UNIVERSITY FOR DEVELOPMENT STUDIES

STARVING THE DEAD, OUR IDEA OF FOOD: AN EXPOSITION OF INDIGENOUS FOOD SCIENCE AMONG THE GONJAS IN THE EAST GONJA DISTRICT OF THE NORTHERN REGION

BY

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AUGUST, 2017

DECLARATION

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere:

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ABSTRACT

'Starving the Dead' is a critical theoretical revelation of indigenous people's experiences, realities, rationality and interpretation of 'food' as a socio-spiritual construct that transcends the materialist meaning of food as 'nutrition'. It has been necessitated by the criticisim rather than critique of indigenous (food) knowledge by modern science as primitive, superstitious, irrational and therefore 'unscientific'. This power-based criticism has disrupted the evolution and development of indigenous food science as a body of knowledge through contamination and eminent extinction leading to unsustainable agriculture, hunger, food insecurity, complex food related ill-health and misplaced food policy priorities. This study therefore aims to (a) investigate 'food science' among the Gonjas if any b) identify the conceptual and theoretical framework on food among the Gonjas (c) investigate the power dynamics between indigenous and modern food science (d) identify, compare and contrast the relative strengths and weaknesses of indigenous and modern food sciences and (e) recommend an appropriate framework for complimentarity. Ethnophilosophy, philosophic sagacity, relational (decolonized) interviews, observation, storey telling and a case study were the main research methods used for data collection while analysis were done using grounded theory. The main findings of the study are; the 'Trilogic Food Theory as the science of food among the Gonjas', there is empirical evidence that corroborates this science; there are useful strengths (and weaknesses) of indigenous food science. It concludes that 'food' is a context and culture driven construct with a rationality that transcends nutrition. It recommends the adoption of the Trilogic Food Theory and Framework for further research, teaching and policy; greater complimentarity and inter-science diaglogue between indigenous and modern food science/scientists; establishment of indigenous food (seed) preservation banks for biocultural diversity; and further research that focuses on indigenous food science and philosophy.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
ACIAR	Australian Centre for International Agricultural Research
AGRA	Alliance for a Green Revolution in Africa
AoA	Agreement on Agriculture
BeCA	Australian Aid's Biosciences Eastern and Central Africa
CAADP	Comprehensive Africa Agriculture Development Programme
CIDA	Cnadian International Development Agency
CIKOD	Centre for Indigenous Knowledge and Organizational Development
CIMMYT	International Maize and Wheat Improvement Institute.
COMPAS	Comparing and Supporting Endogenous Development
CORAF	Conference of African and French Leaders of Agricultural Research Institutes
CRI	Crop Research Institute
CRS	Catholic Relief Services
CSIR	Council for Scientific and Industrial Research
CSOs	Civil Society Organizations
DNA	DeoxyriboNucleic Acid
ECOWAP	ECOWAS Agricultural Policy
EPA	Environmental Protection Agency
FAO	Food and Agricultural Organization
FASDEP II	Food and Agricultural Sector Development Policy II
FDA	Food and Drugs Administration
FGD	Focus Group Discussion
FIVIMS	Food Insecurity and Vulnerability Information Mapping Systems
FRI	Food Research Institute
FVCs	Agriculture Food Value Chains
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GM	Genetic Modification
GMCs	Genetically Modified Crops
GMO	Genetically Modified Organisms
GPRS	Ghana Poverty Reduction Strategy

GPRS II	Growth and Poverty Reduction Strategy
GSFP	Ghana School Feeding Programme
IFIs	International Financial Institutions
IFOAM	International Federation of Organic Agricultural Movements
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
INGO	International Non-Governmental Organization
IPC	The International Planning Committee for Food Sovereignty
IRI	Industrial Research Institute
KFC	Kentucky Fried Chicken
LACERD	Langmaal Centre for Rural Development Initiatives in the Lawra District
LEISA	Low-External-Input and Sustainable Agriculture
LPG	Liquified Petroleum Gas
MDAs	Ministries, Departments and Agencies
MDGs	Milllennnium Development Goals
MoFA	Ministry of Food and Agriculture
NAFTA	The North American Free Trade Agreement
NEPAD	New Partnership for Africa's Development
NGO	Non Governmental Organization
PRI	Plant Research Institute
SADA	Savannah Accelerated Development Authority
SARI	Savannah Agricultural Research Institute
SAW	Sallah Laahu Alihum Wasalam
SCM	Agreement on Subsidies and Countervailing Measures
SHFG	SmallHolder Farmer Groups
SHP	School Health Programme
SHP	Soil Health Program
SPS	The Agreement on Sanitary and Phytosanitary Measures
SWAC	Sahel and West Africa Group
SWAp	Sector –Wide Approaches
TBT	Technical Barriers to Trade
TICOVAP	Threatened Indigenous Crop Varieties Project

TRIPs	Trade Related Intellectual Property Rights
TFC	Trilogic Food Concept
TFF	Trilogic Food Framework
TFT	Trilogic Food Theory
TZ	Tuo Zaafi
UDS	University for Development Studies
UNCTAD	The United Nations Conference on Trade and Development
UNESCO	The United Nations Educational, Scientific and Cultural Organization
USADA	The United States Anti-Doping Agency
USAID	U.S Agency for International Development
VRA	Volta River Authority
WFP	World Food Pogramme
WHO	World Health Organization
WTO	World Trade Organization

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

As a basic and critical human need, knowledge of food and how to obtain it is a natural instinct in man and other living creatures (Kiple and Ornelas, 2000). Every society at every state of its development was therefore adequately educated in interacting with its environment to find food. However, diversities in cultures and environments of interaction determined different conceptions, theories, varieties and quantities of food. This in turn, determined periodic shortages and surpluses in human history. In any case, the key societal objective at the time was to ensure that food was available for every member of the family, community or society (Altieri, 1995; Pretty, 1999, 2002a). In the light of the importance of food vis-a-vis the inevitable periodic shortages and surpluses, different forms and cultures of food conception, production, distribution and consumption became a common characteristic of society. With increasing interaction of different cultures across the world, Kiple and Ornelas (2000) and Millstone and Lang (2008) illustrate that some cultures, notions and conceptions of food and food types have become more popular, more acceptable and more available than others.

Eventually, as capitalism and globalization gripped and influenced the world in different positive and negative forms (Stiglitz, 2003; De Soto, 2003; and Gindin, 2012), western food cultures and science is argued to have dominated other food and agricultural sciences the world over (Lappe et al, 1998; Rosset, 2006; Winne, 2008; Nestle, 2007a, b, 2009; Millstone and Lang, 2008). The birth and spread of the green revolution and other industrial food and

agricultural technologies are therefore seen as a perfection of this modern scientific notions and theories of food (Rosset, 2000).

One critique of modern scientific approaches to food and agriculture, however, is that the intensive application of genetic engineering technologies and chemicals are not only unsustainable in providing the food needs of this and future generations, but also that they are quite destructive to human health (Altieri, 2004; Pretty, 2005a; Schlosser, 2012) and Webber 2009). One reason usually cited for this critique is that globally, food related diseases and conditions such as obesity, cancers and general ill health have been associated with the quality of food and agricultural technology that governs the entire modern food chain (Nestle, 2006, 2007a). Altieri (1995, 2004) and Pretty (2005a) explained that even though agricultural production per person has increased by a third following a doubled world population since the 1960s, this growth in production has masked enormous hidden costs arising from widespread pesticide use, massive ecological damage and high incidences of farmer poisoning and chronic health effects. These costs are said to be grossly underestimated in traditional cost-benefit analysis, all in the interest of profits for a few individuals and multinational corporations. Accordingly, if the true cost of modern food and agricultural science were taken into consideration, it could represent a basis for its rejection as a sustainable food production system (Nestle, 2007a; Pretty, 2005a).

Consequently, it is argued that global hunger which has been presented as a case of inadequate food supply to feed the world's fast growing population and other reasons has been challenged by Lappe et al (1998) as mythical. They argue that global hunger is neither the result of a lack of adequate food nor an overpopulated world, but rather an extreme quest for profit and a desire to maintain the dominance of developed countries over developing countries. The roles

of institutions such as the World Trade Organization (WTO), the World Bank and the International Monetary Fund (IMF) in global economic and political governance is also seen as an extension of this struggle (Sen, 2000; Stiglitz, 2002; Sachibu, 2005; and Rosset, 2006).

Agroecology which incorporates ideas about a more environmentally and socially sensitive approach to agriculture and food focuses not only on production, but also on the ecological sustainability of the production system, has been presented as a more sustainable agricultural system capable of meeting the food and agricultural needs of humanity. This implies a number of values and practices about society and food production that go well beyond the limits of the conception and perception of land as a resource to be exploited for food for profit to one that conceives land as "living" and therefore tries to reconnect land, people and nature to produce food that is not necessarily meant to nourish the body but also to serve other social and spiritual needs of humanity.

Notwithstanding the ideological and power contestations in global food and agricultural politics, it is important to investigate whether or not alleged marginalised food sciences offer equally competitive or better explanatory power, empirical evidence and social relevance of their theories as compared to modern food science. This study therefore aims to investigate the scientific basis and relevance of indigenous food science in the East Gonja District of the Northern region in an effort to understand the scientific claims of this body of knowledge vis – a-vis modern scientific worldviews about food.

1.2 INTRODUCTION TO INDIGENOUS FOOD SCIENCE IN NORTHERN GHANA

"Can you use 'poultry fowl' (foreign breed / incubator-hatched fowl) *('broni koshi' in Gonja)* for sacrifices? Or use 'shedu ble' (transgenic 'water yam') to initiate the new yam season?" You cannot", says elder Shaka at Kpambu in the East Gonja District of the northern region of Ghana. Today, these things are disappearing, what will our ancestors eat? 'Food is not only for the living' is one of my learning points in a short interaction with 87 year old elder Shaka on the subject of food, its conception, production, cultivation, marketing, utilization, security and sustainability. Diversities in cultures, biologies and knowledges are fundamental in understanding the purpose of life and living. Realities and values on food are different in time, space and cultures. Thus, in most western scientific worldviews 'existence and reality' and for that matter food and food matters consist only of the physical, natural or material components as epitomised by the way food is defined - "any substance consumed to provide nutritional support for the body" and that food security exists only when "all people, at all times, have physical and economic access to safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life" (http://www.britannica.com/EBchecked/topic/212568/food) However, in most developing countries in Africa, Asia and Latin America, diversities in cultures and worldviews means that food is not only a physical body need - it is also a spiritual and social need that serves the social and spiritual needs of the people (Millar, 2012). In these contexts and realities therefore, if the spiritual and social food needs of indigenous people are not met, food security may not be claimed irrespective of whether people have economic and physical access to food at all times.

Therefore, what is considered as food in one community may not necessarily be food in another as you cannot offer 'anything' to the spirits and ancestors as food in an indigenous African community.

> *"Some persons, some animals, plants and locations lend themselves more prominently for the spiritual expression than others, and therefore we can make a distinction between 'normal' lay people and people with a spiritual position/disposition as well as between plants and animals that may serve for our food and animals that have spiritual significance and therefore can be used to make sacrifices. The spiritual beings ensure that life emerges and continues"* (Millar, 2012:8).

Therefore, food is not just "any substance consumed to provide nutritional support for the body as conceived by western science. It must necessarily be situated, discussed and appreciated within a context and culture of those who use it. This is the worldview and for that matter the reality of some indigenous peoples of northern Ghana. Existence is composed of the natural, social and spiritual realities. The significance of these realities to the meaning of food, life and death to the indigenous northern Ghanaian cannot be discounted.

Similarly, in the case of the indigenous Zenu organizations in Colombia for instance, reasons for rejecting transgenic or genetically modified crops (GM) include the fact that food is not just a commodity, it is an indispensable element of the people's lives and culture serving not only physical hunger of their physical world but also, most crucially, their social and spiritual lives. And in their words;

"For the indigenous Zenú communities, maize is a fundamental element of our culture and our systems of production, so much so that we consider ourselves 'the children of maize'. Therefore, we are conserving and cultivating over 25 native maize varieties. Our culinary culture is based on this crop, which is one of the major pillars of our food self-sufficiency. Taking into account that maize is a plant which cross-pollinates easily, there is a real threat that transgenic varieties will cross with our local maize varieties, and contaminate them in the same way that the native maize varieties were contaminated in Mexico" (Vélez, 2005:27)

In this sense, Rozin, (2005:2) also stated that;

"in the evolution of culture by the evolutionary process of pre-adaptation, food comes to serve functions other than nutrition, which puts its nutritional aspects in a broader and more complex context. Food becomes a social vehicle, allowing people to make social distinctions and to establish social linkages, for example, by sharing food. Food assumes symbolic functions and takes on moral significance, as with pork for religious Jews and Muslims and beef for Hindus. And food becomes a medium for aesthetic expression, giving rise to elaborate food preparation and cuisines that cannot be justified solely in terms of nutritional factors"

Consequently, other viewpoints and considerations need to be critically analysed and allowed to count at least for those peole who own those views as this has the potential to contribute significant knowledge for food for the holistic benefit of humanity.

1.2. RESEARCH PROBLEM

This study is about the science of food among indigenous people in the East Gonja District of the Northern region of Ghana. Food has been part and parcel of the lives of indigenous people in this remote part of Northern Ghana since time immemorial but it is unclear if its 'science' *is* or has equally *been*. Much of indigenous knowledge including food knowledge has been heavily critiqued by modern science as primitive, atheoretical, superstitious, irrational and therefore 'unscientific' (Wendy et al, 2009). This position has affected indigenous food science as a body of knowledge. As a consequence, this body of knowledge and its foods face eminent contamination and extinction leaving behind needless hunger, food insecurity, unsustainable agriculture, complicated food related ill health and misplaced food policy and practice priorities at the local, national and global levels. The study therefore aims to investigate, the scientific basis of food among indigenous people in the East Gonja District of the Northern Region of Ghana as a case to rethink the way food is conceived, produced, distributed and utilised. Much is already known about the healthy, sustainable, tasty, multi-functional, medicinal, natural and high nutritional value of indigenous foods (Kiple and Ornelas, 2000; Nestle, 2007). However, little is known or at least written about the ontology, epistemology, axiology, gnoseology, value systems and knowledge community of indigenous food 'science'.This is needed not to justify or legitimise indigenous food science as a body of knowledge but to investigate among other things, the explanatory power and empirical evidence of its claim as a time–tested, context driven, holistic science that serves the needs of not only the natural world as in the case of modern food science but also the social and spiritual needs and realities of human diversity. If it is to justify its inclusion, then it may be to justify it perhaps as a superior science that transcends the physical or natural world limits of modern science to include the social and spiritual complexities of reality.The study therefore seeks to

bring a different perspective to the way food is conceived and analysed and to answer two seemingly simple but scientifically complex questions;what *is* food? and what is the science of food among indigenous people of the East Gonja District of the Northern Region of Ghana relative to modern food science? Diversity is a reality of life. The fact that plant and animal species are different from each other cannot be denied. If so, the realities or peculiarities of sciences of each of the diverse entities are a fact of life at least to itself / themselves.

Much of the literature on food and agriculture that advocates sustainable agro-ecological models have established beyond reasonable doubts, the proven potential of this model to help address world hunger and sustainable agricultural production than the large scale profit oriented industrial agricultural mode (Altieri, 1994, 1995, 2000a, 2000b, 2003, 2004; Altieri et al, 1998). Finally, the study is strongly founded on current debate and global frustrations about the status of global food and agriculture, climate change and food security as elucidated by Stern (2008), (Groenfeldt (2006), Haverkort (2011), Zambrano and Miranda (2000), Larpe et al (1998), Lee (2012), Rosset (1999, 2000, 2006) Smith (1999), Dietz et al (2004), La Via Campesina (1996, 2000, 2009), Millar (1990,1996, 2012), Obeng (2005), Quaye (2008, 2009), Wallenstein (1974), Thrupp (1998), GRAIN, (2012), Ritzer (2004), Germán-Vélez (2005), Pretty (1999, 2002, 2005a,b, 2008), Pilgrim and Pretty (2010), among others.

However, few of these scientific studies have comprehensively addressed the 'critical' scientific basis of indigenous food and agricultural science relative to modern technology based food and agricultural science. This study acknowledges this achievement but departs from this trend by seeking to establish the ontology, epistemology, axiology, gnoseology, and knowledge community of indigenous food and agricultural science in northern Ghana. It is my conviction that if this is well established, the general academic community, western science, development

agencies and indigenous communities themselves would have the confidence to at least begin to appreciate, engage and accept indigenous food and agriculture as a legitimate and potent science of ensuring quality food availability for current and future generations.

1.3 MAIN RESEARCH QUESTION

What really *is* food? And what is the science of food among indigenous people in the East Gonja District of the northern region of Ghana relative to modern food science?

1.3.1 Sub-Research Questions

a) Do realities, knowledges and practices of food among indigenous people in the East Gonja District constitute science?

   i. What is the power relationship between indigenous food knowledge and realities in relation to mainstream / modern food science?

   ii. Do some food varieties face contamination and extinction in the East Gonja District and why?

b) What is (are) the concept (s) and theory (ries) of food among indigenous people in the East Gonja District of the Northern region and how do these relate to the definition and conception of food in other cultures?

c) What are the comparative strengths and weaknesses of indigenous and modern food sciences and how could these complement each other in the twenty-first century and beyond?

d) What could be an appropriate framework for understanding and improving the strong and weak points of indigenous food science in the national system for food and agricultural research, policy and practice?

1.4 MAIN RESEARCH OBJECTIVE

To find out what '*is'* food and the *'science'* of food among indigenous people in the East Gonja District of the Northern region of Ghana relative to mainstream food science.

1.4.1 Sub Research Objectives

a) To establish whether the realities, knowledges and practices of indigenous people in the East Gonja District about food constitute science

   i. To investigate the power dynamics between indigenous and modern food science and its effects on selected indigenous food varieties/ species in the East Gonja District in terms of availability.

b) To find out the concept(s) and theory(ries) of food among indigenous people in the East Gonja District and how this relates to the definition and conception of food in other cultures.

c) To identify, compare and contrast the relative strengths and weaknesses of indigenous and modern food science and how these could complement each other towards ensuring food availability, access, quality and utilization.

d) To recommend an appropriate framework for understanding and improving the strong and weak points of indigenous food science in the national system for food and agricultural research, policy and practice.

1.5 ASSUMPTIONS OF THE STUDY

The study assumes that:

a) There is an imposition of foreign worldviews, realities and cultural values of food on indigenous people in Northern Ghana through the power of colonization, neo-colonization and globalization.

b) It is further assumed that in proposing and imposing food matters on indigenous people, modern science gives little, if any credence at all to the fact that indigenous people have their own worldviews, values and knowledge systems about food which have actually sustained them since time immemorial (even before colonization). These realities and knowledge systems on food includes essential elements of social, spiritual and natural parts of the lives of the people. The need to acknowledge, interrogate and revitalise these knowledge systems underpins the necessity of this study.

c) If the status quo of food conception, theorizing, production, marketing, distribution, consumption and disposal is maintained, some indigenous foods, food science and knowledge systems could eventually be extinct.

d) Finally, the study assumes that indigenous food science is more ecologically and environmentally sustainable than modern food science.

1.6 RATIONALE OF THE STUDY

The rationale behind this research is that in the East Gonja District, just as in most parts of northern Ghana, indigenous knowledge has it that people's daily lives cut across natural, social and spiritual realities. Food forms an essential component of the lives of these people just as any other person around the world, at least as a source of nourishment to the body without

which the body will be dead (Kiple and Onelas, 2000). But for these people, there is something else that food does to them aside from nourishing the body, which they consider important. That is, food is also used for quite important social and spiritual purposes such as connecting with other people of their families, communities and histories through festivals and with their ancestors –those who are physically dead but spiritually living. This in turn determines what counts as food to them and what does not. In other words, food must meet their bodily nutritional needs as well as their social and spiritual needs. Whether other people from other cultures around the world accept this reality is immaterial. For them, this is something they have done since time immemorial, are currently doing and will continue to do for the rest of their lives. It is therefore a reality for them but does not have to be a reality for others. This is their worldview (ontology). With this worldview, they have critical values and aesthetics about food (axiology). They have numerous ways of perceiving and learning about food (gnoseology). They also have ways of ordering knowledge or a sense of causality on food (epistemology). For instance, they know through experience, observation, experiment and by their natural taste instinct that high amounts of food that taste sour (acidic) could be harmful to the body and therefore not good to consume in high amounts (Kiple and Ornelas, 2000).

Finally, they have sets of rules and methods for assessing and accepting knowledge about food which varies from one culture and environment to another (knowledge community). If these elements are the building blocks of modern science then it offers a basis for an independent study of whether these claims are 'scientific' about their food. However, as with any science informed by a particular ontology, axiology, gnoseology, epistemology and knowledge community, there are numerous strengths and weaknesses which can be improved over time.

After all, literature on what people eat shows that different people eat different things as food for different reasons. For instance, while a plate of the poisonous (tetrodotoxin) and lethal puffer fish meal called *fugu* (whose consumption is more in surviving the experience than the actual taste and nutrition of the deadly fish) is a delicacy for the Japanese, it is considered weird for other cultures (Deutsch and Murakhver, 2012:41).

Also, while '*casu marzu'* - an unpasteurised sheep milk drink infested with maggots and live insect larvae is considered a delicacy for people in the city of Sardinia in Italy, these foods are regarded and defined as strange, weird and extreme cuisine in other cultures (Hopkins, 1999; Deutsch and Murakhver, 2012:41). Millstone and Lang (2008), assign reasons including personal preferences and cultural values as the factors that determine people's eating preferences. Indigenous food science of the people of the East Gonja District therefore deserves the chance of existence, exposition, development and improvement.

1.7 IMPLICATIONS AND APPLICATION OF THE STUDY

The study has broader and specific implications for food as the single most important physiological need for human survival, hunger, food surpluses, enhanced food security, indigenous knowledge and endogenous development, appropriate food aid, food politics, human health and sustainable food and agricultural development in northern Ghana.

a) First and foremost, the study contributes original and scientific knowledge and literature in the food and agriculture sector in particular and the scientific community in general on indigenous food and agricultural science in northern Ghana with special reference to East Gonja District.

b) In 1964, the Crops Research Institute (CRI) of the Council for Scientific and Industrial Research (CSIR) was established as a Centre of Excellence for innovative and quality agricultural research for development and dissemination of appropriate technologies for high and sustainable food and industrial crop production. However, the Centre has not critically considered the scientific underpinnings and relationships between indigenous food and modern agricultural science. This could have contributed to a more context driven and culturally relevant food security situation in the region as opposed to the current model which leaves the people of the three northern regions as the most food insecure in the country (WFP, 2009). The process and outcomes of this study serve both as an opportunity for and a challenge to research institutions and academia in Northern Ghana in particular and Ghana as a whole to engage in intercultural critique and inter-scientific dialogue on food and agricultural research. This has the potential to increase food security and develop sustainable farming systems for the unique agro-ecology and climate of Northern Ghana.

c) Thirdly, with over eight years of experience as a development worker within, it has been observed that the content of the programmes and intervention strategies of most Non-Governmental Organizations is deficient of the fundamental knowledge base and contexts of the communities which they serve. This, in my view, is partly due to the limited, less publicised and less convincing scientific research that elucidates and establishes the critical science background of indigenous knowledge. As the study seeks to establish indigenous food science in northern Ghana and create a platform for food security related development organizations in northern Ghana as part of a planned postdoctoral stakeholders' project, it is hoped that some development organizations and

agencies would begin to at least appreciate, if not incorporate, the value addition of local food and agricultural science into their country programmes towards the eradication of extreme poverty and hunger in line with goal two of the Sustainable Development Goals of the United Nations (United Nations, 2016) - End hunger, achieve food security and improved nutrition, and promote sustainable

d) The study plans to establish an 'endangered food crops' farm in collaboration with the Ministry of Food and Agriculture. The objective of this farm is to provide a practical opportunity for the scientific community, researchers, development practitioners and the general public to engage, appreciate and critique indigenous knowledge and endogenous development in the field of food security in northern Ghana.

Given the proneness of the research district to food insecurity, the research will stimulate local policy discussion with the district assembly on the role of indigenous knowledge and endogenous development in food and agricultural science and food security analysis. It is expected that this will affect both district and national level policy-making in the food and agricultural sector in (northern) Ghana as a whole. This is particularly important in view of the currently controversial capitalist industrial agriculture model being pursued by the Government of Ghana and the Savannah Accelerated Development Authority (SADA) in the food and agricultural sector. Table 1.1 highlights the key stakeholders, the nature of their stake and the associated benefits of the study to them.

Table 1.1: Relevance and Benefits of the Study

Stakeholder	What Stake?	Intended benefits
The Researcher	- PhD degree - Contribution to scientific knowledge	- Human resource development - Intrinsic and social value - International experience in Australia
Research Communities	Social, spiritual and natural welfare	- Documented contribution to knowledge - Contribution to the preservation of indigenous knowledge on food and agriculture - Possible networking and partnership with local and international institutions on the subject of food and agriculture.
University for Development Studies	Global value in education, research and academic excellence	- Increased international reputation and recognition.
Supervisor		- Increased country research expertise - Opportunity to visit and learn about Ghana - Increased international experience and personal relationship with local supervisor in Ghana.
Local farmers and farmer groups	More information on the global and climate change phenomenon Improved climate /global change adaptation strategies Good practices on adaptation strategies	- Increased Knowledge (including indigenous knowledge) leading to better lives - Better adaptation - Increased connectedness with other relevant food sovereignty stakeholders
Government of Ghana	Accurate and Scientific information Policy development.	- Evidence-based policy formulation - Oportunity to increase food and agricultural production through indigenous food and agricultural Knowledge and practice. - Contribute towards the achievement of the MDGs on extreme poverty, hunger and food security.

Research Institutions	Scientific research information for referencing and further research	Accurate and Scientific information will make further research work less cumbersome. This will also expand the literature on; i. Indigenous food and agricultural science in northern Ghana ii. Indigenous / endogenous knowledge, education, research and development iii. Food security
Development Organizations: NGOs/CSOs	Scientific research information and evidence of feasibility of research findings and recommendations.	Accurate and Scientific information for programme development, implementation and targeted development interventions.
International Community	Scientific research information for referencing and further research.	Accurate and Scientific information for development support programming The study could shape the allocation of development support budget in the area of food security and nutrition in northern Ghana. Policy development

Source: Field Research (2012)

1.8 RELATIONSHIP WITH PREVIOUS WORK ON THE SUBJECT

a) The study relates to and builds on relevant issues, concerns and research in this area by different stakeholders in the food and agricultural sector. First and foremost, it builds on the theoretical and conceptual expositions on the socio-spiritual relevance of most plants and animals as elucidated by Millar (2012:8). This position is re-enforced by indigenous farm communities' perspectives that "our resources (including food) are for the living, the dead and the yet unborn" (Millar, 2004:19).

b) Secondly, it also relates to and utilises some of the findings and lessons of the Threatened Indigenous Crop Varieties Project (TICOVAP) on 'Promoting Endogenous Farm Practices for Food Security, a project undertaken by the Langmaal Centre for Rural Development Initiatives (LACERD) in the Lawra District of the Upper West region in collaboration with the Centre for Indigenous Knowledge and Organizational Development (CIKOD) with financial support from the Dutch government.

c) It is also informed by the strategic direction of most food security concerned international development partners in Ghana such as the Canadian International Development Agency (CIDA), Australian Aid's Biosciences Eastern and Central Africa (BeCA), CORAF's programmes and Australian Centre for International Agricultural Research (ACIAR and International Maize and Wheat Improvement Institute (CIMMYT).

d) As policy is very crucial in the implementation of significant research findings and recommendations, the study is very mindful of the Government of Ghana's own food and agricultural vision and policy direction as contained in the 'Food and Agricultural Sector Development Policy (FASDEP II) of the Ministry of Food and Agriculture, (2007) and the Savannah Accelerated Development Authority's[1]strategic focus in the

[1]SADA is the latest and most comprehensive development strategy to bridge the historical development gap between the Northern Savannah Ecological Belt (Northern Ghana) and the rest of Ghana. Its core mandate is to execute programs designed to accelerate development in the Northern Savannah zone (SADA Strategy and Work Plan, 2011). The zone comprises the three administrative regions of Northern, Upper East

food and agricultural sector which are both more capitalist oriented and externally driven than locally motivated. The study is therefore challenged to engage appropriate literature, background and influences that informed current food and agricultural policy in Ghana vis-à-vis the rural development and poverty eradication agenda of the government of Ghana as contained in the Coordinated Programme of Economic and Social Development Policies, 2010 – 2016 (Government of Ghana, 2010).

e) The study is strongly founded on current debate and global frustrations about the status and sustainability of global food and agriculture, hunger, climate change and food security as elucidated by Altieri (1994, 1995, 2000a, 2000b, 2003, 2004), Altieri et al, (1998). Lappe et al (1998) for instance, concludes that global hunger is not because there is not enough food to feed the world, but that, there are deliberate efforts to keep some hungry whiles others languish in extravagant excesses. He highlights twelve myths about world hunger as will be seen in the chapter on literature review.

f) Extensive literature proposes agroecology as a sustainable alternative to mainstream modern food science. Prominent among these are Groenfeldt (2006, Millar, 1990, 1996, 2003, 2012), Haverkort, (2011), Zambrano and Miranda, (2000), Lee, (2012), Rosset, (999, 2000, 2006), Smith, (1999), Dietz et al, (2004), La Via Campesina, (1996, 2000, 2009), Obeng, (2005), Wallenstein, (1974), Ritzer, (2004) and Thrupp, (1998). Their

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and Upper West regions which occupy 41% of the total landmass of Ghana with a total population of 3,317,475 representing 17.6% of the national population (Ghana 2000 Population and Housing Census, 2007).

analyses explain how agrobiodiversity can help to increase food security on a global scale. For instance, Ritzer, (2004) explains how the massive expansion of Mc Donalds' restaurants across the globe is killing local and indigenous food and food science with its unhealthy selection of fast foods while making profits for a few. Rosset (1999, 2006) examines how the institutions of global governance such as the World Trade Organization, the Food and Agricultural Organization (FAO), the World Bank and the International Monetary Fund (IMF) have reduced food to a mere commodity that is traded for extreme profits at the expense of human survival, whiles Pilgrim and Pretty (2010) and Pretty, (1999, 2002, 2005a,b, 2008) lament how globalization and industrial agriculture has created a disconnect between man and land in the search for food. This disconnect has significant negative consequences as to how man uses land – less care and a sense of exploitation which has resulted in severe reaction in the form of natural disasters that have claimed millions of lives around the world.

1.9.1 LIMITATIONS OF THE STUDY

1.9.1.1 Time and Money

Time and Money represented the immediate limitation of the study. Trust is an essential element of research between the researcher and the research participants especially with 'indigenous people and communities. Building trust howver takes time especially for indigenous research. It was expected that the researcher would have undertaken close to a year of cumminity immersion to build trust and relationship to enable the knowledge holders feel comfortable sharing detailed information. This also required financial resources in terms of travel, transportation, accommodation, feeding and support to other community initiatives. As time and resources were limited, the researcher mitigated these limitations by purposefully

selecting research participants and establishing genealogical relations with the research communities and knowledge holders which helped to quickly promote trust between the researcher and the knowledge holders.

1.9.1.2 Limited Literature

One of the most glaring limitations of the study from the onset of the program is the non availability of relevant literature. As a paradigm study, most of the essential literature were not available in the local Ghaiana market and in most of the public and private libraries and bookshops. As the university for Development Studies had equally limited subscription to major international journals, journal articles related to the the program could not be obtained from the limited subscriptions of the university. To mitigate this, the research resorted to procured selected and rare literature from the online giant, Amazon.com where most of the relevant literature were procured resulting eventually into the establishment of his personal book business registered as Kultures and Knowledges Enterprise. This bookshop ended-up being the most reliable source of high quality, though expensive source of very relevant books on indigenous knowledge and endogenous development not only to other PhD candidates of the programme, but to lecturers, students faculty libraries and the main UDS Library. In particular, the Kultures and Knowledges Enterprise is proud to have supplied the most authorirative and current editions of most of the relevant literature of the programme to the graduate school library. This also explains the voluminous nature of the literature presented in this work as the researcher found several relevant literature for the study.

1.9.1.3 Limited Peer Review

Also, as explained under the power and conflict theory of this work, though the research planned and submitted his work for peer review, most peers who were so comfortable with the status quo of mainstream modern science had difficulty accepting to peer review the study as they disagreed with conceptual arguments raised by the study. This represented the 'tyrant' and power driven attitude of modern science and some modern scientist which this study almost exhaustively adreesed in the literature review of this work with particular reference to Paul Feyeradebend's book, 'The Tyrany of Science', Gribbin's book entitled 'In Search of Schrodinger's Cat: Quantum Mechanics and Reality' and Karl Poppers' several books on the history, philosophy and attitude of modern science. This there resulted into the following quotation which has become one, if the not the most essential quotation of the study;

"The world of quantum mechanics is so strange, indeed, that even Albert Einstein found it incomprehensible, and refused to accept all of the implications of the theory developed by Schrodinger and his colleagues. Einstein and many other scientists found it more comfortable to believe that the equations of quantum mechanics simply represent some sort of mathematical trick, which just happen to give a reasonable working that conceals some deeper truth that corresponds more closely to our everyday sense of reality" (Gribbin, 1984:1)

In the light of this do the food realities of the research participants constitute a Science?

1.9.1.4 Extensive vrs Intensive on Philosophy of Science

In relation to the philosophy of science, the study was rather more 'extensive' than 'instensive' in its approach. That is, the study addressed all five building blocks of the philosophy of

science, namely, the ontology, the epistemology, axiology, hnoseology and knowledge community as relates to the research communities as opposed to focusing, for instance only on the 'ontologogy' or 'epistemology' of food among the Gonjas in the East Gonja District. This has therefore been proposed for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter focuses on reviewing literature related to general and specific aspects of food and food science. The essence of this is to identify pertinent and key literature related to the specific objectives and sub-objectives of the study and for answering the research questions. The following are the key aspects of literature reviewed; Food definitions, Modern (Western) Science, Food history, Food Science (s), Concepts or notions of food, Theories of Food, Philosophy of Food, Food politics and policy, Gender and Food, Food and Technology, Food Geography, Food and Generations, Typologies of Food eaten around the World, Frontiers in Food Research, Conceptual Frameworks, a **c**ritique of Indigenous Knowledge, Theoretical Framework and the Theoretical point of Departure of the study.

2.2 FOOD: SOME DEFINITIONAL ISSUES

According to the Oxford Dictionary of Food and Nutrition (2005), food is "any solid or liquid material consumed by a living organism to supply energy and build and replace tissue" (Bender, 2009:221). Further to this, the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) (Codex Alimentarius Commission, (2013:22) define food as "any substance, whether processed or semi processed, or raw which is intended for human consumption and includes drink, chewing gum, and any substance that has been used in the manufacture, preparation or treatment of food but does not include cosmetics, tobacco, or substances used only as drugs." Bender (2009:221) also defined food as "Any solid or liquid material consumed by a living organism to supply energy, and build and replace tissue". These

definitions are in no doubt informed by the western worldview on the subject. However, Kaplan (2012) did acknowledge and define food in relative terms beyond its narrow nutritive value. He described food as nutrition, food as culture, food as nature, food as a social good, food as spirituality, food as desideratum and food as aesthetics.

2.3 HISTORY OF FOOD

The history of food is reviewed along four lines: What our ancestors ate, a history of staple foods across time and space (wild and domesticated plants and animals used as food), dietary liquids and the so called nutrients. This structure is adopted from the Cambridge World History of Food (Kiple and Ornelas, 2000). The history of food or diet (the types of food eaten) and nutrition (how the body utilises the food) date back to the history of man's existence on the planet some 8 million years ago. Disciplinary knowledge on food and nutrition date back to the times of Greek Physician Hippocrates (370 BC- 460 BC) and represents an important heritage of earlier human cultures. As with all other aspects of life, humans have adapted in their search for and utilization of food. These adaptations can be ordered into three phases in a chronological order namely; the Miocene, the Pleistocene and the Holocene epochs which occurred some 1.5 million, 700,000 and 10,000 years ago respectively (ibid, 2000). Accordingly, the Miocene period is characterised by the shift from a diet comprised primarily of unprocessed plant foods to one that incorporated deliberate food processing techniques and included significant amounts of meat (Pleistocene) to a period marked by essentially modern patterns of climate vegetation and fauna (Holocene). This period was characterised by man's acquisition of intimate knowledge of the life cycles of plants and animals so as to control such cycles and thereby ensure the availability of these nutrients for dietary purposes. Over these ages, popular views have been that, mankind is now better off with the transition from the age

of hunting and gathering to the age of food production, especially of agriculture. Whiles this represents the view of the scientific community, anthropologists are of the view that this shift represents a shift from generally high quality of foods to low quality foods today.

With regard to the evidence of the type of foods eaten by our ancestors, it was noted that "skeletal remains from archaeological sites, play a very special role in dietary reconstruction because they provide the only direct evidence of food consumption practices in past societies" ((Kiple and Ornelas, 20002000:84). Also, different foods were identified with different groups of people according to the archaeological evidence of the shape of their teeth. Rice was associated with Asia, wheat with temperate Asia and Europe, millet or sorghum with Africa and maize with the new world.

Smith (1995) noted that between the 16th and 18th Century, the basic food crops of West Africa were the cereals - millet, (*Pennisetum glaucum)* sorghum (So

Rghum bicolor), rice (Ory za sativ) and fonio (acha - Digitaria exilis) - which were more prevalent in the northern parts of the sub region, while root crops and legumes – yams (*Dioscorea)*, fabourama (tumulku), rizga (Kaffir potato), cowpea (*Vigna unguiculata)*, bambara beans (*Vigna subterranean),* Peanut (*Arachis hypogaea),* geocarpa bean (*Macrotyloma geocarpum),* African breadfruit (*Treculia africana*) and the African yam bean-dominated the southern zone (World Programme for the Censu s of Agriculture 20110.

The history of major staple foods also began with the harvesting of wild grain and the effort to domesticate wild animals such as mammoths and mastodons. For instance, Wolves were domesticated as dogs.

It is said that some 9000 years ago, all of Africans, especially those south of the Sahara still gathered, hunted and fished for all their dietary needs. This was based solely on what the open environment provided at the time (Kiple and Ornelas, 2000:1330). As game was more abundant, meat became an important part of the diet of the region at this period. What has not been highlighted in the literature on the history of food is the social, notional and spiritual dimensions of the ancestral food culture. On the Importance of food, Bruges (2009:31) stated that "Previous generations have managed without cars, central heating, television, mobile phones and most of those things by which we measure the wealth of a nation. But they never managed without food." This underscores the special position of food in human history.

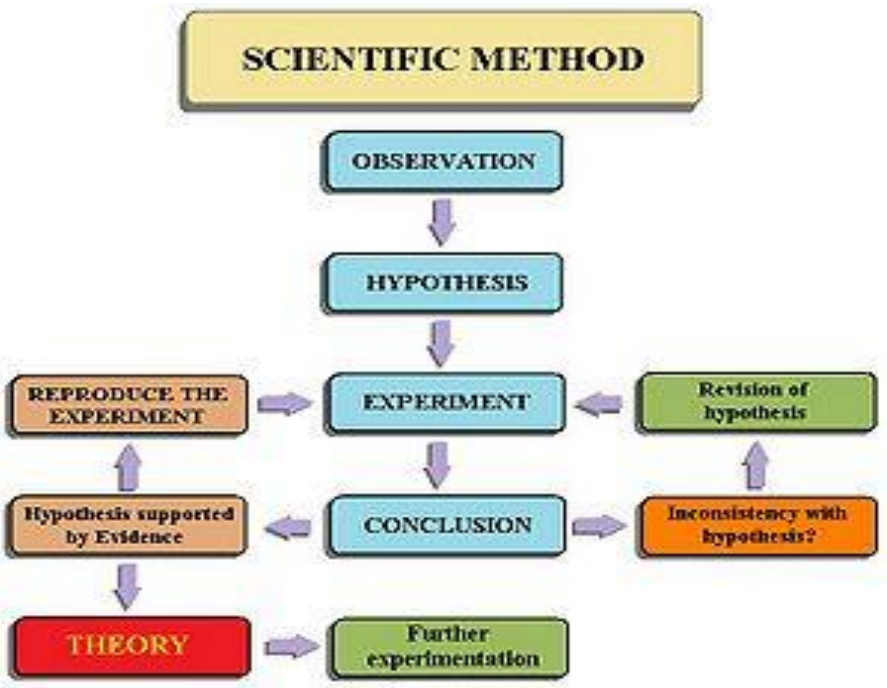
2.4 MODERN (WESTERN) SCIENCE

The objective of the review of literature on science as a discipline is not only to argue that *rationality* and the claim of *universality* or unity of science or scientific facts are not only simply views of scientists who are as fallible and incomplete in their knowledge as mortals, but to indicate that there is significant power play within the western 'scientific' knowledge community which in my view denies it of the very objectivity which it seeks to establish. It is also to highlight that, in as much as western science has made obvious gains and successes, so has it encoutered failures and weaknesses for which other sciences informed by different worldviews may hold significant positive strengths and successes for complimentarity. If anything is responsible, then it may have been rationality and a concept of laws governing nature that allowed science to develop in the west.

Given that there are numerous scientists whose work have influenced much of world history, literature is limited to some of the 100 scientists whose ideologically diverse and renowned

works have shaped much of world history today (Tiner, 2000). This is important to enable readers appreciate what exactly *is* science and whether indigenous food science is science or not. To start with, science is a systematic way to study the world in which we live. Scientists use systematic or particular methods, such as observation and experimentation, to gain a better understanding of the world around us. The word "science" comes to us from the Latin word 'scire' which means "to know." The word "scientist" was introduced in 1834 by a British scholar named William Whewell (1794-1866). Before this time people who studied science were called "natural philosophers." Figure 2.1 describes what is refered to as the 'Scientific Method' of doing science.

Figure 2.1: The Scientific Method



Source: http://www.conservapedia.com/Science

2.4.1 What is a Scientific Theory?

Scientists do not use the term "theory" in the same way that it is used in the vernacular. In most contexts, a theory is a vague and fuzzy idea about how things work — one with a low probability of being true. This is the origin of complaints that something in science is "only a theory" and so is not credible. For scientists, a theory is a conceptual structure used to explain existing facts and predict new ones. According to Robert Root-Bernstein in his essay, "On Defining a Scientific Theory: Creationism Considered," to be considered a scientific theory by most scientists and philosophers of science, a theory must meet most, if not all, of certain logical, empirical, sociological and historical criteria.

2.4.2 Logical Criteria of Scientific Theories

A scientific theory must be:

- a simple unifying idea that does not include anything unnecessary (Occam's Razor)
- logically consistent (contradictions are not allowed)
- logically falsifiable (there must be possible or theoretical situations in which the theory would be invalid)
- Limited, so it is clear whether data verifies, falsifies, or is irrelevant (i.e., it doesn't presume to explain absolutely everything).

The logical criteria are cited in discussions about the nature of scientific theories and how science differs from nonscience or pseudoscience. If a theory includes unnecessary ideas or is inconsistent, it cannot really explain anything. Without falsifiability, it is impossible to tell if it is true or not, so we correct it via experimentation.

2.4.3 Empirical Criteria of Scientific Theories

A scientific theory must:

- be empirically testable or lead to testable predictions or retrodictions (use present information or ideas to infer or explain a past event or state of affairs)
- make verified predictions and/or retrodictions
- lead to reproducible results so others can double-check
- include criteria for determining whether data are factual, artifactual, anomalous or irrelevant.

A scientific theory must help us understand the nature of our data. Some data may be factual (verify the theory's predictions or retrodictions); some may be artifactual (result of secondary or accidental influences); some are anomalous (valid, but at odds with predictions or retrodictions); some are irreproducible and thus invalid; and some are irrelevant.

2.4.4 Sociological Criteria of Scientific Theories

A scientific theory must:

- Resolve known problems, paradoxes, and/or anomalies that scientists have not been able to deal with using past theories.
- Create new problems and questions to work on
- Create a new paradigm or model to use when working on problems
- Provide concepts which help scientists deal with problems.

Some critics of science see the above criteria as problems, but they underscore how science is done by a community of researchers and that many scientific problems are discovered by the community. A scientific theory must address a genuine problem and must offer a means of resolving it. If there is no actual problem, how can a theory qualify as scientific?

2.4.5 Historical Criteria of Scientific Theories

In a historical criteria of science, a theory must:

- meet or surpass the criteria of earlier theories or demonstrate that the criteria are artifactual and so should be replaced
- explain any and all data produced with earlier theories
- be consistent with any and all related theories.

A scientific theory does not just solve a problem, but must do so in a way that is superior to other competing theories. It must explain more data than the competition; scientists prefer fewer theories which explain more rather than many theories, each of which explains little. It should also not conflict with related theories that are clearly valid. This ensures that scientific theories increase in their explanatory power.

2.4.6 Legal Criteria of Scientific Theories

Root-Bernstein does not list legal criteria for scientific theories. Ideally, there would not be but Christians have made science a legal issue. In 1981 an Arkansas trial over "equal treatment" for creationism in science classes was overturned and the U.S. Supreme Court ruled such laws were unconstitutional. In his ruling Judge Overton said science has four essential features:

- It is guided by natural laws, and is explanatory by references to natural laws
- Science is testable against the empirical world
- Its conclusions are tentative, not the final word
- It is falsifiable

In the U.S., then, there is a legal basis for answering the question, "what is science?"

2.4.7 Summary of Criteria of Scientific Theories

The criteria for scientific theories can be summarized by these principles:

- Consistent (internally & externally)
- Parsimonious (sparing in proposed entities, explanations)
- Useful (describes & explains observed phenomena)
- Empirically Testable & Falsifiable
- Based upon Controlled, Repeated Experiments
- Correctable & Dynamic (changes are made with new data)
- Progressive (achieves all that previous theories have and more)
- Tentative (admits that it might not be correct, does not assert certainty)

These criteria are what we expect for a theory to be considered scientific. Lacking one or two might not mean a theory is not scientific, but only with good reasons. Lacking most or all is a disqualification[2].

Popper, (1996:) in his 'Myth of the Framework' defined science as the "rational expression of reality" and indigenous science is "a culture dependant rational expression of reality". Popper's position with science is that; "I do not regard myself as an expert either in science or in philosophy. I have, however, tried all my life to understand something of the world we live in. Scientific knowledge and the human rationality that produces it, are, I believe, fallible, or subject to error. But they are, I believe, also the pride of mankind. For man is, so far as I know, the only thing in the universe that tries to understand what it is all about. May we continue to do and may we also be aware of the severe limitations of our contributions. For many years, I have argued against intellectual fashions in the sciences, and even more against intellectual fashions in philosophy. The fashionable thinker is, in the main, a prisoner of his fashion, and I regard freedom, political freedom as well as a free and open mind, as one of the greatest if not the greatest, value that our life can offer us". Popper's position offers a fundamental perspective to how science ought to be receptive, open and non-conclusive.

> Even within the very scientific community there are fundamental disagreements and debates about modern science's claim of universality, rationality and

[2] http://atheism.about.com/od/philosophyofscience/tp/CriteriaScientificTheory.htm. Accessed, 29th September 2013

objectivity. In his book, 'Transcendence of the Western Mind; Physics, Metaphysics and Life on Earth', Avery (2003: back cover) argues that;

"Metaphysics' is an understanding of life that transcends matter. More importantly, it transcends the difference between who you are and what I am. It is a transcendence of the western understanding of reality. It does not begin with a world and then try to figure out how life evolved within it; it begins with life and then tries to figure out where the world came from. For instance, the materialist understanding of oil and other natural resources is, I believe, at the bottom of the pessimism concerning the prospects for human civilization. Because we depend on finite 'material' resources, their continuous consumption means a finite future for us. When the oil is gone, we will be gone". He notes further that for the western mind, "Everything real is made of matter. It is everywhere and everything in the universe; that is why we do not know what it is. As Descartes says, it is a substance that needs no other thing to exist. But being everything, it cannot be much of anything. It can only sit there in space causing knowledge, itself unknowable…. Physicists have never experienced matter directly any more than the rest of us, but they detect its presence through mass. Mass is quantity of matter. Physicists can measure an object's mass anywhere in the universe in terms of its resistance to acceleration (inertia) when subjected to a known force. If you push an object with a lot of mass it will not move as fast as if you use the same push on a less massive object. More specifically, the heavy object will not accelerate as fast; it will not change its velocity as rapidly as the light one. Nobody knows how or why matter is able to resist acceleration, or why it is acceleration and not simple velocity that is

> resisted, or exactly what it is that matter is holding on to as it resists. But we know that mass resists acceleration so we can use it to detect and measure quantities of matter" (ibid: 35-36).

By this, Avery establishes that; after all, (western) science does not know it all. Additionally, Feyerabend (2011) notes that one of the basic assumptions of a scientific worldview is that the variety of events that surrounds us is held together by a deeper unity. Unfortunately, this assumption, according to him, is not always true and does not always agree with experience. For instance, he agrees that ice turns into water and then into mist but questions whether mist does turn into air. Using process and facts such as these analogies, we can postulate an underlying unity- but we do not experience or observe this unity. We experience difference. So, if we use experience as our only guide (as scientist have taken non-experience as their only guide), we must say that there is diversity, not unity" (Feyerabend, 2011:38).

In conclusion, science did not start with experience; it started by arguing against experience and it survived by regarding experience as a chimera or illusion (ibid: 40). Again, Galilleo et al assumed that all processes in the universe obey inexorable laws. Once again, this is not always true as with experience, some events follow laws whiles others do not. For instance, it is true to argue about the behaviour of the stars and sun rise as following some natural laws, but the clouds do not and animals occasionally give birth to monsters instead of their own kind. Therefore, the idea that the whole universe, the heavens as well as the earth obey a single set of unchangeable laws clearly conflicted with the above evidence and its Aristotelian systematisation. The question that arises then is, were Galileo and Descartes saved by the openness of our worldviews? And what have

worldviews got to do with experience? To answer these questions effectively, a distinction between experience and empiricism need to be drawn. Experience is what we see, hear, smell and notice when entering as yet unknown regions.

Contrarily, empiricism is a philosophy or a worldview which says that experience when *used properly*, tells us exactly what the world is composed of. Aristotle was an empiricist in this sense therefore. He assumed that experience mirrors the world provided the observer is in a *good condition* (when not drunk, asleep, besotted with love etc) and also provided *there are no obstacles between the observer and his or her surroundings*. As such common sense is tied to this assumption and in turn lends its support to it. The best scientific judgement for this assumption, in his view however, is that of the reader. It is important for present day scientists to reassess the potency of these ideas and assumptions to enable us make informed decision as to what constitutes and what does not constitute science. In other words, it is practically impossible to be in the so-called 'good condition' that Aristotle speaks about. It is also impossible not to have obstacles between the observer and his environment. Otherwise, in my own view, if an observer makes an observation that is removed from its context which includes the so called disruptions, then it ceases to be useful for that context. Since the usefulness of a theory depends on its explanatory power in solving a social problem, it follows then that these out-of context theories are unscientific. This section reviews related literature on science as a discipline with a special focus on food science, scientists and philosophers. This is to bring a focus and convergence rather than divergence to the review.

On the existence of a set of standardized procedures for science called the 'scientific method', Wolpert (1992:xi) argues that, "almost as misleading is the idea that there is a 'scientific

method' that provides a formula which if followed will lead to discovery. Any idea of creativity in science - which is rare – is linked, romantically and falsely, with that of artistic creativity".

It is further argued that due to the reductionist and materialistic nature of science, "Only an idea of culture that actually excludes science can restore man's dignity" and special status on earth (ibid: xi).

Science and scientist by design have succeeded to position science as a heuristic, complex, hazy and extremely difficult discipline to understand and reserved only for some categories of people who are held to be the 'intelligent'. According to the American literary critic, Lionel Trilling (2008), "This exclusion of most of us from the mode of thought which is habitually said to be the characteristic achievement of the modern age is bound to be experienced as a wound to our intellectual self –esteem" (ibid:xi)

Consequently, science neither pays allegiance to nature as its source nor its final destination. By this, modern science abolishes as mere fiction the innermost foundations of our natural world: It kills God and takes his place on the vacant throne so henceforth it would be science that would hold the order of being in its hand as its sole legitimate guardian and so be the legitimate arbiter of all relevant truth. People thought they could explain and conquer nature – yet the outcome is that they destroyed it and disinherited themselves from it" (ibid; introduction). "Scientific genius is often characterized by a 'psychic courage' which requires scientists to include in their ideas, assumptions for which they have very little evidence. Scientific creativity is of course not understood and one should be sceptical both of the suggestion that it involves merely a sort of problem-solving that can be done by computers and

of the theory that is heavily dependent on chance, characterized under the rubric of serendipity".

Wolpert argues further that, scientific thinking is unnatural on two grounds;

a) The world is not constructed on a common-sensical basis. This means that, 'natural' thinking –ordinary day-to-day common sense –will never give an understanding about the nature of science. Scientific ideas are with rare exceptions counter intuitive: they cannot be acquired by simple inspection of phenomenon and are often outside everyday experience; and

b) Engaging science requires a conscious awareness of the pitfalls of 'natural' thinking. For, common sense is prone to error when applied to problems requiring rigorous and quantitative thinking; lay theories are highly unreliable".

One of the most pronounced confusion and misunderstanding about modern science is the confusion in the difference between science and technology. According to Wolpert (1992: xii) in establishing the unnatural nature of science, it is essential to distinguish between science and technology. In the first place, technology is older than science. The building of great churches and the building of the steam engine – have in no way been dependent on science. Even the mode of thought in technology is very different from that of science".

Perhaps modern science and scientist are positioned in this power stance "because, any scientific discovery can be made only once, scientific research generates intense competition, even though in the long term most scientists are anonymous, or their names are recorded only in a historical context. But the essential social nature of science engenders cooperation to new

ideas which have to be accepted by consensus of the scientific community and because there is often a reluctance to surrender current views, scientists may be unwise to abandon their ideas at the first indication they have been falsified" (ibid:xii).

In furtherance of this argument, Alvares (2010:243) noted that "in a world consisting of dominating and dominated societies, some cultures are bound to be considered more equal than others. This heritage of inequality inaugurated and cemented during colonialism, has remained still largely intact today. So, the culture products of the west, including its science are able to claim compelling supremacy and universal validity because of their congenital relationship with the political throne of global power. Colonization is associated with subjection, subordination, elimination and substitution of what it deems fit as the best that ought to be. Being a culture product of western science, it is not unexpected that western science will carry or remain loyal to thrusts of western culture". It will attempt to extend its hegemony to other cultures through an elite class whose distinguishing characteristics and elusive values after periods of schooling or working in western societies alienates them from the realities and culture of their own people. "And true to this day, a crucial component in the hysterically active hegemony of the west". She argues that the intimate relationship between science and development has been the single most important factor responsible for the gross influence of science over the imagination of men in our times. Generally speaking, development was merely modern science's latest associate in the exercise of its political hegemony. Earlier, science had linked itself with the enlightenment and millennial claims before going on to associate itself with racism, sexism, imperialism and colonialism and then settling down with development – an idea in which most of these earlier inheritances are encoded (ibid). "Consequently breaking away from development as a habit of thought is part and parcel of an overdue decolonization of

minds" (Sachs, 2010: xii). Accordingly, exposing the epoch –specific nature of key concepts liberates the mind and prompts it to find a language that is equal to tomorrow's challenges. Knowledge wields power by directing people's attention either on or away from where they ought to be (ibid: xix).

The literature therefore points to the direction that over the centuries, science as a discipline has not only become more powerful but also that it has become increasingly unavoidable for any critical engagement with the realities of life on the planet including human food life. Today's modern science is really a combination of three different ways ancient people investigated the world around them. Ancient people investigated the world around them first through ideas, then as observation, then as application. Hence, modern science is really a combination of science as ideas, science as discovery, and science as invention. Science as ideas is what is today called philosophy. Science as discovery is what we call a particular scientific discipline, such as chemistry, or biology. And science as invention is what we call technology. In particular, science has become almost synonymous with technology and sophisticated equipment and machinery that anything devoid of that or its application is challenged as a science. For these and other reasons, the history and philosophy of science especially in relation to food are important to this study.

Parmenides denied change because he admitted only one entity - 'being'. Contrary, to admit change, the atomists postulated two entities –being and non being and assumed that being consisted of many pieces dispersed all over non-being, empty space, as we say today. In conclusion, Feyerabend (2011) summarised his discussion and argument in four propositions as follows:

a) The progress of science (in the sense of its defenders) depends on an openness of worldviews which conflict with the totalitarian pronouncements of many of those defenders.

b) Worldviews may take along time, even centuries before they show results that command recognition.

c) What commands recognition in one community, is often without interest and even damaging in another.

d) A worldview that contradicts 'well established results' may clash with a fashion, or a temporary religious mania; however, it does not clash with the mania of all scientists.

2.5 MODERN (WESTERN) FOOD SCIENCE

In Western literature, it is noted that food preparation and processing were only an 'art' rather than a science until population concentrations started shifting toward the urban areas (Bowers, 1992). At that stage, thinking around how to meet the demands of the rising urban migrant population caused early scientists like Nicholas Appert and Louis Pasteur to experiment and establish their heat preservation of food based on Pasteur's conclusion that microorganisms were responsible for food spoilage (ibid). In other words, considerations of food as a 'science' in the west were driven by a market demand rather than on its merit as an original science and many of the food processes were "developed by trial and error". With the growth of the consumer market, more quality control was needed which required understanding of the process. As safety and quality issues surfaced, the need for a scientific base for processing and preparation procedures became evident" (ibd: 4)

Bowers (1992) stated categorically that the study of food as a science emerged from several disciplines. Before the 1930s, chemists studied the composition of food and bacteriologists identified microorganisms of importance to food safety and preservation. USDA chemists published tables on the nutritional composition of food. During the last two decades of the 1800s, several American investigators analysed the composition of foodstuffs.

Results of those investigations were compiled and published as the Chemical Composition of American Food Materials (Atwater and Bryant, 1896). Water, protein, fat ash and caloric content of food were reported. The Pure Food and Drug Act of 1906 influenced the development of methods for analysis of food products. Federal agencies established the standards of purity and tests to detect adulteration. Books were published on food commodities including Sherman's (1914) 'Food Products' which covered agriculture, food production and preparation for the market, production statistics, composition, digestibility, nutritive value, sanitation, standards, law and regulations covering these subjects – comprehensive coverage, all in one book. Numerous recipe books were available including the Boston Cooking – School Cook Book (Farmer, 1902) which contained a chapter on the composition of food and food ingredients, and promoted the work of scientific cooking. The study of food as a specific science was beginning to develop. Lowe's Experimental Cookery was published in 1932, Morgan and Halls' Experimental Food Study was published in 1938 and the Nason's (1939) 'Introduction to Experimental Cookery' followed. Till date, uncountable writings on food have been publishded with different conceptual and theoretical propositions. In 2003 for instance, Eastwood (2003) wrote comprehensively on the Principles of Human Nutrition as an emphasis on the Western mind's focus on the nutritive value of food as the centre of food theory and food science.

2.5.1 Food Politics and Policy

At least for one reason - power, it is important to review the political literature of food. The power to define has relegated generations and nations to particular stages and status in human history. Probably, one of the most powerful tools of any scientific community is its ability to define what *is* and get others to accept it at all cost. For Western science today, this is one of the most important building blocks of its science – the power of the knowledge community. Food science is inextricably connected to food politics so much so that, food scientist either have to choose between their professional integrity of presenting pure and truly scientitific research findings about food and risk loosing their jobs and livelihoods or present scientific research findings in the way the industry and politicians would be happy with (Nestle, 2007a; Smith, 2008: DVD). Food production, distribution and consumption may not be able to escape the political realities of our much globalised world.

Governments and transnational corporations have enormous power to alter both local and global food systems, ostensibly for one main objective – profit. Examples of the political dimensions of food include food safety, hunger, animal rights and GMOs (Kaplan, 2012). Using local and global structures, institutions, ideologies and sometimes compulsion, a group of 'experts' propose and impose inevitably fallible views on the rest of the world as if these are super-natural and super-human views that are devoid of human errors. People have been made to believe and not understand that certain views, positions and research findings are simply without error. This has in turn shaped local and global policy on food, life and death. In his 'Guide to Knowledge as Power', Sachs (2010) notes that it is 'development as growth' which strains human relations and fundamentally threatens the biosphere. It is hard to imagine how

the dilemma of equity without ecology and ecology without equity can be resolved unless the belief in development is dismantled" (ibid:vi).

Accordingly, western hegemony leaves its imprints not only on politics and economics, but also on minds as well. They noted that just as domestic furniture carries the imprint of its age, mental furniture is also marked by the age of its formation. In this respect, the development discourse is an outcome of the post – war era of fossil-fuel-based triumphalism, undergirded (strengthened from below) by colonial perceptions and the legacy of western rationalism. Cleansing the mind of 'development' certainties, however, requires a conscious effort. Therefore, the author of this book has ventured to expose those key concepts that make up much of the mental furniture of 'development'. As it emerges, just to name some examples [in this book] 'equality' is transmogrified into sameness, 'standard of living' reduces the diversity of happiness, 'needs' make the dependency trap snap, 'production' brings forth disvalue next to value and 'population' is nothing but a statistical artefact. Exposing the epoch-specific nature of key concepts liberates the mind and prompts it to find a language that is equal to tomorrow's challenges (ibid; xii). Delinking the desire for equity from economic growth and relinking it to the community and culture-based notions of wellbeing will be the cornerstone of the post-development age". Within the very framework of 'development' a shift in power has occurred within the food supply chain from primary production to the retail sector, which has become the main outlet for processed as well as fresh food products (Winskerke, 2009:372).

As Habermas and Brand (1886) theorised, the 'lifeworld' of particularly western societies has become extremely mechanistic and propbaly overly 'systematized', subjecting almost every aspect of life, including 'food' to this mechanistic control as though, 'nature' was not the basis of its science. In what they describe as the colonization of the Lifeworld, Herbermas (1986)

believes that "systemic mechanisms have also been forcing out forms of social integration via language in those areas where co-ordination of action dependent on concensus cannot be be replaced, that is where the symbolic reproduction of the Lifeworld is at stake'. That means the communicative patterns of the life-world are subjugated to alien standards of technical control. The life-world, by-and-large, characterized by value-rationality begins to be eclipsed and absorbed in instrumental rationality, making persons become means to political and economic ends not in their interest, nor under their control. A climate of communal agreement is necessary in the life-world, whereas systemic imperatives prevail in the systems (ibid; http://www.scholardarity.com/?page_id=807). Consequently, the various aspects of symbolic reproduction, such as cultural reproduction and social integration are threatened leading to loss of meaning on the level of cultural reproduction, anonemie on the level of social integration and individual psychopathology on the level of socialization" (ibid).

From this background, what has been 'defined' as food has significantly shaped what food really is and for that matter who is defined and reported as hungry, food insecure, vulnerable and malnourished. As such, one of the objectives of this study (as stated earlier) is to reveal the science of food in the research community to ensure that neither the status-quo nor the future of knowledge on food losses or benefits unduly, from the prejudiced position of previous knowledge on the subject.

Much of the literature on food politics and policy suggest an unfair play ground with the science of food especially in relation to powerful governments, institutions of global governance such as the Bretton Woods institutions, the UN system, and global multinational corporations who basically dictate food policy and food matters in the direction only of economic profits (Nestle 2002; Webber, 2009). The power of transnational corporations in

altering the global food system goes beyond corrupting schools, influencing and lobbying nutrition professionals and governments to buying off and silencing scientists in order to alter scientific facts about food. Quite unbelievably, in April 1991 in the USA, the release of the 'Eating Right Pyramid' which placed more vegetables, fruits and grains at the base of the pyramid indicating 'eat more', and placing 'dairy and meat' products at the top of the pyramid (indicating eat less) resulted in intense pressure from the food industry who demanded and lobbied the USDA to alter the pyramid in favour of their industry. Soon after the industry outrage, the USDA had to spend millions of dollars to're-search' and eventually revise the pyramid to appease industry giants towards profits (Nestle, 2002: 52-53). These have been largely supported by international trade agreements such as the WTOs Trade Related Aspects of Intellectual Property Rights - the most comprehensive international agreement on intellectual property to date (Robin, 2008).

As the world's leading GMO company controlling the majority yields of the world's genetically modified corn and soy, it is reported that Monsanto's tentacles have already reached, if not by-passed, southern countries. In Mexico, Monsanto's transgenic corn is said to have conquered indigenous varieties. In Argentina, Monsanto's invasions have only resulted in hunger, high cost of agricultural land which eventually excluded most small-scale farmers rendering them and their families' food insecure and poor (Ibid). Legal battles were also common between the company and local farmers.

In Ghana, as in many African countries, the storms of GMOs and transnational corporations in the food industry have caught on us. The objective of Ghana's Biosafety Act is among other things to; "ensure adequate levels of protection in the field of safe development, transfer, handling and use of genetically modified organisms resulting from biotechnology that may

have an adverse effect on health and the environment" (Government of Ghana, 2011:3). In Ghana, one of the western institutions connected with GMOs is the activities of the Alliance for a Green Revolution in Africa (AGRA). AGRA's vision is a food secure and prosperous Africa achieved through rapid, sustainable agricultural growth, improving the productivity and livelihoods of smallholder farmers in Africa[3].

AGRA's programs focus on four basic areas: soils, seeds, policies and markets. AGRA's partnerships with farmers, governments, private sector and civil society make them a powerful actor and agent for vital change on the GMO landscape. On seeds, AGRA claims that "Africa is facing a shortage of quality seeds. And that "Poor seed combined with climate change will exacerbate the already critical food shortage in sub-Saharan Africa. Africa's population has been growing fifty percent (50%) faster than gains in food productivity. And on soils, the company says "Africa's soils are among the most degraded in the world, and steps must be taken on a large scale to increase fertility and encourage the use of better agronomic practices. AGRA's Soil Health Program (SHP) is meeting the continent's soil fertility crisis head on" In 2012, AGRA published funding for small scale agro-based companies to distribute large quantities of so called 'improved' seeds across the country. While this cannot be concluded as evidence of the infiltration of GMOs into the country, it does suggest that Ghana's subscription to GMOs as provided for in the Biosafety Act is already taking practical effect.

[3] http://www.agra.org/who-we-are/

2.6 FOOD AND TECHNOLOGY

A critical understanding of 'technology' may not be complete without an understanding of the history and political underpinnings of the term. On 20th January 1949, Harry S. Truman (the 33rd President of the United States of America) proclaimed: "We must embark on a bold new programme for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism – exploitation for foreign profit – has no place in our plans. Greater production is the key to prosperity and peace. And the key to greater production is a wider and more vigorous application of modern scientific and technical knowledge" (Ullrich, 2003:308). Technology is defined as the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, and methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function[4]. Technology is also defined as "the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment"[5]. Following from this, Russell (2009:310), a mathematician and philosopher concluded in his book, 'The Prospects of Industrial Civilization'that; "the application of science has been in the main immeasurably harmful; and it would only cease to be so when men have a less strenuous outlook on life". To him "science, hitherto, has been

[4] (http://en.wikipedia.org/wiki/Technology Accessed on 13/09/2013)

[5] (http://www.britannica.com/search?query=technology accessed on 13/09/2013)

used for three purposes: to increase the total production of commodities; to make wars more destructive; and to substitute trivial amusements for those that had some artistic or hygienic value" Russel (2009). In the end, the most outstanding achievement of scientized technology has been the increase in the destructive power of the war machine (ibid: 310).

The application of science and technology to food, especially with the objective of increasing production is the background to the controversial genetic engineering in agriculture. Genetically modified foods "are plants and animals that have been altered using recombinant DNA technology – a technique that combines DNA molecules from different sources into a single molecule" (Kaplan 2012:14). Critiques of the GMO technology argue that most often than not, scientists are not very certain of the health risks associated with the resulting new plant or animal that is created. And that there is little, if any, regulation requiring GMO scientists to conduct further investigations to establish the exact health effects of the engineering.

In the USA, the policies of the Food and Drugs Administration (FDA) and Environmental Protection Agency (EPA) consider genetically modified crops to be 'substantially equivalent' to conventional crops. These policies have been developed in the context of a regulatory framework that is inadequate and in some cases, completely absent" (Altieri, 2004: xiv-xv). What also generates much concern especially in the USA is that labelling is not required to enable consumers identify and differentiate GMOs from non-GMOs. Aside the numerous health problems and environmental risks posed by genetic engineering in agriculture, it is argued that the technology does not really increase crop yield (Gurian-Sherman, 2009). Smith (2007) also argues that genetic engineering in agriculture does not only pose unimaginable and uncertain risks to human health and the environment but also poses irreversible and uncertain

danger to future generations. In his book and companion documentary 'Genetic Roulette; The Document Health Risks of Genetically Engineered Foods' and the 'The Gamble of Our Lives' respectively, Smith has given a comprehensive and detailed account of the health effects of genetically engineered foods due to complex gene manipulations supported by political regimes that have practically been bought by multinational food giants such as Monsanto.

2.7 FOOD PHILOSOPHY

Until recently, food was not considered an area worthy of scientific or even academic pursuit. Great men and women of knowledge only gave a cursory attention to the subject. It was treated as a part of ethical theory or moral philosophy - a branch of philosophy that involves systematizing, defending and recommending concepts of right and wrong conduct (DeWit, 2010). It was held to be too physical, transient and feminist to deserve philosophical consideration by a male dominated profession (Kaplan, 2012; Bellasco, 2008). Other arguments in favour of the less philosophical treatment of food include the views that food is closely associated with the lower senses of man such as taste, eating and drinking which are argued to be "too primitive and instinctual to be analysed philosophically" (Kaplan 2012:2). Specifically, philosopher Carolyn Korsmeyer agrees that taste and eating are tied to the necessities of existence and thus classified as lower functions" (Bellasco, 2008:2).

What might have contributed to this position, in my view, includes the views of great philosophers such as Socrates, one of whose statements in relation to food will leave any potential food philosopher at least to wonder, if not give up, the pursuit of the subject as a philosophical endeavour. Socrates, as reported in Curtin and Heldke (1992: 22 - 27), argued

that food, just like sex, water and clothing, are a source of distraction to the purity of the soul and therefore the philosophical mind.

Heldke (2006:202 - 203) also argued that:

> "Western philosophy characteristically has concerned itself with lofty matters, with minds and the mental, and has left other fields to consider physical bodies—bodies that grow hungry, grow old, and die. Food—let it be said clearly—belongs unambiguously on the side of the bodily, the temporal, and the quotidian. Considering the conservatism of the discipline and its tendency to eschew the life of the body for the life of the mind, it is safe to predict that much time will pass before meetings of Convivium: the Philosophy and Food Roundtable to attract the kinds of crowds that routinely show up at, say, the Philosophy of Science Association" and therefore, "if you are going to go round telling your colleagues you are a philosopher of food, you better be prepared to develop a thick skin and start a wisecrack collection. But, the real, theoretically relevant unfortunateness of the current state of affairs lies in the fact that, by all rights, food ought to hold a place of distinction within the catalogue of philosophical subject matters; it ought to be a subject as important to philosophers as science. Why? Because food, quite simply, is a primary source of meaning and value in humans' lives, and philosophy has traditionally defined itself as a discipline concerned with exploring those sources of meaning.

Conseqntly, Lisa catalogued four tasks aimed at reassessing, acknowledging and giving what is due food philosophy to it. These include the need to, among other things:

a) Apply established philosophical categories to new or uncustomary food-related topics

b) Continue a previous philosophical discussion, but situating that discussion as a discussion in the philosophy of food. For instance, vegetarianism could or should be discussed as an aspect of food philosophy rather than simply of *animals or plants;*

c) Reclaim or re-discover previous philosophical works relevant to food. By this, she meant 'reading in-between the lines of Philosophy to identify real philosophical connotations of food in their literature. She notes for instance that, "When *I* reread the *Republic* after starting to study food philosophically, I was astonished to realize, for instance, that Socrates' luxurious city—the imaginary city he develops in order to answer the all-important question "what is justice?"—comes into existence because the residents of his more humble city start eating meat, and they need more land on which to graze their cattle. The result? War!" (ibid: 202). The argument however does not suggest a redefinition of the works of philosophers who may or may not have even thought about food;

d) Rephrase / recast familiar philosophical questions in new ways prompted by analyses of food, and using these recastings to reveal new categories of philosophical understanding — categories whose scope may be considerably broader than food.

However, as a philosopher in the American pragmatist tradition, Heldke (2006) admits that her views about the philosophy of food may vary from those of other philosophers of different

traditions. Philosophical neglect of food is not a curious accident, but that there are deep structural reasons why the main strands of the western philosophical tradition cannot take food seriously. To do so will call into play the very questions asked by that tradition, as well as the philosophical methods used to answer them. Philosophers in the dominant western tradition have been uninterested in those aspects of life that "give colour to existence"; those common everyday experiences that as we say, "add spice to life". Rather, they have confined their attention to aspects they thought could be ordered "theories" (where theory making is understood to be the activity of reducing temporal events to abstract, disembodied, atemporal schemata) and those kinds of values that are defined as public, masculine and universal. Our relations to aspects of life that can only be understood as concrete and embodied (primary among them our relations with food) have been marginalised. They have been pushed to the periphery of what has been regarded as important" (Curtin and Heldke, 1992:3). To a large extent therefore, food determines what counts as a person in our culture.

Three primary areas where food philosophical enquiry has "unfortunately" made little inroads are epistemology, metaphysics and the relationship between food and cultural identity. The latter being very important because a people's culture can be harmed by an exploitation of its cuisine. "When we come to the relatively untapped possibilities of ontology and epistemology, it bears observing that food can contribute very directly here to efforts to make the categories of human being and knowing more grounded in the temporal, the emotional, the experiential and the bodily. By exploring humans' relations to food on the most elemental levels (e.g. ingestion and elimination), we cannot but come to question received Western notions of being and knowing that conceived of an absolute separation of knower from known, self from other. As Ray Boisvert observed, "Taking seriously our status as embodied and enculture,

philosophers could actually begin to grasp philosophizing as a 'human' rather than as a 'mental' activity" (ibid: 214).

This study takes as one of its inspiration gaps in the literature such as expressed above by Heldke to explore the building blocks of the food science of the people of East Gonja District – revealing necessarily, their worldviews, the epistemology, the ontology, axiology and knowledge community.

A psychologist, Paul Rozin, rather probably recognised the fundamental role of food than philosophers of the 19th century when he wrote that "food is fundamental, fun, frightening and far reaching. And probably nothing is more frightening or far reaching than the prospect of running out of food. A hungry stomach will not allow its owner to forget it, whatever his cares and sorrows. For much of history, the search for sufficient food drove the conquest and colonization of continents –and the enslavement or eradication of entire populations" (Bellasco 2008:2).

Further to this debate, the food industry's profit motivated attempt to disconnect the food producer from the food consumer adds to this reductionist approach to food philosophy. Over the past few years however, academia and philosophy are giving tremendous attention to food studies than before. As Kaplan notes, "more philosophical work has been done on food and agriculture in the last five years than the previous thirty". The proliferation of countless food courses, programmes and dedicated institutions for the study of food is an indication that this area has started receiving its honours and academic merits.

Notwithstanding the absence of consensus among philosophers on the nature of food, some functional definitions of food have been isolated.

Food as nutrition is defined as a substance or material that originates in the environment in plants, animals or water. Followers of this philosophy of food believe that food is composed mainly and exclusively of nutrients such as carbohydrates, fats, minerals, fibres, proteins and vitamins which are ingested by living organisms to sustain, grow and maintain life (Bowers, 1992). Food on this perspective is not open to different interpretations than those established by the so called 'objective' means.

Food as nature is yet another candidate of the eating of food. As nature is both objective and normative, it is perceived to have intrinsic value distinct from its instrumental value of satisfying human ends. From this perspective any food that is associated with natural means or processes is considered good, and that which is not, is considered bad or not as good as natural food. This is also informed by the knowledge that harmony with nature is good while disharmony is bad (Kaplan, 2012). This view of food probably influenced the growth and flourishing of the organic food age.

Food as culture has social meaning and significance beyond its nutritive and natural functions. Here, each society determines what food is, what is permissible to eat and how and when particular things are consumed. Food production, preparation and consumption are dependent on the beliefs, cultural practices and laws of a particular society or nation. Food and culture define one another (Kaplan, 2012).

Close to food as culture is food as a social good (ibid). In this context, food acts as a binding agent for families, communities, nations, friends and social gatherings. Food is produced, exchanged and shared in accordance with some common principles.

The spiritual connotation of food is central to most religions across the world. Religions prescribe which foods are good to be eaten and which are not. Here, society or groups who identify with common spiritual background connect dietary value with moral conduct and spiritual salvation Heldke, 2006). Food under this conception has a metaphysical significance and connects members of a community to religious values. For instance, practicing Muslims, for religious reasons, do not eat pork and this is held with high spiritual cleanliness and obedience to the Almighty Allah (God).

Food as a desideratum. Food is the object of hunger and desire. It is the focus of what we want when we feel the urge to eat. This desire otherwise called appetite is tied primarily to the physical sensation of hunger caused by complex physiological reactions. “When food is viewed as an object of desire, we are led into murky depths of the unconscious and bodily urges” (Kaplan 2012:4)

Food as aesthetics can be described in two major forms. As the object of aesthetic experience, food has a taste and appeals to the senses. Descriptions of food such as tasty, delicious, fresh, overcooked etc relate to the aesthetical function of food. Secondly, food is also held to be artful. This is described in terms of its visual presentation and sensual composition. In this model food is subject of aesthetic judgement about its taste and appearance. Here it transcends the nutritive and spiritual functions of food (Kaplan, 2013). Writing on the ontology and epistemology of food, Heldke (2006:21-216) has notes that;

"While no philosophers of food have developed full-blown critiques of the fundamental ontological division between subject and object—between myself as a perceiver/possessor of the world and the items in the world that enter my vision—this topic presents itself as one on which we can make an important contribution. This is so precisely because of the profound way in which eating "violates" this purportedly fundamental dichotomy.

Epistemology

In the twentieth century, scientific investigation (or an idealized version of it) has come to stand as the model of inquiry and knowing, in terms of which all other knowledge-producing activities are judged—and, often, found lacking. Science—or our idealized version of it—embodies the very qualities that Descartes taught us to seek in our inquiry: dispassion, disengagement, and an emphasis on abstract principles and timeless certainty. Foodmaking presents an interesting challenge to this model of knowing. In "Recipes for Theory Making," the suggestion that practices of recipe creation and exchange might offer models of inquiry that highlight its embodied, emotional, relational and temporal aspects were exlored. Such models stand as implicit challenges to the Cartesian model. This suggestion receives further treatment in "Foodmaking as a Thoughtful Practice," where it is suggest that the various activities of food making can and should stand as models for inquiry, precisely because they puncture the border between "theorizing" and engaging in "practical" activity. Were foodmaking more of a model of inquiry than science, food making and the humans affected by these activities would all be the beneficiaries.

Ray Boisvert presents a related proposal in his call for "convivial epistemology," which begins with the notion of humans as beings living with their surroundings—not subjects studying objects external to themselves. Such an understanding of knowing uproots a whole variety of received philosophical problems and preconditions, including, for instance, the problem of skepticism and the separation of fact and value. Boisvert's work—the essay "Convivial Epistemology" as well as other of his writings—stands as the clearest example of work that takes on the fourth task. His ways of examining food unearths the profound potential that it possesses to transform the very ways in which we ask the most basic questions of philosophy (ibid: 214-16).

2.8 FOOD AND GENDER

The socially constructed as opposed to the biological role of women in society has long been a subject of debate especially in western academic thought. Bellaso (2008:41) and Donovan (2012) noted in his introductory analysis of the relationship between gender and food that, "Just as gender relations and sexuality remain problematic, there is no doubt that food presents conflicted identities for women". He questions whether food is a tool for women's empowerment or enslavement. While there is no straight forward answer to his question due to the diversity of cultural perspectives on the role of women in relation to food, a background to the western philosophy and academic thought about a 'woman' can give one perspective to the story. "The feminist philosophical literature on embodiment has, over the past two decades, presented a sustained, nuanced, and multi-faceted attack on received philosophical notions of human personhood, a central topic in ontology. According to the prevailing Cartesian model, humans are minds that are only accidentally attached to inferior bodies. And more so in western culture, women, in Western thought, have been defined as more fully tied to our bodies

and to all things bodily, because of our role in reproduction, our traditional tasks as caretakers of bodies, and our identification with sex and the sexual. As such, we have historically been regarded as incomplete or defective humans. Feminists have been at the forefront of challenging this ontological legacy, and explicating the ways in which it marginalizes and subordinates women" (Heldke, 2006:215; Bordo (1993).

For the relationship between food and gender, academia has been seriously polarised by the concept of 'separate spheres' of associating food production to a more male domination and food preparation and consumption as the domain of the woman. What is defective about this polarization is that it relates only one aspect of food, thus food consumption to the neglect of other key areas such as food production, storage, transportation which have received profound female involvement and influence on a global scale. According to the Food and Agricultural Organization (FAO), "women produce more than 50% of the food grown worldwide. This includes up to 80% of food produced by women in African countries, 60 per cent in Asia and between 30 and 40 per cent in South America" (Bellasco, 2008:41).

For women, food and cooking can be a source of power and sometimes enslavement depending on the context. In my view, the active involvement of women in food production, preparation and consumption has been a source of power in the sense that it enables them take care of the family especially younger children and babies whose hope of survival and life depends on food which has a natural and biological beginnings and association with womanhood through breastfeeding. Before we are able to engage in any thought of existence we were fed in one way or the other by a woman. Hence the role of a woman in relation to food is more of an empowered position. "Women often choose to provide service because they recognise that their work contributes to sociability in groups and sometimes a group's very survival". Even

when women are restricted to feeding just their own immediate family, they find leverage through cooking" (Bellasco, 2008:42). Related to the issue of power in food and cooking for women is the concept of 'food voice' – "in societies that do not want to listen to women food gives them a say" (ibid:44). One critical underlying factor to whether women see food or cooking as a burden or as a matter of power is whether the art or science of cooking is made for home or family consumption or as a source of income.

With the rise of capitalism and increase in commercial food business, the engagement of women in almost non-stop industrial food production and preparation can indeed give a sense of enslavement for women where in addition to the primary home food matters, they have to, in order to survive and as a matter of discriminated job availability commit several hours in restaurants preparing food for consumption.

Another critical feminist dimension of food focuses on the time allocation for food preparation at home as opposed to buying food from outside in restaurants (Shapiro and Lo 2012:455) noted that "Working hours and family income are negatively related to time spent preparing food cooked at home, yet education and leisure time are positively related. Gender differences in food choice are not only influenced by the value of time and nutrition-consciousness, but also by gender roles: educated women devote less time to food preparation and educated men spend more". Accordingly, food choices vary in accordance with income. Another dimension of their study which has potentially controversial implications for women's food lives is the finding that food preparation choices are also influenced by the value of the homemaker's time. "Individuals who put a high value on time, due either to longer working hours or higher wages, spend less time eating out or cooking at home, substituting convenience foods from retail stores". If this is true and their earlier submission also holds, it could be concluded that men

value their time more than women and that time used for cooking is less valuable than time used in working in other endeavours for income.

Also, McPhail et al (2012: 473) in exploring how gendered divisions of food consumption continue to exist within a supposedly "non-sexist" ideological context argue that, "while food and food ways remain gendered, the denial of them, through a process called performing individualism," strengthens gender inequality by allowing gender disparities to appear not as systematic instances of inequity but rather as isolated instances of "natural" tastes and personal choice). And in western societies, food is codified as either masculine or feminine. Examples of some feminine foods enjoyed by women are salad while men would usually go for steak and red meat. Consequently, western "food scholarship has shown that such gendered discourse of food and food ways helps to reify normative gender identities and gender oppression and, at the same time, frames men's and women's food consumption patterns". Reactions to research questionnaire on gender and food also point to the fact that research participants are not completely sure about the relationship between food and gender. Reactions such as "I don't really want to be sexist but"; "God that's a hard question! Gender and food?"; "Oh that's hard"; "It all depends on what people like to eat"; "They might both eat the same thing" (ibid: 479)

The generalization of food and gender may also well hide or dwarf other fundamental and contextual variations on the intensity of the gender discourse in relation to other issues such as sexism, racism and colonialism. The position of the black or otherwise African, Asian or Caucasian woman in relation to food may reveal significant variations. In her book 'An't I A Woman, Black Women and Feminism' Hooks (1981:1) writes that, "At a time in American history when black women in every area of the country might have joined together to demand

equality for women and a recognition of the impact of sexism on our social status, we were by and large silent. Our silence was not merely a reaction against white women liberationists or a gesture of solidarity with black male patriarchs. It was the silence of the oppressed – that profound silence engendered by resignation and acceptance of one's lot. Contemporary black women could not join together to fight for women's rights because we did not see 'womanhood' as an important aspect of our identity. Racist, sexist socialization had conditioned us to devalue our femaleness and to regard race as the only relevant label of identification. In other words, we were asked to deny a part of our selves and we did. Consequently, when the women's movement raised the issue of sexist oppression, we argued that sexism was insignificant in light of the harsher, more brutal reality of racism" (ibid:1). While this text relates more to African-Americans who suffered the brunt of slave trade the influences of this history have been global affecting even Africans living in Africa as opposed to the indigenous African woman who have maintained their original identities as women including critically, their identity with food and family welfare.

Writing on 'Ethnic Identity, (Post) Colonialism and Floodways of Ghanaians in London', (Tuomainen, 2009:565) made the presumption that "food and eating are products of culture and that a distinctive food culture reflects the surrounding culture in general" In Ghana, educated people were accustomed to British institutions and customs, and the identities of Ghanaians in the diaspora have been formed through this (post) colonial experience. Notably, the colonial rulers imposed a number of "native states," which they imagined corresponded with established "tribal" boundaries (ibid). In Ghana, adaptation on the culinary front was more marked in the urban areas of the south where governmental employees, military officers and businessmen became accustomed to foods such as tinned milk, tea, sugar (ibid). Till date the relationship

between Ghanaian food culture and the British colonial rule are still glaring in the food habits across the entire country.

Among Muslim Asian women, womanhood is not very distant from the function of food preparation and consumption. With religious traditions of the woman being central in maintaining family welfare of which food is key among other highly valued roles, women identify with food preparation while men identify more with its production. The difference being the Islamic conception and theory of the role of the woman is completely different from the western perspective at least from one perspective – a spiritual, more ethical and equitable perspective. This also lends further explanation to the evolving literature on food, power and identity in the Middle East in general where decades of occupation has resulted in practical concerns and theoretical considerations of food issues. Grosglik and Avieli (2013:185) noted that "food is a prominent means of power… and foodways may also negotiate, subvert and challenge existing power structures".

2.9 FOOD GEOGRAPHY

Food Geography is a field of human geography which focuses on patterns of food production and consumption at local to global level (Heldke, 2006). "It reveals a complex pattern of global connections. The map of the geography of food shows a pattern that reflects the dominance of developed countries over developing countries. The map reveals the deeply layered connection between food innovation, its production, transportation, retail and consumption but hides the many environmental and human costs. It shows how agribusiness and supermarkets produce and import food for year-round consumption but indirectly export drought, soil degradation, groundwater exploitation and human dislocation (Millstone, E. and Lang, M. (2008). It shows

how developing countries can be both exporters of food yet importers of food aid. The map of the geography of food reveals a modern day land grab by agribusiness, it shows how the control of food supply is being gently ripped from the hands of local indigenous people and placed in the control of large global corporations. The map shows a rapid increase in food production alongside a growth in food scarcity. The geopolitics of food is complex. Food security for the rich improves alongside its protection and subsidy. At the same time, food security for the poor declines, perhaps as a result of their governments being advised to reduce their own agricultural support. The geography of food reveals a paradox and hypocrisy and a power relation that profits the corporations to produce vast amounts of food that the poor and vulnerable will never see[6]".

Food geography is an emerging paradigm in response to the fatalities of the industrial agricultural model of modernization. It presents how an integrated and territorial model of agriculture as opposed to a globalised food regime can result into sustainable agriculture and food production.

This industrial, modernized large scale model according to Winskerke (2010) is characterised by three mutually reinforcing processes of disconnecting disembedding and disentwining local agriculture and food production (ibid). By disconnecting, Winskerke means that the pursuit of industrial agriculture utilising economies of scale with complicated supply chains have only resulted in loosening the links and increasing the distance between producers and suppliers of

[6] (http://thebritishgeographer.weebly.com/geography-of-food.html).

goods and services especially food on the one hand and the consumers and customers on the other hand. In an attempt to compensate for this lost value, regulations, quality control, labelling and trademarks have been intensified to bridge this gap. Whether or not these compensations are adequate substitutes for this lack of direct contact and personal trust that consumers have for the food system depends more on the judgements of the victims – most of whom according to Nestle (2002, 2006) and Smith (2003, 2007) 'have no clue what it is that they are being fed by the food industry' (Kimbrell, 2002:155-156).

By disembedding, Winskerke (2010) explains that the local and regional character of food and other agricultural products have largely disappeared. In other words, the value attached to the origin or place of production or manufacture of a particular product has been lost. For instance, consumers can no longer trust that the natural food that they have longed trusted and enjoyed from the natural forests in the Amazon Basin is the same that Walmarts or Tysons say it is.

By Disentwining, Winskerke (2010) means "Upscaling and increased specialization in the supply chains have disconnected the producers and suppliers of different goods and services from each other, and created separate spheres of activity. Whereas food, care, education and leisure form an indivisible whole for the individual, whose use is linked to place and time, the opposite is now the case for the supply of these goods and services, which takes place through separate and specialized supply and provision chains" (ibid: 371)

In summary, writing on industrial agriculture, Kimbrell (2002:3) laments that:

> "industrial agriculture is devastating our land, water and air, and is now threatening the sustainability of the biosphere. Its massive chemical and biological inputs cause

> widespread environmental havoc, as well as human disease and death. Its monoculture reduces the diversity of our plants and animals. Its habitat destruction endangers wildlife. Its factory farming practices cause untold animal suffering. Its centralised corporate ownership destroys farm communities around the world, leading to mass poverty and hunger. The industrial agriculture system is clearly unsustainable. It has truly become a fatal harvest".

For most of its claims, thus, 'industrial agriculture will feed the world, industrial foods are safe, healthier and nutritious, industrial food is cheap, industrial agriculture is efficient, industrial foods offer more choices, industrial agriculture benefits the environment and wildlife and finally that biotechnology will solve the problem of industrial agriculture' are at best corporate lies and deadly myths.

According to Winskerke (2010), in order to respond to the multidimensional and complicated nature of the problem presented by industrial agriculture and the agri-food system towards desirable social, economic and ecological outcomes, two different paradigms and two different food geographies can be discerned. These are, the agri-industrial paradigm (the hypermodern food geography) and the integrated and territorial agri-food paradigm (the alternative food geography). Agri-industrial paradigm is to be understood as an acceleration of the agri-food modernization process that has been dominant in the past decades.

The core of the Integrated and territorial agri-food system paradigm is that food production is firmly embedded in and based upon the specific qualities and distinctive features of the region and very often integrated with other regional rural entrepreneurial activities, such as nature conservation, landscape maintenance, agritourism, care and education. It is built around a

highly differentiated definition of food quality, which reflects differences in farming systems, organizational networks, cultural traditions, consumer preferences, institutional frameworks and policy support". In effect, the paradigm places high premium on bio-cultural diversity in food production, processing, preparation and consumption (Winskerke (2010; Milestone and Lang, 2008).

On a global scale, Millstone and Lang (2008) have practically mapped the entire world (developed, developing and transitional economies) with the kinds of food they eat and the reasons behind these dietary choices. The key issues reviewed from their extensive coverage of who eats what, where and why include the key current concerns about food, the challenge of feeding the world, GMOs, land ownership, agricultural biodiversity, fast food, organic food farming. Table 2.2 gives details of these issues across different developed and developing nations.

Table: 2.1: Global Food Concerns in Selected Countries

Country	**Details of Current Food Concern**
USA	Maize for biofuels: The use of maize for ethanol production more than doubled between 2000 and 2006. In 2007, 20% of the maize crop was used to produce ethanol, estimated to rise to 25% in 2008.
Mexico	Food Riots: In January 2007, thousands of people protested against doubling in the price of tortillas caused by farmers in the USA and Mexico replacing edible maize crops with industrial maize for processing into biofuels
Peru	Bread Price: The price of imported wheat increased by 50% during 2007, resulting in rising bread price.
Bee colony	The recent collapse of honey bee colonies in Europe and the Americas may

Country	Details of Current Food Concern
Collapse	impact on agricultural production. Bees pollinate over 90 food crops, and play a role in one in three mouthfuls in the average American diet.
Russia	Food Price Freeze: In October 2007, the Russian Government persuaded food producers in retail chains to freeze the price of some staple foods for an agreed period to try and avoid unrest in the run-up to national elections
Mauritania	Rising Food Prices: In November 2007, people protested at rising food price. The price of locally grown food had increased by 28% and imported wheat by 75%.
Ghana and Benin	Biofuel Crops: Plans are being made to plant millions of hectares with jatropha and sugar cane to produce biofuel
Zambezi Valley-flood	Substantial flooding early in 2008 will haven a devastating effect on agriculture in the region.
Kazakhstan	Import ban: In early 2008, the government warmed that it will be limiting growing export.
Yemen	Food Riots; In August and September 2007, people protested in Yemen about rising food prices, caused by higher import prices
Tanzania	Bio-Fuel Crops: Thousands of small scale farmers have been evicted to make way for Jatropha and sugar plantations
Bangladesh	Cyclone: In 2007, a cyclone destroyed a rice crop worth $600 million and the price of rice rose by 70%
Kyrgystan	Bread Price: The price of bread in the capital increased by 50% in 2007 while salaries and pensions increased by only 10%.
China	Biofuel Crop ban: In June 2007, China banned production of ethanol from

Country	Details of Current Food Concern
	food crops.
China	Diary demand: The increasing demand for milk and diary products in China has led to it not being the only third – largest milk –producing country but the largest importer of milk products.
China	Big Freeze: Early in 2008, the most severe winter weather in 50 years killed millions of livestock and damaged crops, leading to soaring food prices.
Australia	Drought: The long – running drought affecting much of Australia led to the halving of the wheat harvest on 2007, and to no grain being exported from East-Coast ports.

Source: Developed from Millstone and Lang (2008:16 -17)

To anchor the realities of the concern of competing land use for food production and biofuels in Ghana, it is reported that, in November 2007, a Norwegian biofuel company, 'BioFuel Africa' – a subsidiary of Bio Fuel Norway[7] took advantage of Africa's traditional system of communal land ownership and current climate and economic pressure to claim and deforest large tracts of land in the Kusawgu area of the East Gonja District of the northern region of Ghana – the study area for this research. The intention was to create "the largest jatropha plantation in the world" (Nyari, 2007). It took the effort of vigilant development workers and

[7] (www.biofuel.no)

the District Assemvly to stop the activities of the company and reverted the land to the traditional authority.

Consequently, cost of food imports in developed countries increased from 429 trillion dollars in 2006 to 512 trillion dollars in 2007. In developing countries, impact seem less from 186 trillion in 2006 to 234 trillion dollars in 2007 (Millstone and Lang (2008:16 -17; 2013).

Also, expenditure on food as a percentage of household expenditure on consumables increase from an average of about 18% in developed countries to an average of 58% in developing countries (ibid:18-19). In 2007 / 2008, emergency food aid from the World Food Programme was the ultimate source of hope for several countries including Afghanistan, Tajikistan, Zimbabwe and Bolivia due largely to natural disasters, soaring food prices and so on (Millstone and Lang (2008:16 -17; 2013)..

The globalization of food production and trade has resulted in increases in food borne diseases across continents and countries. With more people eating food made out of the home (at fast food restaurants), food related infection has also increased. It is reported that “around 1.8 million deaths a year are caused by diarrhoea, largely contracted from consuming contaminated food and water” ((ibid, 2008, 2013). Most of the deaths are among children and in developing countries where medical and health systems are poor.

2.10 GENETICALLY MODIFIED CROPS

The reason for analysing genetically modified crops (GMCs) is due to the central nature of the technology in the conception of food over time and space. Thus, as indigenous people across

different cultures may not see GMOs as food due to the very architecture of their origin, other cultures especially from some Western countries do not see anything wrong with these foods.

Since the production in 1984 of the world's first GM crop, over 170 different crops have been genetically modified and tried across the world. Commercial cultivation started in 1996 in the USA. Since this time, the area put under the cultivation of GMOs has reportedly increased to about 55 million hectares (Millstone and Lang (2008:16 -17; 2013). As opposed to conventional breeding which involves gene transfer only between the same species, technology of genetic modification involves the transfer of genes from one plant, animal, virus or bacteria or practically anything possible into another. For instance, it is noted that fish genes that resist cold conditions have been moved into strawberries to enable them adopt this characteristic.

Whiles consumer resistance keeps increasing, the GMO industry players are not joking. The type of crops as a percentage of the total global GM crops is quite high. Brazil, which entered the market in 2003, now has the world third largest area of cultivation for GMOs. On a worldwide scale, the area under cultivation of GMOs has increased from 28 million hectares in 1998 to 59 million in 2002 and 102 million hectares in 2006 (Millstone and Lang (2008:16 -17; 2013).

Global contamination levels of GM crops indicates that the most affected crops include soya bean-57%, maize - 25%, cotton-13%, canola oilseed rape - 5% and alfalfa, papaya and squash combined is less than 1%. These aside, table 2.3 below highlights some cases of GM contamination in selected countries.

Table 2.2: Global Cases of Genetically Modified Organism Contaminations

Case	Analysis
GM Maize contamination	In 2005, syngenta's BT10 variety of GM maize was found to have been mixed with another variety, and to have been grown commercially in the USA in 2000 -2004. This untested GM maize had been shipped throughout the world.
GM Rice Contamination	In 2006, Bayer's LL Rice 601, which had been grown in field trials in 2001, was found throughout the rice-growing areas of the USA, and in food and feed supplies around the world.
GM in Organic food	GM Soya and Maize were found in 44 out of 58 products sold in South Africa as "organic" or "non GM".
GM Soya	In 2001, Roundup- ready soya was found in two products on sale in India, despite them not having government import permits.
GM Papaya	Analysis of Papayas from farms in north-east Thailand reveal that they had been contaminated by a GM variety, growth experimentally on a government research station and not licensed for commercial use.
GM Found in Baby food	Analysis of 20 baby-food products sold in the Philipines in 2001 found traces of GM soya in 7 of them.

Source: *Developed from Millstone and Lang (2008:44-45)*

Agricultural biodiversity includes the plants, animals and micro-organism species that support food production. Accordingly, the genetic diversity of our current population dates back to some 10,000 years ago when selected species have been selected and bred to create the

domesticated varieties that we use today. Unfortunately, this genetic diversity of our food crops is diminishing drastically. Millstone and Lang report that, 'at the beginning of the 21st century, only 10% of the food crops that have been developed are still being farmed with many local varieties being replaced with a small number of so called 'improved varieties, often involving non-native varieties' (ibid:58).

In the USA, 97% of original fruits varieties are reported to have been lost. In the Middle East, 83% of the original wheat variety is reported to have been lost. Some 559 breeds of cattle, 319 goat, 263 pig, 669 sheep and 363 chicken breeds are endangered or endangered maintained worldwide.

At the global level, three key policy initiatives have influenced agricultural biodiversity around the world. These include, in 1991, the Union International Pour le Protection des Obtentions Vegetales (UPOV) which recognised the breeders' rights and gave legal ownership of industrialised seeds to the companies that developed them.

In 1992, the UN Commission on Environment and Development's World Summits in Rio effected the Trade Related Intellectual Property Rights agreement extending ownership to living organisms.

In 2002, the UN's Food and Agricultural Organization (FAO) agreed an international Treaty on Plant Genetic Resources for Food and Agriculture, thereby allowing common shared access to a limited number of important crop varieties.

"Staple food is food that is eaten regularly and which provides a large proportion of a population's energy and nutrients". Cereals made up of largely rice, maize, wheat, millet and sorghum make up the world's single largest staple food category across Africa, Asia, Europe and the Americas. About 4 billion people rely on rice, maize or wheat as their staple food (ibid: 80). In Africa and elsewhere, roots and tubers such as yam, cassava constitutes a major staple with some 500 million people around the world having cassava as their staple. Roots and tubers are a good source of carbohydrates.

With the fear of the loss of the world's crop diversity and the increasing cases of GMOs, the preference for organic foods keeps increasing. This accounts for the more than trebling of the market growth for organic food and drink between 1997 and 2005 with sales of organic foods increasing from $10 billion dollars in 1997 to $40 billion in 2006. Switzerland, Denmark, Austria, Sweden, Germany, Italy, UK, France, USA and the Netherlands are the major spenders in the organic food industry with an average per capita expenditure of $64 per person per year. Switzerland being the extremely high spender with $134 spent per person per year (Lang and Milstone, 2008:88).

By conception, fast food is part of all cultures. That is, food that can be prepared, eaten quickly, out of the home and usually using hands. At this level, most foods can be regarded as fast food across different countries. The hue and cry about fast food is actually due to the size of the industry, the rate of growth, annual turn-overs and proliferation across nations and continents of particular fast food giants across the world and the quality of foods prepared and distributed out of the industry. Currently, Mc Donalds, Buger King and Tricon (Kentucky Fried Chicken and Pizza Hut –KFC) are the world's three largest fast food corporations. In 2007, KFC alone had over 11000 restaurants in over 80 countries while Burger King had 11, 283

restaurants in 69 countries around the world. In North America, Burger King opened 92 new restaurants in USA and Canada in 2007. In Latin America, over 900 restaurants had been opened in Central America and the Carribean by the end of 2006. This phenomenon is what Ritzer (2012) described in his book as the McDonaldization of society.

The poorer the better or the richer the better? It is noted that burger chains are not investing in Sub-saharan Africa. The main reasons include the price. Whereas fast foods are considered cheap in industrialised countries, is different for developing countries. As noted earlier, with developing countries spending over 58% of their annual income on food as compared to 18% for developed countries and in fact 14% in the USA, people in developing countries cannot afford to spend 5 hours per day required to buy one Big Mac *(a hamburger sold by McDonald's)* as compared to only 0.2 hours of work that is needed to buy one Big Mac in America.

Quite apart from the price, it must also be noted that even though fast food restaurants are fast spreading in developing countries, especially in Ghana, most of the foods served are more fancied by the younger generations in urban centres (though the fever is catching-up in rural areas too) (Omari et al 2013).

Consequently, it is reported that 10% of calories in the USA diet come from fast foods. Fast foods tend to be high in animals fats making them the single latest contributors to the rising levels of obesity across the developed and some developing countries (ibid: 94). In the USA alone, it is reported that 71 million adults are officially estimated to be obese and some 50 million more are overweight.

2.11 ORGANIC AGRICULTURE

According to the Food and Agricultural Oganization (FAO / WHO Codex Alimentarius Guidelines, Organic Agriculture is "a holistic production, management [whose] primary goal is to optimize the health and productivity of interdependent communities of soil, life, plants, animals and people" (UNCTAD, 2008:6-7). This definition is similar to the International Federation of Organic Agricultural Movements' (IFOAM) definition of organic agriculture as a production system that sustains the health of *soils, ecosystems* and *people*. It *relies on ecological processes, biodiversity and cycles adapted to local conditions*, rather than the use of inputs with adverse effects. Organic Agriculture combines *tradition, innovation* and *science* to benefit the shared environment and promote *fair relationships* and a good *quality of life* for all involved" (http://www.ifoam.bio/en/organic-landmarks/definition-organic-agriculture". Accessed *on 27th July 2017)*

According to IFOAM, organic agriculture rests on four key principles, namely, the principle of health, ecology, fairness and care.

IFOAM's Principles of organic agriculture

i. **Principle of Health:** Organic agriculture should sustain and enhance the health of soils, plants, animals, humans and planets as indivisible.

ii. **Principle of Ecology:** Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

iii. **Principles of Fairness:** Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

Principle of Care: Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

From the foregoing, it can be deduced that organic agriculture is a system of agricultural production that seeks to promote and enhance an ecosystem's health while minimizing adverse effects on natural resources. The aim of organic farming or agriculture is to create integrated, humane, environmentally and economically viable agricultural systems that rely to a large extent, onlocal or non-farm renewable resources, and the management of ecological and biological processes.

Generally, organic agriculture uses less external inputs, whether organic or inorganic

2.12 TYPES OF FOODS EATEN AROUND THE WORLD

The types of food eaten around the world are just as diverse as the people who eat them and as early in human history as our memory can serve us. There is no formula and there may never be any to determine what people eat and why they eat it. The most plausible formula is probably the 'cultural formula'. That is, people's dietary habits and choices are simply determined by their environmental, social, economic, and spiritual orientation. This is why I (the researcher) am not tempted to describe anybody's food as 'weird', 'strange' or 'extreme' as the other authors of western worldviews do. After all, as recent as 2013, the UN's Food and

Agriculture Organization (FAO) (2013), in its recent publication, *'Edible Insects' Future Prospects for Food and Feed Security'* suggests the eating of insects as a viable and nutritious alternative for food (and feed) security.

The purpose of highlighting the strange foods therefore is to illustrate the different positions about food and hence the need for different foods for different societies around the world. Among the Gonja in particular and in most parts of northern Ghana several plant and animal species constitute different delicacies for different purposes.

Deutsch et al (2012), Zimmern (2011), Couch and Goodes (2009), Hopkins (1995) and selected internet sites offer a wide range of foods across the world which they describe as 'weird', 'strange' and 'extreme'. Some of these are isolated in the following below;

2.12.1 Top Ten 'Strangest' Foods From Around the World[8]

It is said that one man's trash is another man's treasure. The same could be said about food: one man's nightmare may just be another man's delicacy. From cow's tongue and pig's snout to chicken's feet, from fried worms and frog's legs to sautéed snails, the list of weird stuff we eat is endless (and often quite tasty). If you've been indulging lately and need a reason to diet, take a read, you may just lose that appetite. This review will later be organized into alphabetical order with 5 foods under each of the 24 alphabets giving rise to a total of 120 different types of 'attention catching foods that are eaten around the world.

2.12.1.1 Bird's Nest Soup

Think of this as like the Chinese version of mom's chicken soup. It is made using the nests of cave swifts -- the nests are held together by bird saliva, which gives it a unique texture. Since nests are high in nutrients, the soup is said to be the cure for what ails you. Besides boosting the immune system, it is also thought to help with digestion, sexual prowess, asthma, and concentration. This food is a rare and coveted Chinese delicacy. The picture below shows the plate of Bird's Nests Soup.

Plate 2.1: Bird's Nests Soup

Source: *(Accessed on 17th September 2012 at https://s-media-cache-ak0.pinimg.com/originals/a7/5d/75/a75d7510f07b041ddfbb301d3105a095.jpg*

2.12.1.2 Thousand-Year Old Egg

It does not actually take a thousand years to prepare the eggs, but it can take several months. It is known in Cantonese in Chinese as pei dan or in Mandarin Chinese as 'pi dan' (Deutsch et al 2012:188). To make this Chinese dish, duck or chicken eggs are preserved in clay and ash with

a mixture of salt, lime, and rice straw. When the process is complete, the yolk becomes a dark green substance with strong sulfur and ammonia smell and the egg whites turn dark brown and jelly-like. Plate 1.3 shows the 'Thousand-Year Old Egg.

Plate 2.2: A 'Thousand –Year Old Egg'

Source: http://cdn.history.com/sites/2/2014/03/hungry-history-unscrambling-the-thousand-year-egg-E.jpeg, Accessed on 27th July 2017)

2.12.1.3 Muktuk

Muktuk is an Eskimo dish of frozen whale skin and blubber that is usually made from the bowhead whale. It is traditionally eaten raw, though it can also be served diced, breaded, and deep fried or even pickled. Muktuk can be found all over Alaska's Inuit communities during the summer and fall whaling season. Plate 1.4 below shows Muktuk.

Plate 2.4: Muktuk

Source: http://s.orzzzz.com/news/70/97//54cb1a122629b.jpg, Accessed on 27th July 2017.

2.12.1.4 Tarantulas

Fried tarantulas are a delicacy in Cambodia and women walk around with large trays and sell sacks of spiders for just a dollar. Pull the legs off and eat two at a time. Not everyone eats the sack at the end, though. It holds the web as well as the heart and eggs and can be a bit chewy.

Plate 2.3: Tarantulas

Source: https://i.ytimg.com/vi/rYBwaj-51TA/maxresdefault.jpg (Accessed on 27th July 2017)

2.12.1.5 Drunken Shrimp (China)

Listed as one of the top ten cruelest dishes in mainland China, "drunken shrimp" is still very popular. Known as a bachelor's dream recipe, drunken shrimp is different type of fast food that can be prepared in just 30 seconds. Most often, the shrimps are eaten alive but sometimes they are first made to get drunk and then cooked in boiling water. Another recipe idea suggests that the shrimps should be marinated in Chinese white wine, known as Baijiu, after being boiled. Either way, eating such uncooked or semi-cooked shellfish could cause the serious food-borne parasitic infection *Paragonimiasis*. Still, it is considered as an incredibly tasty dish. The picture below shows a plate of Drunken Shrip.

Plate 2.5: Drunken Srimp

Source:

https://upload.wikimedia.org/wikipedia/commons/thumb/6/62/Drunken_shrimp_alive.jpg/1200px-Drunken_shrimp_alive.jpg, Accessed on 27th July 2017)

2.12.1.6 Ikizukuri (Japan) - *Live sashimi*

Ikizukuri means 'prepared alive' in Japanese and therefore freshness is the key for this Japanese food art - Shashimi - where live food is served in traditional decorative fashion. Certainly, it's a cruel practice and it needs a high level of skill to hit the fish on the head to stun and then fillet it. Fish Ikizukuri is often served garnished with lemon wedges, whereas small octopuses and squid are usually eaten whole, wrapped around a chopstick. The picture below shows a plate of Ikizukuri.

Plate 2.6: Japanese Ikizukuri

Source: https://upload.wikimedia.org/wikipedia/commons/thumb/4/4e/Ikizukuri.jpg/1200px-Ikizukuri.jpg, (Accessed on 27th July 2017)

2.12.1.7 Odori ebi

Odori ebi is a type of delicacy similar to shashimi in which baby shrimps, intoxicated by rice wine, are eaten alive while still jumping around and moving their legs. People who eat Odoriebi claim it to be very tasty. A picture of the Odoriebi is shown below;

Plate 2.7: Odori ebi

Source: http://all-that-is-interesting.com/wordpress/wp-content/uploads/2013/01/bizarre-seafood-sannakji-2.jpg, Accessed on 27th July 2017

2.12.1.8 Raw Oysters

Listed as 'best choice' on the seafood watch list, oysters are significantly closer to plants than animals. Like Casu Marzu, oysters are also believed to increase sexual desire and must be alive just before consumption. An excellent source of minerals and vitamins, oysters are a very popular food, especially in coastal areas. Oysters are often eaten raw on half the shell and are in high demand. But what if I tell you that they could cause a blood infection known as *Vibrio vulnificus septicemia*? In the U.S. alone, at least $120 million is invested every year on Vibrio vulnificus-caused illnesses or death. So for those who love to eat raw oysters, the best solution is to eat only post-harvest processed oysters. The source clearly says that 51% of people who get the Vibrio vulnificus infection will not survive. Also, 95% of deaths from seafood are caused by this bacterium. Best is to follow the slogan "boil it, cook it, peel it or forget it".

Plate 2.8: Raw oisters

Soure: http://i.ndtvimg.com/i/2015-08/oyster-625_625x350_61441016933.jpg, (Accessed on 27th July 2017)

2.12.1.9 Ying Yang Fish (China)

Another culturally sensitive food from China is Ying Yang fish, famously known as 'dead-and-alive-fish'. This dish is made up of a fish that is fresh and moves its head while its body is deep fried and covered with sweet and sour sauce. When you try to pick up the fresh meat dish, you will find the fish's mouth stirring and head still twitching. Originally from Taiwan, Ying Yang fish is now widely criticized and forbidden worldwide, but in China, people love to eat it. I really do not understand how someone could eat a fish in pain, with its eyes staring at you, while you are about to swallow its meat[9]. The picture above shows Ying Yang Fish.

Plate 2.9: Ying Yang Fish

Source:http://www.environmentalgraffiti.com/news-7-bizzare-habits-eating-food-while-animal-still-alive?image=11#sdBdsRrVpbX3RBBk.99, Accessed on 27th July 2017

2.12.1.10 A Dog Meat Platter in East of Hanoi

As stated earlier, humans can eat anything that is there in the food chain. Beef, pork, chicken, fish and seafood have become old fashioned food items. In Indonesia, people eat boiled bats seasoned with coconut cream. People are looking forward to trying something new and interesting. Eating dog, cat, tiger, horse and other pet animals is no longer challenging. Among the Frafras in the Upper East region of Ghana, dog meat is a delicacy as in many parts of the world.

Plate 2.10: Dog Meat

Source: http://cdn2.fella.com/2016/08/16114316/dog-elixir2.jpg, Accessed on 27th July 2017

2.12.1.11 Hákarl

Hákarl is a traditional food from Iceland. It is the rotten, 'fermented shark' meat of the Greenland shark. It is known to have a high concentration of ammonia which dominates the taste and a secondary but no less noticeable fishy flavour. It is often eaten with a shot of the local wine (Deustch and Murakhver (2012: 91). Hakarl is shown in the picture below

Plate 2.11: Hakarl

Source:https://johnhendersontravel.files.wordpress.com/2017/06/hakarl-drying.jpg?w=1024&h=683. Accessed on 27th July 2017

From a westerner's point of view, "though in prehistoric times, humans would have eaten animals alive, what we have seen so far makes us believe that perhaps we are traveling back in time. The practice of eating food that is alive may be quiet unnerving and unexpected for most modern cultures.

2.12.1.12 Frog Meat

Frogs are amphibians that live in rivers, swamps, marshlands and other damp climates, on all continents except Antartica (Deutsch and Murakhver, 2012:74). Edible species of frog include, the *Rana esculenta (Marsh frog), Rana ridibunda (and the Rana catesbeina (American bullfrog).* Frog meat is typically white, tender and slightly flaky, with a delicate taste and texture often described as similar to a cross between chicken and fish. The picture below shows a display of edible frogs.

Plate 1.12: Edible Frog

Source:

https://www.google.com.gh/search?hl=en&site=imghp&tbm=isch&source=hp&biw=1384&bih=791&q=Odo+Ebiri&oq=Odo+Ebiri&gs_l=img.12...1877.8798.0.14368.11.11.0.0.0.0.1457.3467.2-1j4j1j7-1.7.0....0...1.1.64.img..4.4.2505.0..0j35i39k1.BpS_kJAcO_s#hl=en&tbm=isch&q=Frog+meat+&imgdii=MsYEYgjf21fkLM:&imgrc=qIswQ1hlz6AODM Accessed on 27th July 2017

2.12.1.13 Tuo Zaafi (TZ) with Groundnut Soup (‘Kude na Akulonku be Epo’)

The white thick paste is known as the TZ while the brownish liquid in the white bowl is the groundnut soup. The two are eaten together even though the soup can be eaten alone. It is a

main and complete dish. The TZ itself is made from corn and cassava flour which is mixed and stirred in a pot of hot boiling water. The misture starts as porridge with continous stiring until the mixture turns into a sticky paste. The soup can be prepared during or before the TZ is prepared. But since it takes much longer to prepare the soup than the TZ itself most people will prepare the soup in advance. TZ is the staple food for most people in the northern parts of Ghana. Different grains are used by different cultures to prepare it. The Gonjas mostly use maize, guinea corn and cassava to prepare it. People in the Upper East and West regions instead prepare it with Millet. TZ and Groundnut soup are shown in two separate bowls below.

Plate 2.13: Tuo Zaafi (TZ) with Groundnut Soup

Source: Field Study, 2013

2.12.1.14 Fufu (Kapl in Gonja)

Fufu or *'kapl'* (in Gonja) is a staple food of most people in the northern part of the country. Here it is made mainly and soley from yam. In the southern parts of Ghana however, it is also a staple food for the Asantes, the Akyem, Bono and Fante peoples of the Akan ethnic group of Ghana and is eaten in Guinea as well. It is made by boiling starchy food crops like cassava, yams or plantains and then pounding them into a dough-like consistency. Fufu is eaten by

taking a small ball of it in one's fingers and then dipping into an accompanying soup or sauce. Foods made in this manner are known by different names in different places. Among Hausa communities in Northern Nigeria, it is known as **sakora**, among the Dagombas of Northern Ghana.

Plate 2.14: Fufu

Source: Field Study, 2013

2.12.1.15 Pigeon Peas (Cajanus Cajan)

Pigeon Peas Cajanus Cajan (or *aduwa* in Gonja) is a delicacy that is enjoyed by most people in the northern parts of Ghana. This variety of beans is well noted for its recalcitrant nature to cooking. It can take up to 6 hours to get well cooked. When well cooked, it is best enjoyed with shea butter oil and stir-fried onion pieces. Others also enjoy it with palm oil. This food is generally accepted to be an endangered food crop as less and less people are seen to be cultivating, cooking or trading in it.

Plate 2.15 Pigeon Peas (Aduwa)

Source: Field Research, 2013

2.12.1.16 Bambaran Beans (*'Aku'* in Gonja - **Vigna subterranea**)

Similar to Aduwa but larger in size is 'aku (bambabran beans - **Vigna subterranea**). But for its size and taste, aku, has almost all characteristics of Aduwa. It can take close to 6-7 hours to get the food well cooked. Onions are fried in shea butter oil and added to it to give it its traditional taste.

Plate 2.16: (‘Bambara Beans’ (Aku, in Gonja)

Source: Field Research, 2013

2.13 FOOD AND GENERATIONS

Diet or foods eaten around the world vary significantly in time and space over several millennia. Several factors including social, environmental, ecological and economic have accounted for this. Beginning from the age of our ancestors, an effort is made to review the dietary habits of changing generations.

These changes are not without implications. It is noted that “such changes have been largely responsible for the increase in diet related diseases such as diabetes, some cancers, and cardiovascular disease” (Millstone and Lang, 2008). Kiple and Ornelas (2000:11) concluded that “About 10,000 years ago, humans started changing the way they made a living as they began what would be a lengthy transition from foraging to farming . This transformation known as the Neolithic Revolution was actually comprised of many revolutions, taking place in different times and places that are often viewed collectively as the greatest of all human strides taken in the direction of progress. But such progress did not mean better health. On the

contrary, hunter-gatherers were, on the whole, considerably better nourished and much less troubled with illness than their farmer descendants."

In Summary, this nutritional transition has been characterised by (Millstone and Lang (2008:82)

a) A decline in consumption of traditional staple foods and other traditional food crops such as pulses and oilseeds

b) An increase in intake of fat, sugar, salt and often animal foods

c) An increase in alcohol consumption in non-islamic countries

d) An increase in the consumption of refined and processed foods

e) An overall reduction in dietary diversity.

Across the developed and developing countries, it has been observed that diets in developed industrial nations contain more animal based origins than foods in developing countries which are more plants based. Correspondingly, they contain more proteins, fats, sugar and energy than those in developing countries. In the Greater Accra region for instance, it has been found that fast food comprised globally recognized popular fast foods such as French fries, pizzas, and fried rice, and some traditional Ghanaian foods such as jollof rice, banku with tilapia, and kelewele. In total, 68% of restaurants in GAR were fast food restaurants. The cuisine concept enabled us to explore more fast food characteristics than what were done in previous studies. Omari et al, (2013)[10] concluded that "the availability of fast foods signals the need for more

[10] http://www.wageningenur.nl/fr/Publications.htm?publicationId=publication-way-343334363436 .

research to improve our understanding of their contribution to food security and their link with health, culture and environment. Rearcher is therefore encouraged to explore the cuisine concept and identify new significant research questions for advancing the field of food studies.

2.14 FOOD JUSTICE

The irony about world hunger is that "enough food is produced to feed everyone adequately, if it were to be shared uniformly. Some over-eat while others are malnourished. Technologically, the problems of food production has been solved but political, economic and social forces result in severely skewed patterns of production, distribution and consumption (Millstone and Lang, 2007:12). Most people in developing countries especially women and children suffer hunger and starvation due largely to a defective global agricultural and food system which prioritises profits over lives. Before proceeding with the details of world hunger and the food injustice literature, it is important to make an effort to define the highly context driven concept of hunger. Holben (undated: 3*)* gave varying conceptions and definitions of the term including "the uneasy or painful sensation caused by a lack of food" and "the recurrent and involuntary lack of access to food". What is certain about the concept of hunger and the various definitions advanced is that it is not only a physiological concept but also socio-economic. Other definitions of hunger from commonly-used conventional and electronic references include, but not limited to:

Webster's New World Pocket Dictionary (1997), which defined 'hunger' as 'need or craving for food;

a) Need for food, the uneasy sensation felt when one has not eaten for some time. A strong desire for something; to feel hunger (Oxford American Dictionary,1980);

b) Discomfort, illness, weakness, or pain caused by a prolonged, involuntary lack of food (Future Harvest Centers, 2004);

c) A desire or need for food; any appetite, strong desire, or craving (Dirckx, 2001); and

d) A sensation resulting from lack of food, characterized by dull or acute pain referred to the epigastrium or lower part of the chest (*Taber's Online*, 2005; Thomas, 1989). Usually, accompanied by weakness and an overwhelming desire to eat. Hunger pains coincide with powerful contractions of the stomach. Hunger is distinguished from appetite in that the latter is a pleasant sensation based on previous experience that causes one to seek food for the purpose of tasting and enjoying it". In as much as millions of people and organizations are interested in ending global hunger as enumerated below by Holben (undated: 20-24), there are relatively a smaller group of organized entities who benefit substantially from global hunger.

Debatably, beneficiaries of global hunger have put across a number of reasons supposedly responsible for the lack of enough food to feed most of the world's population. Lappe et al (1998) have given a comprehensive account of the arguments put forward for global hunger and in turn, provide arguments against this – calling them simple myths which have grown from 10 to 12 since the first edition of the book was published. In this review, the myths and the arguments against them have been presented in the same style that the authors presented

them, i.e, the myth and the argument against it. It is acknowledged also that much of the text in-here represent the exact arguments as they have been presented by the authors with and sometimes without quotations.

2.15 TWELVE MYTHS ABOUT WORLD HUNGER

Literature on the twelve myths of world hunger contains extensive quotation from Lappe et al (2012).

a) **Myth 1:** There is simply not enough food to go around: The argument is that the world's resources are too stretched to be able to produce adequate food and therefore, "unfortunately, some people will just have to go hungry".

The reality, in contrast is abundance, not scarcity, best describes the world's food supply. Enough wheat, rice and other grains are produced to provide every human being with 3,500 calories a day. That does not even count many other commonly eaten foods - vegetables, beans, nuts, root crops, fruits, grass-fed meats, and fish. Enough food is available to provide at least 4.3 pounds of food per person a day worldwide: two and half pounds of grain, beans and nuts, about a pound of fruits and vegetables, and nearly another pound of meat, milk and eggs-enough to make most people fat! The problem is that many people are too poor to buy readily available food. Even most "hungry countries" have enough food for all their people right now. Many are net exporters of food and other agricultural products (ibid, 2012).

b) **Myth 2:** Nature is to blame for hunger and famine: It is argued that natural disasters such as droughts, floods, and other events beyond human control are responsible for world hunger. Contrarily, human-made forces are making people increasingly vulnerable to nature's vagaries. Food is always available for those who can afford it—starvation during hard times hits only the poorest. Millions live on the brink of disaster in south Asia, Africa and elsewhere, because they are deprived of land by a powerful few, trapped in the unremitting grip of debt, or miserably paid. Natural events rarely explain deaths; they are simply the final push over the brink. Human institutions and policies determine who eats and who starves during hard times. Likewise, in America many homeless die from the cold every winter, yet ultimate responsibility does not lie with the weather. The real culprits are an economy that fails to offer everyone opportunities, and a society that places economic efficiency over compassion.

c) **Myth 3:** There are simply too many people in the world to feed: It is argued here that there are simply too many people on the planet than the resources can feed. With finite resources therefore, the only way out is to reduce population growth through several suggested methods such as contraceptive use, abortions, family planning.

In reality however, birth rates are falling rapidly worldwide as remaining regions of the Third World begin the demographic transition—when birth rates drop in response to an earlier decline in death rates. Although rapid population growth remains a serious concern in many countries, nowhere does population density explain hunger. Rather, there is abundant evidence that in most developing countries such as Nigeria and Brazil, abundant food resources coexist with hunger Millstone and Lang (2008). Costa Rica, with only half of Honduras' cropped acres per person, boasts a life expectancy—one

indicator of nutrition —11 years longer than that of Honduras and close to that of developed countries. Rapid population growth is not the root cause of hunger. Like hunger itself, it results from underlying inequities that deprive people, especially poor women, of economic opportunity and security. Rapid population growth and hunger are endemic to societies where land ownership, jobs, education, health care, and old age security are beyond the reach of most people. Those Third World societies with dramatically successful early and rapid reductions of population growth rates-China, Sri Lanka, Colombia, Cuba and the Indian state of Kerala-prove that the lives of the poor, especially poor women, must improve before they can choose to have fewer children. To substantiate this point, Millstone and Lang (2008:18) reported that "More than enough food is produced to feed everyone in the world, and yet more than 850 million people do not get enough food to lead active and healthy lives.

In 2005, the UN FAO estimated that the world's total production of cereals was about 2.2 billion tonnes. Divided equally between the 6.5 billion people living in the world, that would give each person approximately 340 kilograms of cereal a year – sufficient to provide at least 2000 calories of energy a day for everyone" (ibid: 2008:18). On the subject of hunger and food, much has been said and argued that the lack of food is neither a cause of hunger nor starvation. In his most popular writing on famines, Sen (1983) convinced many around the world that traditional analysis of famines is fundamentally defective, and the author develops an alternative analysis known as the entitlements approach to conclude that famines are as a result of a deprivation of people of the means of procuring food but not because there is not enough food to feed the world.

d) **Myth 4:** The Environment versus more food? The fourth myth is the argument that the pressure to feed the world's hungry people is destroying the very resources needed to grow food. The world must therefore choose to grow enough food at the expense of environmental quality or starve to save the environment.

Reality: We should be alarmed that an environmental crisis is undercutting our food-production resources, but a tradeoff between our environment and the world's need for food is not inevitable. Efforts to feed the hungry are not causing the environmental crisis. Large corporations are mainly responsible for deforestation-creating and profiting from developed-country consumer demand for tropical hardwoods and exotic or out-of-season food items. Most pesticides used in the Third World are applied to export crops, playing little role in feeding the hungry, while in the U.S. they are used to give a blemish-free cosmetic appearance to produce, with no improvement in nutritional value. Alternatives exist now and many more are possible. The success of organic farmers in the U.S. gives a glimpse of the possibilities. Cuba's recent success in overcoming a food crisis through self-reliance and sustainable, virtually pesticide-free agriculture is another good example. Indeed, environmentally sound agricultural alternatives can be more productive than environmentally destructive ones.

e) **Myth 5:** The Green revolution is the answer: It is argued that the miracle seeds of the green revolution hold the key to ending global hunger through guaranteed higher yields per unit area.

Reality: The production advances of the Green Revolution are no myth. Thanks to the new seeds, millions of tons more grain a year are being harvested. But focusing narrowly on increasing production cannot alleviate hunger because it fails to alter the tightly concentrated

distribution of economic power that determines who can buy the additional food. That's why in several of the biggest Green Revolution successes—India, Mexico, and the Philippines—grain production and in some cases, exports, have climbed, while hunger has persisted and the long-term productive capacity of the soil is degraded. Now we must fight the prospect of a 'New Green Revolution' based on biotechnology, which threatens to further accentuate inequality.

f) **Myth 6:** We need large farms, justice versus increased production: The demand for greater justice and fairness especially for small scale land owners who have lost and continue to lose their lands to multinational corporations has created yet another excuse for the defenders of world hunger. The argument is that with pressure to release land or to fairly distribute land, a dilemma occurs between releasing land to small scale poor farmers who allegedly do not have the know-how to increase production to large scale big growers who have the know-how. Since the latter cannot have access to adequate land for productive purposes, world hunger is inevitable. We either choose justice with empty stomachs or food without justice of land ownership for food production.

Reality: Large landowners who control most of the best land often leave much of it idle. Unjust farming systems leave farmland in the hands of the most inefficient producers. By contrast, small farmers typically achieve at least four to five times greater output per acre, in part because they work their land more intensively and use integrated, and often more sustainable, production systems. Without secure tenure, the many millions of tenant farmers in the Third World have little incentive to invest in land improvements, to rotate crops, or to leave land fallow for the sake of long-term soil fertility. Future food production is undermined. On the other hand, redistribution of land can favor production. Comprehensive land reform has markedly increased production in countries as diverse as Japan, Zimbabwe, and Taiwan. A

World Bank study of northeast Brazil estimates that redistributing farmland into smaller holdings would raise output to an astonishing 80 percent.

g) **Myth 7:** The free market can end hunger: The market should be left alone. Governments should not interfere with the free market. This way, the problem of hunger will be solved as the market will automatically allocate resources to where they are needed.

Reality: Unfortunately, such a "market-is-good, government-is-bad" formula can never help address the causes of hunger. Such a dogmatic stance misleads us that a society can opt for one or the other, when in fact every economy on earth combines the market and government in allocating resources and distributing goods and services. The market's marvelous efficiencies can only work to eliminate hunger, however, when purchasing power is widely dispersed.

So all those who believe in the usefulness of the market and the necessity of ending hunger must concentrate on promoting not the market, but the consumers! In this task, government has a vital role to play in countering the tendency toward economic concentration, through genuine tax, credit, and land reforms to disperse buying power toward the poor. Recent trends toward privatization and de-regulation are most definitely not the answer. Evidence abound that markets do fail and have never worked perfectly without government intervention the world over (Mandelbrot and Hudson, 2008; Bremmer, 2010).

h) **Myth 8:** Free trade is the answer: It is argued that if all countries obeyed free trade rules, the advantages associated with comparative advantage would lead to all countries benefiting and therefore leading to mass poverty reduction.

Reality: The trade promotion formula has proven an abject failure at alleviating hunger. In most Third World countries exports have boomed while hunger has continued unabated or actually worsened. While soybean exports boomed in Brazil to feed Japanese and European livestock hunger spread from one-third to two-thirds of the population. Where the majority of people have been made too poor to buy the food grown on their own country's soil, those who control productive resources will, not surprisingly, orient their production to more lucrative markets abroad. Export crop production squeezes out basic food production. Pro-trade policies like NAFTA and GATT pit working people in different countries against each other in a 'race to the bottom,' where the basis of competition is who will work for less, without adequate health coverage or minimum environmental standards.

i) **Myth 9:** Too hungry to fight for their rights: “If initiative for change must come from the poor, then the situation truly is hopeless. Beaten down and ignorant of the real forces oppressing them, poor people are conditioned into a state of passivity. They can hardly be expected to bring about change”.

Reality: Bombarded with images of poor people as weak and hungry, we lose sight of the obvious: for those with few resources, mere survival requires tremendous effort. If the poor were truly passive, few of them could even survive. Around the world, from the Zapatistas in Chiapas, Mexico, to the farmers' movement in India, wherever people are suffering needlessly, movements for change are underway. People will feed themselves, if allowed to do so. It is not our job to 'set things right' for others. Our responsibility is to remove the obstacles in their paths, obstacles often created by large corporations and U.S. government, World Bank and IMF policies.

j) **Myth 10: More U.S. aid will help the hungry;**-In the effort to end world hunger our primary responsibility as US citizens is to increase and improve our government's foreign aid.

Reality: Most U.S. aid works directly against the hungry. Foreign aid can only reinforce, not change, the status quo. Where governments answer only to elites, our aid not only fails to reach hungry people, it shores up the very forces working against them. Our aid is used to impose free trade and free market policies, to promote exports at the expense of food production, and to provide the armaments that repressive governments use to stay in power. Even emergency, or humanitarian aid, which makes up only five percent of the total, often ends up enriching American grain companies while failing to reach the hungry, and it can dangerously undercut local food production in the recipient country. It would be better to use our foreign aid budget for unconditional debt relief, as it is the foreign debt burden that forces most Third World countries to cut back on basic health, education and anti-poverty programs. In fact, Moyo (2010) emphasized that especially in Africa; millions of people are actually poorer because of aid. Rather, she argues that with access to capital and with the right policies, even the poorest nations can turn themselves around. First we must destroy the myth that aid works - and make charity history. In his book 'The White Man's Burden', Easterly, (2007) criticiqued the Western government and institutions' wrong approach to aid. He concluded that especially developing countries, this has resulted in so much ill than good.

k) **Myth 11:** We benefit from their poverty: "No matter how much Americans may think we would like to help end hunger, deep down, we know that hunger benefits us. This is because hungry people will work for lower wages, we can buy everything from them at lower prices".

Reality: The biggest threat to the well-being of the vast majority of Americans is not the advancement but the continued deprivation of the hungry. Low wages both abroad and in inner cities at home may mean cheaper bananas, shirts, computers and fast food for most Americans, but in other ways we pay heavily for hunger and poverty. Enforced poverty in the Third World jeopardizes U.S. jobs, wages and working conditions as corporations seek cheaper labor abroad. In a global economy, what American workers have achieved in employment, wage levels, and working conditions can be protected only when working people in every country are freed from economic desperation.

In the USA, policies like welfare reform throw more people into the job market than can be absorbed at below minimum wage levels in the case of 'workfare' which puts downward pressure on the wages of those on higher rungs of the employment ladder. The growing numbers of 'working poor' are those who have part or full-time low wage jobs yet cannot afford adequate nutrition or housing for their families. Educating ourselves about the common interests most Americans share with the poor in the Third World and at home allows us to be compassionate without sliding into pity. In working to clear the way for the poor to free themselves from economic oppression, we free ourselves as well.

l) **Myth 12:** Food or freedom? Curtail freedom to end hunger: Proponents of this position argue that for hunger to be eliminated it is clear that a society would have to undergo radical changes including critically, a curtailment of their freedoms. “A tradeoff between freedom and ending hunger is unfortunate, but it appears to be a fact of life. People have to choose one or the other” but not both.

Reality: There is no theoretical or practical reason why freedom, taken to mean civil liberties, should be incompatible with ending hunger. Surveying the globe, we see no correlation

between hunger and civil liberties. However, one narrow definition of freedom the right to unlimited accumulation of wealth-producing property and the right to use that property however one sees fit is in fundamental conflict with ending hunger. By contrast, a definition of freedom more consistent with our nation's dominant founding vision holds that economic security for all is the guarantor of our liberty. Such an understanding of freedom is essential to ending hunger.

2.16 FOOD SOVEREIGNTY, AN EXTENSIVE DISCUSSION

2.16.1 Food Sovereignty: The Origins and Definition

Usage of the concept of food sovereignty dates back to the mid 1990 as an umbrella term for particular approaches to tackling the problem of hunger and malnutrition as well as fostering rural development and sustainable livelihoods (Windfuhr et al, 2005). These approaches are mainly in opposition to the mainstream development paradigm built on liberalisation of international agricultural trade, trade based food security and the increase of productivity of industrial agriculture by well-resourced producers in the developed world. In fact, it is perceived and used by many as an alternative paradigm to neo-liberal globalisation and trade liberalisation.

The concept of food sovereignty was first brought to public debate in 1996 during the World Food Summit in Rome, by an association of small scale peasant farmers' movement known as La Via Campesina. The concept, according to Supan (2008) is an agricultural, environmental, and rural development policy framework. After several critiques and amendments to the concept, Via Campesina and the International Planning Committee in 2004 re-defined food sovereignty as;

'The right of individuals, communities, peoples and countries to define their own agricultural, labour, fishing, food and land policies, which are ecologically, socially, economically and culturally appropriate to their unique circumstances. It includes the true right to food and to produce food, which means that all people have the right to safe, nutritious and cultural appropriate food and to food-producing resources and the ability to sustain themselves and their societies" (Windfuhr, 2005 :12)

The amendment of the text to include 'individuals' was made to highlight that the right to food is recognized as a human right, which is also an individual right.

In the context of these definitions and redefinitions, the IPC isolated ten core elements of food sovereignty which are more comprehensive than originally presented by Via Campesina. These include;

a) Priority of local agricultural production to feed people locally;

b) Access of smallholder farmers, pastoralists, fisherfolk and landless people to land, water, seeds and livestock breeds and credit;

c) The right to food;

d) The right of smallholder farmers to produce food and a recognition of farmers' rights;

e) The right of consumers to decide what they consume, and how and by whom it is produced;

f) The right of countries to protect themselves from under-priced agricultural and food imports;

g) The need for agricultural prices to be linked to production costs and to stop all forms of dumping. Countries or unions of states are entitled to impose taxes on excessively cheap imports, if they commit themselves to using sustainable production methods and if they control production in their internal markets to avoid structural surpluses (supply management);

h) The populations' participation in agricultural policy decision-making;

i) The recognition of the rights of women farmers who play a major role in agricultural production in general and in food production in particular; and

j) Agroecology as a way not only to produce food but also to achieve sustainable livelihoods, living landscapes and environmental integrity.

2.16.2 The Food Sovereignty Declaration

Article 1 of the 13 Article Food Sovereignty declaration defined a peasant as "a man or woman of the land, who has a direct and special relationship with the land and nature through the production of food and/or other agricultural products. Peasants work the land themselves; rely above all on family labour and other small-scale forms of organizing labour. Peasants are traditionally embedded in their local communities and they take care of local landscapes and of agro-ecological systems". The declaration then outlined the following rights of peasants with regard to their food and agricultural systems;

Right to life and to an adequate standard of living, Right to land and territory, Right to seeds and traditional agricultural knowledge and practice, Right to means of agricultural production, Right to information and agriculture technology, Freedom to determine price and market for agricultural production, right to the protection of agriculture values, right to biological diversity, Right to preserve the environment, freedoms of association, opinion and expression, right to have access to justice, (La Via Campesina, 2001:64).

2.16.3 The Principles of Food Sovereignty

Via Campesina (2001) set out seven key principles to achieve food sovereignty as follows:

a) **Food as a Basic Human Right:** Food is a basic human right. Everyone must have access to safe, nutritious and culturally appropriate food in sufficient quantity and quality to maintain a healthy life with full human dignity. This requires nation-states to declare that access to food is a constitutional right and guarantee the development of the primary sector to ensure the concrete realisation of this fundamental right.

b) **Need for an Agrarian Reform:** A genuine agrarian reform is necessary which gives landless and farming people – especially women - ownership and control of the land they work. Indigenous peoples should have unfettered access to their lands for production purposes. To encourage young people to remain in rural communities as productive citizens, the work of producing food and caring for the land has to be sufficiently valued both economically and socially. Governments must make long-term

investments of public resources in the development of socially and ecologically appropriate rural infrastructure.

c) **Protecting Natural Resources.** Food sovereignty entails the sustainable care and use of natural resources especially land, water, and seeds. The people who work the land must have the right to practise sustainable management of natural resources and to preserve biological diversity. The patenting and commercialisation of genetic resources by private companies must be prohibited and the World Trade Organisation's Intellectual Property Rights Agreement should be stopped. Farming communities have the right to freely use and protect the diverse genetic resources, including seeds, which have been developed by them throughout history (Rocha and Liberato, 2013). The relevance of this argument cannot be over emphasised as Millar (1990:1) argues that the "treatment of Low-External-Input and Sustainable Agriculture (LEISA) as the brain-child of the Western world and for that matter a "New Breakthrough" with no or little due reference to the small farmer in, for example, northern Ghana is gross academic dishonesty". According to him, "the farmers did LEISA 50 years ago and would have been doing it more efficiently by now, had we not interfered with so called improved technology". This is yet another example of how globalization has complicated climate change and food sovereignty in even the most remote village of our time.

d) **Reorganising Food Trade:** In order to achieve food sovereignty, food must be seen first and foremost as a source of nutrition and only secondarily an item of trade. National agricultural policies must prioritise production for domestic consumption and food self-sufficiency before considering trade in food. Food imports should not displace local production nor depress prices through highly subsidized agriculture in the

developed world. This means that export dumping or subsidised export needs to be re-organized in such a way that it reflects the true cost of production. In Ghana for instance, there is a lot of hew and cry about the imports of cheap rice and poultry products into the Ghanaian market which has been reported to be negatively impacting local production of these food items.

e) **Ending the Globalisation of Hunger:** Food sovereignty is undermined by multilateral institutions and by speculative capital in their quest for supernormal profits. The growing control of multinational corporations over agricultural policies has been facilitated by the economic policies and conditionalities by the institutions of global governance namely the WTO, World Bank and the IMF (Stiglitz, 2002).

f) **Social Peace:** Everyone has the right to be free from violence. Food must not be used as a weapon to achieve selfish ends. Increasing levels of poverty and marginalisation in the countryside, along with the growing oppression of ethnic minorities and indigenous populations aggravate situations of injustice.

g) **Democratic control:** Going by the tenets of democracy in the context of food sovereignty, peasants and small farmers must have direct input into formulating agricultural policies at all levels and not just during political elections. Food and agricultural policy formulation should be participatory enough and preferably bottom up in character. At the higher level the United Nations and related organisations especially the World Trade organisation, the World Bank and the IMF will need to demonstrate responsible practice of openness and equity in the way these world bodies are managed.

2.16.4 The Challenges of the Concept

Proponents of the concept of food sovereignty argue that food sovereignty is one of the best approaches to ending global hunger and malnutrition. However, the concept is faced with fundamental and entrenched challenges first from the origins of its construction and primary stakeholders as poor people, secondly from the understanding and consensus on the concept, thirdly from the character of global economic and political powers of globalization and finally from the hows of its operationalization at local and country levels.

With regards to challenges confronting the achievement of food sovereignty, Supan (2008) developed four thesis to explain the nature and enormity of the challenges facing the realization of food sovereignty across developing countries. These have been built around four themes:

a) Local market and International Trade
b) Local Knowledge and technology
c) Access and Control over resources
d) Production Models

2.16.5 Local Market and International Trade; First Thesis

Article 8 of the food sovereignty declaration provides for the freedom of peasants to determine price and market for their agricultural production. From this rights perspective to the principles of food sovereignty, the concept supports bringing food providers and consumers closer together; puts providers and consumers at the centre of decision-making on food issues; protects food providers from the dumping of food and food aid in local markets; protects consumers from poor quality and unhealthy food, inappropriate food aid and food tainted with genetically modified organisms and rejects governance structures, agreements and practices

that depend on and promote unsustainable and inequitable international trade and give power to remote and unaccountable corporations. There is therefore a conflict of interest between proponents of food sovereignty and those of international trade. Consequently, trade liberalization rules view the realization of food security, rural development, and livelihoods as policies that are subordinate to the rules that facilitate exports. In turn, in a food sovereignty framework, trade rules are subordinate to such policies among other food sovereignty objectives. This therefore presents challenge number one to the achievement of food sovereignty. It is also argued that the practices of the WTO with support from the World Bank, the FAO and the IMF may not give way to any fair global food regime The Food and Agriculture Organization's (FAO) even projects further increases in food imports by developing countries (Supan, 2008:112). This projection buttresses the fact that for the past 15 years, commercial food imports and food aid constitute 4.7% of total food needs in Ghana (FAO, 2004:5-7). This challenge is therefore applicable in the Ghanaian situation and hence the need for this study. Fundamental to this challenge in his conclusion is that "only governments—not NGOs—can initiate the WTO trade dispute settlement system to seek redress for this unfair and destabilizing business practice" (Supan, 2008: 114).

2.16.6 Local Knowledge and Technology: Second Thesis

Against peasant's rights to own and obtain impartial and balanced information about capital, market, policies, prices and technology, there is little evidence according to Supan (2008), in the Doha Agenda, the bilateral trade and investment agreements, or in trade-related capacity building projects of efforts to ensure that local knowledge, technology, resources, and producers will drive agricultural research and development. To worsen this situation, there appears to be intellectual theft of agricultural knowledge and technology of peasants. Genetic

engineering of plant and animal species and unethical patenting all fall under this challenge. This state of the art or uneven playing ground of agricultural knowledge and technology directly threatens the potency of local farmers' adaptation to climate and globalization. It is also at odds with peasant farmer's right to seeds and traditional agricultural knowledge and practice as declared by Via Campesina in article 5 of the food sovereignty declaration.

2.16.7 Access and Control over Resources: Third Thesis

Some of the key resources to sustainable food and agricultural development which the food sovereignty declaration sets out for peasants include the rights to; land and territory, knowledge and agricultural technology, the right to determine price and market for agricultural production, preserve the environment, the right to biological diversity, the right to protect agricultural values in ways consistent with peasants culture and the right to the means of agricultural production including the right to obtain funds from the State to develop agriculture. However, Supan, (2008) argues that the technological fixes of the Second Green Revolution, if they entail expropriation, privatization, and patenting of community resources, will greatly reduce, rather than expand, access to resources. The expansion in donor supported, export oriented commercial agricultural production in developing countries damage the environment, contribute to global warming and distorts world prices for agricultural products further limiting access to food and threatening the survival of peasant farmers.

2.16.8 Production Models: Fourth Thesis:

Since Malthus's theory of the possibility of population growth outstripping food production, global agriculture has witnessed a tremendous revolution in terms of the efforts to produce more using less inputs, thus efficiency. This has resulted in several technologies whose

application cut across agricultural inputs such as land, seeds, knowledge, water, air, labour and so on. The most popular naming of these efforts which blends technology and industrialization is the green revolution which has been very successful in some parts of the world at a severe cost to others especially developing countries. It is argued that the so-called efficiency of industrialized agriculture depends on externalizing core environmental, public health, and social costs from prices and on taxpayer subsidies to compensate for farm gate prices that are below the cost of production. A production system that continues to count depletion of natural capital as economic growth cannot be made "green" through a technology fix (Supan, 2008). This approach to agricultural development continues to perceive as outmoded and inefficient, indigenous forms of food and agricultural production by small scale farmers. This therefore leaves several legitimate questions on the ability of peasants to produce the needed quantities and qualities of food needed by the world's populations.

Another challenge to the food sovereignty concept is the absence of an operational legal instrument to back the principles and objectives of the concept. Though the five policy proposals appear comprehensive enough to ensure food sovereignty to a greater extent, how to get these proposals fully and unconditionally approved by the appropriate institutions and bodies is highly questionable.

Last but not the least, food crises and emergency food needs are yet another critical challenge to the concept. This is based on concerns as to whether the methods and ways of peasant farmers can produce enough to meet the needs of peasant people with adequate reserves to handle unplanned human and natural disasters such as floods.

2.16.9 Key Policy Issues

At the global level about six concrete policy proposals have been made to achieve food sovereignty.

A Code of Conduct on the human Right to Food. The purpose of this is to govern the activities of those involved in achieving the right to food, including national and international institutions as well as private actors, such as transnational corporations.

An **International Convention on Food Sovereignty** that replaces the current Agreement on Agriculture (AoA) and relevant clauses from other WTO agreements. These include TRIPs, the General Agreement on Trade in Services (GATS), the Agreement on Sanitary and Phytosanitary Measures (SPS), Technical Barriers to Trade (TBT), and the Agreement on Subsidies and Countervailing Measures (SCM).

A **World Commission on Sustainable Agriculture and Food Sovereignty was** established to undertake a comprehensive assessment of the impacts of trade liberalization on Food Sovereignty and security, and develop proposals for change. These would include the agreements and rules within the WTO and other regional and international trade regimes, and the economic policies promoted by international financial institutions (IFIs) and multilateral development banks. Such a commission could be made up of and directed by representatives from various social and cultural groups, peoples' movements, professional institutions, democratically elected representatives and appropriate multilateral institutions.

A **reformed and strengthened United Nations** (UN), active and committed to protecting the fundamental rights of all peoples, as being the appropriate forum to develop and negotiate rules

for sustainable production and fair trade. Several major conventions and treaties have been developed by the United Nations or their subsidiary bodies, such as the International Treaty on Plant Genetic Resources for Food and Agriculture, developed under the FAO in harmony with the Convention on Biological Diversity.

An **independent dispute settlement mechanism** integrated within an International Court of Justice, especially to prevent dumping and, for example, GMOs in food aid. An international, legally binding ***treaty*** that defines the rights of smallholder farmers to the assets, resources, and legal protections they need to be able to exercise their right to produce. Such a treaty could be framed within the UN Human Rights framework, and be linked to already existing relevant UN conventions.

As noted earlier, the global stage will remain one of the most problematic and most difficult to deal with by proponents of food sovereignty. Already, it is reported that while the first instrument has been followed up since 1996, the second was ignored for several years (Windfurh et al (2005:11). Prematurely, if the four global level policy proposals are achieved, then food sovereignty stands a greater chance of becoming the long awaited alternative to neo-liberalism especially in developing countries.

2.16.10 Food and Nutritional Security and Sovereingty in Africa

Any discussion on availability, access, quality and utilization of food cannot be complete without a discussion of the two main current debates on food; food security and food sovereignty especially in Africa. In a paper delivered by Millar, (2013) the following questions remain critical to the debate on food in Africa.

a) Is there a one African Agriculture? No! There is no ONE African Agriculture but a multiplicity of Agricultural expressions in Africa that cover a continuum but with expressions that allow for some categorizations.

b) Is current attention to assist Africa in her agricultural development "Food First"? No! The current focus is rather foods for MARKETS rather than FOODS FOR FEEDING.

c) Does African have a focus on her own Endogenous Agricultural Development based on her indigenous knowledges? No! African relies on Donor-driven initiatives that depend on external knowledge.

In the context of rapidly increasing urbanizationin Africa, food provisioning and food sovereignty are very important. At a time when most people live and work in urban environments, feeding Africa's cities challenges the current food supply and production patterns. Feeding African cities also challenges the way in which policy makers and other key actors perceive the rural vis-à-vis the urban. Traditionally, the rural has been seen as a provider of services for the urban area, where as food policies have largely been addressed from the angle of large-scale production of major selected staples. Analysis are based on a value chain approach that perceives food also as socio-culturally and spiritually constructed phenomenon by different actors (ibid, 2013).

5.6.1 Hunger and Food Production in Africa

Quoting extensively from the Africa Progress Report (2011) (of the Africa Progress Panel Chaired by Kofi Anan the following positions emerge for discussion).

The Report recognises the fact that several African countries are on the verge of meeting their MDG targets for hunger reduction. This notwithstanding the continent as a whole continues to be the world's most food-insecure region. Hunger and malnutrition remain pervasive in many countries, and rising food prices are compounding the situation for millions across the continent, particularly in zones of protracted conflict and in fast-growing urban areas. The position is also taken that Agricultural productivity is also affected by social realities such as persistent poverty and insufficient access of women to land and other essential resources.For the Volatility of Food Prices: the report states that:

a) Food prices are higher now than at any time since 1984.

b) Meanwhile the World Bank's Food Price Watch sees Sub-Saharan Africa less exposed to risks of soaring food prices.

c) The domestic food production is increasingly replacing imports and recent harvests have been good.

d) On the micro level, higher prices make life even more difficult for Africa's poorest, who already spend between 60 to 80 per cent of their income on food.

e) Faced with reduced access to food and increased vulnerability to the seasonality of local food prices and markets, households are forced into unavoidable compromises, such as choosing cheaper (often less nutritious) food, selling productive assets, withdrawing children from school, forgoing healthcare, or simply eating less than they need.

5.6.2 Structural Barriers to Food Security

The report enumerates the barriers to food security as follows:

a) Disadvantageous international trade rules and subsidy regimes;

b) A debilitating lack of essential infrastructure such as irrigation and storage systems; inadequate agricultural research;

c) A lack of improved seeds, fertilizers, and plant protection material;

d) Poor soil and water management systems; poor access to credit and marketing services;

e) As well as inefficient and wasteful agricultural value chains.

These structural barriers are increasingly compounded by global trends. In the short-term, the gap between the continent's domestic food supply and demand will widen as global consumption patterns continue to shift towards meat products, and more profitable bio-fuels supplant food crops. These successes remain too small to feed the continent. Global food production will have to increase by 70 per cent over the next 40 years to keep pace with population growth, and a significant part of that increase will have to come from Africa.

2.16.11 Food and Agricultural Policy in Ghana

Within the context and frameworks of the Growth and Poverty Reduction Strategy (GPRS II), the Comprehensive Africa Agriculture Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) the vision of Ghana's Food and Agricultural Sector Development Policy (FASDEP II) is "a modernized agriculture culminating in a structurally transformed economy and evident in food security, employment opportunities and

reduced poverty". Within this framework and vision, the new direction for Ghana's food and agricultural policy, according to the FASDEP includes targeting a few communities for support, adoption of a value chain approach to agricultural development with value addition and market access given more attention. Efforts will also be intensified to build capacity towards meeting challenges of quality standards in the international market, with focus on increasing productivity along the value chain. While imports will not be controlled by quotas and tariffs, the use of standards to control imports of poor quality produce will be pursued. Attention will be given to improving standards in local markets and for food safety (MoFA, 2007). Medium to short term priorities include:

a) Targeting selected commodities for food security and for income diversification, based on comparative and competitive advantage, and sustainable land management and environmental practices.

b) A major research effort to promote the commercialization and linkage to industry of selected indigenous agricultural commodities as a strategy for poverty reduction;

c) Stronger partnerships between MDAs and private sector for improved response to the sector policies will be pursued;

e) For harmonization of interventions to improve coordination among donor funded projects, and consistency of the projects within the sector, the Government and her development Partners have committed to a new partnership framework as embodied in the sector –wide approaches (SWAp);

f) Integrate elements on sustainable natural resource use. The food and agriculture sector policy priorities of Ghana are as follows;

1. Food security and emergency preparedness
2. Improved growth in incomes
3. Increased competitiveness and enhanced integration into domestic and international markets
4. Sustainable management of land and environment
5. Science and Technology Applied in food and agriculture development
6. Improved Institutional Coordination

The policy listed two key challenges confronting the development of agricultural exports in the country;

a) Limited capacity of exporters to meet export volumes; and

b) Limited skills and knowledge of agricultural operators to meet the requirements of external markets, contributing to high rate of rejection of exports.

In response, some of the stated strategies to address these include efforts to "Promote good agricultural practices, particularly for meeting sanitary and phytosanitary requirements of importing countries" (FASDEP, 2007:1-29). This policy commitment buttresses the research problem under investigation. Thus, Sanitary and Phytosanitary measures, also known as the SPS Agreement, are part of the WTOs Agreement on the Application of Sanitary and Phytosanitary measures which was negotiated during the Uruguay Round of the General Agreement on Tariffs and Trade, and entered into force with the establishment of the WTO at the beginning of 1995. While further investigation will be conducted in this regard, this policy provision already presents a formidable challenge to the achievement of food sovereignty objectives in Ghana.

From the above, it can be discerned that setting the vision, goal and objectives of ECOWAP against Ghana's FASDEP II, it will be difficult to accept the statement that "The objectives for agricultural development in Ghana, as outlined below, are consistent with these regional and sub-regional development initiatives, especially in relation to food security" (Ibid, 2007: 1-29)

2.17 CONCEPTUAL FRAMEWORK

The key conceptual frameworks of the study include the Right to Food, Food Security, Food Sovereignty, Globalization, Indigenous Knowledge, slow and fast food, food as commodity, food as a weapon, multifunctional Agriculture, organic farming and Green Revolution.

Writing on the importance of food to existence, Bellasco (2008:2-3) explained that "Food is the first of the essentials of life, the world's largest industry, our most frequently indulged pleasure, the core of our most intimate social relationships. It is very hard to imagine a positive social experience that does not involve the sharing of food whether a simple cap of tea with an acquaintance, a lunchtime "bite" with colleagues or a sumptuous lobster dinner with a lover. On a broader level, civilisation itself is impossible without food. Food identifies who we are, where we came from, and what we want to be. Food reveals our souls. Food is a highly condensed social fact. Food is also the object of major anxiety, for what and how we eat may be the single most important cause of disease and death. For much of history, the search for sufficient food drove the conquest and colonization of continents- and the enslavement or eradication of entire populations".

Notwithstanding this, food is one of the areas that have suffered a fundamental setback in academia. Food scholarship has also been hindered by the concept of separate spheres which

assigns the private sphere of consumption to females and public sphere of production to males. This ideological polarization certainly influenced the development of middle class academia, for it effectively segregated women professionals in less valued "domestic" disciplines such as social work, nutrition and nursing and male dominated realms of industrial agriculture, food technology which have generally received more public respect and academic prestige". Over the years, concerns over access to quality food and agriculture has generated a lot of thinking and debate which have resulted in diverse concepts and propositions on how food and agricultural systems should operate from the local level to the global stage to ensure the availability of adequate food to all peoples' of the world. What is certain about these concepts is that they all have a bias depending on their origins which range from global institutions such the UN Agencies, Non Governmental organizations, Civil Society Organizations and Smallholder farmer groups. The so-called socially oriented arms of the UN such as the WHO and FAO are associated with the rights based approaches while the capitalist oriented ones like the World Bank, the WTO and the IMF are behind the market oriented approaches and concepts such as food security. Civil society and peasant farmers are for fundamental human rights, protectionist and indigenous peoples' perspective such as food sovereignty. Governments have usually been torn between national interests and global agreements and pressures. The three concepts have several differences and similarities which identifies them in their uniqueness.

2.17.1 The Right to Food

The oldest food and agricultural policy is probably the 'Right to Food', which was recognized in the Universal Declaration of Human Rights in 1948. Article 25 of the declaration says that "Everyone has the right to a standard of living adequate for the health and well-being of

himself and of his family, including food". This right was later clarified in the International Covenant on Economic, Social and Cultural Rights adopted in 1966 and which took effect in 1976 stating that, "The States Parties to the present Covenant recognize the right of everyone to an adequate standard of living… including adequate food,… The States Parties will take appropriate steps to ensure the realization of this right". (Articles of all the theories and concepts related to food and agriculture, the right to food was the first to be proclaimed and brought to public debate. It is also included in the International Covenant on Economic, Social and Cultural Rights of 1976. The right to food is, therefore, an integral component of human rights. Since it is in the category of a human right rather than being a political concept, it has a different character to food security and Food Sovereignty. As a human right, it implies that an individual can require the state and the communities of states to respect, protect and fulfil their needs for appropriate access to sufficient food of an acceptable quality (FAO, 2004; Quaye et al, 2009). The right to food provides for individual entitlements and related state obligations, which are to be enshrined in national and international law. In that sense, the right to food empowers oppressed communities and individuals against the state and other powerful actors.

In 1948, the United Nations Declared under article 25 of its Human Rights Declaration that "everyone has the right to a standard of living adequate for the health and wellbeing of himself and his family including food".

2.17.2 Organic Farming

Organic farming involves using techniques to achieve good crop yields without harming the natural environment or the people who live and work in it. Organic farming works in harmony with nature rather than against it (The Organic Organization, 1998). As much as possible,

organic farming makes use of locally available inputs as opposed to reliance on external inputs. Against the criticism that organic farming is primitive, organic farming does not mean going 'back' to traditional methods. Many of the farming methods used in the past are still useful today and in fact being advocated by many environmentalists. Organic farming combines local indigenous knowledge with the best available scientific knowledge. Organic farmers do not leave their farms to be taken over by nature; they use all the knowledge, techniques and materials available to work with nature. In this way, the farmer creates a healthy balance between nature and farming, where crops and animals can grow and thrive.

2.17.3 Green Revolution

The conclusion in 1967 by the US President's Science Advisory Committee that "the scale, severity and duration of the world food problem are so great that a massive, long-range, innovative effort unprecedented in human history will be required to master it" marked the beginning of an era coined in 1968 by the Administrator of U.S. Agency for International Development (USAID) William S. Gaud as the "Green Revolution". This era was marked by significant scientific breeding of improved varieties of rice and wheat in particular, extensive use of fertilizers and other chemical inputs and irrigation with the objective of increasing yields and for that matter food supply to solve global hunger. Physically stronger, nutrient responsive, disease, pest and heat resistant and above all, early maturing crop varieties were developed under the microscope (International Food Policy Research Institute - IFPRI, 2002:1). Undoubtedly, global yields of rice and wheat in particular were reported to have more than doubled in the 1970s. The basic question that remained is; did the increase in global food supply reduce global hunger? Rosset (2000:2) writes that "despite three decades of rapidly expanding global food supplies, there are still an estimated 786 million hungry people in the

world in the 1990s" with most of these people living in Africa and Asia. Additional environmental degradation manifesting in poor soil fertility is one of the legacies of the green revolution notwithstanding some of its legitimate achievements though. It is acknowledged that more literature has not been fully explored in relation to the Green Revolution.

2.17.4 Multifunctional Agriculture

The multifunctionality concept in agriculture offers yet another hope for indigenous food science in northern Ghana. The concept refers to the multiple services or functions that agriculture provides to the society beyond the immediate production function model of the west. These functions include environmental services, cultural and spiritual services, social services, religious / aesthetic services (Groenfeldt, 2006). The usefulness of the concept also stems from the value addition of these multiple functions. There are some indigenous cultural /spiritual food practices which enhance environmental quality and consequently enhance the availability of quality food for people. The concept therefore underscores the relevance of indigenous realities of the social, spiritual and natural worlds. This position is re-enforced by indigenous farm communities' perspectives that "our resources (*including food*) are for the living, the dead and the yet unborn" Millar (2003:19). The multifunctionality concept in agriculture therefore offers a closer approximation to indigenous people's concept of food. Further detail is however needed to specify what exactly it is that indigenous peoples, especially in northern Ghana want to name, in their preferred vocabulary, as their ultimate 'comfort zone' in food and agriculture.

As one of the central concerns of the study, the threat to indigenous crop varieties in northern Ghana is rife. In 2007, under the Threatened Indigenous Crop Varieties Project (TICOVAP),

the Langmaal Centre for Rural Development Initiatives (LACERD), a Non-Governmental Organization in the Lawra District of the Upper West region promoted the cultivation of 7 indigenous crop varieties. One of their conclusions was that "Family food security can be improved between 10-20% through the production of indigenous crops in combination with the adoption of traditional agricultural practices" (COMPAS and Centre for Indigenous Knowledge and Organizational Development (CIKOD, 2007)

2.17.5 Low External Input and Sustainable Agriculture (LEISA)

As already discussed, the green revolution came with definite successes and obvious challenges. Environmental degradation, poor soil fertility, extinct crop varieties are among some of the challenges of the revolution. The negative effects of the green revolution led to new initiatives that have sought to address its failures and problems. Instead of substituting local resources and local knowledge with outside inputs and knowledge, complementarity between local knowledge and outside knowledge have been sought. Examples of successful LEISA practices according to Millar and Haverkort (2000), include; agro-forestry, soil and water harvesting, use of local plant varieties, and unconventional animals and plants, botanical pesticides, integrated pest management, micro-climate management, ethno-veterinary and local health practices.

Food and agriculture, probably one of the oldest human encounter with nature and the most researched domains of human existence and experience is at the same time one of the most contextually misunderstood and deficiently theorised by 'popular' western knowledge and science. Unfortunately, most if not all of conceptualization, theorizing, analysis and policy making about food, food production, distribution, marketing, consumption and disposal have been and continue to be done through the lenses of dominant, oppressive western science.

What is, and what is not about food are all shaped and designed by western science, and its associated institutions[11]. Informed by their worldviews and value systems, academics, governments, donors, development partners and multilateral and bilateral agencies have conceptualised, analysed, 'publicised' and practicalised food in ways that have arguably created more problems than solutions with regard to food in most developing countries.

At this stage, while an effort will be made to explain from existing literature the idea or meaning of food, as a completely indigenous knowledge compliant research, the researcher considers it premature, ethically incorrect and intellectually deceptive to try to give a definition of food before interacting with the original knowledge owners on the subject.

2.17.6 Food as a 'Commodity'

From a western scientific worldview, food is simply defined as "any substance consumed to provide nutritional support for the body". It is usually of plant or animal origin, and contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals. The substance is ingested by an organism and assimilated by the organism's cells in an effort to produce energy, maintain life, or stimulate growth (Bender, 2009). According to the Encyclopedia Britannica;

[11]Food safety and food security are monitored by agencies like the International Association for Food Protection, World Resources Institute, World Food Programme, Food and Agriculture Organization, and International Food Information Council. They address issues such as sustainability, biological diversity, climate change, nutritional economics, population growth, water supply, and access to food.

food is "material consisting essentially of protein, carbohydrate, and fat used in the body of an organism to sustain growth, repair, and vital processes and to furnish energy"[12] This definition obviously cannot be representative of global worldviews about food because among the people of the Mantaro Valley of the Andes for example, food is consumed in order to preserve the health of the people as well as the land and the animals. Additionally, "food is used in rituals and festivities in order to preserve the health of Pachamama or Mother Nature (Zambrano and Miranda, 2000). Therefore, the presentation and definition of food as any substance that supports and nourishes the body alone cannot be generalised to be the only truth about food in the world.

Clearly, the historical fact that people secured food through two methods, thus, hunting and gathering, and agriculture seem to be losing connection with modern agriculture. Today, most of the food consumed by the world population is supplied by the food industry, which is operated and directed by multinational corporations that use intensive farming and industrial agriculture to maximize system output and profit at the expense, of many hungry people around the world.

In contrast to the highly mechanistic, linear food production, distribution, and consumption model applied in the industrialized food system, indigenous food systems are best described in ecological rather than neoclassical economic terms. In this context, an indigenous food is "one that has been primarily cultivated, taken care of, harvested, prepared, preserved, shared, or

[12] http://www.britannica.com/EBchecked/topic/212568/food.

traded within the boundaries of our respective territories based on values of interdependency, respect, reciprocity, and ecological sensibility". As the most intimate way in which indigenous peoples interact with our environment, indigenous food systems are in turn maintained through our active participation in traditional land and food systems[13].

This is what Pretty (2002) and Pilgrim and Pretty, (2010) envisage as the new form of production and consumption founded on more ecological principles and in harmony with the cultures, knowledges, and collective capacities of the producers themselves. For a more sustainable and meaningful food and agriculture, the relationships, linkages and interdependencies between nature, people, land, culture and biological diversities need to be respected, preserved and cared for. While Pretty and Pilgrim's argument are quite valid in terms of the biocultural diversity of agriculture, it must be noted that the harmonization of production and consumption with ecological principles, cultures and knowledges should not be regarded as new.

Away from the scientific, laboratory level of fidgeting with food and agriculture in the west (known as genetic engineering) is the institutional and regulative framework that dictates the direction and pace of food and agriculture around the world. The fate of the world's food, agriculture and farmers are under the mercy of unethical neoliberal economics engineered by the Bretton Woods' institutions under the leadership of the World Trade Organization with direct and indirect funding by multinational food and food related companies working tirelessly

[13] http://www.indigenousfoodsystems.org/ 21-02-12)

and insatiably on profit making at the expense of human lives. What is at stake according Rosset (2006) is the very future of our global food system and of each country's agricultural and farming systems. The livelihoods of rural people in both industrial but more especially developing countries are under threat. Food is not just another commodity, but something which goes to the heart of human livelihood, culture and security. Rosset proposed an alternative vision for global agricultural policy which suggests taking agriculture completely out of the WTO's ambit. The challenge with Rosset's suggestion or desire though is the power relations that surround the institutions of global governance of which the WTO is one. Developing countries and their institutions especially the South Centre has done quite a lot in this direction. It is necessary therefore to engage, with different strategies these western institutions in order to secure the food and agricultural future of indigenous people.

Reviewers of Magdoff and Tokar's work on Agriculture and Food in Crisis; Conflict, Resistance, and Renewal, summed it all when they wrote that: "The failures of "free-market" capitalism are perhaps nowhere more evident than in the production and distribution of food. Although modern human societies have attained unprecedented levels of wealth, a significant amount of the world's population continues to suffer from hunger or food insecurity on a daily basis. In Agriculture and Food in Crisis, Magdoff and Tokar (2010) have assembled an exceptional collection of scholars from around the world to explore this frightening long-term trend in food production. Agricultural production is shaped by a system that is oriented around the creation of profit above all else, with food as nothing but an afterthought. As the authors make clear, it is technically possible to feed the world's people, but it is not possible to do so as long as capitalism exists. Toward that end, they examine what can be, and is being, done to create a human-centered and ecologically sound system of food production, from sustainable

agriculture and organic farming on a large scale to movements for radical land reform and national food sovereignty" (Magdoff and Tokar, 2010)

2.17.7 'Slow' and 'Fast' Food

Slow food is one of the reactionary strategies to the proliferation of western industrial food and agricutural practices. The concept started in the 1970s in the town of Bra in the Langhe area of Piedmont, Italy. Slow food emerged as an alternative model to the industrializing food sector by building on natural resources, culture and social capital. The name was evoked by a protest following the opening of the first McDonal restaurant close to the Spanish Stairs in Rome in 1985 (Van Der Muelen, 2008). Slow food is a struggle for clean, good and fair food.

The model was inspired by a critical view of global trends in society such as the proliferation of 'fast food' restaurants which is catching up strongly with all nations and almost every corner of the country side including Ghana. In Ghana, the emergence of giant fast food restaurants such as Frankies, Papaye, Boun Jour and Kentucky Fried Chicken (KFC) in Accra only confirms and mothers the numerous fast food restaurants dotted everywhere in Ghana. In northern Ghana, the trend is the same if not even worse. One of the critical concerns about these fast food restaurants are that they cook and serve only a limited selection of foods. These includes; Banku, Rice, Fufu, red red (fried plaintain and beans), rice balls and a few others. There are three key challenges presented by this practise, 1) Because they create a stable demand for these food items, farmers are swayed to the production of these crops to the neglect of other indigenous varieties thereby endangering those varieties, 2) These foods capture the taste of the consuming public against other indigenous varieties. 3) They simply just marginalise indigenous food varieties (slow food) through dominance.

At the international stage, slow food is faced with two major challenges, namely;

a) Whether small scale local food production systems can solve global food problems at hand and

b) The friction that slow food's origin in the Langhe area causes between the emerging local gastronomy cluster which it helped to develop and the movement's drive to proliferate its comparative advantage through the world.

My reaction to the first dilemma though is that, why do we need to worry about the global food problem? After all, the diverse local foods form the global. So, if they have no problem then there is no global food worry.

It is acknowledged that rapid urbanization and the time pressures of city life seem to have added to the emergence and proliferation offats food restaurants. Factors shuch as climate change and environmental degradation have also contributed to poor access to household energy which compels many to adopt to the global fast food culture to avoid the drudgery involved in the preparation of some indigenous foods. It is worthy of note however, a the identity of particular food diet does not ceaize to be indigenous if it becomes universalized. It remains indigenous to the pople of the origin society but foreing to the society in which it was introduced.

2.17.8 Food as Weapon

The use of food as a weapon of war is one of the consequences of the globalization of food and agriculture and the political economy of large scale industrial agriculture (Lee, undated).

Destroying farmland and food crops are among the oldest uses of food as a weapon. Destruction of farms, crops, and food supplies is a tactic of warfare between nations and civilizations. As the processing and distribution of food become more complex and far-flung, people dependent upon others for their food supply are vulnerable to malnutrition and starvation, and to food-borne poisoning or infection.

There is an important question of where the idea of using food as a powerful weapon originated? In 1974, the idea of using food as a weapon was introduced in a 200-page report[14] by politician Henry Kissinger. The report, entitled National Security Study Memorandum 200: Implications of Worldwide Population Growth for U.S. Security and Overseas Interests, stated that food aid would be withheld from developing countries in need until they submitted to birth control policies that would effectively sterilize large numbers of the population to curb growth.

The document states: "There is also some established precedent for taking account of family planning performance in appraisal of assistance requirements by AID [U.S. Agency for International Development] and consultative groups. Since population growth is a major determinant of increases in food demand, allocation of scarce resources should take account of what steps a country is taking in population control as well as food production. In these sensitive relations, however, it is important in style as well as substance to avoid the appearance of coercion."

[14] http://wlym.com/text/NSSM200.htm

These aside, the following recommendations of the report among other things have significantly contributed to the phenomenon:

a) High priority for U.S. bilateral and multilateral LDC Agricultural Assistance

b) Expansion of production of the input elements of food production (i.e., fertilizer, availability of water and high yield seed stocks) and increased incentives for expanded agricultural productivity. In this context a reduction in the real cost of energy (especially fuel) either through expansion in availability through new sources or decline in the relative price of oil or both would be of great importance;

c) Significant expansion of U.S. and other producer country food crops within the context of a liberalized and efficient world trade system that will assure food availability to the LDCs in case of severe shortage. New international trade arrangements for agricultural products, open enough to permit maximum production by efficient producers and flexible enough to dampen wide price fluctuations in years when weather conditions result in either significant shortfalls or surpluses. We believe this objective can be achieved by trade liberalization and an internationally coordinated food reserve program without resorting to price-oriented agreements, which have undesirable effects on both production and distribution;

d) A strengthened research effort, including long term, to develop new seed and farming technologies, primarily to increase yields but also to permit more extensive cultivation techniques, particularly in LDCs".

Probably, one of the most provocative charges to the use of food as weapon is the book written by Llaila Afrika (2010) – 'Nutricide; Using Food as a Weapon against the Black Race'. In this book Afrika (2010: 19) asserts that " The nutritional genocide of African people, which is called nutricide is a reality that must be faced by Africans. Nutricide is the deliberate and systematic alteration of foods in order to cause physical and mental 'dis-eases', genetic mutations and or death. African children are deprived of vital nutrients which cause attention span disorders, learning problems, behavioural disorders and hyperactivity. It is typical to find zinc deficiency in boys and iron deficiency in girls. Iron deficiencies in boys are ignored. African boys in Philadelphia public schools were having conduct problems, disruptive behaviours, restlessness, irritability and learning problems. They were found to have iron deficiency. Iron is the nutrient needed by the left hemisphere of the brain. The part of the brain used for cognitive skills is in the area of the brain that manages reasoning and logic…When an African girl or boy has an iron deficiency, he or she perceives information differently and does not respond well". He argues further that, "A healthy pineal gland secretes melanin. Melanin makes highly melaninated African people superior to all races. So it follows, an unhealthy pineal gland would have an effect upon the Africans' health, mind and spirit. There are many ways to deteriorate, weaken and or destroy the pineal gland. This destruction can occur without the knowledge of the victim. In the vast majority of Caucasian health, mind and spiritual sciences, and psychic books, the pineal gland is omitted and no mention of its health status is even vaguely discussed. It is medically clear that all glands can get diseased. Medical white racism ignores the dis-eases and nutrient-deficiencies of the pineal gland, because in the Caucasians, the gland has the lowest activity or is usually inactive (dead), so it is not diagnosed or treated for illness".

Another form of the use of food as a weapon is the denial of the means of its production such as access to land or control of seeds. This comes in different forms. For instance, in November 2007 in the study area (East Gonja District) a massive destruction of farmland was discovered. "Vegetative cover over a large stretch of land near a village called Alipe within the White Volta River basin about 30 kilometres from Tamale, the capital town of the Northern region of Ghana. Heavy agricultural machinery were systematically pulling down trees and decimating the area a few metres south of the village. The land had been stripped bare of all its vegetation cover. Enquiries revealed that the site was to be the beginning of a large jatropha plantation developed by a Norwegian biofuel company called BioFuel Africa – a subsidiary of BioFuel Norway[15]. At a public engagement session in Kusawgu, the traditional capital of the Kusawgu Division of the Gonja Traditional Council, Mr. Finn Byberg, Director of Land Acquisition for BioFuel Africa, stated that BioFuel Africa hoped to "develop the largest jatropha plantation in the world in Ghana" (Nyari, 2007).These therefore necessitated an inquiry into the food science of the people of northern Ghana.

2.17.9 Food Security

The definition of food security as agreed during the 1996 World Food Summit, is: 'Food security exists when all people, at all times, have physical and economic access to safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life' (SWAC, 2007:13 Windfuhr, 2005). This is both the vision and the definition of food

[15] (www.biofuel.no)

security used in the 'World Food Summit Plan of Action' and on which the FAO coordinated 'Food insecurity and vulnerability information mapping systems (FIVIMS) are based. This definition also reflects the World Bank's perspective of the concept as the "access by all people at all times to enough food for an active and healthy life" (Quaye, 2008:334). The concept focuses on four aspects of food and agriculture as follows:

1. Food availability,
2. Households and individuals' access to food
3. Market operation and stability and
4. Food use (Nutritional and health aspects).

From these focus areas especially on market operation and stability, it is important to note the key actors and proponents of food security as international institutions including the Food and Agriculture Organisation (FAO), the World Health Organisation (WHO) and the World Bank. This sharply contrasts with food sovereignty which is basically the voice of the poor and CSOs/NGOs as this matters in terms of power relation analysis and for that matter how the poorest of the poor in northern Ghana (small scale peasant farmers) where Civil society organizations and NGOs are also almost the government of the area adapt to the vagaries of climate and global change.

From the market orientation, food security does not only mean the capacity to feed the population with food that is produced in the country itself. It can be attained as per the intensions of its proponents by importing food. Food imports can come through food aid or through trade. According to Dietz et al (2001:61), the food aid component of food imports in Ghana has mostly been small. Food aid data for the period after 1970 show that the average

cereal imports were about 80,000 metric tonnes, with peaks in 1977-80, 1983-85, 1987, 1991 (an absolute peak of 200,000 metric tonnes), and 1992-93". Cereal aid mainly consisted of wheat, wheat flour and rice. The FAO (2004:5-7) reported that for the past 15 years, commercial food imports and food aid constitute 4.7% of total food needs in Ghana. The situation in northern Ghana is more desperate given its highest poverty levels and perennial disasters that destroy farms and foods.

Relative to food sovereignty, however, food security is largely a definition of a goal rather than a programme with specific policies. The implementation strategies required to achieve food security may need to change over time, to address new threats or barriers to achieving food security.

Given the interest and forces behind food security (World Bank, IMF, WTO, FAO), its outreach is quite extensive especially in developing countries through direct interventions in the form of food aid, policy interventions and bi /multi lateral agreements. International development agencies such as the WFP can be seen as some of the vectors of food security.

In Ghana for instance, a food security and nutrition monitoring system by the World Food Programme in collaboration with Ghana's Ministry of Food and Agriculture in the three northern regions has been in place and reporting on a regular basis, the state of food security situation in the three northern regions (MoFA and WFP, 2009). According to World Food Programme's Comprehensive Food Security and Vulnerability Analysis, food insecurity in Ghana is concentrated in the poorest three northern regions which are also the areas most prone to floods and droughts (WFP 2009:13). As much as 34, 15 and 10 percent of the populations of the Upper West, Upper East and Northern regions are food insecure respectively and some 13,

20 and 17% of their populations are vulnerable to food insecurity respectively. Regional specific reports indicate that;

- In the **Northern Region**, 30% of its 54 sentinel sites recorded empty granaries in 2009. Reports in increased vulnerability and food insecurities reported in 2012 is evidence to this effect (WFP, 2012). Also the number of sites recording 3 meals a day had fallen from 52% in May 2009 to 45% in June 2009

- In the **Upper East Region,** where 16 out of the 24 sentinel sites reported, 13% reported empty granaries in June 2009 as compared to 5% in May 2009.

- Finally, in the **Upper West Region,** 40% of the 10 reporting sites (total sites is 24) recorded empty granaries (MoFA and WFP, 2009:1).

All three regions were reported to have experienced less than normal rainfall, impeding crop growth and development. Many farmer households in these regions therefore face food insecurity on a daily basis due mainly to climate change factors. As climate affects different regions differently therefore, it is emphasized that food security is understood to be less about sufficient global and national production but more about livelihoods that are able to provide enough food at the household level (Kirkland, Kemp, Hunter and Twine, 2013:82)

2.17.10 Globalization

Globalization is built on three distinct and yet converging theories; the World-System Theory, World-Polity Theory and the World-Culture Theory.

A world-system is any historical social system of interdependent parts that form a bounded structure and operate according to distinct rules, For Immanuel Wallerstein who built the foundations of the theory "a world-system is a social system, one that has boundaries, structures, member groups, rules of legitimation, and coherence. Its life is made up of the conflicting forces which hold it together by tension and tear it apart as each group seeks eternally to remould it to its advantage The modern world-system has its origin in the European world-economy created in the late-fifteenth and early-sixteenth century" (Martinez -Vela1, 2001:3)

World Polity Theory: A polity is a "system of creating value through the collective conferral of authority" (Meyer, 1980:111-2). The system is constituted by a set of rules, also called frames or models. Actors in the system are "entities constructed and motivated by enveloping frames" (Boli and Thomas 1997: 172). The world polity contains no single actor or institution defining what is valuable for the world as a whole. "Instead of a central actor, the culture of world society allocates responsible and authoritative actor hood to nation-states" (Meyer et al, 1997: 169).

World Culture Theory is a label for a particular interpretation of globalizations that focuses on the way in which participants in the process become conscious of and give meaning to living in the world as a single place. Analytically, globalization comprises the set of dynamic relationships among the four core units--societies, international system, individual selves and humankind. Empirically, globalization involves the conjunction of different forms of life. This is expressed concretely in the interaction between actors or groups holding different views of world order.

The origins, structure and functions and the modus operandi of these three theories will be dealt in detail during the main study

Globalization is a highly contested concept in terms of its meaning, form, implication and practice. Consequently, literature on globalization is large and diffuse" (Kothari et al, 2002:16). It is argued that the word `globalization' has become so fuzzy and used with such a variety of different meanings that a general theory of globalization must acknowledge and incorporate various discourses. The most prominent current usage of the term `globalization' is undoubtedly associated with the global expansion of the market form of economy (economic globalization): the integration of national economies into the international economy through trade, foreign direct investment, capital flows, migration and the spread of technology among others. However, globalization is usually recognized as being driven by a combination of economic, technological, sociocultural, political, and biological factors. There are specific reasons why the economistic understanding of globalization has, at least in the short run, gained widespread acceptance. Some of these include but not limited to the profit, wealth and power reward characteristic of capitalism which drives this form of globalization (benefiting individuals, governments and other economic entities such as transnational corporations).

After several years of work with the World Bank as chief economist and member of the three-member Council of Economic Advisors in the executive house of the US government, Stiglitz (2002:9) defined globalization as "the closer integration of the countries and peoples of the world which has been brought about by the enormous reduction of costs of transportation and communication, and the breaking down of artificial barriers to the flows of goods, services, capital, knowledge and (to a lesser extent) people across borders". The renowned economist and Nobel Prize winner of economics in 2001 in his Globalization an Its Discontents' clearly

acknowledged some benefits of globalization but highlighted the horrors and failed promise of globalization in the following words:

> "The protests at the Seattle meeting of the World Trade Organisation in 1999 were a shock. Since then, the movement has grown stronger and the fury has spread. Virtually every meeting of the International Monetary Fund, the World Bank and the World Trade Organisation is now the scene of conflict and turmoil. The death of a protestor in Genoa in 2001 was just the beginning of what may be many more casualties in the war against globalization" (ibid:3).

He added that even conservative politicians such as France's Jacques Chirac, have expressed concern that globalization is not making life better for those most in need of its promised benefits (Ibid, 2002:4).

Notwithstanding the divergence on the theory of globalization, some effort will be made to review the key relevant aspects of globalization in connection with the current study. Globalization describes the process by which societies, regional economies, and cultures have become integrated through a global network of political ideas through communication, transportation, and trade. Several definitions of the term have been made and an attempt will be made to draw a general conclusion from them. Giddens (1990:64) has described globalization as 'the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa'. According to McGrew (2000: 348), globalization "is a process (or a set of processes) which embodies a transformation in the spatial organization of social relations and transactions – assessed in terms of their extensity, intensity, velocity and impact – generating

transformational or interregional flows and networks of activity, interactions and the existence of power". He emphasized that globalization is a process which unites and divides peoples and communities. It does not automatically follow that humanity is becoming a single global community of fate. What other literature describes as the aspects of globalization, McGrew (2000:348) name them as the drivers of globalization and these include;

a) **Economic Shifts:** This refers to the natural tendencies for capitalism to expand through the information age business and regional and global markets. This is probably one of the most controversial aspects of globalization due particularly to its association, promotion and erquation with capitalism.

b) The second driver is **Technological Shift** which describes the move towards post industrial economies and informatics revolution which facilitates every domain of globalization from economic to criminal.

c) **Political Shifts** away from state interventions to the market access with emphasis on deregulation, privatization and economic liberalization culminating in making societies and economies more open to the world.

d) **Cultural Shifts:** This is fuelled by increased awareness among national elite and many citizens' groups or social movements such as the global environmental movement.

The three main institutions that govern globalization according to Stiglitz (2002:10) are the World Bank, the IMF and the WTO. Much significance to this study is these institutions of

global governance which can be expanded to include the FAO and the other agencies of the UN system. This group of institutions provide the needed focus of the study due to their (self-assigned) roles as drivers of especially economic globalization which has direct and different implication on local and global food systems. Their physical and programme presence can be seen and felt in almost every corner of the developing world affecting different sectors and aspects of people's lives differently. According to the General Agriculture Workers Union, in the Upper East Region of Ghana "Three tomato farmers in the region committed suicide in 2008 and many others attempted to". Martin Pwayidi, one of the three suicide victims in 2008, reportedly lost $2,000 he had secured from a bank and invested into his four-acre tomato farm in 2008 because no one would buy from him. "Last year was very terrible for me; I lost everything. There was absolutely no reason to live. I am just lucky to still be alive today [and not to have committed suicide]"[16]. The coordinator of the Ghana Trade and Livelihood Coalition, Ibrahim Akalbila, said, "All over the sub-region there is serious price-undercutting and price fluctuations from country to country for agricultural products,". Pwayidi's tragedy is just but one of the terrible manifestations of globalization as driven by these institutions of global governance.

2.17.11 Conclusion

Exploration of the literature on indigenous knowledge, endogenous development, research and education, and food and agriculture shows obviously the existence of current, up-to-date and

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16 http://www.modernghana.com/news/211846/1/report-plummeting-profits-drive-tomato-farmers-to-.html *(Thursday, 20th April 2011, 10:35am)*

large volumes of relevant and useful knowledge, practice and experience. What is deficient is the dissemination of this knowledge to the fast-moving, 'out of time' 'no-time-to reflect' development agents such as Civil Society organizations and government especially in northern Ghana. The proliferation of civil society organizations in all sectors in northern Ghana is alarming. Having been working with most of these partners, it is clear that very few if any NGOs are implementing any of the effective indigenous knowledge practices proven beyond reasonable doubt. One of the value additions or benefits of this research to the academy and the general population is to establish / enhance the link between academia and industry as an outlet for information sharing on the age, potency, applications, success stories, good practices and challenges of indigenous knowledge and endogenous development, research and education and the need for the development community to begin to at least reflect on the current development frustrations of positivist 'profit- led' development paradigms.

2.18 INDIGENOUS KNOWLEDGE, ENDOGENOUS EDUCATION, RESEARCH AND DEVELOPMENT

2.18.1 Indigenous Knowledge

Indigenous knowledge is a central concept in this study. Indigenous knowledge has been defined as "the accumulation of experiences and the sharing or passing down of information from one generation to the next within a society" (Millar, 1996:40; Semali and Kincheloe, 1999). It is a socio-cultural construction of knowledge and learning processes. Dei et al (2000:6) define indigenous knowledge as "a body of knowledge associated with the long-term occupancy of a certain place." It refers essentially, to the traditional norms and social values that guide people's way of living including how they interpret and make sense of their world. Indigenous peoples have lived on knowledge orally handed down to them since time

immemorial. Even in the most difficult and seemingly 'hopeless' natural and environmental conditions, indigenous populations have usually survived. Millar (2004) detailed how African indigenous knowledge proved effective in soil and water management, crops and trees and animal production. Parts of the Upper East region of Ghana offer a good example of one of the harshest habitat and how indigenous peoples have survived this. Hot, dry, rocky and poor patches of soils are some of the keywords to describe the habitat. The following extract from Millar's (2004) interrogation of Azure, a rural farmer in Kongo, a farming community in the Upper East region of northern Ghana explains the stock of knowledge exhibited by indigenous people especially in the agricultural sector:

> "I was talking with the farmer Azure, who is now in his early fifties and has two wives and eight children."*How long have you lived here?*" "I was born here and my father told me that his grandfather lived here." "*Has the land always been as rocky as this*?" "Since our ancestors chose this land for us, it has always been the same." "*How do you manage to produce on land like this?*" "When I was a child, my father taught me to farm this land in the way he said his grandfather did. As you can see, it involves arranging the stones in a special way across the slopes. This slows the water running down and holds back the soil that is stolen by the running water. Before we farm at the beginning of the rainy season, we apply animal manure on the soil. We use our hoe to fill the soil and during harvesting we leave the sticks on the soil, as you can see." "*Do you get enough from small parcels like this*?" "We do not get enough, BUT WE HAVE SURVIVED" (Millar, 1990:1).

Barring two temptations; the temptation to condemn and reject local *indigenous* (italics are my own insertion) knowledge and practices, and the temptation to justify and idealize them (Millar, 2004:7), this study will investigate how indigenous knowledge can enhance food availability in this part of northern Ghana.

2.18.2 Endogenous Education

Endogenous learning and education are activities to develop and transfer knowledge, skills and wisdoms by people in indigenous or local communities that combine traditional with other indigenous and mainstream ways of learning (Haverkort et al, 2012:5). In order for endogenous development to thrive, it is argued that there is the urgent need for a coordinated and independent system of not only tertiary but also basic and secondary forms of education that is built on local people's worldviews and cultural systems.

"Perhaps the most influential forms of endogenous education is the 'pedagogy of the oppressed' of the Brazilian educator and philosopher Paolo Freire. Freire emphasized the need for a change from regarding the student as a 'passive trainee' to seeing the student as an 'active learner'. He also insisted on the need for continuous exchange between action and reflection within the learning process. Adding on this, the experience of COMPAS showed that learning also means knowing to read the signs of nature (winds, stars, clouds, plants, animals, dreams and feelings) as part of communication between humans and the surrounding universe.

More recently, the Earth Charter Initiative, which includes many world leaders as well as organizations promoting ecological sustainability, called for education based on eco-pedagogy or earth-pedagogy. This implies re-directing formal curricula to incorporate values and

principles of the culture of peace and sustainability. This pedagogy includes peoples' culture, respect for identity and diversity, and looks at the human as a being in continuous development, interacting with others and the world (Corcoran et al., 2005). CoOMPAS partners have experiences in building on local knowledge and ways of learning.

The following example presents a roadmap to reform education in Africa according to Nana Nketsia (Haverkrt et al, 2012: 53-56)

Box 1: African Roadmap to Reform Education

The school must integrate the African worldview and indigenous relationships. The learning process must start transmitting these values and traditions at an early stage, along with the knowledge of why such activities must be sustained. The teachers must be those who live by and have experienced the form of knowledge they are transmitting. Teachers themselves urgently need a program to unlearn in order to re-learn their cultural selves.

It is necessary to teach how Europe has been imbibed as 'education' and in the process has unraveled Africa. Without understanding the colonizing culture, it may be very difficult, if not impossible, for the African to teach about Africa. Un-learning must be a special subject. Ownership of the school system is vital. Endogenous development can only materialize when there is constant community responsibility for the institutions of learning.

The language of transmission must embody the meaning and culture of the society within which the knowledge is being transmitted. African dictionaries of English, French, Spanish or Portuguese need to be created. Assessment of students should include the level of culture and depth of socialization of the individual achieved. There must be a strong social and cultural basis for evaluating the level of knowledge gained. Modern technological innovation is not antithetical to endogenous development, but should be integrated in a manner that is based on the way of life and creativity of the community. This process needs to be part of formal education.

Source: Nana Nketsia, COMPAS Magazine 10.

Whereas countries like India have gone far in implementing indigenous systems of education and practice which are already making impact in, for instance, their medical history, most African countries are yet to wake up to this need. Also, the commencement of graduate level programmes in indigenous knowledge and endogenous development at the University for Development Studies in Ghana is a right step forward.

2.18.3 Endogenous Research

Endogenous research is research being carried out by indigenous and local knowledge communities using indigenous ways of learning, transdisciplinary methods and co-learning with other sciences, aiming to develop endogenouses sciences. The need to reshape research in line with indigenous knowledge, endogenous education and development is based on the argument that bio-cultural diversity and reality go beyond present scientific perception of reality and cannot be explained using conventional mechanistic, materialistic and reductionist ways of modern science.

2.18.4 Endogenous Development

Endogenous development is development that is based mainly but not exclusively on local resources, knowledge, values, culture, leadership opportunities and challenges. "Endogenous development is based on local people's own criteria of development and takes into account, the material, social and spiritual well-being of people. It takes local cultures into account. Ten key principles are central to endogenous development. These are;

a) Building on local Needs and Resources

Endogenous Development emphasizes the need to build any 'development' initiative on the needs and resources of the local people. In other words, any initiative should focus on the social, spiritual and material needs of the people of a particular community and make use of the resources such as their knowledge, environmental and financial resources. Thereafter, if there are legitimate reasons to meet external needs or use external resources from other communities, this is absolutely acceptable within the framework of the concept.

b) Improving local Knowledge and Practices

As endogenous development does not rule out external resources, it means that it expects as part of its framework improvements on knowledge and practise from other cultures. Where local knowledge or practice is inadequate, external support is most critical. According to Millar et al (2008:9), "endogenous development is inward looking but not in a negative way. It does not close off external influences such as modern science and technology". The rationale being that endogenous development works to minimize and eliminate the tendencies of external resources disorienting, undermining, compromising and even annihilating its traditional system (ibid). This is the complementarity principle of endogenous development.

c) Local control of Development Options

Endogenous development prioritises local control of the development of its systems and processes as a basis for advancement or progress. External control of development options amounts to colonization and therefore anti developmental.

d) Identification and use of development niches

As in every society, the identification and advancement of unique selling points of local communities is a very crucial part of its overall development. For instance, if a community has

a unique knowledge, approach and methodology of solving a social, spiritual and material problem, it is expected that this would be prioritised and used first for the development of the local environment and then where external need or utilisation becomes necessary, it is applied.

e) **Selective use of external resources**

While endogenous development does not completely "close off" external influence on local resources, it does not encourage unfiltered adoption of anything from the external. In other words, that which is introduced from the external must be absolutely necessary and that it is also not locally available. Otherwise, it is not needed.

f) Retention of benefits in the local area

Endogenous development abhors the exportation of development benefits from the local area. As stated earlier, if local resources are used in generating benefit, logically, there is limited reason for transferring benefits externally. Haverkort et al (2012:22) noted that "When development processes, inputs and outcomes are controlled and dominated by external agencies and factors, the likelihood is their collapse upon exit" leaving local people with the challenges of discontinuity and loss.

g) Exchange and learning between cultures

Endogenous development encourages intercultural learning as long us this meets the relevance of the other principles of the concept. It is in effect, an acknowledgement of the limitations that

characterize every knowledge system. By encouraging intercultural learning and exchange, benefits can be maximized.

h) Training and capacity building

Endogenous development requires periodic training and capacity building using contextualised methods and methodologies.

i) Networking and strategic partnership

As different cultures possess different strengths and weaknesses, networking and strategic partnership building would enhance the learning and unlearning of useful and 'non-useful' elements of both cultures.

j) Understanding the systems of knowing and learning

In order to effectively operate with any system of knowledge, it is important to first understand the systems of knowing and learning in the particular culture and environment. This principle is probably one of the most important if the principles are to be prioritized. This is because, to be able to train and build capacity, network and build strategic partnership or even identify local resources, it is important to know how the local people learn and unlearn.

2.18.5 Bio-cultural diversity

Biological diversity is the variability of the totality of living organisms and environments. It includes genes, species and eco-systems of a region while cultural diversity is the variability in

the totality of human and man-made environment. It includes worldviews, beliefs, knowledge, values, norms, morals, language, law, arts, and artefacts and institutions of a region". (Haverkort, 2007:24-25). While a combination of the two words give 'bio-cultural diversity', in reality it is a concept with intrinsic value. In other words, the reality and the relationship between biological and cultural diversity cannot be easily separated. The relationship between the people at a particular place cannot be separated for instance from the plant and animal species on which they depend for their livelihoods. Biological diversity is of economic and scientific diversity. It provides the essential stability and resilience of a bio system. Cultural diversity is also considered an important source of exchange, innovation and creativity (ibid). According to the UNESCO declaration on cultural diversity, " Cultural diversity is one of the roots of development understood not simply in terms of economic growth but also as a means to achieve a more satisfactory intellectual, emotional moral and spiritual existence" (ibid: 25).

The relevance of this concept to this study cannot be over emphasized. The search for the indigenous food science of the people of the East Gonja district is probably made possible by the acceptance of the fact that different people in different parts of the world have different worldviews about food and therefore the possibility of a different science about food.

There is evidence however that global biodiversity is declining rapidly. It is estimated about 20% of the world's existing species face the risk of extinction over the next 30 years if human activity is not checked (ibid:25). Particularly, the application of genetic engineering in plant and animal species and increasing consumption of organic resources by man risks creating super species that endanger other natural species.

2.18.6 Transdisciplinarity

According to Nicolescu (2006:143, 2008) *trans*disciplinarity as opposed to *multi* and *inter* discsiplinarity "concerns itself with what is between the disciplines, across the disciplines and beyond all disciplines".

The concept emerged after disciplinary studies in the works of the Swiss Philosopher and Psychologist Jean Piaget. Nicolescu (2006) reported that "transdisciplinarity will not be limited to the interactions or reciprocities between the specialised researchers, but will locate these links inside a total system without stable boundaries between the disciplines" And for Nicolescu (2006), inherent in transdisicplinarity, is the transcendence of the subject. As noted by Heisenberg, winner of the Nobel peace Prize for Physics "one must supress any rigid distinction between the subject and object, between objective reality and subjective reality. The concept of 'objective' and 'subjective' designate two aspects of one reality; however, we would make a very crude simplification if we want to divide the world in one objective reality and one subjective reality. Many rigidities of the philosophy of the last centuries are born by this 'black' and 'white' view of the world. We have to renounce the privileged reference to the exteriority of the material world. The too strong insistence on the difference between scientific knowledge and artistic knowledge comes from the wrong idea that concepts describe perfectly the 'real things'" (ibid: 143).

The key objective for reviewing literature on transdisciplinarity is because food transcends disciplinary thinking and philosophy. It cuts across and in fact goes beyond any particular confined thinking. It means different things to different people.

As noted by Kaplan (2012:2) "perhaps the real reason why relatively few philosophers analyse food is because it is too difficult. Food is vexing. It is not even clear what it is. It belongs simultaneously to the worlds of economics, ecology and culture. It involves vegetables, chemists, and wholesalers, livestock, refrigerators and cooks, fertilizer …. The subject quickly becomes tied up in countless empirical and practical matters that frustrate attempts to think about its essential properties".

The study therefore agrees with the transdisciplinary charter adopted at the First World Congress of transdisciplinarity in Portugal in November 1994. The provisions of the charter provided significant insight ito this study.

As Hardon et al (2007:20) noted, transdisciplinarity therefore "is research that transcends disciplinary boundaries to address and solve problems related to the life-world." Transdisciplinary research therefore transgresses boundaries between scientific disciplines and between science and other societal fields and includes deliberation about facts, practices and values.

In particular, articles 1, 2, 10 and 14 are of significant relevance to the objectives and spirit of this study;

> ***Article 1:***
>
> *Any attempt to reduce the human being by formally defining what a human being is and subjecting the human being to reductive analyses within a framework of formal structures, no matter what they are, is incompatible with the transdisciplinary vision.*
>
> ***Article 2:***
>
> *The recognition of the existence of different levels of reality governed by different types of logic is inherent in the transdisciplinary attitude; Any*

attempt to reduce reality to a single level governed by a single form of logic does not lie within the scope of transdisciplinarity

Article 10:

No single culture is privileged over any other culture; the transdisciplinary approach is inherently transcultural.

Article 14:

Rigor, openness, and tolerance are the fundamental characteristics of the transdisciplinary attitude and vision. Rigor in argument, taking into account all existing data, is the best defence against possible distortions. It involves an acceptance of the unknown, the unexpected and the unforeseeable. Tolerance implies acknowledging the right to ideas and truths opposed to our own.

Western food and agricultural science is the predominant science of food and agriculture the world over. As a basic daily need of man, obtaining food through interaction with the environment was a natural education that every human society, at its stage, had which served its food needs though with periodic severe shortages and surpluses as is the case (or even worse) now. The key societal objective at the time was to ensure food is available for every member of the family, community or society (Kiple and Ornelas, 2000). Different forms of sharing of food were therefore a common feature of society. The emergence and struggle for superiority of particularly western cultures in food and agriculture was in my view stimulated by differences in worldviews, value systems and knowledges which had materialistic perception / orientation of existence. Essentially, what can be seen, felt and manipulated is what matters. From this orientation and socialisation, food became an object of study, fidgeting and eventually, with the birth and maturity of capitalism in disciplinary studies (economics and politics), food became one of the objects for profit making for further food and wealth accumulation.

Western food and agricultural science seem to have lost connection with its own history and that of nature which essentially, was the natural interaction with the environment in a way that connects man and nature in a caring way (Pilgrim and Pretty, 2010). The application of western scientific thought, education and research marked the beginning of an unfriendly way of man's interaction with nature for the purpose of finding food. The birth of the green revolution and other food related technologies is a perfection of this ideology (Rosset, 2000). This in no doubt also marked the beginning of an unpredictable and aggressive reaction by nature to man's search for food.

However, western science and scientists themselves have come to the realization that most of the current scientific approaches to food and agriculture are not only unsustainable in providing the food needs of this and future generations, but also that they are quite destructive to human health (Altieri, 2004). Globally, food related diseases and conditions such as obesity, cancers and general ill health have been associated to the quality of agriculture and food that is let out from the technology nozzle. In her scholarly writing on sustainable agriculture, Pretty (2005), exposed that though agricultural production per person has increased by a third following a doubled world population since the 1960s, this growth in production has masked enormous hidden costs arising from widespread pesticide use - massive ecological damage and high incidences of farmer poisoning and chronic health effects. These costs are grossly underestimated in traditional cost-benefit analysis. Increasingly, however, the external costs of pesticides, to environments and human health, are being seen as unacceptable. In response to this trend, recent years have seen millions of farmers in communities around the world reduce their use of harmful pesticides and develop cheaper and safer alternatives.

Global food shortages across the developing world in particular has been established to be perfect plans and designs perfectly delivered by nations and multinational food and pharmaceutical companies in the interest of profit making (Sen, 2000; Stieglitz, 2002). Western institutions of global governance (WTO, WB, IMF) have been and continue to build and perpetuate this state of affair through solid political, financial and scientific power.

2.19 INDIGENOUS SCIENCE

The definition of indigeneity varies in different localities, with no single criterion that can be applied universally, except to note the accepted principle that people have the right to define themselves according to their culture. Indigenous People are those who retain knowledge of the land and food resources rooted in historical continuity within their region of residence (Kuhnlein, Erasmus, and Spigelski, 2009:3). Dei et al (2000:6) conceptualise indigenous knowledge as "a body of knowledge associated with the long-term occupancy of a certain place." It refers essentially to the traditional norms and social values that guide the people's way of living including how they interpret and make sense of their world.

The local food systems that they are currently using are those we define as "traditional food systems", which invariably include some foods that may be used by many outside of the indigenous culture (e.g. salmon). In essence, "traditional foods" are described as those foods that indigenous people have access to locally, without having to purchase them, and within traditional knowledge and the natural environment from farming or wild harvesting. Alternatively, we define "market foods" as those foods that enter communities often through global industrially sponsored retail outlets, and which must be purchased. The long-term objectives are to address scientific issues, public health, and policy, with the goal of

influencing local, national and international policies for environmental protection of indigenous peoples' land and food resources. In this way, communities can be encouraged to strengthen their use of local food and sustain knowledge of their local food systems for essential contributions to cultural protection, well-being and health. Millar and local knowledge owners (2012) have presented the varied sciences and indigenous knowledge systems of northern Ghana focusing on the Gruni area of the Upper East region and the Dagari area of the Upper West region. Though this study excludes the northern region as a district geographical area with different cultural and biological diversity, it gave a general impression of the indigenous knowledge and sciences of the people of northern Ghana. Millar and the local knowledge owners succinctly isolating the spiritual, social and material worldviews of the indigenous northern Ghanaian, they elucidated the scientific and super scientific structure and background of the knowledge systems of the northern Ghana based on the five roots of any science ;

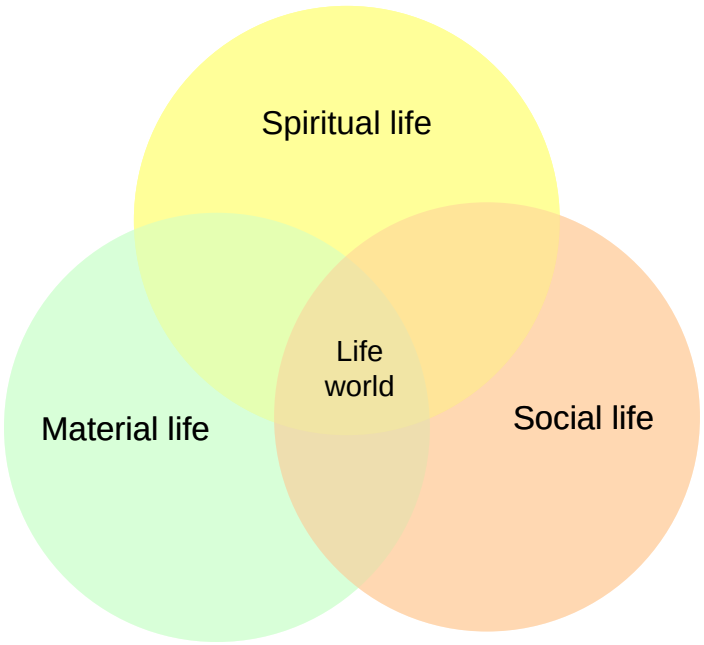
a) The way reality is understood and lived -Worldview or Ontology
b) The things that people find important – Their value systems / axiology
c) The ways people learn and experiment – the gnoseologies
d) How knowledge is build – the epistemology and theories
e) The way the knowledge community is organized – Institutions of Learning.

2.19.1 Ontology – World Views

Accordingly, Northern Ghanaian perceives reality as being composed of the social, natural and spiritual worlds. These three world are inseparable and give a rich and holistic meaning than when perceived in isolation (ibid, 2012) depicting a systems thinking notion. This interconnected worldviews (the social, the physical and the spiritual) give rise to an interesting constellation and interaction of Cosmo visions of knowledges as depicted in Figure 2.17

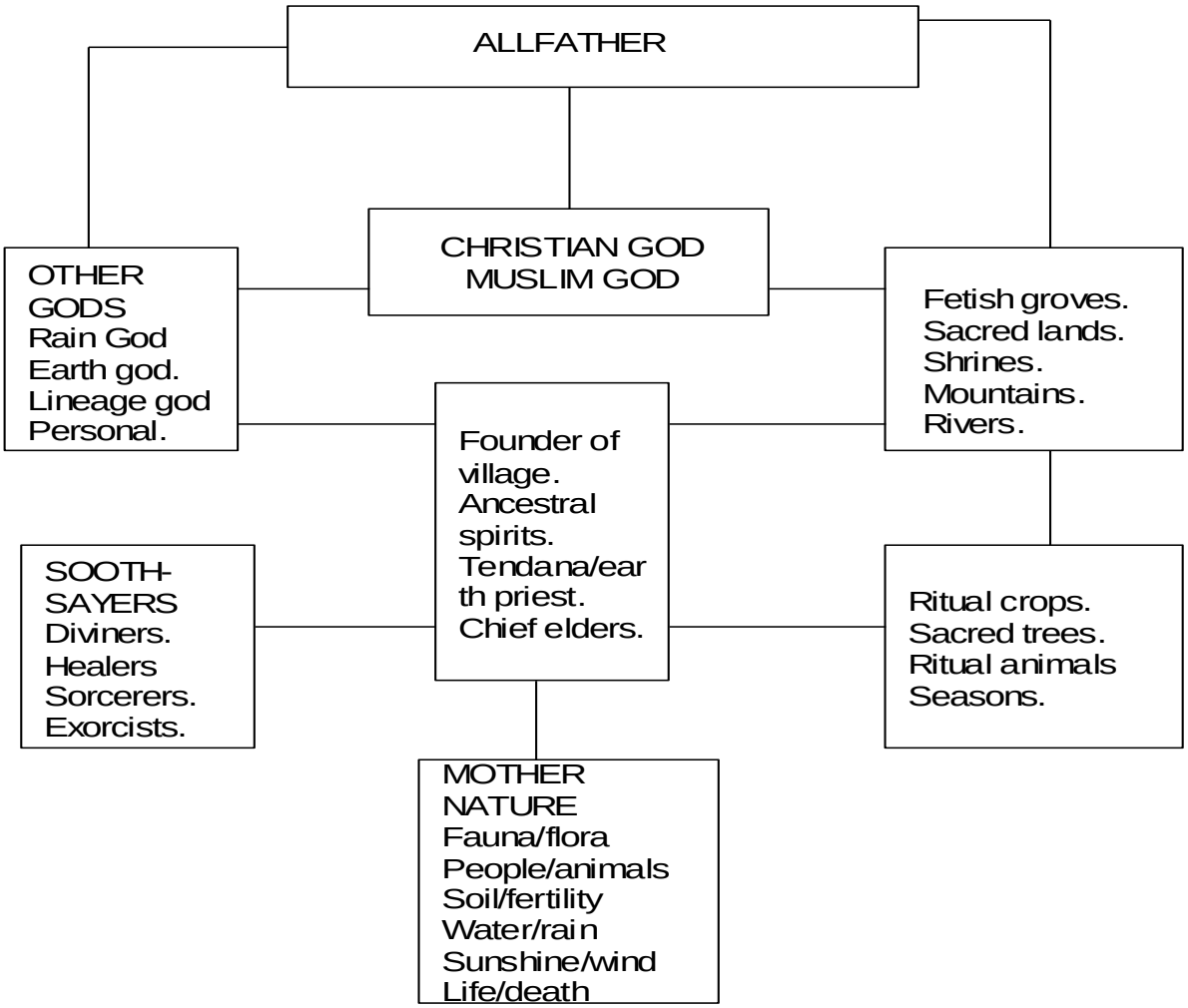
Similarly, Figure 2.18 shows a typcal ontological believe in most parts of northern Ghana as comprising, essentially of the Almighty God refered to as the 'All Father' under whom all other gods and religious believes are anchored.

Figure 2.2: The Three Worldviews of Indigenous People



Source: *Adopted from Haverkort et al (2012:33)*

Figure 2.3: The Ontology of the Indigenous Northern Ghanaian



Source: *Millar (2012:7)*

The Spiritual World

The main entity of the spiritual world is the Creator of all mankind and the universe and is also referred to as the Almighty Father. This supreme power of creation and destruction of all life makes the spiritual world the most powerful of all the three worlds. Next to this spiritual entity are the smaller gods called deities who possess smaller powers and reside in the natural environment. They range from family deities, to water gods, land gods, sacred grooves, shrines, trees, sacred plants and animals (Haverkort et al (2012).

The Social World

This world is made up of the ancestors, the living and the yet unborn. The cycle of being born, dying and rebirth continues and provides the opportunity for humankind to build up experiences and, in so doing come closer to the ancestors" (ibid:9). Essential knowledge of existence and making meaning out of life is drawn from the relationship between the living, the dead and the yet unborn through sacrifices and rituals. Just as the living, the dead are profiled according to the quality of life lived and for that matter the quality of life that can be handed down to next generation. Men and women who have lived upright and morally sound lives have high ancestral position which makes them capable of influencing our lives and fate. Examples of these type of people who command special powers and energies among the Dagaaris are the *Tindanas (sons of first settlers who are the custodians of the land), the healers who possess special powers to heal and cure illnesses, the spirit medias and soothsayers (people who have the capacity to see beyond the natural and social worlds), Village Elders and Chiefs (who are community or family leaders)*(Haverkort et al, 2012; Millar, 2011)

The Natural World

The natural world is made of the living and non-entities such as land, rocks, soil, water and clouds. The natural world is equally important as it provides the immediate source of food, water and shelter for the spiritual and social worlds.

2.19.2 Axiology: Our Value Systems

Our axiology essentially comprises social cohesion, ancestral acceptance, freeing the mind and reciprocity as opposed to Euro-western axiology of materialism, competition, survival of fittest, individualism and welfare (Haverkort, 2011 and Millar, 2012). Among the Dagaari and Grunis in the Upper West and East ast regions respectively of northern Ghana, Millar (2012) has isolated and categorised (though not exhaustive) a number of value systems and ethics of the people across the three worlds. With particular reference to this study, the obvious limitations of Millar's work on the sciences of northern Ghana are that;

a) His study is a general overview of the sciences of the people of northern Ghana. In other words, it is not subject specific.

b) Secondly, it focused on only the Upper East and Upper West Regions of northern Ghana which are actually the smallest in size and populations of the three northern regions.

Hence my proposed study is different in that it is subject specific (food science) and also it is being carried out in a region which has not received similar studies like the Upper East and West regions.

2.19.3 Gnoseology

The way we teach, learn, and adapt our knowledge is strongly linked to our ancestors. Our knowledge is considered as ancestral knowledge. The ancestors are believed to be the depository of our knowledge which is preserved and retrieved through spiritual means. Our way of learning is not directly taught to learners but flows naturally with learners as they become of age. Three forms of learning have been identified by Millar (2012) is; the knowing environment, the learning distance, organized learning and tutelage or apprenticeship. The knowing the environment form of learning according to Millar (2012) has the family as the main unit of learning. Learning takes place in the immediate environment which is composed of structures, functions and institutions around the individual such as trees, land, grasses, markets, marriage and so on. These provide the learner a rich collection of reality that faces him or her on a daily basis rather than on some abstract formulation. The second level of knowing has also been identified as distant environment which is characterised by locations such as government institutions, external religious institutions and much more. Under this form of learning, particular families or clans have specialty knowledge and expertise to perform certain functions creditably. Examples include the blacksmiths family or clan who are experts in the manufacture of farm and other metal tools and the hunters who are experts in hunting. Accordingly, "the boundaries of these two environments are social constructs mainly based on the cosmovision of the people rather than rigid geographical boundaries" (ibid: 26)

The apprenticeship is another way of learning among indigenous African communities where individuals embark on learning that is neither restricted by time nor space and is dominated by experiential learning where the learner basically follows the footsteps of an elderly person in doing what they have seen them do. To reinforce learning and experience, sometimes

prototypes of knowledge being taught are developed for the young learner to try out on their own using the original one as a benchmark. This approach is more cognitive and referred to by the Dagaari as "wulu" meaning showing as opposed to non-cognitive indigenous ways of learning which consists of the use of images, symbols, rituals, stories, and proverbs to teach and learn.

2.19.4 Epistemology

The indigenous northern Ghanaian's ways of explaining, knowing and organizing knowledge can be well appreciated when analysed along the *what why, how,who, which and when*. This explains knowledge on the sense of causality among various elements and spectra of life. It provides adequate answers to the *why, hows, when* across the spiritual, social and natural worlds. The epistemologies of northern Ghana with particular reference to soil and water management, crops and trees, livestock keeping, medicine mathematics, food processing, metallurgy and building technology have been elaborated by Emiagwali (2003).

2.19.5 Knowledge Community

As indicated in my case study, the knowledge community describes the gate keepers of knowledge generated by the community. What is and what is not are both decided on by the implicit and explicit agreement of the community. As found in the case study, food has been identified by the community as the first in the list of the value system of the household.

Smith (1995) has adequately treated the subject of indigenous food culture in the West African sub region by giving a historical perspective of indigenous West African food culture, identified and distinguished indigenous foods from traditional foods and made explicit the

economic, health and nutritional values of indigenous foods. He however did not present the entire holism of indigenous food science. He did not show the spiritual significance and dimension of the food lives of indigenous people. Secondly his study did not detail the epistemology of indigenous people's food science.

2.20 THEORETICAL FRAMEWORK

The following are the main but not exclusive theoretical and conceptual frameworks used in the study:

2.20.1 Indigenous Knowledge Theory

This theory provides the basis of most of the analysis of the study. It is the main theory used in data collection, analysis and conclusion. Indigenous knowledge is defined as knowledge of the indigenous peoples of a particular land used for everyday living, survival and social existence. It emphasizes that spiritual identity is a way of knowing as a body of epistemology that connects place, spirit and body (Dei, 2012). These principles formed the basis of all theoretical and conceptual analysis in the study. In particular, the methodology for data collection and analysis were based on this theory. The use of this theory as the main framework is due to the nature of the research problem and the power of the theory in explaining the spiritual, social and physical realities of indigenous populations. It is therefore the most appropriate theory in this context.

2.20.2 Intersection Theory

This theory perceives reality and experience as composed of interconnected rather than isolated phenomenon (Dei, 2012). It analyses phenomenon in relation to another phenomenon. It

reinforces a sense of holism and defies singular interpretations (ibid). In other words, the theory encourages analysis of a particular phenomenon in relation to other related phenomenon in order to get a better understanding of that which is being analysed. This theory was thereforee used to explore the relationship between the natural, social and spiritual relationships of food among the indigenous people of the study area. The objective is to improve understanding and knowledge between the physiological components of food and the socio-spiritual aspects as they affect the people of the East Gonja District. This connects with the 'triletic' ontology of indigenous people which is made up of the physical, social and spiritual realities. It contributed to addressing the research objective on whether or not the realities, knowledges and practices of indigenous people in the East Gonja District about food constitute a science.

2.20.3 Anti-colonial Theory

According to Dei, (2012) "The anti-colonial framework is a theory about the mechanics and operations of colonial and re-colonial relations and the implications of imperial projects on:

- Processes of knowledge production, interrogation and validation;
- The understanding of Indigeneity and local indigenousness; and
- The pursuit of agency, resistance and subjective politics.

He emphasized that what is 'colonial' must be understood in the sense of not simply 'foreign or alien', but that which is 'imposed and dominating'. The application of this theory in this study is based on its suitability and potential power to explain a number of emerging phenomena about food in northern Ghana. These include but not limited to (i) the current food and agri-culture of northern Ghana in general from the perspective of our colonial legacy. (Tuomainen,

2009:544) noted that, "In the case of Ghana, the British undoubtedly affected the food pathways and traditions of Ghanaians. On the one hand, (post) colonialism generated hybrid identities, which means that a number of Ghanaians already regarded English foods and food practices as part of their own food culture in Ghana, even though in the past these were mainly restricted to the elite or people in higher social positions (e.g. within families) and to formal restaurants". Globalization and thus trade liberalization has led to the proliferation of western food cultures such as fast food restaurants, agro chemical and seed shops at every corner of the country. This has been top-dressed by the presence of unimaginable numbers of agriculture and food related NGOs and donor partners in northern Ghana ostensibly in the promotion of food security towards the reduction of the high levels of poverty in the region. Similarly the disappearance of some indigenous food crop varieties in some parts of northern Ghana epitomises this challenge (Centre for Indigenous Knowledge and Organisational Development and COMPASS, 2008).

2.20.4 Anti-Development Theory

Anti-development theory says that Western-style development as we are pursuing it is the root cause rather than the solution to Africa's problems (Dei, 2012). It is simply an extension of Western disciplinary and normalizing mechanisms to dominate the South (Escobar, 1991). Africa does not need to develop according to a European model. Europe's context is different from Africa's context and therefore our development approaches must be necessarily different. Central to this theory also is the definitional power of what constitutes development (Peet and Hartwick, 2009). Europe's definition of development is materialistic, anti-social and anti-spiritual. However, the spiritual and social are critical parts of our worldviews and therefore must be part of our development practice. Tucker (1999) as quoted in Dei (2012: 29) notes that

"the model of development now widely pursued is part of the problem rather than the solution". And that this Western ideology of development "distorts our imagination, limits our vision, [obscuring] us to the alternatives that human ingenuity is capable of imagining and implementing". He explained that development cannot be imposed neither can African peoples be acted upon. The application of this theory helped to investigate whether or not western foods and food cultures are imposed in the research communities and how. It was also used to interrogate the social and spiritual food needs of the indigenous people's worldview. Specifically, it was used to explore and analyse the question of whether some indigenous food varieties face contamination and extinction and why this is the case.

2.20.5 Modernization Theory

Modernization theory is premised on the argument that Africa is locked in a vicious cycle of poverty (Dei, 2012; Peet and Harwick, 2009). The extent of underdevelopment, it argues, can only be cured by the successful penetration of innovative and progressive elements of 'modernization' - where modernization essentially includes the infusion and control of western capital, technology, open market reforms, trade liberalization, increased role for the private sector, retrenchment of the public sector workforce and the pursuance of western value systems through aid programmes, financial institutions and multilateral corporation (Peet and Hartwick, 2009). The pursuit of 'unlimited human rights' including the right to homosexuality is considered part of this thesis. The theory therefore problematizes the spiritual and social aspects of the African worldview as primitive and superstitious and therefore needs to be replaced with western models. For instance, the theory argues that "the persistence of certain aspects of traditional economic behaviour directed towards social ends rather than the maximization of monetary gains is alleged to constitute a serious obstacle to development"

(Dei, 2012:24). Application of this theory in this study was largely directed at understanding the strengths and weaknesses of the modernised western food culture vis-à-vis the 'un-modernised' indigenous food cultures in the study area. Some elements of this included an investigation into the technology of genetic modification of plant and animal food sources.

2.20.6 African Womanist / Black Feminist Theory

Gender is noted as a social construct and that gender and sexuality are sites and sources of difference (Dei, 2012, Donavan, 2012, Fine 2011). Gender is arguably defined as a socially distinguishable characteristic or manner of existence of being as male/female/bisexual/transgendered (Hooks, 1999)

Gender denotes membership in the category. Gender relations and discursive conceptions of male/female; bisexual/transgender etc are historically contingent and located. Some of the key ideas of this theory include;

- Identity
- Knowledge production
- Embodiment and how bodies are read
- Political mobilization
- The entanglements of gender and power.

Gender denotes social relations of power and privilege that shape, structure and is informed by identity and experience (ibid: 30; Peet and Hartwick, 2009).

The application of this theory is critical to this study in view of the role of the woman in

relation to food in indigenous communities. Women are an important part of the conception, preparation and consumption of food in a typical indigenous community. The theory was therefore be used to investigate the role of the indigenous African woman in theorizing about food. The position of the indigenous African woman in relation to food will be analysed in relation to the modernised woman's food culture. This theory informed the choice of relational interview as a method of data collection where participants decided who should participate in the discussions resulting into wives of two of the knowledge holders participating in the interviews with their wives given their role in the conception and theorizing of food.

2.20.7 Power and Conflict Theory

In his extensive works on power, Foucault (2001, 2005), Foucault and Rabinow (1998), states that power is relational and can be used to dominate and asserted to seek redress. Power and agency leaves the subject as active resistors (Dei, 2012). There is an asymmetric relationship between the power holder and the subject and conflict arises as a sign of power contestations. This theory provided a background to the relationship between indigenous and mainstream food cultures. It was specifically used in analysing and answering questions relating to the dominance and marginalization of indigenous food sciences across different cultures.

It is acknowledged that while the above theories broadly informed the conceptualization of the study and some of the arguments, indigenous knowledge there is the central theory of the study.

2.21 A CRITIQUE OF INDIGENOUS KNOWLEDGE

Writing on indigenous and scientific knowledge, Agrawal (2004:1) notes that "the distinction between indigenous and western /scientific knowledge can present problems for those who believe in the significance of indigenous knowledge for development". He labels these problems as contradictions and ironies. While recognizing the validity of many of the arguments employed by the theorists of indigenous knowledge, Agrawal suggests that "there are certain contradictions and conceptual weaknesses in most of the writings on indigenous knowledge". He isolated three grounds on which he argues that indigenous knowledge differs from western / scientific knowledge. These include;

a. Substantive grounds – He argues that because of the differences in the subject matter and characteristics of indigenous and western knowledge.

b. Methodological and epistemological ground; - The argument is that, the two forms of knowledge employ different methods to investigate reality;

c. On contextual grounds, traditional / indigenous knowledge is more deeply rooted in its environment (Banduri and Affel-Marglin, 1993; Chambers, 1980:2; Dei, 1993; Howes and Chambers, 1980:330; Warren, 1980 and 1990:1).

To ignore indigenous people's knowledge is almost to ensure failure in development (Brokensha et al, 1980:7-8)

The main thrusts of Agrawal's argument are that;

a) Distinguishing 'indigenous' and 'western' as two types of knowledge is not only potentially ridiculous, but also counterproductive for those who believe that indigenous knowledge has a contribution to make to sustainable development.

b) He also argues that there is actually nothing new about the rhetoric and practice of indigenous knowledge; and

c) And finally, the tragedy of archiving and disseminating indigenous knowledge runs counter to the very concept of indigenous knowledge.

Reacting to Agrawal's argument however, Heyd (2004:8) argues that the fundamental source of confusion in Agrawal's analysis lies in the fact that he equates 'scientific' knowledge with 'Western' knowledge. All scientific knowledge clearly is not western knowledge, nor is all western knowledge 'scientific'.

Heyd (2004:1) also argues that Agrawal repeatededly confuses scientific knowledge with technical applications of science. Accordingly, Agrawal uses the penetration of science-based, technical applications into everyday 'life in the West' and concludes that indigenous knowledge cannot be distinguished from scientific knowledge in its specific attention to the immediate and concrete necessities of people's daily lives. However, I believe that we should distinguish between the motivating factors for the development of knowledge and those underlying the application of that knowledge (ibid: 1)

Heyd (2004) however agrees with Agrawal on two arguments; that is, it is uncertain whether in the long run ex-situ conservation, documentation and dissemination of indigenous knowledge will actually benefit indigenous people. Also, "if the well-being of economically – and

politically –marginalized indigenous peoples is really of primary concern, there may be more direct ways in which their interests can be furthered. Notably, indigenous peoples might find a 'greater voice' and ultimately achieve in situ preservation of their indigenous knowledge, if management proposals made by them on the basis of their indigenous knowledge were accorded full legitimacy in policy decisions affecting their land, resources and communities".

For the purposes of this study, the implications of these arguments and counter arguments is that, the researcher is more conscious of the relevance of the arguments in the conduct of his research. For instance, how would the documentation of the indigenous food science of northern Ghana benefit the indigenous people in the short and long term? The study therefore emphasises the key principles of endogenous development that benefits the local people.

2.22 THEORETICAL POINT OF DEPARTURE

For the purposes of isolating the theoretical point of departure for this study, a critical attention has been paid to the theoretical positions and arguments of the major authors on the notion of food as it relates to indigenous people and their food lives. From the foregoing literature, it is evident that an extensive amount of study and research of scientific, philosophical and artistic value has been done about food over time and space. The quality of analysis in most cases is of high academic standard and rigour. However, with the exception of a few of them (such as Kiple and Ornelas 2000, Heldke 2006, Bellasco 2008, Kaplan 2012, and Deutsch et al 2012 among others) who treated food as a culture and to some extent a spiritual phenomenon, most others have regarded it more as a physical materialistic object eaten only to nourish the body and nothing else. For instance, Kiple and Ornelas (2000:13) stated that "Although as living organisms, we keep in mind that it is the nutrients contained in these foods that are necessary

for all of our bodily functions, including support of normal growth and maturation, repair and replacement of body tissue and the conduct of physical activity".

Even among the few listed above who have analysed food as a social and spiritual phenomenon, none of them analysed the entire perspectives of indigenous peoples' food science based on their complete science of existence and logic such as their Ontology, epistemology, axiology, gnoseology, and knowledge community.

There are therefore three theoretical points where this study departs from those in the reviewed literature.

a) Current literature and knowledge suggest that, 'physical' and 'materialistic' worldviews dominate food analysis and for that matter modern food science. As physical worldview represents only one of the currently known three worldviews, (namely social, spiritual and physical) there exist an ontological gap in food theorizing and scienctific analysis (Rozin, 2005).. The spitritual and social ontologies need some space or consideration to test their explanatory power and relevance for explaining and providing for food availability, access, quality and utilization.

b) The fact that proponents of indigenous foods and food science fall short of making complete or comprehensive scientific analysis of indigenous foods (Ontology, epistemology, axiology, value systems and knowledge communities) means that there is some knowledge lacking in the food science of indigenous people.

c) The state of world hunger coupled with food related ill health and disease in the world today amidst plenty food and advancement in modern science and technology constitute a failure of modern food science and therefore a gap in knowledge that demands alternative thinking and sciences. Lappe et al, (2008), Winne (2009), Nestle (2007a), Kiple and Ornelas (2000) testify to this failure.

The following chapters (3, 4,5 & 6) are therefore focused on presenting and analysing empirical data in a consistent and logical manner on the theory and science of food among indigenous people in the East Gonja District of the Northern region. This provides at least a starting point for engaging and critiquing indigenous food science aside the numerous applications of the study above.

CHAPTER THREE

METHODOLOGY

3.1 RESEARCH DESIGN AND METHODOLOGICAL FRAMEWORK

The study is founded on anticolonial indigenous research paradigm described by Chilisa (2011) as a "framework of believe systems that emanates from the lived experiences, values and history of those belittled, and marginalised by Euro-western research paradigms" (ibid, 2011:19; Smith, 1999). The culture, worldviews, philosophical assumptions, local realities, value systems and theoretical frameworks of the communities of study are the main but not exclusive considerations of the study. The methodology is therefore informed by anticolonial indigenous paradigm transcending disciplinary, positivist and Eurocentric thoughts and science.

From two standpoints, the study is a unique and challenging inquiry departing from traditional positivist research. First, it is more qualitative in approach, and secondly, it challenges and critiques dominant and powerful development research paradigms especially positivism. Rigour can therefore not be compromised both in the process and product of the study. Nevertheless, a case traditional study was used analyse the food culture among selected hotels and restaurants and the type of foods they served and why. Credibility, transferability, dependability and conformability have been critically factored into the entire research to ensure acceptable standards (Chilisa, 2011; Denzin and Lincoln, 2011).

Data collection, collation, analysis and interpretation made use of indigenous research methods and decolonization of methods approach. In particular, the adoption of a decolonization of methods approach is to ensure that maximum benefit of complementarity is gained from

mainstream research methodologies and indigenous methodologies. Additionally, the combination of the two approaches enabled a fair and critical analysis of the contested theories and concepts on the subject of food.

Decolonized interview method, ethnophilosophy, philosophic sagacity, cultural artefacts, proverbs and metaphors formed part of the conceptual framework of the study; storytelling, songs, poems, talk circles and indigenous knowledge- based interview guides are some specific examples. Soft systems methodology was also used to further analyse the research problem and data collected (Checkland, 1981; Checkland and Scholes, 1999).

Ethical considerations were driven by the culture and realities of the research communities. The ethical guidelines and procedure for conducting indigenous research by the University for Development Studies complemented the communities' ethical concerns. Lastly, the four general principles of *relational accountability, respectful representation, reciprocal appropriation and rights and regulations* in a post-colonial indigenous research paradigm were applied.

Finally, using a combination of disciplinary, multidisciplinary and transdisciplinary approaches, principles and methodology (Nicholescu, 2006, 2008; Jager et al, 2008), the study investigated, analysed and critiqued the inter-cultural and inter-scientific analysis of world views, value systems and sustainability strategies on food in northern Ghana using largely qualitative and, where really necessary, quantitative data.

3.2 RESEARCH METHODS

A combination of research methods were used to collect, analyse and interpret data to answer the research questions. The study was also guided by the transdisciplinary Charter (Nicolescu, 1994) due to the fact that indigenous knowledge transcends disciplinary boundaries and *is*, as in the case of Moari knowledge, more and less than a paradigm (Smith, 2008). In this sense, the approach was used to advance arguments and move the frontiers about the concept and uses of food beyond what modern science knows and describes as anything taken 'to nourish the body and provide some vital nutrients' to other socio-spiritual concepts of food such as 'to please the ancestors, mother earth and the spirits (Nicolescu, 2002).

Rigour is to address the reliability and validity critiques of qualitative research such as subjectivity, the potential for informants to withholdor distortvital information. The study is situated within the framework of a culturally safe research involving the mentorship of elders, chiefs, custodians of the land, farmers and culturally relevant and appropriate while satisfying the rigour of a transdisciplinary research. The ten principles of endogenous research were discussed with the research communities.

A summary of how the research was conducted is given below;

1. A review ooof the University for Development Studies' Graduate Research Guidelines which consisted of;
    - Postgraduate Research Consent Forms
    - Ethical Review Forms
    - Research Agreement forms

- Introductory Letter from Graduate School

2. Expert Language Translation of Key scientific / Philosophy words, terms and concepts.
3. Physical, emotional and spiritual preparedness for the study
4. Community entry and disclosure
5. Trust and rapport building – Reconnecting Family relations with research participants

Different methods, techniques and tools were adopted to collect data. These are enumerated below;

3.2.1 Ethnophilosophy

Ethnophilosophy, according to Chilisa (2011) refers to the "collective worldviews of people that are encoded in language folklore, myths, metaphors, proverbs, taboos, rituals, festivals and artefacts". This body of knowledge served as a depository of literature for the study. Meaning and analysis were drawn from a combination of these data collection methods. Theoretical frameworks were drawn from these methods especially in relation to food and its availability. The Damba festival, for example, is a good opportunity to investigate and learn in more detail, the concepts and theories about food. Metaphorical sayings and proverbs related to the subject of food were used to collect more data. For this reason, much of the data collection and analysis were done using 'Gonja' as the language of communication, presentation and dissemination of research findings.

3.2.2 Philosophic Sagacity Method

This is a reflective system of thought based on the wisdom and traditions of a people. The advantage with this method is that it enables the research to consult a large body of knowledge

from the sages which is usually not documented in the literature. These sages were encouraged to critique the written literature on the subject of the research (Smith, 1999; Denzin et al, 2008; Chilisa, 2011).

3.2.3 Indigenous Focus Group Interviews (IFDG)

In indigenous African societies, the family and the community constitute important value systems. Critical issues of concern are addressed in a collective spirit of social organization. Consequently, some practices have exhibited unrivalled sense of respect for members of the society at least in offering them equal opportunity, respect and recognition. From this background therefore, IFGD or relational interviews can be discerned. Hence, family and community Focus Group Interviews were used to discuss the concept of food among indigenous people.

The use of focus group discussions is based on its compatibility with real communication systems in natural settings (Chilisa, 2011). In other words, in real life situations in indigenous communities, group interactions provide a more realistic perception of issues and arrival at acceptable decisions.

What is different in the application of the FGD method in this study is that, participants in the group were not solely determined by the researcher or facilitator of the discussion (as in main stream western FGD) but were allowed to freely flow according to the culture of the people in participating in group, family and community matters of concern. For instance, if an elder in the Indigenous FGD feels he / she wants to invite another elder, sage or family relation in fulfilment of family or community values, this was allowed. Secondly, unlike in traditional

FGDs, participants in IFGDs have equal opportunity to express their views through the use of techniques such as talking circles where respect for each other allows participants to freely express their views (Smith 1999; Chilisa, 2011; Denzin and Lincoln, 2011). This is done by passing a sacred object such as a feather, stone etc around the group to give participants the opportunity to speak and be heard.

Respect was accorded the relations of research participants. Their preferences and choices about the research interactions are paramount. Confidentiality was at the discretion of the research participants. As a characteristic of indigenous research, fellow elders and community members were invited to join the interaction; this was method was used at Kpambu. The Shrine Lord invited about 7 other community members to join the discussion. This was not resisted by the researcher as the main objective was to learn from the people through their own ways of learning (Gnoseology). This involved the use of an interview guide that helped to bring into the discussion, ways in which people are connected to others and their environment (Chilisa, 2011).

3.2.4 Decolonized Interview Method

A questionnaire-based interview is not necessarily bad in indigenous research settings if it meets the knowledge requirements and cultural values of the researched. Chilisa (2011) and Smith (1999) isolated three principles about anti-colonial indigenous research interviews which when observed can result ina good culturally responsive interview. These are:

a) Recognition and provision for a relational way of knowing, demonstrating love, interpersonal relationships, respect for participants and a sense of togetherness rather than individualism.

b) The researched are the knowers while the researcher is the learner. From this premise, the researched should be free to draw from their web of connections with their local realities and worldviews especially from their physical, social and spiritual worldviews.

c) Lastly, the researched should be free among other things to:

i. Critique the literature written about them;
ii. Bring to the discussion indigenous knowledge such as proverbs, folktales, myths etc; and
iii. Free to enter into dialogue with the researcher on his/her research questions.

The above criteria were carefully applied to develop a contextualised interview guide for the study.

3.2.5 Story Telling Method

In indigenous research, stories fill the gap in the story of the colonized from their own perspectives. Additionally, stories enable researchers to triangulate post-colonial indigenous values with other knowledge systems. Food is probably one of the subjects that has suffered deficit theorizing from positivist western science. Theories, concepts and ideologies around food, its production, consumption, marketing and utilization have undermined, suppressed and marginalised indigenous perspectives on the subject. Story telling in indigenous research is one way of elucidating the treasures of indigenous knowledge about food in indigenous communities. Self-praise, identity and contemporary stories and songs were used to collect data

on the subject. Folklores, proverbs and tales are some specific examples. Proverbs such as *'K-boru Gbarangbanje! Kache ne larabaku luwe ban bishi muso',* provided a deep insight in food security among the Gonjas. Literally, this proverb is a praise for the comparatively less tasty but more robust and weather resistant water yam. The praise is that; the gigantic wateryam! When the smooth very tasty yam called *'larabaku'* is out of season, they will look out for the water yam'. The significance of this proverb is that, some types of foods provide an insurance against lean seasons and need to be maintained in the farmer's diversity of crops so that when the most preferable is out of season or is unable to withstand weather vagaries, this variety would be available to help prevent severe hunger.

3.2.6 Music

Much of indigenous knowledge and ways of learning are buried in traditional forms of music (Millar et al, 2012). Among the Gonjas, certain types of music are associated with spiritualism. One of such music is 'Aguro'. It is sang using mainly proverbs. The skills of "aguro" are passed on from father to son and remain with the family or clan. There is a lead singer, supported by 3-5 respondents who beat two hand-held metals to produce a unique rhythm. The music can be organized based on any subject as the musician is usually talented enough to sing on any subject. This was used to elicit some of the conceptual and theoretical meanings of food in the community.

3.2.7 Structured and Unstructured Interviews

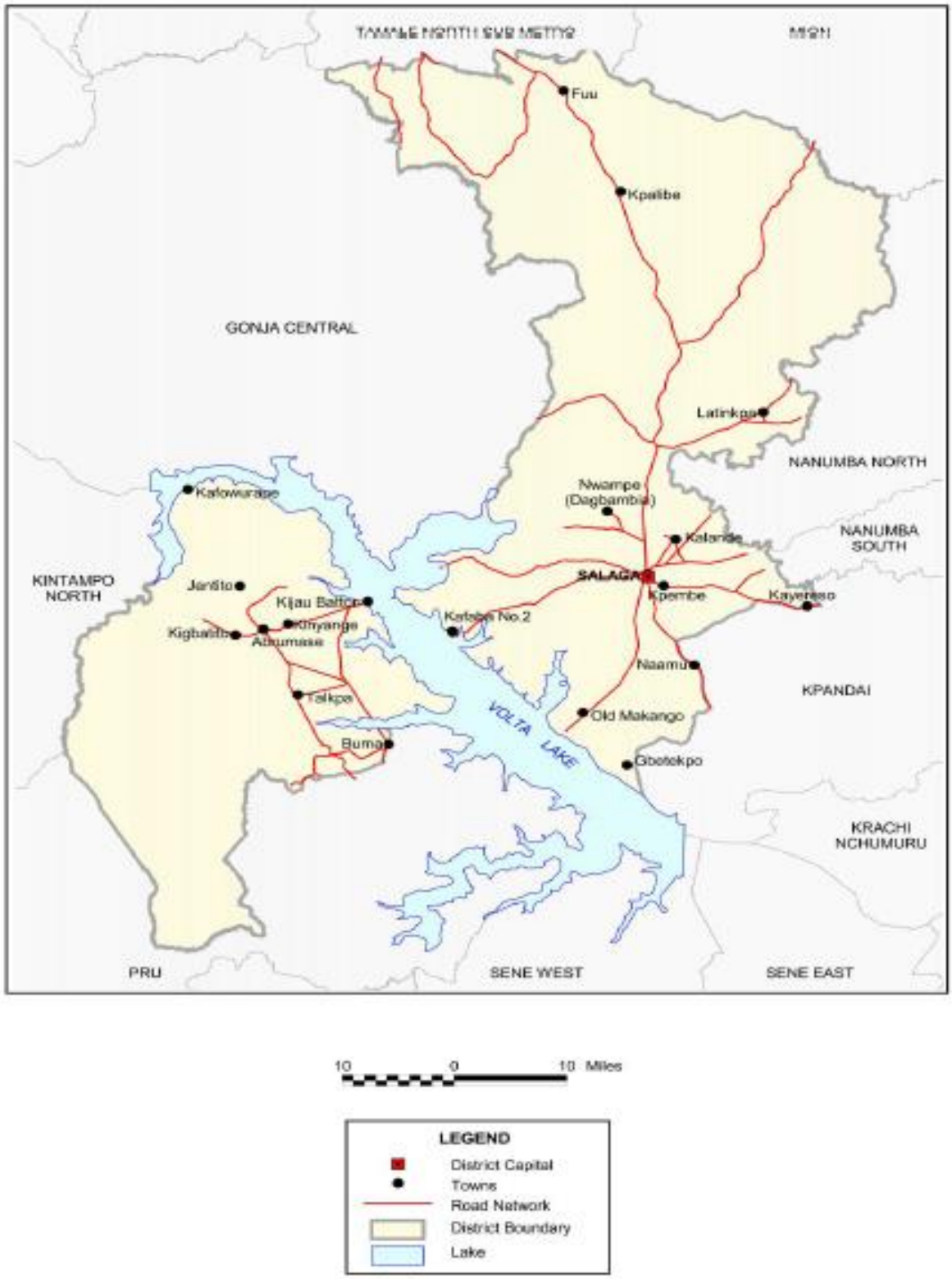
Finally, traditional structured and semi structured interviews were also used to collect data from restaurants and hotels within the Tamale metropolis This was also meant to triangulate data collected from indigenous communities, restaurants and hotels.

3.3 STUDY AREA – EAST GONJA DISTRICT

3.3.1 Location and Size

The East Gonja District is one of the oldest districts in the country created in the 1950s by the Nkrumah regime. It is located at the South-eastern section of the Northern Region of Ghana. The district lies within Latitude 8°N & 9.29°N and, Longitude 0.29°E & 1.26°W. It shares boundaries with the Mion District and the Tamale Metropolitan Assembly to the North, Central Gonja District to the West, Nanumba-North, Nanumba-South and Kpandai Districts to the East, and the Brong-Ahafo Region to the South. The total land area of the district is 8,340.10 square kilometres, occupying about 11.95 percent of the landmass of the Northern Region making it the largest district in the country (Ghana Statistical Service, 2014:1).

Figure 3.1.: Map of East Gonja District



Source: Ghana Statistical Service, (2014: 2)

3.3.2 PHYSICAL FEATURES

3.3.2.1 Climate

The East Gonja District lies in the Tropical Continental climatic zone. Temperatures are fairly high ranging between 29oC and 40oC. Maximum temperature is usually recorded in April, towards the end of the dry season with minimum temperatures recorded from December to January, during the Harmattan period. The area experiences a single rainy season (May to October) and a long dry season (November to March/April). Average annual rainfall varies between 1,112.7 mm and 1,734.6mm (Ghana Statistical Service, 2014:1).

3.3.2.2 Topography, Relief and Geology

The topography of the district is typical of the Northern Region, generally flat with few undulating surfaces. Nowhere does the land rise up to 200 metres. The district is underlaid by the Voltaian sedimentary formation with low potential for mineral formations and poor water retention. The area receives annual precipitation averaging 1,050mm, considered enough for single farming season. Temperatures are usually high, averaging 30°C (Ghana Statistical Service, 2014:1).

3.3.2.3 Vegetation

The natural vegetation in the district is the Guinea Savannah Woodland which has evolved from climatic conditions and modified substantially by human activities. The vegetation is relatively dense, compared to the rest of the Northern Region. The tree cover consists of semi-deciduous trees such as Shea-nut and dawadawa, oil palm and raffia palm trees at the extreme Southeast. There are few grooves, which have been preserved over the years. In addition, high

grasses that characterize savannah areas are extensively spread throughout the district. A large number of both plant and animal species inhabit the natural environment. However, intensive harvesting of trees for fuel wood and charcoal burning, and also activities of Fulani herdsmen are fast reducing the tree cover, particularly in areas close to the Tamale Metropolitan District and the Abrumase areas close to the Pru District in the Brong Ahafo region (Ghana Statistical Service, 2014:1).

3.3.2.4 Rainfall

The rainfall pattern in East Gonja is characterized by irregularity and variability in terms of timing of onset, duration and total amount of rainfall, which has been the key limiting factor affecting crop production in the district. However, the district has one main rainy season which is sufficient to support and sustain plant life. The total annual rainfall ranges between 1050mm to 1500mm.

3.3.2.5 Drainage

The district has a number of large water bodies that flow throughout the district. These include the Volta Lake and the Dakar River both of which run across the district. A number of streams, dugouts, valleys, hills and mountains are also found at various locations in the district, as part of the natural environment. The confluence of the Volta and some of its major tributaries including the White Volta and the Dakar River are found in the district (Ghana Statistical Service, 2014:1).

3.3.2.6 Soils

The bulk of the district is covered by ground water laterites, developed mainly from Voltaian Sandstone materials, highly concretional with frequent exposures of iron pan and boulders. The soils in the district can be classified into two major groupings. These are; Alluvial soils generally classified under Glysols are found around the Volta Lake, particularly in the drawn-down zone of the Volta Lake during the dry season. The soils along the Lake are medium textured and moderately well drained in parts. The soil is potentially fertile and is suitable for a variety of crops especially vegetables, rice (Ghana Statistical Service, 2014:1). There are, however, deeper and slightly better soils in some locations, which could support shifting cultivation patterns.

3.4 POPULATION AND DEMOGRAPHIC CHARACTERISTICS

According to the Ghana 2010 Population and Housing Census Census (Ghana Statistical Service (GSS), 2014) the district has a total population of 135,450 which represents 5.5% of the total population of the Northern region with a total of 18,811 households. Females represent 48.5% while males represent 51.5% of the total population. As much as 81.3% of the population of the district is rural with only 18.7% urban. The age structure of the district's population consists of 54.6% of 1-19 year age group, 40.9% of 20-64 year age group and 4% of the 65-95 year age group. The district has a total dependency ratio of 92.3%. About 93.1% of the total population of the district are Ghanaians by birth, 2.9% are non-Ghanaians, 2.9% are with dual nationality. About 1.1% are Ghaianaians by naturalization. Guans constitute 47.8% of the people of the district, Mole-Dagomba14.6% and 14.15% are Gurma. Islam is the single largest religion practised in the district. Up to 65.5% of the population are Muslims, 5.5 traditionalists; about 8.45% are Protestants and 9%, 6.3% Pentecoastal and Catholic

respectively. The average hosehold size is 10 persons and this represents up to 23% of all household sizes. One person household size is only 5.5% meaning that there are only a few households where there is just one person as the only person living in the household (GSS, 2014).

3.4.1 Social and Cultural Structure

The district has a total population of 135,450 with the major ethnic groups being the Guans, the mole-Dagbani and the Gurma. The other minority ethnic groups are the Ewe, the Akan, and the Ga-Adangbe. The East Gonja District forms part of the Gonja Traditional Kingdom with the King (the *Yagbon-wura*) as the President whose court and administrative headquarters is in Damongo in the West Gonja District. There are five Paramount Chiefs in Gonja-land who ascend to the position of the King (*Yagbon-wura*) on rotational basis. One of such paramount Chiefs is located in the East Gonja District and that is, the *Kpembe-wura*. There are also some Divisional Chiefs who are answerable to the *Kpembe-wura*. All the Divisional Chiefs have Sub-Chiefs under them. The people of East Gonja District like the others in the region celebrate the *Jintingi* (Fire) festival and the *Damba*festival. The staple foods in the district are *Tuo Zaafi (*made from maize flour), *fufu* (yam and cassava) and rice whose raw products are produced in the district.

3.5 SAMPLING PROCEDURE AND SAMPLE CHARACTERISTICS

This section describes the number of research participants selected and the desired characteristics of such participants. A total of four communities were purposively selected from the district. The following criteria was used to select research participants;

a) **The State of Indigeneity of the Community:** The level of remoteness of the community from urban centre was approximated for indigenousness. It is

acknowledged here that purely indigenous communities are difficult to find. However, it is true that very remote communities that have limited access to modern science exposures are approximatey more indigenous than urban communities where modernization is held to be the daily 'way of life' though most of them have no clue of the theoretical details of modernization. For instance, at Kpanbu, access to modern health, education, transport and other amenities date back to only the 1990s. The only school in the community as seen in figure 1.1 communicates deeper than appear on the community's exposure to modernization.

Plate 3.1: Picture of Kpambu Basic School

Source: **Field Study (2013)**

b) History of the community in terms of originality of establishment by the founder of the Gonjas (Ndewura Jakpa).The direct descendants of the great Warrior of Gonjas is called K-Jakpa Nana (meaning the direct descendants of the founder of the Gonjas). The objective behind this criterion is that there are some spiritual knowledges in particular

subject areas which are the domain of only the indigenos people of the area. This knowledge is not easily shared with settlers. By selecting the indigenous people of these areas, learning can be said to have taken place with the appropriate knowledge holders on culture and tradition.

c) As it is difficult to find purely indigenous communities, age was also used as a close approximation of indigenousness. Theoretically, age is an important element in indigenous knowledge transmission. Knowledge held by indigenous people is transferred from one generation to another through surviving elders. This gnoseology uses experience as a critical ingredient in understanding knowledge. Consequently, when a very old person who has been in touch with his grand or great grand parents approaches old age and or sense dying, they hand over their stoke of wisdom and knowledge to their eldest son or daughter who in turn hands down this treasure onto the next generation, in that order. Therefore, in all three communities selected, the main research participants households selected were above the age of 80 years. At Kpambu, the main reseach participant was above 92 years; in Kpembi was about 87 years whiles the research participant in Bau was 79 years. In each of the research communities the main research participants invited other family and community elders to join the learning sessions.

d) **Occupational or professional background of the research participants:** In indigenous communities, professional or occupational inclination is a historical phenomenon based on clan or lineage specialization. Every community is segregated and well noted and highly respected in terms of their expertise and role in the community. There are chiefs, farmers, hunters, blacksmiths, warriors etc. As the study

is mainly about food, farming and hunting families were purposively selected to ensure relevant learning and knowledge transfer on the research.

e) **Ethnic affiliation:** Ethnicity is a major pattern in indigenous knowledge. Each ethnic group has a unique order of believe system that may vary from one group to another though sometimes very similar. The Gonjas are the indigenous people of the East Gonja District constituting as much as 47.8% of the total population of the district (GSS, 2013). The research communities and households were selected from the Gonja ethnic group. The rationale is that indigenous communities are ethnically stratified and segregated in terms of cultural uniformity, land owners and settlers. As the land owners are the custodians of the land and responsible for its pacification, it is assumed that much of the knowledge about food and agriculture on this land is handed down from one generation to another within this ethnic group. The objective of the choice of three communites instead of one which would have been adequate to reveal the theory and concept of food among the Gonjas was to triangulate data and research findings across the research communities (even within the same ethnic group). The other was to maintain a focus on a smaller group to ensure in-depth discussion on their concept and theory of food. Selection of households in each selected community was therefore guided by three key characteristics: (1) That the household is Gonja by ethnicity and indigenous in the community; (2) the household is identified as a farming, hunting or royal family and (3) the household has an elderly person who is over 80 years of age with three generations – a son /daughter, a father / mother and a grandfather/ grandmother. Where a great grandfather / mother were available, preference was given to such a family. The reason is that, in indigenous communities, knowledge is handed

down from one generation to another and graduated in age. The presence of an older generation helps to validate the data collected from younger generations. Women constituted an important part of the research participants. The notion of food is one of the spheres of human endeavour where the roles of men and women are so distinct and yet so fused depending on the cultural setting. For instance, while the conception of food may be the same for men and women, its production, preparation, and utilization in the natural, social and spiritual realms assigns different roles to men and women. The study therefore deeply engaged with the indigenous feminist perspectives of food among the research participants. At Bau for instance, the entire learning session with the research participant, who was a hunter was held with his 68 year old wife. As research participants are more knowledge owners than simply research subjects, the sample size and characteristics were more flexible to their intellectual suggestions and recommendations especially in terms of who participated and who did not in any particular setting.

Table 3.1 Sample Size and Characteristics

No	Name of Community	Total Sample	Sample Characteristics
1	Kpembi	4	1 Retired Farmer above 80 years (blind) + wife and elder son 37 years, 1 Middle Age farmer of 56 years (My elder brother from my house)
2	Kpambu	7	Community Chief and Chief Priest (Ke-Gberwura) above *90 years Mixed Group of other community members (5- farmers, 1 teacher
3	Bau	7	A Hunter cum farmer over 76 years and his family members as follows: 2 Wives 62 and 50 years

			2 Eldest Sons (41 & 32 years) 2 Children (9 & 13 years)
4	Kito	1	Farmer and Shrine Lord aged over 70 years
	TOTAL	19	

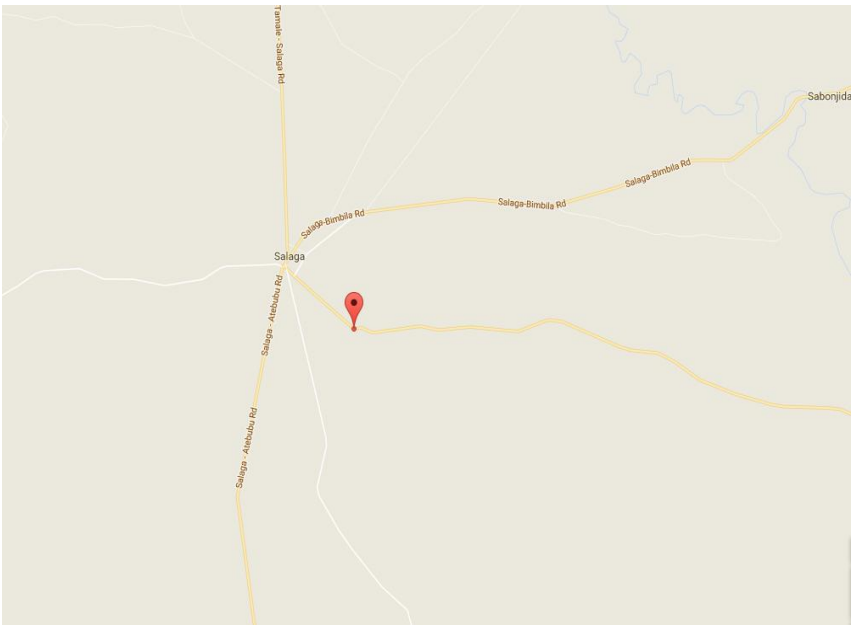
Source: Field Research, (2013)

3.6 RESEARCH COMMUNITY PROFILES

3.6.1 Kpembe

Kpembe is located on Latitude Located on Latitutude N08°31.909 and Longitude W000°29.921 in the East Gonja District of the Northern Region of Ghana. It is the traditional capital of the East Gonja district and the seat of the paramouncy of the East Gonja Traditional area which is one of the 'gates' that rise the to overall paramouncy of the Gonja Kindgom in Yagbon. It is a therefore an important settlement in the histrory of the Gonjas. Being one of the gates to the Jonja kingdom means the village was established byt eh founder of the Gonjas who planted one of his biological sons there to rule that area after the conquar and as he proceeded with the conquest. According to the 2010 population and Housing Census, the community has a total population of 2, 441 peole of which 1176 are males and 1265 are males (Ghana Statistical Service, 2012). Total number of houses was 345 and 337 households giving rise to an average household size of 7.2. Agriculture is the main economiv activity of the community with with some isolated petty traders.

Figure 3.2: Map of Kpembe



Source:

https://www.google.com.gh/maps/place/8%C2%B031'54.5%22N+0%C2%B029'55.3%22W/@8.5316333,-0.5113963,13.02z/data=!4m5!3m4!1s0x0:0x0!8m2!3d8.5318167!4d-0.4986833?hl=en

Figure 3.3: Satelite Image of Kpembe

Source:https://www.google.com.gh/maps/place/8%C2%B031'54.5%22N+0%C2%B029'55.3%22W/@8.532988,-0.5013748,1262m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d8.5318167!4d-0.4986833?hl=en

3.6.2 Bau (Quarters)

Bau is located on Latitude N08°31.888 and Longitude W000° 37.633 in the East Gonja District of the Northern region ofGhana. It is a small community with a total population of 465 residents residing in 61 houses and 56 households with an average household size of 8.2. About 214 of the residents are male while 251 are females (Ghana Statistical Service, 2012). The main economic activity of the community is agriculture with pockets of petty trade dominated by women who operate micro grocery shops.

Figure: 3.4: Map of Bau

Source:

https://www.google.com.gh/maps/place/8%C2%B031'53.3%22N+0%C2%B037'38.0%22W/@8.6975195,-0.9546887,8.92z/data=!4m5!3m4!1s0x0:0x0!8m2!3d8.5314667!4d-0.6272167?hl=en, Accessed, 27th July 2017

Figure 3.5: Satelite Image of Bau

Source:
https://www.google.com.gh/maps/place/8%C2%B031'53.3%22N+0%C2%B037'38.0%22W/@8.5300076,-0.6296608,1043m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d8.5314667!4d-0.6272167?hl=en, Accessed, 27th July 2017

3.6.3 Kpambu

Kpambu is also a small community located on Latitude N08°34.118 and Longitude W000°46.397 in the East Gonja District of the Northern Region of Ghana. According to the 2010 population and Housing Census, it has a total population of 189 of which 119 are males and 70 females. It has total of 34 houses in 31 households with an average Household Size of 6.1 (Ghana Statistical Service, 2012). Agriculture is the main economic activity of the area followed by petty trade and fishing.

Figure 3.6: Map of Kpambu

Source:

https://www.google.com.gh/maps/place/8%C2%B034'07.1%22N+0%C2%B046'23.8%22W/@8.580879,-0.8054557,12.83z/data=!4m5!3m4!1s0x0:0x0!8m2!3d8.5686333!4d-0.7732833?hl=en, Accessed, 27th July 2017

Figure 3.7a: Satelite Image of Kpambu

Source:
https://www.google.com.gh/maps/place/8%C2%B034'07.1%22N+0%C2%B046'23.8%22W/@8.5654743,-0.7891209,6845m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d8.5686333!4d-0.7732833?hl=en, Accessed, 27th July 2017

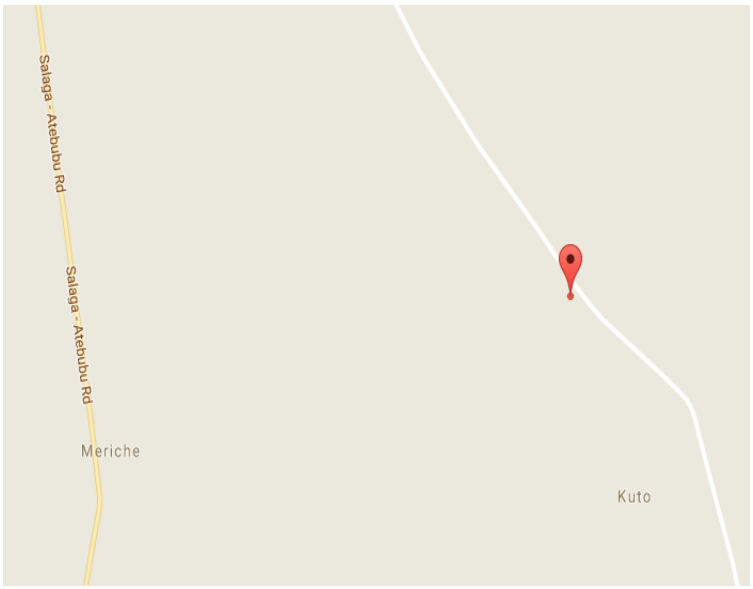
Figure 3.7b: Satelite Image of Kpambu

Source:
https://www.google.com.gh/maps/place/8%C2%B034'07.1%22N+0%C2%B046'23.8%22W/@8.5654743,-0.7891209,6845m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d8.5686333!4d-0.7732833?hl=en, Accessed, 27th July 2017

3.6.4 Kito

Kito is also a small community located on Latitude N08^{0}27.545 and Longitude W00029^0.503. It has a total population of 198 residents residing in a total of 47 houses and 37 households with an average household size of 3.5. Males constitute 87 while females constitute 111 (Ghana Statistical Service, 2012). The main economic activity is farming. The community is one of the popular.

Figure 3.8: Map of Kito



Source:

https://www.google.com.gh/maps/place/8%C2%B027'32.7%22N+0%C2%B029'30.2%22W/@8.4696207,-0.5204703,13.17z/data=!4m5!3m4!1s0x0:0x0!8m2!3d8.4590833!4d-0.4917167?hl=en

Figure 3.9: Satelite Image of Kito

Source: https://www.google.com.gh/maps/place/8%C2%B027'32.7%22N+0%C2%B029'30.2%22W/@8.4696207,-0.5204703,13305m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d8.4590833!4d-0.4917167?hl=en

3.7 DATA TYPE

The main objective for the following types of data to be collected is to answer the research questions within the theoretical and conceptual framework established.

a) Primary data were collected on the ontology, axiology, gnoseology, epistemology and knowledge communities on food in the sampled communities. This is to enable a critical analysis of the original submissions of indigenous people's knowledge based on the notion of food. Similar secondary data were collected on modern food science. The reason is that, modern food science is documented and easily available from various sources such as books and journal articles. This contributed to answering the main research question on the science of food among indigenous people in the district.

b) Both primary and secondary data on indigenous and modern food species and varieties were collected to determine the power relationships and the threat of contamination and extinction of species.

c) Data on indigenous farming methods, concepts, approaches and methodologies were collected and investigated to reveal possible conceptual and theoretical underpinnings of some of the food practices of the research participants.

d) Food Value Chains (FVCs) - The development of modern food science has come with several processes and outcomes that have culminated into numerous concepts, ideologies and notions about food which are worthy of investigation. Some of these include food security, food sovereignty and main stream notions of food (food

production, food as weapon, food as subject to subsidies and food as a commodity) and the way these notions have resulted in development strategies including the green revolution, Low External Input and Sustainable Agriculture (LEISA), organic farming, slow food, food as weapon and food as subject to subsidies.

e) Data on indigenous strategies of ensuring food availability for multiple generations helped to identify if any concepts do exist for indigenous people on food security

f) Strengths and weaknesses of indigenous and modern food systems were isolated and investigated using both primary and secondary data.

g) Purposes / uses of food: A catalogue of the uses of food was compiled from the four communities to find out what food really means to different people depending on their location and culture.

h) Hunger and Famines: What constitutes food is central to the concept of hunger and famine. Depending on what is regarded as food, different interpretations and definitions of food may be discerned. Additionally, the scale of the pursuance of the then Millennium Development Goals on Hunger (MDG1) and the current Sustainable Development Goals (SDGs) deserves an enquiry of this nature. Data collected here were used to investigate culturally appropriate concepts of hunger and food security in northern Ghana.

As festivals and sacrifices are important platforms where indigenous food issues are practised and reaffirmed periodically, data were collected on food related festivals in

each of the research communities as a means to unravelling the social, spiritual and physical uses of food. In indigenous communities, sacrifices are made with highly selective plant and animal species which serve as food not only to the physically living but also as pacification for the dead. These data were of significant importance to the study due to the centrality of spirituality and social relevance to indigenous knowledge and worldviews.

3.8 TRANSLATION OF 'KEY WORDS' INTO 'GONJA' LANGUAGE

It is acknowledged that colonization and western education have significantly affected the ability of the descendants of indigenous people to fully comprehend their own local languages. This situation has created a gap in communication between the youth and their older generations (Grand- and Great-Grand fathers and mothers) who were relatively less exposed to western education. This research and researcher are no exceptions. Additionally, the key terms and terminologies are also not terms that are used on a daily basis. In order to communicate better, the meaning of the key terms and terminologies of this study (concept, theory, ontology, epistemology, gnoseology, axiology, indigenous, philosophy, knowledge, etc) to the understanding of indigenous people, the meanings of these terms were extracted from various encyclopedia and dictionaries including the Encyclopaedia Britannica, Encyclopaedia Americana, Oxford and Cambridge Advanced Learner's dictionaries, Wikipedia, and Webster's International Dictionary. The extracted meanings of the key terms were translated to the research participants from English to Gonja Language. This was done by a team of Gonja and English Language tutors of the Bagabaga and Tamale Colleges of Education. By this, the researcher sought to improve his own understanding of the terms to enable him simplify the

various meanings of the terms from the scientific literature to the indigenous research participants.

This enabled the researcher to use equivalent words, phrases or terminologies to communicate with indigenous communities during data collection. It is noted however, though not unusual, that as with all languages, these terminologies may or may not have direct equivalents or translations in Gonja. In such cases the closest meaning, expression or phrase was used to describe the term. These key words and terminologies include but not limited to;

i.	Food	i.	Ontology
ii.	Science	ii.	Epistemology
iii.	Theory	iii.	Gnoseology
iv.	Concept	iv.	Axiology
v.	Indigenous	v.	Knowledge Community
vi.	Knowledge	vi.	Philosophy

These terminologies were translated using the New Encyclopedia Britannica, 1995; Encyclopedia Americana, 1994, Webster's Third International Dictionary of the English Language Unabridged (with Seven Language Dictionary) Volume 1 A-G (1986:2371), the Cambridge Advanced Dictionary, (2000), Cambridge Advanced Learners' Dictionary (Third Edition) (2008), the Oxford Advanced Learner's Dictionary (7th International Students' Edition) (2005). Other sources include Dei et al (2000:6) who defined indigenous knowledge as "a body of knowledge associated with the long-term occupancy of a certain place." Other online sources include, http://www.thefreedictionary.com. The choice of a combination of old publications such as 1986, 1994 and 1995 editions and new publications such as 2000, 2008 was to track changes if any, in the meanings of the terms over time.

3.9 A CASE STUDY

3.9.1 A Case of the Urban Food Culture in the Tamale Metropolis.

The case study is used to depict state of knowledge in terms of the power relations between indigenous foods and western foods. This has become necessary to enable the study to figure out whether or not some indigenous food varieties are threatened with extinction from western foods. Dominance is used as a proxy for power. In order words, when something dominates the other, it is taken to mean that several factors have played into the dynamics of making it more visible than the other. This is also the case with traditional power as analysed by Foucault (1998, 1991 and 2001). The case study involves an assessment of the menus, the name and type of food, the method of preparation, nationality of the owner, estimated time taken to prepare indigenous and foreign dishes, the general description of its original menus, cooking methods and types of food stuffs used. Three premiere (old) hotels, four 'modern' and three ordinary hotels were chosen within the Tamale Metropolis. Table 3.3 shows the list of hotels and major roads used for the study.

Table 3.2: List of Hotels Interviewed for Indigenous Foods on their Menu

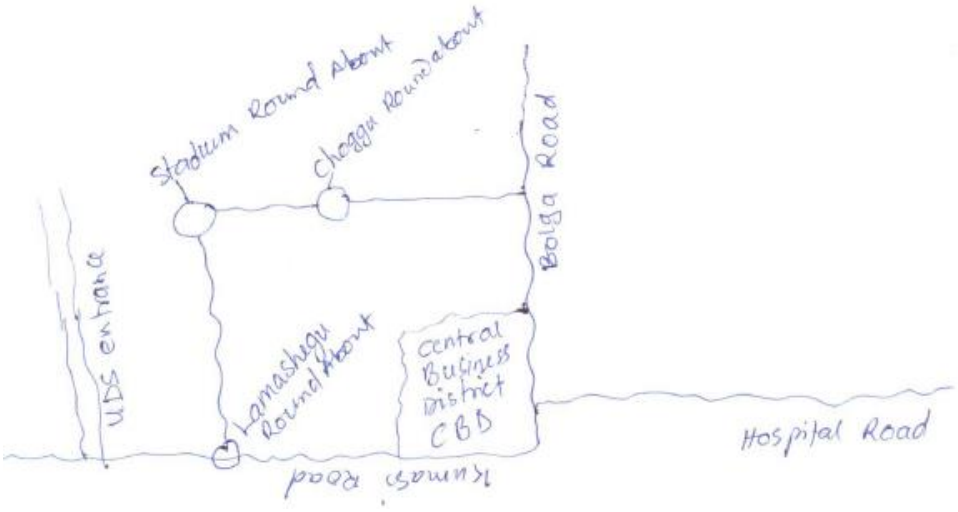
SN	Name of Hotel	Location / Address
1	Las Hotel	Hospital Road
2	Picorna Hotel	Ababu Market
3	Alhassan Hotel	Adjacent Bank of Ghana
4	Mariam Hotel	Agric Road, adjacent ISODEC
5	Gariba Lodge	Bolga Road, near IPA
6	UDS International	Kumasi Road, near SOS Children's Village

	Conference Centre and hotel	
7	Modern City	Off Bolga Road, near Nothern School of Business
8	Gbanzab Hotel	Near New Stadium Round about
9	Ariwa Sunshine Hotel	Gumani Second Road
10	Catholic Guest House	Bolga Road, Agric Traffic Light

Source: Field Research, (2013)

In addition to this, two restaurants each were randomly selected along major routes within the Tamale Metropolis and in the Central Business District. In all a total of 10 restaurants were chosen along these roads as shown in figure 3.1. Table 3.4 also gives a list of the roads sampled for the selection of restaurants for interview and their estimated length.

Figure 3.10: Major Roads Sampled for Interviews with Restaurants



Source: Field Research, 2013

Table 3.3: Major Roads Sampled for Interviews with Restaurants

SN	Name of Road	From	To	No. of Restaurants Counted
1	Bolga Road	Aviation Club House	VRA / Barclays Banks	5
2	Hospital Road	VRA / Barclays Banks	Police Barrier –on the way to Salaga	5
3	Kumasi Road	VRA / Barclays Banks	UDS Central Administration	5
4	Radio Savanna Road	AgricTraffic Light	Nyohini Roundabout	5
	Total			20

Source: Field Research, (2013)

The reasons behind the use of Tamale as a case study are threefold;

a) Tamale is the biggest urban city in the Northern region. It is the target of intra-regional rural-urban migration including out migration from the research community. Counter influences of cuisine cultures are therefore encountered by the 'in' and 'out' migration of people from the rural areas to this metropolis.

b) Tamale is a cosmopolitan city providing home for people from different cultures, countries, and backgrounds. Due to the large and diverse size of the population, it is assumed that, there

is a correspondingly large demand for diverse foods or cuisine including, critically most of the foods that are feared extinct from the research community.

c) A cursory observation of the location of commercial food activities in the metropolis reveals a large number of fast food restaurants in the metropolis that is worthy of such study.

The choice of popular hotels is based on the size of the hotels and the general acceptability that they are popular. General acceptability of popularity was assessed by the probability of an unknown person simply directing you to the hotel on enquiry on its location or at least having ever heard of its name. In the same manner, these hotels also pose a power relation challenge with less visible and less known hotels and therefore are able to provide a menu that tries to satisfy its diverse customer base through effective demand –ability to pay for different foodstuffs to be served in the hotel. A controlled factor was introduced and three ordinary less popular hotels were selected for the study.

The choice of streets was also not random. It was based on the fact that as business entities, restaurants want to locate themselves along streets which are easily accessible by people who want to buy food. A road which is less used simply means that few people would ply it to look for food. Hence restaurants, like any other business entity, will locate at the place that is more likely to be sighted by eaters. This resulted in the selection of the roads within the Tamale Metropolis. All restaurants, small and big, which were sighted on both sides of each road were considered for the interview.

The main data collected from the 10 hotels and 10 restaurants include; the menu list, the name and type of food, the method of preparation, the estimated time taken to prepare the said food, the general

description of its origin e.g., Ghanaian, Chinese, American, Italian, Indian etc. and the method or type of fuel or energy used for cooking.

In all, 9 out of the 10 hotels chosen had a menu. All hotels interviewed were (100%) owned by Ghanaians. The most dorminant source of enegy for cooking is LPG and charcoal. The most dominant type of food found on the menu of all the ten hotels is rice in its various dishes ranging from fried rice being the most dominant to Jollof rice, plain rice with source and rice balls. These are served as lunch and breakfast menus. The commonest indigenous meal found on the menus of most of the hotels was TZ, Fufu, Rice and Beans (Wache), Banku, Kenkey, Yam slices, millet and corn porridge served as breakfast and Rice balls. The most dominant methods of cooking identified were boiling, frying and steaming with only a few cases of baking and roasting. The maximum time taken to prepare an indigenous meal like TZ and Banku depending on the quantity is 1 hour and 30 minutes. Food is mostly precooked, stored and served on request. Equally, it takes about the same time to prepare some of the foreign foods such as fried rice. The process of frying the rice with the appropriate additives was held to be the most time consuming event.

All hotels interviewed indicated their restaurants were not Fast Food Restaurants. The main reasons why more foreign foods dominate menus of the hotels was demand. It was found that both local Ghanaian and foreign international customers buy more foreign foods than the indigenous foods. Demand for indigenous foods was said to be relatively lower than foreign food especially when compared to fried rice. TZ however had a very high demand across 80% of all hotels that serve it. The main reason given for the relatively low demand for indigenous meals is lack of awareness and adequate knowledge about them. Availability of adequate and constant supply of indigenous food stuff was also identified as key issue. For breakfast in particular, only millet and corn porridge with

'kose' (beans flour made into a paste, moulded and fried) was identified on the menu of about 2% of all hotels interviewed. Tea, oats beverages such a milo and continental dishes were the most popular on the menus of these hotels.

Among the restaurants interviewed 90% decribed themselves as fast food restaurants aiming to serve customers with a minimum period of 10 – 15 minutes. Almost all (95%) of all restaurants were owned by Ghanaians with only two percent owned by foreigners (A Togolese and Indian). Only two out of the 10 restaurants serve breakfast of which only one serves a local Ghanaian breakfast (Poridge). The main fuel for cooking was LPG and charcoal. Fried Rice pre-dominates all dishes served in the restaurants interviewed. Over 90% of all food served in the restaurants were foreign. Rice dishes dominate all others. A combination of rice and beans dish popularly called *'wache'*, was also found to be very popular among hotels more than in restaurants. However, in terms of the main foodstuff used for the preparation of wache, there is a significant change over time. Traditionally, 'wache' was known to be tasty when cooked with local rice, and local beans using potassium nitrate (kanwa) as a catalyst to reduce the time taken to cook the beans. Potassium nitrate is known to give the food its unique dark colour and taste and took not less than five hours to prepare with most of the time taken being allocated to the time needed to boil the beans. It must be noted however that potsssium nitrate is held to be injuries to human health at high concentrations and also destroys the protein in beans.

Today, 'improved' variety of white black-eyed beans is used in combination with mostly polished and perfumed rice from America. This improved variety of beans takes an average of 30 minutes to get cooked. This brings the total cooking time to a maximum of two hours including the time taken to prepare stew. The improvement in the variety of beans is said to be the significant factor in the

reduction in the time taken to cook it. This kind of engineering with the beans is held by many as unhealthy. In place of kanwa, some people use local and foreign food coloring agents such as the straw of guinea corn stalks to give the wache the desired brownish colour. For some respondents, the taste of today's (modern) 'wache' is significantly different as it is clearly less tasty.

One of the most critical reasons given for the low featuring of some (deep) indigenous foods on the menu of most restaurants was the lack of appropriate skills required and sometimes the socio-spiritual barriers. For instance, one respondent indicated that one reason why 'wasawasa' is unpopular in modern restaurants is the believe that the dish is a spiritually clean meal and spoils during preparation if there is any element of 'dirt' involved in the preparation. Dirt was described to include physical unhygienic environment, a woman in a menstrual cycle, flatulence in the course of preparing the food and many others. As these practices are not a problem in mainstream restaurants, the only logical conclusion for operators of restaurants is to exclude this food.

It was also noted that some indigenous delicacies unfortunately do not find their way on the menus of restaurants because of the long time taken to cook them. A typical example was given as *bambara* beans which take an average of about four hours to get cooked. With this in mind, most eaters do not even ask for these foods with the assumption that because of the long time involved in cooking them, they are not being served. Consequently, restaurants that cook these foods are informal, often marginalized, 'road' side local restaurants. However, restaurants that place a premium and commitment to serving these foods in a moderately hygienic environment have exceptionally high demand. These include Hajia Sauda Food Complex (located behind Modern City supermarket in the Central Business District of Tamale). She specializes in TZ, Fufu, Kenkey, Wache, Rice balls, sliced

yams, and banku. Hajia Sadia's restaurant specializes in 'wache' and bambara beans at the Goil Fuel Station in central town, opposite the Volta River Authority or Barclays Bank.

In conclusion, indigenous foods are relatively less common in popular hotels and restaurants in the Tamale metropolis. Among some of the indigenous foods expected in the hotels and restaurants include; TZ with indigenous leafy vegetables such as ayoyo, bra, groundnut soup, tubani, etc. While demand can be high for such foods, hygiene is one factor that scares most people away from local restaurants that serve them. The main reasons given for the low feature of indigenous foods on most hotels and restaurant menus include; low awareness about indigenous foods by eaters, unavailability or lack of constant supply of their food stuffs, perceptions of unhygienic environment during preparation, and time taken to prepare some indigenous foods.

Most customers who buy food demand foods that can be prepared within a maximum of 30 minutes and at the same time served hot. This has resulted into a culture of food par-boiling; i.e precooking and storing the food in a fridge or freezer and only using a few minutes to cook and serve on request.

Therefore, if they have to meet the high urban food demand, indigenous foods and food lovers have a few alternatives to move on the food draft table as follows:

a) Indigenous foods

i. Maintain their stronghold as rural-based people whose lifestyles are not under the time pressure like urban 'educated' people.

ii. To accept genetic engineering to shorten the time taken to cook or prepare them.

iii. Devise a way of par / pre-cooking them and finish up with minimal cooking at customers request without losing their unique taste through the par boiling and storage processes. Some people have devised dangerous ways of reducing the time required to cook these foods by adding paracetamol tablets to the food.

iv. Devise an ingenious way of cooking them faster without tampering with their genetic material. This may require some 'energy' rather than food engineering.

b) Indigenous Food Lovers

i. Would have to change their food attitudes either by predetermining in advance what they want to eat for lunch at breakfast time and Dinner at Lunch time. This way indigenous foods can be prepared for them with the original taste and time requirements

ii. Place high premium on the natural quality of their food choices and therefore be ready to accept them the way they are.

a) Food Businesses

Alternatively, innovative hotels and restaurants are needed to provide specialized service in the hospitality industry. This will ensure that the traditionally longer, artful, 'socially' and 'spiritually' attached values to the preparation of indigenous foods could be maintained. In the literature, this type of food and service is described as slow food.

As indicated above, though the remaining 10% of restaurants visited were not explicitly labelled as fast food restaurants, they practically run the fast food concept serving customers within an average of 15 - 30 minutes. A total of 7 indigenous dishes were recorded. These include; TZ, Banku, Bambara beans, tubani, kenkey, wache (rice and beans cooked together). The most frequently

occurring dish among the indigenous foods are fufu and TZ. A large number of the restaurants identified as serving indigenous dishes were largely characterized by an informal less organized environment. Educational levels among the owners of these restaurants are also low. Demand was held to be high but supply could not match up, largely due to a foreign dish such as fried rice for reasons including food additives that attract and change the taste of consumers, short time within which it can be served, ease of preparation and availability of foodstuff and associated required ingredients. The data therefore points to a negative correlation between level of education and consumption of or demand for indigenous foods. More educated people tend to consume more western foods than indigenous foods.

In conclusion the relativity of food knowledges, practices and experiences can probably be best epitomised or much appreciated by an analysis of the reaction of one of the world's most renowned scientist, Albert Einstein, in reaction to Erwin Schrodinger's quantum mechanics reality equations. What quantum physics simply says is that nothing is real, exists if we cannot observe it. In his book 'In Search of Schrödinger's Cat, Quantum Physics and Reality', Gribbin (1984:1) narrated how Einstein, after fruitlessly searching for the reality of Schrödinger's equations on quantum mechanics (the reality cat of Schrodinger which did not exist for Einstein), described Schrödinger's reality. Accordingly, "The world of quantum mechanics is so strange, indeed, that even Albert Einstein found it incomprehensible, and refused to accept all of the implications of the theory developed by Schrodinger and his colleagues. Einstein and many other scientists found it more comfortable to believe that the equations of quantum mechanics simply represent some sort of mathematical trick, which just happen to give a reasonable working that conceals some deeper truth that corresponds more closely to our everyday sense of reality" (Gribbin (1984:1). This refutation is not different from

how western science describes the spiritual and social aspects of indigenous science. However, it is almost unquestionable that, quantum theory represents the greatest achievement of science, far more significant and far more direct practical use than relativity theory. Quantum mechanics provide the fundamental underpinning of all of modern science. The equations describe the behaviour of very small object generally speaking the size of atoms or smaller and they provide the only understanding of the world of the very small. Without these equations, physicist would be unable to design working nuclear power stations (or bombs) build lasers, explain how the sun stays hot. Practically, there would be no science of molecular biology, no understanding of DNA and no genetic engineering.

3.10 DATA ANALYSIS AND THEORY GENERATION

Data analysis was done using grounded theory. Grounded theory is a research method that involves formulating theory based on field data as opposed to formulating a theory of hypothesis and using it as a basis for data collection. One of the disadvantages of a hypothesis-based research is that sometimes, researchers can (unintentionally) change the outcome of an experiment because they already have a hypothesis, and so they try to fit the data to the hypothesis. This was avoided in this study. Grounded theory turns the whole research process around. Theory is therefore generated or grounded in the data collected. In this study, key Words, Phrases, Themes and Concepts related to food were carefully selected from data and subsequently subjected subjected to aided Interpretation of Knowledge from research participants using the key-word guide developed from the Tamale and Bagabaga Colleges of Education. A case study was also used to analyse data collected from hotels and restaurants in the Tamale Metropolis to answer to the culinary culture and power relationsh between indigenous foods and foreign foods. Finally, theory was generated based on the data collected.

CHAPTER FOUR

4.1 THE SCIENCE BEHIND INDIGENOUS FOOD KNOWLEDGES, EXPERIENCES AND PRACTICES

4.2 INTRODUCTION

This chapter introduces the question of whether or not the daily realities, experiences and practices of indigenous people constitute a science. The associated objective is "to establish whether or not the realities, knowledges and practices of indigenous people in the East Gonja District about food constitute a science. Empirical data from the field are presented and analyzed with the aim of achieving the objective. A discussion is also made of a related case study (see box 3.1) on the general science of indigenous people in the district.

4.3 FINDINGS UNDER SUB-OBJECTIVE ONE

Table 3.1 presents the knowledges experiences and practices among the three research communities - Bau, Kpambu, and Kpembi in the East Gonja District of the Northern region. These were found through observations, interaction with community elders, and story telling and learning from indigenous knowledge holders.

Table 4.1: Food Knowledges, Expereinces, and Practices in Research Communities

SN	Scientific category	Description
1	Knowledges	Food conceptualization, varieties, food production, processing, utilization; cooking, eating, surpluses, shortages, famines.
2	Experiences	Food varieties, food production, processing, utilization; cooking, eating, surpluses, shortages, famines, observing the social, spiritual and physical utilization of food.
3		Food conceptualization, growing food with immediate family and communal labor. Selecting seeds for reproduction, sharing food and

	Realities	seeds with immediate community members, preparing food, serving new foods to the gods and ancestors before consumption, storage of food, controlling food wastage.
4	Practices	Growing food with immediate family and communal labour. Selecting seeds for reproduction, sharing food and seeds with immediate community members, preparing food, serving new foods to the gods and ancestors before consumption, and storage of food

Knowledge and experience define practice as reality. Conceptualizing food in the two knowledge communities revealed identities that tell a story about the Gonjas as a conqueror ethnic group. The conception of food began as early as the need to survive hunger was instinctually observed and experienced.

In Bau where the knowledge holder is a hunter and Kpambu where the knowledge holder is a chief and shrine lord at the same time identification, risky trial-tasting of plant and animal species as potential sources of food were an acceptable practice in arriving at wholesome food. According to the knowledge holders (research participants) based on knowledge and experiences of earlier generations handed down to them, this experimentation for wholesome food resulted into two definite outcomes; good healthy nutritious food that supported life and dangerous poisonous food that caused ill health, and in some cases claimed the lives of their 'experimentalscientists'. The researcher's quest for a better understanding from the knowledge holders of how edible and non-edible plant and animal food sources were even detected before they caused harm or death revealed that, things that serve as food sometimes have a physical instinctual attraction which draws gatherers.

Secondly, signs of usage of these foods by other living organisms also signal their edibility. Last but not the least, a deep sense of spiritual belief and verification is used to identify wholesome food. This knowledge is put into practice through experimentation. It was explained that *'aah! fokan dan nkeni ne kekaa du* ***karkara****,* ***nyannyan,*** *nkoo* ***awule****, fin pin fini kuman wale'*. This means; upon tasting, if the potential food is bitter, sour, or itchy it means that the food is not entirely edible'. However, in some cases, wild unwholesome food sources are tamed over time through repeated cultivation and propagation until some of the unhealthy / unwholesome characteristics become mild enough or eliminated for consumption. Modern science revealed that the degree of bitterness and sourness indicates the levels of acidity and basicity or alkalinity of food and therefore their level of wholesomeness as edible food (Bowers, 1992, Pomeranz and Meloan, 1987). For instance, the bitter variety of cassava known in Gonja as 'Kpanko' is known to be poisonous. It is said to contain large quantities of cyanogenic glycosides "linamarin" and "lotaustralin". The identification and isolation of this 'poisonous' nature of this variety was reportedly tracked by indigenous people through experience of the very sour taste and eventual cause of death by people who ate this variety of cassava. In search for food however, it was narrated by knowledge holders that, early indigenous scientists soaked this variety of cassava in different batches of water for several days before subjecting it to several rounds of boiling with the objective of making it edible before eating. The preferred language for modern science for this process, would be 'an experiment to dilute the poisonous hydrocyanic acids. This process of domestication resulted in several tamed varieties of cassava.

Evidently, reporting on the history and evolution of squashes, Kiples and Ornelas (2000:343) narrated that, "Native Americans transformed the small green and white gourdlike pepos of wild

plants into a cornucopia of colorful and Shapely pumpkins and squashes". The flesh of wild pepos is too bitter to eat raw. Toxic oxygenated tetracyclic triterpenes, called cucurbitacins, permeate the leaves, roots, and the fruits as deterrents to herbivory. Nevertheless, the frequency of immature peduncles among archeological remains suggests that the young tender fruits were consumed, probably after leaching out the cucurbitacins through multiple boilings. Eventually, "squash domestication took place at least five times to yield the cultivated members of C. argyrosperma, C. fiifolia, C. maxima, C. moschata, and C. pepo" (ibid). One critical question however remained unanswered, that is, since it is not everyone who goes experimenting for food and can therefore tell its expected effect on health and life, how did communities come to accept a completely new plant and / or animal including its mode of preparation as food worth eating?

One knowledge holder or research participant in Bau, responded that, the value of sharing good things and especially food by indigenous communities is an intrinsic value system. In other words, and for example, when a hunter experiments a food plant or animal and observes no negative ill health, he first experiments it with his immediate family and when this proves harmless, it is then shared with the chief and other members of the community. The reverse is not true for substances that cause harm and / or death. As a process of validation that involves a multiplicity of functions and roles for the individual, if not properly analyzed, indigenous ways of validating social, material and spiritual knowledge in northern Ghana "can give rise to notions that such methods are not scientific" (Millar, 2012: 46). "Whatever is done in the fact finding, fact validation and fact translation processes, is conscious of the fact that he is propagating both process and content which should be sensitive to sociological and spiritual factors" (ibid:46). Through this practice of sharing only what is good, trust and confidence is built within a community that allows members of the community to

trust and accept new food forms. It was also explained that, even currently, when some community members fail to have good harvests for some reason, members with good harvest share both food and seed for the next planting season with others to ensure greater harvest in the community.

Another practice of food sharing is the concept of 'keisa', or gleanning. The concept is based on inherent knowledge and value by a farmer that, some people of the community either may not have the means to farm, or may not have gotten a good harvest but need to survive. Hence, harvesting is not done with the intention of collecting 100% of yields or produce from the farm. Some minor produce are left behind for this part of the community. This 'second–hand' harvesting by the non-owners of the farm granted by the mercies of the real farm owner has a deep sense of sharing and community welfare in a traditional indigenous Gonja community.

These knowledges and practices shaped current realities and practices of food in these communities and among the Gonjas to some extent.

Snively (2000:21-23) argues that the core Universalist idea is that "the material world ultimately judges the adequacy of our accounts of it. Science presumes that the things and events in the universe occur in consistent patterns that are comprehensible through careful, systematic study. Scientists believe that through the use of the intellect, and with the aid of instruments that extend the senses, people can discover patterns in all of nature. Science also assumes that, the universe, is, as its name implies, a vast single system in which the basic rules are everywhere the same. Scientists propose, but ultimately, after debate, negotiation and all the rest, it is the world that disposes. The character of the natural world is unrelated to human interest, culture and religion". It must be noted that, Traditional African science and western science both have their positive and negative aspects. There

is overlap between the two and they are not mutually exclusive. The major difficulty lies with the denial by western science of the validity of Africa's contributions. Because every culture's way of viewing the world is different, it seems possible that every culture may have developed unique strategies for doing science. Some of these may just possibly fill in the gaps in others. If the scientific knowledge of all cultures could be pooled and regarded with equal respect, the world would undoubtedly be an immeasurably richer place.

If all students could learn how the purposes of scientific activity have varied in cultures and historical times, and how all cultures have developed sciences to meet their needs, they can also learn that modern western science is not universal, infallible, or unchangeable. For this kind of critical thinking is necessary to enable students to understand how modern science is a particular way of thinking about the natural world, rooted in western culture, and how the purposes of western modern science could be changed to create future sciences that better meet the needs of diverse societies

4.4 INDIGENOUS SCIENCE AMONG THE GONJAS

A sense of the general Science of the Gonjas as detailing the ontology, epistemology, Gnoseology, axiology and Knowledge Community among Gonjas was explained by Sachibu (2012). See also box 2 in chapter two under literature review.

3.4.1 A Sense of Rationality?

This study argues that the best science is the science that answers to the needs of life and society. And since life and society are relative and cannot be 'universal', it follows then that the knowledges, experiences and practices of the individual and societal realities of the knowledge holders of this research are rational in their context and worldview. Dei (2013) emphasized that whiles it is

acceptable and real to mis-understand some phenomenon, it is not real to mis-experience same. Experiences that people go through in their lives are real for them and cannot be subject to an external approval or disapproval as reality. After all, when Aristotle suggested that there is a single best answer to every question, thus, the 'universal truth' he had no clue what realities and practices existed in Bau, Kpembi and Kpambu when they concluded on their controversial universality of science and the laws of nature. Those theories and concepts were highly deficient and cannot be held to hold for the entire world. As defined by Ogawa in Snively (2000: 9) science is a "rational perceiving of reality" where perceiving means both the action constructing the reality and the construct of reality. The merit of the use of the word perceiving gives science a dynamic nature and acknowledges that science can experience a gradual change at any time".

With reference to the power relations between indigenous and western scientific food matters it was found that the amount of time and the energy needed to prepare food is a principal factor in the dominance of western food knowledge over indigenous. While it can take up to one day to cook some kinds of indigenous foods such as Bambara beans, Guinea peas and …, the application of technology such as genetic engineering to food itself to make it soft for cooking or to the methods of processing and cooking, (high energy / heat emitting) cookers and partial industrial cooking have resulted in preference for these foods especially by the youth. The amount of physical human activity required to stir a traditional 'Tuo Zaafi' in the research community which is also common in northern Ghana is significantly higher than that required to prepare, for example, macaroni. These factors, time taken to cook, energy taken to cook and pre-cooking or processed foods have significantly contributed to the relatively weaker position of indigenous foods against western foods. The case study that follws examines the extent of dominance of western foods over indigenous foods. This

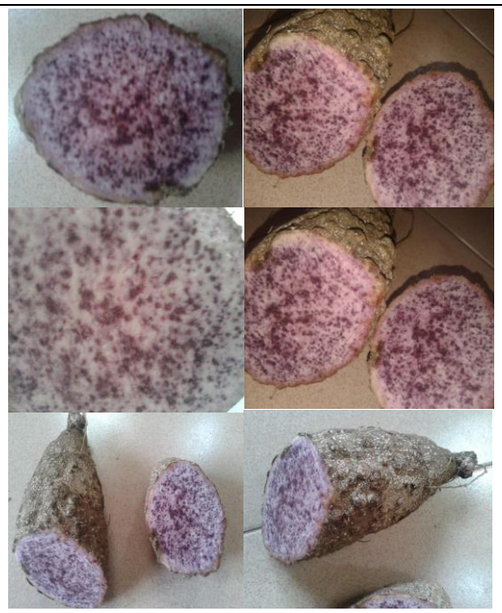
phenomenon increases from rural to urban areas. It is an indication of the power relationship between indigenous food conception and western food concepts.

It must be noted however that, indigenous people from the research community are aware of the lapses of this fast and slow physical activity of the western food system. They identified poor taste, shorter life spans and generally low nutritional value of these foods as compared to indigenous foods.

4.5 THREATENED FOOD CROPS IN EAST GONJA DISTRICT

Globally the following factors have been named as the main threats to global food or plant diversity; agricultural technologies, patents and corporate ownership, the overall degradation of the environment. Table 3.2 identified some food crops which are acknowledged by the research participants as facing extinction due to their diminishing cultivation, availability, consumption, and preservation of their seeds.

Table 4.2: A List of Selected Indigenous Food Crops that Face Extinction

SN	***Name of Threatened / Endangered Food***	***Image / Picture of Endangered Food***	***Botanical name and description***	***Material and Socio-Spiritual Significance***
1	*Water Yam / Purple Yam/ Yam Ratalu* *(Chichirboka in Gonja)*		***Dioscorea alata*** *Source:* 1. *Field Research, 2013* 2. *http://massspectrumbotanicals.com/?s=Dioscorea+alata&post_type=product*	*One of variety of water yam with spoted violet pigmentations. Highly nutritious and enhances biodiversity*

2	*Air Yam* *(Called Akenbi in Gonja)*		***Dioscorea bulbifera*** ***Source:*** *1. Source: Field Research, 2013* *2. http://wildlifeofhawaii.com/flowers/1965/dioscorea-bulbifera-air-yam/* *(Accessed on 05/06/2014)* *This naturalized Polynesian canoe plant and weed is native to Africa. The plants are dioecious with male and female flowers on separate plants, however these plants rarely bloom. When present, the tiny flowers are in slender, pendent spikes or panicles at the leaf axils. The female flowers are followed by seed capsules that are only winged on the basal side. The leaves are large, green, hairless, untoothed, alternate, palmately veined from the leaf base, long-petioled, and broadly heart-shaped. The slender, twining, hairless, green to purple-flecked stems climb to the left (clockwise), are round to slightly angled in cross section, and have no spines. Rounded, up to 5 inch (13 cm) in diameter, potato-like bulbils (aerial tubers) are formed on the stems at the leaf axils. The plants sometimes also have small underground tubers. Even when the plants are not producing seeds, they can be propagated by both the bulbils and tubers.Highly nutritious and enhances biodiversity.*

3	*Red beans* *('Chibi peper' in Gonja)*		*Source: Field Research, 2013* *For the botanical names of some of the crops, the following onine resource was used.* *http://www.fao.org/fileadmin/templates/ess/documents/world_census_of_agriculture/appendix4_r7.pdf* (Accessed on 3rd June 2014).	*Highly nutritious and enhances biodiversity. It is useful as part of a 'multi-grain spiritual offering'*[17]

[17] A 'multi-grain spiritual offering' is a practice where usually a soothsayer directs a person to offer a mixture of multiple grains (e.g a mixture of 9 grains) as a gift to a poor person or place it at a designated point as food /offerings to the spirits as a form of charity, to aid in a good way, avert a calamity or cause some harm.

	Pigeon Peas *'Aduwa'*		***Cajanus cajan*** *Source: Field Research, 2013*	*It is a perennial legume from the family Fabaceae. It also is useful as part of a 'multi-grain spiritual offering'.*
4	*(Jugo bean, Bambara groundnut, African groundnut) (Aku in Gonja)*		***Vigna subterranean*** *Source: Field Research, 2013* *Source 2:* *http://www.biodiversityexplorer.org/plants/fabaceae/vigna_subterranea.htm*	*Highly nutritious, enhances biodiversity and a perfect hunger / famine crop. It also is useful as part of a 'multi-grain spiritual offering'.*

5	*Akuturku* *(A variety of beans)*		*A variety of beans that seems almost extinct now. Unidentified*	*Highly nutritious and enhances biodiversity. It also is useful as part of a 'multi-grain spiritual offering'.*
6	*Asapatra* *(A variety of beans)*		This is a variety of beans that is flat in shape and usually grown on a small scale in a mixed cropping arrangement. Its botanical name is yet to be found. ***Source: Field Research, 2013***	*Highly nutritious and enhances biodiversity. It also is useful as part of a 'multi-grain spiritual offering'.*

7	*Atlample – A kind of wild variety of beans*		*This variety of beans seem not be familiar to most agriculturalist and therefore regarded only as a wild beans variety. But for the people of Kito, it is called Atlampe and of high social and spiritual significance.* ***Source: Field Research, 2013***	*Highly nutritious, enhances biodiversity and used as a spiritual food for every nursing mother of the village of Kito in the East Gonja district to minimize maternal and infant mortality*
8	*Millet (Adurbi)*		*Millets are a group of highly variable small-seeded grasses, widely grown around the world as cereal crops or grains for both human food and fodder. They do not form a taxonomic group, but rather a functional or agronomic one.* ***Source:*** *Field Research, 2013.*	*Used as sacrifice and diet thereafter*

Source: Field Research, 2013

Taking 'chichirboka' for example, this white and purple pigmented yam is currently rare to find and most children in the research communities do not know it. In one of the research communities for instance, it was reported that when this yam was prepared as food the children in the house refused to eat it, claiming that it is rotten due to its multicolored nature. Some factors responsible for this marginalization and threat of extinction is the globalization, industrialiszation and commercialization of agriculture. Industrial agriculture characterized by heavy farm mechanery only becomes more efficient and cost effective when large hectares of a homogenous crop are considered. This way farm machines are designed speficically for planting, harvesting and processing of specific crops. Profit can then be maximized. At least in northern Ghana for instance, the USAID's Agricultural Development and Value Chain Enhancement (ADVANCE) focuses only on maize, soy and rice. Accordingly, the project "was re-designed in 2011 to comply with USAID's new Feed the Future (FtF) strategy. The goal of ADVANCE was to facilitate a transformation of northern Ghana's agricultural sector in maize, rice, and soybean to achieve a greater degree of food security among the rural population in the north while increasing competitiveness in the domestic markets. ADVANCE contributed directly to achieving FtF's objectives of reducing poverty and hunger through inclusive agricultural growth and improved nutrition[18]. Unfortunately, this selective adoption and support of a few crops for large scale cultivation diverts farmers' attention and

[18] (http://www.acdivoca.org/site/ID/ghanaADVANCE

resources from many important food crops that provide useful health benefits and preservation of the world's food crop diversity. Otherwise, if plant diversity was irrelevamt, then the building of the Doomsday's Vault at Spitbergen Island, Svalbard in Norway by the Global Crop Diversity Trust (GCDT) remains highly questionable.

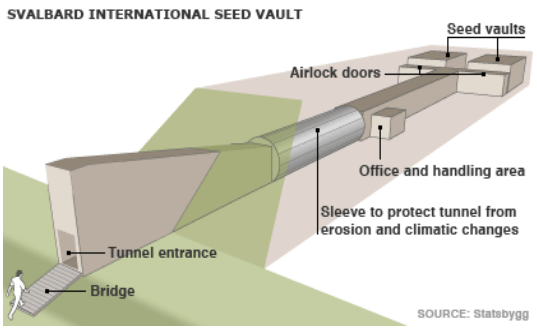
The Doomsday Vault (See plate 1.18a) is a huge hole that has been blastered out of the side of the actic mountain and a tunnel has been drilled deep into the the rock. The facility is lined with a one-meter-thock concrete, fittered with two high-security, blast-proof airlock doors, and built to withstand nuclear war, global warming, terrorism and the collapse of the earth's energy supplies. It is a bank built to last 10,000 years. Currently, millions of seeds are stored in the facility as a means to safeguarding the world's future food supplies. Accordingly, there are more than 50,000 edible plants in the world. About 150 of these are said to have been commercialized, and only 40 of those are cultivated regularly (ibid: XVII)[19]. The project is probably one of the justifications of the seriousness of the threat facing the world's food crop diversity (Cummings, 2008: XVII).

Meanwhile the importance of traditional farming and seed saving has been validated by the largest consortium of seed banks in the world, the Consultative Group on International Agricultural Research (CGIAR). According the CGIAR study of forty seven countries affected by natural disarsters, war *and perhaps genetic engineering as*

[19] http://www.croptrust.org/, 2014).

part of the food wars (italics are my own insertions) around the world, the small farmer and seed holder remains the main hope for the successful reconstruction efforts" (Cummings, 2008: xv)

Plate 3.2a: The Doomsday Vault 1



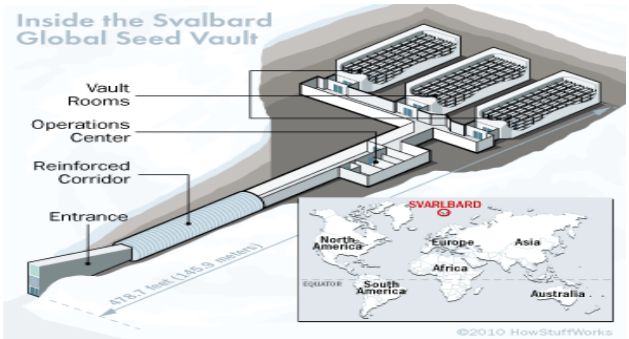


Plate 3.2b: The Dooms day Vault 2

Sourcre: Cummins (2008),

https://www.google.com.gh/search?q=doomsday+vault&source=lnms&tbm=isch&sa=X&ei=ENm2U76rF8LC7AbutYH4Dg&sqi=2&ved=0CAYQ_AUoAQ&biw=1600&bih=789

(Accessed on 26th June 2014).

Box 3.1: A Case Study on Indigenous Science among the Gonjas

I Cannot Sleep Father, I am Back to Learn: Intra-Cultural Conflict, the Impasse in Modernity and the Search for other ways of Knowing.

Introduction

Janton Dashie is a small farming community in the East Gonja District of the Northern region. It is about 30 kilometres from Tamale. According to the 2000 Population and Housing Census, Janton Dashie has a total population of 973 of which 504 are males and 469 female. There are 72 houses and 102 households.

Research Methodology

Prior to my decision to embark on a learning visit to a traditional African community, I had an exposure with 'Baba', a traditional mental healer in Janton Dashie who is noted to have healed uncountable mental patients of their ailments. Baba as he is known and called, (meaning father) is a Gonja by ethnicity. My over 20 visits to Baba were in search of a mental treatment for my nephew who suffered mental disorder while in his Senior High School.

After wondering for a while on which traditional African community I could get exposure to indigenous African knowledge, I consulted my sister who searched her memory and suggested Baba and opted to go with me since I visited Baba with her when our nephew was ill. As a Gonja like Baba, I enjoyed the advantage of being a native speaker of Gonja though I am not from Baba's community. After narrating my frustrations as to the appropriate words to choose to convey the meaning of the various elements of my learning ambition – His science –Ontology, epistemology, gnoseology, axiology and knowledge community, I came to the conclusion that, to be able to reduce biases of traditional research especially with the perception of educated people as liars and research addicts, I adopted a slightly different approach where I submitted myself to Baba to teach me some 'tradition'.

On arrival, I explained the purpose of my visit as; to learn some tradition from him following my observations of his world view, knowledge and expertise. I indicated my interest to record the discussion to ensure that I do not forget most of the discussions and his teachings since I do not know any other way of storing and retrieving (unlike him through memory) the important information that he was going to share with me. Baba accepted my request to record.

Worldview – Ontology

In my learning interaction with Baba on his perception or view about the world, he noted that "Man never dies completely". There is a chain of great grandparents (ancestors) who are always there to help in his life pursuits which included mainly a life composed of himself, his family, his community and neighbouring communities on one hand, and reliance on the gifts of nature such as land, water and plants and animals which he uses to achieve his life objectives such as the pursuit of his mental healing practice. My understanding of what Baba was teaching me was to the effect that his world view composed of spiritual, social and natural realities. Aside the learning of his spiritual world of ancestors, his practice of traditional mental healing was a practical demonstration of his combination of the

natural, spiritual and social worlds. This world view matched with the values and aesthetics that Baba taught me about his community as will be seen in the next sessions.

Epistemology

After failing to ask relevant questions on how knowledge was conceived, theorised and causality explained, this session was limited to inferences from the teachings of Baba. Some of these inferences are that good and bad are the outcomes of how man interacts with the social, natural and particularly spiritual world. Positive interactions with the three worlds would yield a positive outcome and a negative interaction will yield a negative outcome. For instance, the prevalence of unexplained sicknesses and occurrences such as mental problems, lack of rainfall, excessive flooding are caused by negative interference with these realms such as felling mighty trees and hunting certain animals (totems) which serve as the residences of spirits. It was understood in conclusion that if man interacts positively with the environment (social, spiritual and natural), the environment will be kind with us.

Axiology – Value Systems, what is important?

Food, a wife and children, protection for the children (specifically fortification against wild animals, witches and human attacks), becoming a chief if you are a royal, maintaining the purity of the environment land, trees, water and animals and possessing a horse were the key values of Baba and his community.

Food and water constituted the very basic needs of everyone to survive. This was acquired through a respectful interaction with the natural environment through hunting, farming and gathering. For this and other reasons the natural environment is very much respected, adored and protected for hosting the source of food for every individual, family and community. Observance of environmental taboos and totems are therefore an important component of community.

Having a wife and raising a family was another important value that was learned from Baba. This is the basis of reproduction and continuous human existence. It is a crucial value in the sense that the absence of it threatens human and spiritual existence. Once a family starts, the next most important value is the protection of children both physically, socially and spiritually. Physical and social protection involves teaching children the basics of life and surviving such as farming, traditional skills training through apprenticeship, teaching of good moral values and so on. Spiritual protection involves fortification of children against physical and spiritual harms such as firearms, physical fights, attack by wild animals, witches and wizards and bad spirits. Children are seen as assets and a source of prestige as they are the surest way of sustainable livelihoods and taking care of old age. In mainstream development efforts, this can be comparable in its own strengths and weaknesses as a social safety net and / a form of insurance.

Becoming a chief as a key community value underpinned the appreciation of the social world of this traditional African Community. Leadership, authority and governance are not new concepts for Baba and his community. As a royal, any male or female child born aspires to be a chief or queen mother as a life ambition with the understanding though that not every royal will become a chief due to the fact that there is only one chief but many royals at a time.

Maintaining the purity of land, trees, water and animals as a value is based on the instinct of life and survival guaranteed by ancestral and spiritual blessings. How pure these values are maintained will determine the quantity and quality of life.

The people of Janton appreciate and value a horse as a means of transport. It is explained that unlike now when cars are available, horses were the main source of transport aside walking. Transport needs such as attending funerals, festivals, wars etc made the possession of a horse an important part value of the community.

Ways of Learning - Gnoseology

Baba isolated four ways of knowing or learning in a traditional African Community like his. These were named as:

i. *Determine the occupation of ones clan. Every family and clan has a profession that has been handed down to them by their previous generations through inheritance. This was the beginning of adult learning. Families had occupational specializations in say fishing, blacksmithing, hunting, weaving etc. Learning at a very young age starts by learning to know what your parents or grand parents did as a means of living. In some communities, new born babies are initiated into these professions through ritual performance such as immersing the new born baby in water for three times in the case of a male and four times in the case of a female in fishing community. Baba indicates this is how he learnt his mental healing practice.*

ii. *Another way of learning was through submission and respect to elders. This involves basically approaching an elderly person in the community or elsewhere, acknowledging your lack of knowledge, readiness and request to serve and learn. This way of knowing is also described as tutelage.*

iii. *Soothsayers are also a sure way of learning what you do not know. Upon consultation, soothsayers are believed to have powers that can tell the past, the present and the future about any situation. Knowledge seekers therefore can consult soothsayers in order to learn what they do not know*

iv. *Learning can also take place by consulting shrines. Knowledge from this source is held very high and sacred and can be done in a local shrine or external one in another community.*

v. *Lastly, revelation through dreams is a sure way of learning. It is believed that sleep is a physical and spiritual encounter where much is revealed by the spiritual world to the physical world. Dreams can be interpreted by elders or the dreamer depending on their level of*

complexity. Complex dreams can either be interpreted by experienced elders or soothsaying which acts as a confirmatory learning method.

Knowledge Community

"We lie these days". Those days, there was trust; what you say is the truth because others know that you will not lie"

- *In any particular community, the chief is the leader and knower of all knowledge holders. He (should) knows all people of different knowledge backgrounds such as blacksmiths, fishermen, hunters, royals so he confirms knowledge in this order.*

- *It is usually from the chief that any new person seeking or claiming knowledge is directed before the chief in turn invites his community knowledge holder in the particular discipline for further interactions.*

- *Knowledge is by inheritance handed down by generations to their lineages This is known as 'dankari', in Gonja and ….in Dagbani. All families and clans therefore have specialised knowledge areas by which they are known by community members. This forms the basis on which your claim of one kind of knowledge or the other is accepted or rejected based on people's awareness of your clan, lineage and line of profession.*

- *Coupled with a culture that abhors falsification, knowledge is either accepted or rejected on the above rules of the knowledge community in Janton Dashie. An example is Baba's own acceptance in Janton as a prominent mental health doctor. It is undisputed that he heals mental patients.*

Strengths

i. *Though this is currently growing weak, all aspects of the life of the people of entire Janton Dashie was based on trust. In order words, one could rely on his or her neighbour without fear of unexpected disappointment or betrayal. Falsehood was abhorred so life was good with a high sense of unity and togetherness.*

ii. *Individual and community needs were also limited or controlled to the bearest minimum devoid of extravagance and affluence. This way life was less complicated and people easily met their needs as described above (food, wife/family, horse, protection of children etc)*

iii. *A sense of 'us' as a community rather than 'I' as an individual was also high. Self-centeredness and greed were not values of the community.*

Weaknesses

i. *As the community simply lived solely on a limited number of needs, innovation was quite low and when nature presents challenges or opportunities beyond the capabilities or needs of the community these become unbearable or not fully utilised*

Secrecy is also held to be a weakness in the sense that it excludes more people from learning and theories and concepts are shrouded in secrecy.

4.6 FOOD AND SYMPATHY: BEGGING

Another critical component of theoretical and philosophical relevance to food studies is the sympathetic appeal of food. That is, in most countries around the world where poverty manifesting in hunger and starvation are prevalent, 'begging for alms' is a common practice. It was observed that the use of food as a justification for begging has been the most appealing or most acceptable reason any giver would be drawn into giving help to a beggar. The art of this begging has been characterized by the beggar extending his hand and opened palms to the giver and folding it back towards his or her mouth to signify the purpose of the begging – hunger. At least in Ghana, if not the whole of Africa, this gesture is one of the most justified reasons to give money to beggars. In a random interview with motorists at the Tamale Central TrafficLight, neat the State Transport Cooporation and the Tamale Agric Traffic' lights, 30 out of the 56 motorists interviewed indicate that the use of food as a reason for begging is the most compelling reason for them to give money to beggars. However, respondents have indicated that overtime, they have lost confidence and trust in beggars when they use hunger as a reason for begging as most beggars now simply lie about their situation, using it as an economic activity.

Though other physiological needs such as shelter, sex, etc are as good reasons for begging, food has topped the list due to its importance to human existence.

4.7 SUMMARY AND ISSUES ARISING

From the foregoing, it is evident that within their social, spiritual and natural contexts, the experiences and practices of indigenous communities constitute science. Going through a rigorous process of spiritual and social ascertainment and physical practice, indigenous communities in the research area have established beyond modern science the existence of an ontology, epistemology, axiology, gnoseology and a knowledge community that uses a multiplicity of realities to confirm what is good and what is not as a source of food. They are very conscious of the power relationship between their food system and those of other cultures. One of the mediums of this relationship being movement of people, animals and ideas across places. Migration and urbanization for instance, have brought definite revelations of the dominance of some foods from other cultures over their foods and the risks that these foods pose to the long term availability and pureness of their food systems. They understand the ultimate implications of an eventual extinction of any food in their lives as a whole. That is, the fact that some social and spiritual functions of the society may be extinct as a result and consequently pose a dramatic negative effect on their physical wellbeing through their scientific relationship with the social and spiritual realms.

Key Issues Arising

Whiles Indigenous People are aware of the dominance of western food science and its associated dangers to their holistic lives of the social, spiritual and physical, they are unpurturbed about Western Food Science's non recognition of the validity of indigenous food science even though proponents of indigenous food science like the researcher signficantly do. Futher research is therefore needed to determine specific ways of protecting and revitalising indigenous food science as an alternative food science.

Indigenous People's Reaction to Modern Science's Denial of Their Worldviews

This piece provides a deep sense of legitimacy to indigenous people's science and discounts any need for authentification of their realities, especially by external forces.

In an attempt to find indigenous people's reacion to Modern Science's denial of their spiritual and social worldviews, two philosophical questions were possed to the researcher; 1) "Amuso Anyi minlaaa, nko Anyi minwutaa? Anjo na ne esa ko kane fini awuta pie na mba wuta echefu-ere? Literally, this means "and so aren't we (living)?. In order words, are we not living and making sense of our social, spiritual and physical worldviews? "Should someone somewhere confirm that we are living before we are deemed to be"?

4.8 CONCLUSION

In conclusion, it is noted that indigenous food knowledges, experiences and practices constitute undeniable realities for them in ways that bring a holistic meaning to their lives through the perfect interconnections of the social, spiritual and physical worldviews. Without a pre-set-up plan to do 'science' as in the case of modern science, they go through a rigorous system of knowing, conceptualising, experiencing, testing, confirming, learning, relearning and unlearning what food means to their socio-spiritual and physical existence. Whereas the power imbalance between their food systems is unfavourable to them, they have no deliberate strategy drawn on paper, discussed and scheduled for implementation to counter the dominance of western food science. They rely entirely on the natural nature of their science to resolve this imbalance.

CHAPTER FIVE

DATA ANALYSIS

5.1 INTRODUCTION

This chapter introduces the question of whether or not there is a concept and theory of food among the research communities. The associated objective is to find the concept and theory of food among the research communities. Empirical data from the field are presented and analyzed with the focus of establishing this objective and answering the associated research question; What is the concept and theory of food among Gonjas in the East Gonja District? Key findings are discussed with appropriate literature support. Finally, a summary on the sub-objective is drawn highlighting relevant issues that demand further research. A conclusion pertaining to this specific objective is then drawn.

5.3 THE 'GENERAL SCIENCE' OF THE GONJAS

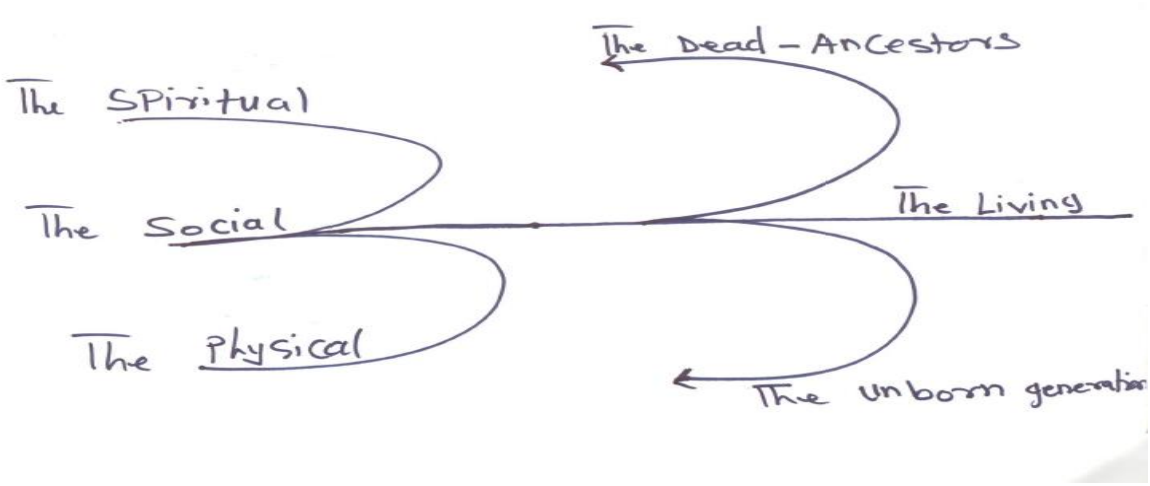
5.3.1 The Ontology – The World View

Gonjaland and Gonjas came into being as a result of the conquering efforts of one man –Sumaila NdeWura Jakpa and his followers. As the founder and leader of Gonjas and Gonjaland, Ndewura Japka subdued the communities of the lower Black Volta basin and put together a kingdom that he bequeathed to his children. A number of pre-Gonja people lost their independence in the process and became subject people controlled by Ngbanye (Gonja) princes (Mahama et al 2009: 171). History has it that Ndewura Jakpa combined two major religious believes and practices for the establishment of his currently single largest kingdom constituting 19% of the total

landmass of Ghana (Foster, 2014:1). These are the indigenous traditional African religion and Islam. Throughout his wars, the warrior was said to have used both the supreme guidance of the Almighty Allah through his dedicated Muslim spiritual leader (an imam) and himself, an African traditionalist. He consulted both the Islamic divinity and Traditional smaller gods before he commenced any warfare. This dual religious background of the founder of Gonja and Gonjaland can still be seen today in the structure of the communities of the five sons who he located across his kingdom to rise to the paramouncy. These are Kpembe, Tulwe, Bole, Daboya and Kusawgu.

These five gates constitute the indigenous chieftaincy gates of Gonjaland. By structure, each has the traditional people who rise to become chiefs and the Muslim section who act as Islamic spiritual leaders of the community called *sapkare ebi* or the muslim community. Along this is the warrior sections that are purely traditional African worshippers and do not usually pray in the Islamic way. This history significantly reinforced the worldview of the Gonjas across the entire kingdom. The Gonjas refer to the Almight God as *Ebore or Nyinpe-Tale*. The Gonjas therefore have a strong spiritual, social and natural worldviews of the existence of God. Figure 4.1 shows the three worldviews and their internal dynamics. Within the social worldview there are three further subdivisions which include the world of the living, the world of the dead (ancestors) and the world of the yet unborn generations. A complex of reinforcements exist within these worldviews. The world of the ancestors rienforces the spiritual world and the world of the yet to be born generations reiforces the physical worldview.

Figure 5.1: Intra Worldviews with the Spiritual, Social and Physical Worldviews



Source: Field Research, 2013.

The level of significance of reality of the spiritual realm by most people in Africa and Ghana for that matter can be evidenced by the level of importance attached to funerals and the dead. On 26th April 2014 at 7:45 pm, TV3 run a news item on their 'News 360' entitled 'The Dead and their Graves: A Look at Elegance and Luxury at the Cemetary'. As shown in the images that follow (Figure 4.2a) complete physical residential apartments are constructed for the dead as a home in recognition of the fact that though they are dead in physical life, they are believed to be living and deserve some form of comfort in the ancestoral world. Whiles this can be said to be a display of extravagance and riches, there is often a critical perspective which is ignored and discounted about those who perfom these acts. That is, there is a reality which these people face with regard to the departed souls of their people. It may be difficult to argure that 'this is wanton display of extravagance'. Rather, it challenges critical thinking on why anybody would do this for a 'dead person' if they are of sound mind (sane)..

Astrong believe in the 'reality' of the spiritual worldview is the single most probable factor responsible for this display.

Plate 5.1a: Graves in Some Parts of Ghana

Source: TV3, 'News 360': 'The Dead and Their Graves (26th April 2014 at 7:45 pm)

Plate 5.1b graves in Some Parts of Ghana

Source: TV3, 'News 360':'The Dead and their Graves (26th April 2014 at 7:45 pm)

5.3.2 The Spiritual Worldview

Spirituality "refers to the manifold ways through which humans in different cultures and different religions aim to follow a spiritual path, along which one advances to achieve a certain immaterial objective, such as a higher state of awareness, reach wisdom or communion with God, spirits, ancestors or with the creator" (Haverkort et al, 2012:37). The supreme being of the spiritual realm is God, the Almighty'- the Creator of all things from the spiritual to the social, the Physical and that which we cannot even imagine. Chapter 112, verse 1- 4 of the Holy Qur-ân, defines this Ssupreme Being in the following words;

a) Say, He is Allah, The One

b) Allah, the Eternal, Absolute

c) He begetteth not, Nor is He Begotten

d) And there is None Like unto Him

Further explanation of these verses is that; first and foremost, the nature of God is so sublime, so far beyond our limited conceptions that the best way in which we can realise Him is to feel that He is a personality. 'He' and not a mere abstract conception of philosophy. He is near us; He cares for us; we owe our existence to Him. Secondly, He is the One and Only God. The only one to whom worship is due; all other things or beings that we can think of are His creatures and in no way comparable to Him. Thirdly He is eternal, without beginning or end, Absolute, not limited by time or space or circumstance, the Reality. Fourthly, we must not think of him as having a son or a father for that would be to import animal qualities into our conception of Him. His key attributes include but not limited to the ones enumerated in table 4.1.

Within the spiritual Islamic Worldview, the dead are believed to be living and only perceived to be dead because the living do not perceive that the dead are living. I personally view this as a case of intellect beyond excellence which most men are not able to conceptualise and therefore settle with an easier alternative of denial, rejection and ridicule as superstition. This is a case of spiritual intellect. This is stated in Surat Al –Baqarah 2:154 "And do not say about those who are killed in the way of Allah, "They are dead." Rather, they are alive, but you perceive [it] not".

Similarly, the 99 names of Allah (http://alislaah4.tripod.com/islamicpictures/id23.htm) provide a deep sense of the Muslim believe in the omnipresence and omnipotence of Allah (God) as the creator of

the universe and all all things beyond it. This indicates the level of importance attached to the spiritual realm.

Spiritual practices may include meditation, prayers, contemplation, ceremonies, sacrifices, festivals, initiation rites, revelations, myths, and are intended to connect to the spiritual reality and / or to develop an individual's inner life; such practices often lead to an experience of connectedness with a larger reality. Depending on cultural differences, different people in time and space have chosen different media and methods of relating to the Supreme being.

The mind is the main tool for knowing about the existence of a spiritual domain of life. Spiritual experiences are discoveries or revelations made in specifically ***sensitive or elevated states of mind*** as opposed to easily **distractible** sensory observations based on so called logical influences. Spirituality is the foundation of all religions such as Islam, Hinduism, Buddhism, Taoism, Confucianism, Shintoism, Judaism, Christianity and all other occultic and secret societies to which most world figures belong. Religion comes from the Latin word re-ligare which means to re-link the tangible and the non- tangible worlds. “It is fundamental to acknowledge that the type of reality that a certain culture attributes to the spiritual domain of life determines the constituting elements of the corresponding religions, philosophical and metaphysical framework, ethos and ethics, which are orienting thinking and acting within the social and natural domains of life” (ibid: 37).

In fact, renowned philosophers like Socrates argue that a mind that is deeply connected to its bodily needs / senses such as food, sex, clothing among others is far

removed from a deep sense of reality due to obvious 'distractions' from these senses, Curtin and Heldke (1992: 22 -27). For him death is the desired outcome which the philosopher has worked all his life for as a means to separating himself from his bodily desires in order to seek the highest state of purity of the soul.

Spirituality can hardly be regarded as 'unscientific'; rather, I will argue that it is a superior science that demands a more critical study. The only difference which also combines as major weaknesses of modern science is that spirituality is an elevated superior science that transcends the total comprehension and manipulation of man as required by modern physical science and scientist. Whiles efforts can be made to improve understanding and explanatory power of spirituality, it cannot be claimed that anybody scientist or otherwise, has a complete knowledge of the entirety of nature. This also explains why this study adopts a transdisciplinary approach.

5.3.4 The Physical or Material Worldview

The domain of material life embraces all the objects that are generally associated with 'nature' such as stones, rocks, waters, trees, plants, animals, air, winds, clouds, stars, planets, gases and fire. Additionally, this domain of life embraces all objects that are fabricated by humans, mainly related to tools and technologies e.g. symbols for social or spiritual status, medicines, ingredients for rituals, wheels, ships, airplanes, houses, cars, radios, TV's, computers, cell phones or money, just mentioning some of them.

The main difference between the conventional and endogenous worldviews is in the second often materially existing objects are not just seen as inanimate or 'dead'

material, but as an expression of spiritual qualities or potentialities which have been embodied in material and / or social life.

This means that in an endogenous world view, whatever material phenomenon we are looking at, its specific meaning is not limited to the object as such. Matter eventually expresses ontological principles borne out of the interaction between human beings of the social domain of life and non-human beings living in the spiritual world". This explains why between the conventional and the endogenous notions, certain objects of the material domain of life can have coinciding, as well as contradicting value or meaning: For instance, for a modernist science-based biologist a food crop is the result of a smart way of natural selection through which the urge to survive that is seen as inherent to every plant species, meets the urge to survive of human beings. That this is not just a theoretical way of looking at a plant becomes evident if we consider that people who share such an understanding of a plant do not have any doubt of manipulating the life of the plant by using mineral and synthetic fertilizers, pesticides, transgenic seeds, soil-less production systems, mechanization etc. As long as this manipulation is not negatively affecting the potential of survival of the food plant or its human consumer 'everything goes'.

5.3.5 The Social Worldview

The social world comprises the organization of human societies from the basic level of the family, to communities, ethnic groups, nation-states and other human re-groupings with their leaderships such as chiefs and presidents etc. The most important endogenous view of the social worldview is to gain an understanding of how the

phenomenon of social life is related to those inherent in the spiritual and physical worlds. In figure 4.1 for instance, the social is linked to the physical material world through us as the living beings, to the spiritual world though the dead ancestors and the yet unborn generations of children. This interrelationship between the social and the spiritual and material worldviews creates yet more complex relationships beyond the total comprehension of man.

5.3.6 The Epistemology

Deep interactions with knowledge holders in the three research communities give a sense of theory at interplay among the three worldviews. Whatever life phenomenon that is at stake, its being or not being is either a cause or consequence of the interactions within the social, physical and spiritual worlds, between the social and the physical worlds, the social and the spiritual world and the spiritual and the physical worlds. Good and bad are the outcomes of how man interacts with the social, natural and particularly spiritual world. Positive interactions with the three worlds would yield a positive outcome and a negative interaction will yield a negative outcome. In some instances however, there is not any particular order in which events occur in terms of a cause – effect analysis. For instance, the prevalence of unexplained sicknesses and occurrences such as mental problems, lack of rainfall, excessive flooding are caused by negative interference with these realms such as felling mighty trees and hunting certain animals (totems) which serve as the residences or foods of the spirits and ancestors. Instances where a supposedly bad event or situation befalls a person or animal that is known to be good or not having done any act that deserves the circumstance, consultations with the spirits through sooth saying and other

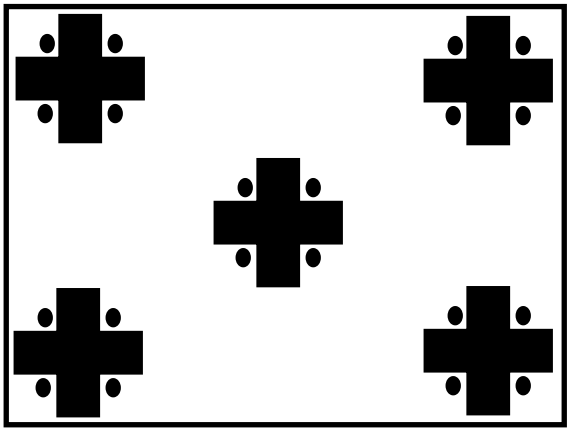
sacrifices with the spiritual world are undertaken to establish the cause and the appropriate remedy needed. It was understood in conclusion that if man interact positively with the environment (social, spiritual and natural) the environment will be kind with us most of the time. From the spiritual perspective, two interrelated examples of practices that ensured adequate quality food availability (food security) to the household were given as follows:

a) K'Juto-ba: This is a proactive practice of ensuring high crop yield and good quality food therefrom. It is a spiritual practice where a farmer performs a spiritual sacrifice usually using a fowl. Roots, stems and leaves of selected herbs are prepared and soaked in a clay or calabash pot and kept at a vantage point in the farm for the spirits to intervene to ensure a good yield and food quality. The practice has been held to give good results in terms of crop yield and quality of food.

b) No-kra: No-Kra is a preventive farming / food security conscious practice that involves invoking the protection of the spirits against what has been described as the 'evil or envious eye'. Practically and physically, it involves a preparation of grounded carbonised material mixed usually in shea butter or some other liquid. This is used to design the shape of an addition sign (+) on a flat rocky or broken clay plate. A dot is placed in each of the four quadrants of the symbol as shown in Figure 4.2; it is believed that envious passer-by people or spirits do marvel at and envy healthy looking farms which causes spiritual destruction of the farm leading to poor harvest. To avoid this, No-Kra is

prepared and placed at the four corners and the centre of the farm. This preparation performs its preventive role of warding off these evil or envious people / spirits while K'jutoba performs its proactive role of increased crop yield and food quality.

Figure 5.2: 'No-Kra'



Source: Field Research, 2013

It must be noted that spirituality in the worldviews of the indigenous people is not psychology. It is an existence which affects and is affected. Further details of the epistemology of the research communities with reference to their food science are explained later in this chapter under theory**.**

5.3.7 Axiology: Value Systems

Food, a wife, children, protection for the children (specifically fortification against wild animals, witches and human attacks), becoming a chief if you are a royal, maintaining the purity of the environment (land, trees, water and animals) possessing a horse and a sense of **'sharing'** what is deemed good for society were among the key values of the three communities where the study was conducted.

Food and water constituted the very basic needs of everyone to survive. This was acquired through a respectful interaction with the natural environment through hunting, farming and gathering. For this and other reasons the natural environment is very much respected, adored and protected for hosting the source of food for every individual, family and community. Observance of environmental taboos and totems are therefore an important component of community.

Having a wife and raising a family was another important value that was learned from Baba. This is the basis of reproduction and continuous human existence. It is a crucial value in the sense that the absence of it threatens human and spiritual existence. Once a family starts, the next most important value is the protection of children born physically, socially and spiritually. Physical and social protection involves teaching children the basics of life and surviving such as farming, traditional skills training through apprenticeship, teaching of good moral values and so on. Spiritual protection involves fortification of children against physical and spiritual harms such as firearms, physical fights, attack by wild animals, witches and wizards and bad spirits. Children are seen as assets and a source of prestige as they are the surest way of sustainable livelihoods and taking care of the aged. In mainstream development efforts, this can be comparable in its own strengths and weaknesses as a social safety net and / or a form of insurance.

Becoming a chief as a key community value underpinned the appreciation of the social world of this traditional African Community. Leadership, authority and governance are not new concepts for Baba and his community. As a royal, any male or female child born aspires to be a chief or queen mother as a life ambition with the

understanding though that not every royal will become a chief due to the fact that there is only one chief but many royals at a time.

Maintaining the purity of land, trees, water and animals as a value is based on the instinct of life and survival guaranteed by ancestral and spiritual blessings. How pure these values are maintained will determine the quantity and quality of life.

The people of Kpambu appreciate and value a horse as a means of transport. It is explained that unlike now when cars are available, horses were the main source of transport aside walking. Transport needs such as attending funerals, festivals, wars etc made the possession of a horse an important part value of the community.

Last but not least, sharing is a very important virtue of the research communities. In a proverbial submission, one knowledge holder in Kpambu stated that "It is only through sharing that something increases". In other words, when some good is shared, it increases the number of people who have access to it. As it is good, everyone will try to protect and preserve it. By so doing the availability of this thing is increased exponentially.

5.3.8 Gnoseology - Ways of Learning

Five ways of knowing or learning in a traditional African Community have been identified in the research communities as follows:

a. Determine the occupation of one's clan. Every family and clan has a profession that has been handed down to them by their previous generations

through inheritance. This was the beginning of adult learning. Families had occupational specializations in say fishing, blacksmithing, hunting, weaving etc. Learning at a very young age starts by learning to know what your parents or grandparents did as a means of living. In some communities, new born babies are initiated into these professions through ritual performance such as immersing the new born baby in water for three times in the case of a male and four times in the case of a female in fishing communities. Baba indicates this is how he learnt his mental healing practice.

b. Another way of learning was through submission and respect to elders. This involves basically approaching an elderly person in the community or elsewhere, acknowledging your lack of knowledge, readiness and request to serve and learn. This way of knowing is also described as tutelage.

c. Soothsayers are also a sure way of learning what you do not know. Upon consultation, soothsayers are believed to have powers that can tell the past, the present and the future about any situation. Knowledge seekers therefore can consult soothsayers in order to learn what they do not know.

d. Learning can also take place by consulting shrines. Knowledge from this source is held very high and sacred and can be done in a local shrine or external one in another community.

e. Lastly, revelation through dreams is a sure way of learning. It is believed that sleep is a physical and spiritual encounter where much is revealed by the

spiritual world to the physical world. Dreams can be interpreted by elders or the dreamer depending on their level of complexity. Complex dreams can either be interpreted by experienced elders or soothsaying which acts as a confirmatory learning method.

5.3.9 Knowledge Community

The way knowledge is produced, transformed and accepted differes fom one science to another. In most indigenous communities, the chief usually knows all categories of knowledge holders. He knows all people of different knowledge backgrounds such as blacksmiths, fishermen, hunters, royals. So he confirms or rejects new or existing knowledge based on this basic background knowledge of the various categories of professions in his jurisdiction. Trust is a critical element of the indigenous system of knowledge production, validation and utilization. It is usually from the chief that any new person seeking or claiming knowledge is directed before the chief in turn invites his community knowledge holders in the particular discipline for further interactions.“We lie these days”, says one research participant. Those days, there was trust; what you say is the truth because others know that you will not lie” (Sachibu, 2012:3).

Among Indigenous People, Knowledge is by inheritance handed down by generations to their lineages. This is known as ‘dankari, in Gonja. All families and clans therefore have specialised knowledge areas by which they are known by community members. This forms the basis on which anyone’s claim of one kind of knowledge or the other

is accepted or rejected -based on people's awareness of your clan, lineage and line of profession.

Coupled with a culture that abhors falsification, knowledge is either accepted or rejected on the above rules of the knowledge community. In the example of the case study in Janton, the community's acceptance of 'Baba' as a mental health healer or psychiatrist is based on their handed down knowledge that his great grandparents had this knowledge. It is undisputed that he heals mental patients in the community. With particular reference to food in this research, the knowledge community is explained under the theory chapter.

5.4 THE TRILOGIC FOOD CONCEPT (TFC)

The search for a concept of food among indigenous people in the research communities started with an effort to understand the 'general' science of the people of the three communities where the study was conducted; Bau, Kpambu and Kpembe all in the East Gonja District of the Northern region. Building on this 'general science', the food science is then revealed.

5.4.1 What is Food?

The concept of food among the research communities was established as 'Purposeful Food' or 'Purpose-driven Food'. From this understanding, it was learnt that there is no definite definition for food but there is definition of the various purposes that food serve. An effort to reveal a definition risked reducing its value as an embodiment of several parts. Like systems theory, the sum of the various parts, purposes or uses of

food do not give a holistic meaning to what food really means to the research communities in its spiritual, social and physical holism. Critically, the conception of food begins with the conception of life, death and life after death. Food must serve the social, spiritual and physical needs of man.

Other food concept(s) with great similarity but with clear distinction to the **Trilogic Food Concept** of this study is the concept of **food sovereignty**. A detailed review of this concept therefore becomes immediately necessary to distinguish it from the Trilogic food concept to avoid any misunderstanding and theoretical confusion. In the end a clear distinction is made between the two concepts.

5.4.2 Principles of the Concept

a) The diverse physical needs for food is a reality for indigenous people.
b) That diverse spirituality regarding food is a daily reality for indigenous people.
c) The Social which comprises the living, the dead and yet unborn generations (tri-generational food) is a daily reality for indigenous people's.
d) The linkages between the physical, the spiritual and the social realms of food are a rationale existence for indigenous people in their right to life and death. It provides the central argument for understanding and strengthening indigenous food systems in complementarity with western or other food sciences and concepts.
e) The evidence to the reality and rationality of the purpose-driven concept of food among the research communities is the reality of the existing cultural practices of all ethnic groups in Ghana.

f) A denial of any of the above realities is to deny the diversities of the current knowledge systems and daily practices of various ethnic groups of Ghana and elsewhere in Africa.

g) The framework is a living thing adjustable to the social, spiritual and physical diversities and dynamics of life and death.

h) The framework does not claim superiority over other frameworks in its effort to provide a better understanding of indigenous and western food sciences but it challenges western food science to prove its relevance and explanatory power to the social and spiritual realities of indigenous people in the East Gonja District and for that matter among all spiritually and socially inclined people in Ghana.

i) It challenges current national food policy and strategy focus as theoretically and practically disjointed and 'context-blind' in its efforts to promote agricultural development and food security in Ghana.

j) It argues that with food security and sustainable agriculture still struggling to provide adequate quantities and qualities of food to feed the country's 23 million people (see chapter …. on food poverty in northern Ghana) under western food science for over a century since colonization, indigenous food science deserves a fair national attention. This is evidenced by the increasing food insecure people in Ghana and the decreasing contribution of the agricultural sector to Ghana's GDP.

k) The current concept of food security is not relevant for the context for which we place it. In order words, it does not adequately and practically address the practical social and spiritual aspects of the food realities of most of our communities.

5.4.3 Strengths of the Concept

The concept is backed by empirical evidence in the research communities as follows:

a) Its background as an insider's research limits its susceptibility to error arising from distrust from knowledge holders. As an insider's research, the methodology for data collection necessarily involved the researcher having to establish a convincing genealogical and ancestral lineage to the research community and knowledge holders from whom learning for the study took place.
b) The concept also borrows its strength from its theoretically grounded analysis. Originating from the spiritual, social and physical worldviews of indigenous peoples, it adopts a non-positivist approach to its enquiry and places the researched as the knowledge holder and the researcher as the learner as opposed to mainstream modern science approaches.
c) It is based on empirical research.
d) It links well the the indigenous food theory and pratise in relation to food conception, availability, access, quality and utilization in Ghana.

5.4.4 Weaknesses

a) One key weakness of the concept is that it emanates from a less powerful position relative to modern food science. It faces the challenge of general acceptability as a result.
b) Because indigenous knowledges are least documented, it is difficult to share its positions and dispositions with the academia and the general public for debate, dialogue and critique.

From the foregoing, one clear difference between food sovereignty and purposeful food is the underlying theoretical framework. Because food sovereignty emerged from a civil society concern for a 'policy' and 'social justice' need, it lacked a critical analysis of an underlying theory. For instance, food sovereignty is understood as a right which should be granted or permitted by some form of political power to be effective. This is evident in the definition and declaration by its initiators, La Viacampesina when it stated that food sovereighnty is "the right of peoples to define their own food and agriculture; to protect and regulate domestic agricultural production and trade in order to achieve sustainable development objectives; to determine the extent to which they want to be self-reliant; to restrict the dumping of products in their markets; and to provide local fisheries-based communities the priority in managing the use of and the rights to aquatic resources. Food Sovereignty does not negate trade, but rather it promotes the formulation of trade policies and practices that serve the rights of peoples to food and to safe, healthy and ecologically sustainable production" (Windfuhr, 2005: 12-13).

Food sovereignty is thus a set of principles that protect the policy space for peoples and countries to define their own agricultural and food policy, their model of production and consumption of food without interference. Food is a basic human right and food sovereignty, in the words of the Via Campesina (1996a), means that peoples have the "right to define their own agricultural and food policies, produce their own food in their own territory" in ways that enhance the environment and peoples' cultural values (Via Campesina, 2000c, 2000d). Food sovereignty means ensuring that peasants, small farmers and rural women have the right to all resources necessary for producing food including access to and control over land, seeds, water, credit and markets.

5.4.5 Applications of the Concept

Three examples are used to demonstrate the physical, social and spiritual applications of the trilogic food concept.

Example 1:

Bambara beans and guinea peas are used as the physical foods in this example. These foods are regarded as lean season or hunger related foods which are grown and harvested by design or by accident during the long dry hot, hamattan season of the north (November – February / March) annually. During this period, most foods that have been harvested during the growing season have been consumed. As these crops are only grown on a small scale (sometimes through intercropping) quantities harvested are equally limited. However, these foods are known to be hunger busters because of their characteristic of causing substantial water intake after consumption.

Coupled with other strategies, these foods are consumed more during lean limited food periods with the knowledge that, the significant consumption of water throughout the day will eliminate the need for the so called 3 square meals which come with associated overeating and obesity. 'Drinking more water especially during hot weathers is regarded as a modern science virtue? The question that follows is; is this indigenous analogy rational? What then is rationality and are indigenous people rational? To the western scientist, perhaps, it may just be a coincidence' that indigenous people think this way and not really that they are rational.

Example 2:

For the spiritual dimension, it is believed among the research communities that certain foods, plants and animals are more acceptable to the spirits than others. In some cases, the spirits have to eat or be offered these foods before the living so that they (the spirit) can bless the land for further bumper harvest. Taboos and totems are used to preserve these plant and animal species from over consumption and / or destruction. This practice, according to the knowledge holders, has helped to maintain and improve a number of crop and animal diversity over the centuries. Even though the value of this conservation is usually not communicated or may not even be the objective of the said taboos it has in the end created a value that is admired and revered by modern science; 'environmental protection and conservation'. Does spirituality makes sense in this regard? To whom does it make or not make sense?

Example 3:

The social realm explains the relationship between the living, the dead and the yet unborn generations as depicted by figure 4.1. This has an important relationship with food which re-enforces the quality of life for the living and the dead. For instance, the social need to welcome new born babies with particular foods and food sacrifices ensures the preservation and continues cultivation of these foods thereby increasing crop diversity and quantity of food produced.

Food Related Proverbs, Stories and Songs and their Implications for Food Conception, Access, Availability, Quality and Utilization

The following proverbs and songs provided important conceptual and theoretical insight in the food lives of the research communities.

i. "Kagbanyi min wu fo ne ashuya, emadanye nsa anye asa fo: This literally means, if a Gonjaman does not see you with the raw material for brewing alcohol (processed guinea corn), when he prepares his alcohol, he will not give you. This means that there is a general expectation among indigenous people of Gonja origin that everyone needs to show some sign of responsibility in terms of feeding his or her family and not to expect others to feed them. Otherwise, if the other sees no sign of effort by a neighbour to feed him or her, they may not share their food with them. This proverb also applies to general life endeavours.

ii. ‘K-boru Gbarangbanje! Kache ne larabaku luwe ban bishi muso’ provided a deep insight into food security consciousness among the Gonjas. Literally, this proverb is praise for the comparatively less tasty but more robust and weather resistant water yam. The praise is that; the gigantic water yam! When the smooth very tasty yam called ‘larabaku’ is out of season, they will look out for the water yam’. The significance of this proverb is that some types of foods provide an insurance against lean seasons and need to be maintained in the farmer’s diversity of crops so that when the most preferable is out of season or is unable to withstand weather vagaries, this variety would be available to help prevent severe hunger.

iii. K-filmu di akon: This literally means ‘underrate it and sleep hungry’. In other words, there are some foods and food crops which, by their mere size look too insignificant to be able to safeguard hunger or starvation but in reality, it provides a lot of hope and sustenance when well conceived and appreciated.

5.5 THE TRILOGIC FOOD THEORY (TFT)

5.5.1 An Introduction to the theory

This section introduces the question of food theory in the research communities with the objective to find out the theory of food among indigenous people in the four research communities of the East Gonja District. The chapter therefore answers to epistemological reasoning among the knowledge holders of the research communities. Epistemology is the part of philosophy that deals with knowledge. It relates to the theoretical framework, or the way of ordering knowledge and deals with the origins, nature and extent of human knowledge on a particular subject such as food. Empirical data from the field are presented and analyzed with the objective of establishing the sense of causality or being on food. The chapter also analyses the point of departure in knowledge about the science of food among the research communities.

Literature related to the subject and sub-objective is revisited in an effort to substantiate empirical data with pertinent literature on the subject. Key findings are then discussed with appropriate literature support. Finally, a summary on the sub-objective is drawn highlighting relevant issues that demand further research or were not the direct objective of the study but nevertheless relevant to the broad study area of indigenous food science. A conclusion pertaining to this specific objective is then drawn.

The theory and philosophy of food among knowledge holders in the research communities revealed a deep sense of bio-cultural, bio-spiritual and bio-physical diversity in the conceptualization of food. In Gonja epistemology is explained as:

> *'kana ne bomin be kenyi ler, kana ne kudu ne kana ne kesa' (*i.e, the origins of human knowledge, its nature and extent of it). *Ke be ɲini kuso ne kenyi la, kanane anyintin fin kumu, ne kana ne anyin tin ta kinyi n fin kuso mu ne anye sha* (It shows what knowledge is, how to acquire and utilize knowledge). *Kuna migeto kana ne kinyi bee lie kashinteɲ* (it also investigates how knowledge confirms or disagrees with truth).

From this understanding, it was learnt that there is no definite definition for food but there is definition of the various purposes that food serves. An effort to reveal a definition risked reducing its value as an embodiment of several parts. Like systems theory, the sum of the various parts, purposes or uses of food does not give a holistic meaning to what food really means to the research communities in its spiritual, social and physical holism. Critically, the conception of food begins from the various lives, death and beyond death needs which it must serve from the social, spiritual and physical worldviews.

The statement from which the theory of food among the Gonjas in the East Gonja District can be extracted is **'kijibi kike ne kumu be kushun"** literally translated as 'every food and its purpose'. 'Ajibi ko wuto na be-ko amu a lonye kasawule nko a-tuwe ela asa anye nana ana'. This means every food and its purpose. Some foods are

only used to pacify the gods, the land or the ancestors and once offered to them, cannot be eaten by the living The most popular instance of this is a ‘mashed masa with fresh cow milk’. While this can be purposefully prepared for consumption usually by children, when purpousefully prepared for the spirits, it cannot be eaten by the living. Plate ….shows ‘mashed masa with fresh cowmilk in a calabash’ and offered to the spiritis at ‘ants’ colony’ called ‘gurguro’ in Gonja as shown in plat….

Plate 5.2: Mashed ‘Masa’ with Fresh Cow Milk at an ‘ants’ colony’ for the spirits.

Source: Field Research, 2013

There are also foods that are only eaten by a particular category of people in society due to some historical and / or spiritual significance. A typical example is ‘Atelampe’ as eaten by pregnant women in Kito, one of the research communities. The key conceptual finding about food among the research communities therefore is **purposeful food or purpose–driven food**. What really counts as food is determined by the social, spiritual and physical purposes for which it is needed. Defining food in

any particular purpose context reduces its being and meaning to that purpose. By broad implications therefore, there is social, physical and spiritual foods that serve the various social, physical and spiritual purposes of life, death and the unknown existence. There is therefore **three levels of logic (Trilogic)** associated with the thinking, nature and being of food.

The question that follows is whether this provides a good explanatory power to the social phenomena of food in the community.

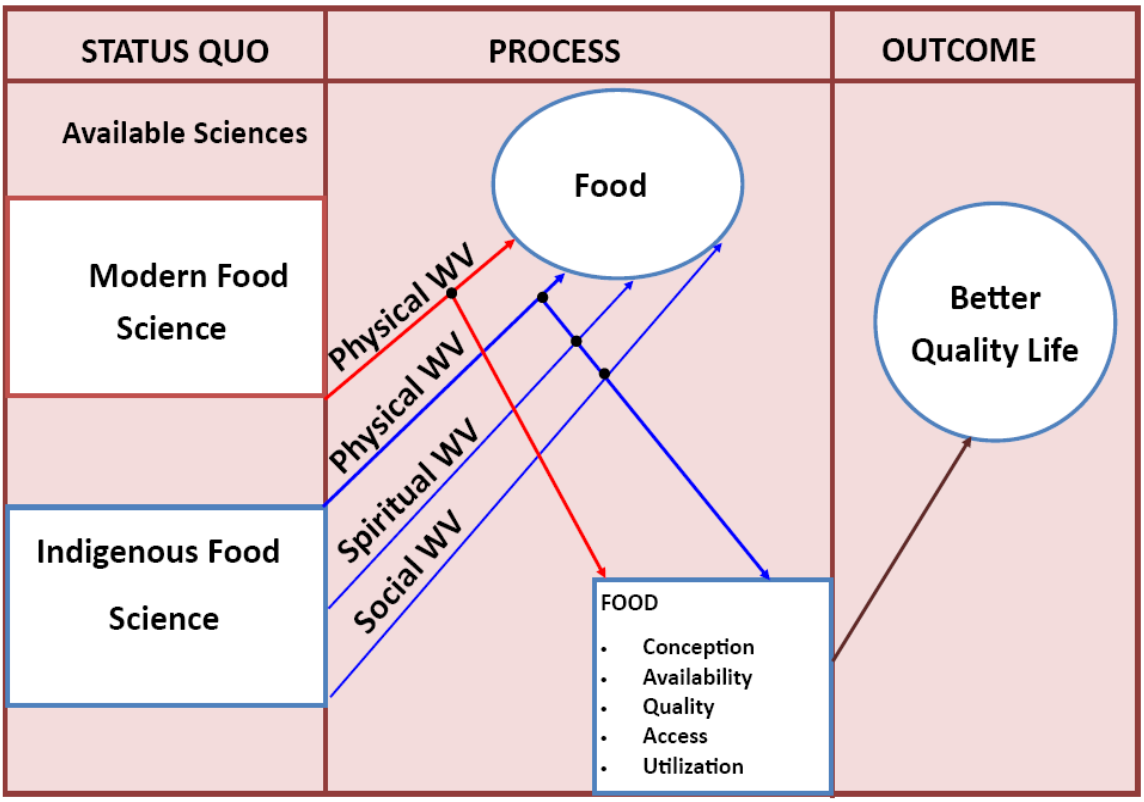
For instance, the story of Atlampe (a variety of beans) and the People of Kito in the East Gonja District also tells a detailed story about the multi-purpose nature of food other than nutritional benefit. It provides one dimension of the explanatory power of the trilogic food theory.

The story goes that;

> During the early history of human settlements through conquering, original communities or tribes that were resident on these lands were conquered and taken as slaves unfortunately on their own land even though they did not have a sense of ownership of that land but the conquerors had. In such encounters at Kito in the East Gonja District of the northern region, some indigenes were taken as slaves. While slaves could live a normal life in a community, they are often not treated equally as the conquerors. In one such instance, a slave woman delivered a baby and was fed with specie of beans which was held to be highly inferior in quality for consumption. The

slave woman died as a result leaving the baby. Subsequently, a trend of post-natal mortality increased. Further investigations, observations and soothsaying revealed that unless the nursing mothers of the new land owners ate the same bean species, they will continue to die after birth. Since then, every woman from the community who is a real Gonja must taste this type of beans before she survives. It is critical to note that the cause of death if this type of bean is not eaten is not because of any nutritional deficiency but rather a spiritual relevance. For this reason, this type of food is not eaten in large quantities and no other bean specie can perform this role. The commitment and need to maintain this bean through generations has become one that cannot be mistaken. Else, post natal deaths will continue to hit the community. This is the reality of food in Kito. By implications, any contamination of the food diversity of the community that leads to the extinction of this food specie would be disastrous. In the context of the people of this community therefore, rationality and logic is that which ensures that maternal mortality is reduced to the bearest minimum. Over the centuries, their observations on maternal mortality is expected help to prevent it within their worldviews, value systems and a sense of the causality (epistemology) of events and occurrences as observed over time. Figure 4.3 explains the 'Trilogic Food Theory' in detail.

Figure 5.3: The Trilogic Food Theory



Source: Field Research (2013)

5.5.2 A Focus on Epistemology

The main theoretical framework within which the food theory of the research community is situated is the **Indigenous Knowledge theory.** It emphasizes that spiritual identity is a way of knowing and expression of reality. It is a body of epistemology that connects place, spirit and body (Dei, 2012). The use of this theory as the main framework is due to the nature of the research problem and the explanatory power of the theory in explaining the spiritual, social and physical realities of indigenous populations. The relevant concepts of indigenous knowledge theory include indigeneity, Indigenousness, identity, culture, history, spirituality,

colonialism and knowledge production; as well as the nexus of society-culture and nature (Dei, 2013). Quoting extensively from Dei (2013 Lectures Notes) the basic principles of indigenous knowledge theory include but not limited to:

a) Indigenous ways of knowing as a body of epistemology connects place, spirit and body.

b) Spiritual identity is a way of knowing. Land and spiritual identity are in fact salient/fundamental analytical concepts offering an entry point in understanding the lived experiences of those who are indigenized.

c) Indigenous knowledge is spiritually-driven or anchored. Such knowledges are embedded or imbued with the spirit. The spiritual becomes the axis on which Indigenous knowledge rests -that is, the substructure or foundation for understanding the social, cultural, economic, material and political. Therefore, understanding the spirit constitutes an important basis of indigenous epistemological knowing. With specific reference to theorizing food among the knowledge holders in the research communities, this principle was vindicated by the emphasis of spiritual significance of food which reason, it was explained, "not any kind of food can be offered to the 'spiritual' gods. "Some persons, some animals, plants and locations lend themselves more prominently for the spiritual expression than others, and therefore we can make a distinction between 'normal' lay people and people with a spiritual position/disposition as well as between plants and animals that may serve for our food and animals that have spiritual significance and therefore can be used

to make sacrifices. The spiritual beings ensure that life emerges and continues" (Millar, 2012:8).

d) "Indigenous' as place-based knowledge reflected through land, history, culture and identity offer powerful explanatory powers in contemporary communities and socio-political encounters". The understanding here is that experience and practice constitute the contextual and analytical base of knowledge. Knowledge on food and its utilization therefore varies from one place to another; from one culture to another even within the same ethnic group (Gonjas). For instance, at Kpambu where the main knowledge holder also combines as the chief and the shrine lord of the community.

e) "Indigenous knowledge is about searching for wholeness. This wholeness is a nexus of body, mind and soul, as well as the interrelations of society-culture and nature. To understand is to have a complete, holistic way of knowing that connects the physical, metaphysical, social, material, cultural and spiritual realms of existence".

f) Within Western cultures knowledges exist in hierarchies of power. Such hierarchies of power are themselves only meaningful in a competitive culture. The competitive nature of these communities itself help produce 'ordered' subjects'. Claiming local cultural resource knowledge as specific knowledge has broader implications for subverting dominance of Euro-colonial knowledges and Euro-modernity. Indigenous epistemology sees difference as embodiment of knowledge, power and subjective agency. Creating an

'Otherness' is about power and control.

g) A critical indigenous discursive framework brings three (3) conceptual understandings to Indigeneity: i) colonialism, in its deep-reaching denial of history and identity - has created unequal outcomes for groups in terms of their histories, engagement of culture and traditions, and spiritual identities; ii) there are situational variations in intensities of different identities given the effects and after effects of colonization; iii) central to decolonization for indigenized and colonized communities is resistance in order to regain our collective spiritual power and inner strength.

h) It is through a nurturing of oppositional stances informed by our relative subject positions and experiences that the dominance of Westernity and Eurocentricity can be subverted. In fact, the indigenous discursive framework claims the intellectual agency of the indigene to define oneself. It affirms the epistemological relevance of the indigene to set the terms of our engagement in dominant culture.

i) A critical indigenous discursive framework is necessarily anti-colonial. It is about resistance, subjective agency and collective politics. It centres the agency, voice and political and intellectual interests of indigene in accounting and resisting oppression and domination. The politics of knowledge production for indigenous scholars is to claim our agency through self-actualization and collective empowerment.

j) The indigenous discursive framework highlights an ontological lineage to communities and a 'spiritual ontology'. This calls for placing at the centre the 'spiritual' in the axis of social movement politics, making questions of economics, culture and history the superstructure. This approach to indigenous praxis cannot be viewed simply as a project of decolonization and the unraveling of the power relations of knowledge production, interrogation, validation and dissemination.

Finally, the Indigenous discursive framework critiques the independence of 'scholarship', 'politics' and 'activism'. It does not subscribe to the luxury of the independence of scholarship from politics and activism. But the framework is also mindful of not prescribing a particular politics. The learning objective is to create a space to legitimize politics in the intellectual/academic realm.

k) Although 'land and spiritual identity' [i.e., land-based spirituality] have a special salience that salience should not lead us to a discourse of reductionism or the idea of irreducible / essentialized difference. This is because history, culture and spiritual identities are sites and sources of asymmetrical power relations structured along the lines of difference (race, class, gender, sexuality, [dis]Ability, etc).

Having laid the general principles of the discursive framework of indigenous knowledge, it is crucial to bring theory down from its polarised, hazy heights and preserve of only the critical thinking laboratory scientists' zone. Theory is an

explanation rather than a description of social facts. Taking theory simply as "what *is*, it becomes probably easier for the layman to understand what really *is* food for the research communities in this study. According to them, food *is* anything which answers to the diverse 'consumption' needs of man in his social, spiritual and physical holistic forms. Essentially, the theoretical framework for the holism of man for these people is the physical, social and spiritual needs which they need to meet on a daily, monthly and yearly basis. For instance, in the physical world, food is used to nourish the body to enable it perform its daily activities. In the social world, food is that which is capable of meeting a particular task depending on the culture of the particular user or users.

For the research communities just as modern scientists, the nutritive value of food is its main task and criteria for qualification. Food must provide some form of support to life through relief of hunger, providing the means of life to the smallest imaginable part of the human body. This physical worldview of food among the research communities is equally important as it provides the immediate physical strength for social and spiritual purposes of life. Its importance according to the knowledge holders can only be appreciably examined by the quantum of a man's life that is dedicated for searching for the appropriate food. Indigenous people do not therefore discount the relevance of the physical world of food. For instance, it is held to be the medium through which the spiritual and the social thrive and in turn reinforces it. For the living and the sick for instance, physical food is a means to physical, spiritual and social healing. For the ancestors and yet unborn children, food is a means to their perpetual life and hope for a mortal life on earth respectively.

In the spiritual realm, it serves the purpose of nourishing the spirits in forms that are best known to the inhabitants of that world. When this feeding of the spiritual world is well done, definite positive feedbacks such as bumper harvests, adequate rains, minimal or reduced deaths in the physical world are encountered. On the other hand, if not well fulfilled the anger of starvation in this realm is vented onto the inhabitants of the physical worldview in the forms of floods, poor harvest, pest infestations, drought etc. Could result into certain disastrous feedbacks to the inhabitants of the physical world which in most cases are mis-understood and consequently labelled as unscientific, a-theoretical, superstitious and without prove –though not all of modern scientific claims have proofs.

In the social world, food is perceived as that which connects the living among themselves on one hand, the living with the dead on the other and the living with the yet unborn generations on the third. Within the social realm therefore, there are three-fold food realities which face the indigenous research communities. For instance, particular, plants, animals and non-living things are used as offerings to the ancestors. When the unseen spirits take the unnoticeable parts of these foods, the living including women, children and adults are in most cases permitted to consume the physical components. As an unordinary meal, this kind of food eaten by the living is believed to provide spiritual strength. Again, in the social world, certain foods such as Atlampe are used to connect the living with the yet unborn generation through child birth. By significance, a sense of fairness is instilled in the society on the need to feed good food to everyone as one would want to be fed.

Among the living, food is used to show love, affection, concern and create meaning in life through sharing especially where and when one individual, family or community lacks the means of its acquisition. It is important to note that in both the spiritual and social worlds, consumption is an essential part of the conception of food. Its form and nature in these two worldviews (social and spiritual) however, is beyond comprehension especially within a limited reductionist timeframe for a 3-4 year PhD study'.

In chapter two, the **theoretical point of departure** of the study was established. It was that while a number of studies such as Millar (2012), Kiples and Ornela (2000), Heldke (2006), Bellasco, (2008), Kaplan, (2012), Deutsch et al (2012) have done critical and extensive amount of work on the philosophical, scientific and artistic value on food over time and space, the analysis fell short of giving a complete account of the Ontology, epistemology, axiology, gnoseology, and knowledge community of indigenous people's food lives especially in this part of the country. In particular, the sense of being, causality and socio-spiritual dimensions of food among indigenous people has not been adequately highlighted. This is critical as it helps to explain why and how indigenous people express their reality about food in the research community and to some extent among the Gonjas. This gap when filled by the end of this study will bring new knowledge to the area of food studies in academia. There are therefore three theoretical points where this study departs from earlier studies and in the literature reviewed:

a) An Ontological gap in food theorizing: focus on physical world against social and spiritual worlds.

b) The Epistemological Gap. The fact that proponents of indigenous food science fall short of giving the scientific perspectives / standpoint of indigenous foods (Ontology, epistemology, axiology, value systems and knowledge communities); and

c) There is a significant gap (failure of modern food science) in modern food science as its purpose is being defeated by rampant food related ill health, world hunger in the midst of plenty food, food access, quality and availability and sustainable development)

5.6 COMPLEMENTARITY: INDIGENOUS AND MODERN FOOD SCIENCES

This section of the data analysis chapter investigates the various strengths and weaknesses of western and indigenous food sciences as presentd in the literature review and data analysis sections of this study. The objective is to identify, compare and contrast the relative strengths and weaknesses of both sciences and how these could complement each other. In the end, it is aimed at making both indigenous and modern food science relatively stronger. Empirical data from the field are presented and analyzed to answer the sub-research question; what are the comparative strengths and weaknesses of indigenous and modern food sciences and how could these complement each other in the twenty-first century and beyond? Literature related to the subject and sub-objective is revisited in an effort to substantiate empirical data with pertinent literature on the subject. Finally, a summary on the sub-objective is drawn highlighting relevant issues that demand further research or were not the direct objective of the study but nevertheless relevant to the broad study area of indigenous

food science. The principles on which the strengths and weaknesses (see table 5.1 for summary) of both sciences are analysed are set out as follows;

a) Relevance to human existence
b) Physical health implications
c) Sustainability
d) Nutritional quality including taste
e) Access

First and foremost, the study found that, given that empirical evidence exist globally that different people eat different 'things' as food not just for their nutritional benefit (Deutsch and Murakhver, 2012; Kiple and Ornilas, 2000), modern food science lacks the needed empirical evidence to validate its theoretical proposition of 'food' as 'nutrition'. This is one of the significant weaknesses of modern food science. A comparison of the strenths and weaknesses of modern and indigenous food science are presented in table 5.1.

Table 5.1: Strengths and Weaknesses of Modern and Indigenous Food Sciences

Science	Strengths	Weaknesses
Indigenous Food Science	1. Closeness to nature or eco-friendly agriculture 2. Diversity in food crops 3. Tasty food 4. Healthier 5. Multiple theoretical uses in (Physical, social and spiritual) 6. Strong value system (axiology)	1. More time to cultivate and process 2. More time to cook 3. Small scale 4. Less convenience 5. Less investigation into the physical worldview of food

Modern Food Science	1. Agricultural mechanization in food cultivation and processing 2. The application of fertilizers 3. Food fortification for nutritional value increase 4. Genetic engineering for improvement in varieties 5. Preservation 6. Convenience 7. Increased food production	1. Heavy chemical dose (pesticides, insecticides etc 2. Increasingly unnatural 3. Heavy additives 4. Poor taste 5. Less healthier 6. Single theoretical use as a nutritive value in the physical being. 7. A danger to human health through genetic engineering 8. Commoditization of food leading to a hungrier world with more food.

Source: Field Research, (2013)

Analyses in this chapter are based entirely on the submissions by the research communities. It must also be noted that what constitutes strength and / or a weakness is highly relative. A critical perspective is therefore used to assess and judge strengths and weaknesses with appropriate literature support.

5.7 STRENGTHS OF INDIGENOUS FOOD SCIENCE

5.7.1 Stronger Theoretical Base: Multi-functional Nature of food

Theoretically, indigenous people perceive food differently. As opposed to modern science, indigenous food science attaches two additional ontological perspectives to food, thus; the social and the spiritual perspectives. For modern science, food is that which serves the physical nutritional needs of the body. For indigenous food science,

food does not only provide nutritional benefit to the body. It also serves as food for the spirits, the ancestors and unborn children. This multifunctional role of food re-enforce each other for further better quality food for the physical health and vitality of the body. Consequently, the axiology or value system attached to food among indigenous people is one of sharing good seed, ensuring peaceful co-existence in a (farming) community, support to food cultivation, processing, transportation and utilization. It is a common practice to find indigenous people sharing small quantities of their annual harvests with other members of the community.

Another good value system of indigenous food science is the concept of 'Keyisa', or gleaning. The concept is based on inherent knowledge and value by a farmer that, some people within the community either may not have the means to farm, or may not have gotten a good harvest but need to survive. Hence, harvesting is not done with the intention of collecting 100% of yields or produce from the farm. Some minor produce are left behind for this part of the community. This 'second–hand harvesting by the non-owners of the farm granted by the mercies of the real farm owner has a deep sense of sharing and community welfare in a traditional indigenous Gonja community. These knowledges and practices shaped current **realities** and **practices** of food in these communities and among the Gonjas to some extent.

5.7.2 Closeness to Nature

From conception to cultivation, processing and utilization, indigenous food sciences use methods and approaches that are generally held to be natural (FAO, 2013; Kiples and Ornelas, 2000). Due to the social and spiritual attachments of indigenous people to land and the environment in general, their interaction with the environment for the

production of food is seen as a favour from the nature for which they have to reciprocate with kindness and less destruction. In this direction, indigenous communities would usually commence their cultivation of the land for food by performing sacrifices that ensure that the living land shows mercy to them to give good yields from their farms. Acts of massive destruction to land for food purposes was either not known or frowned upon. This knowledge has arguably shaped the nature and extent of agricultural mechanization by indigenous people (the hoe and the cutlass) which is consistently being labelled and ridiculed as primitive and inefficient. The wisdom, as narrated by some of the research participants is to harm the ecosystem of the soil only to the extent necessary to feed society. Therefore, the tools and implements are just enough to clear the land to produce food in quantities that are enough to feed a family or community. The current quest for the adoption of minimum or zero tillage under conservation agriculture is probably the best argument in favour of this concept and practice of agriculture (Altiery, 2001; Pretty, 2000). Little or no interest was shown in making substantial profits from the sale of food as is currently the case with the excessive commiditization of food by the food industry leading to the adoption and application of heavy eath moving equipment to till the land on a large commercial scale that guarantees the so-called economies of scale – a revolution which Kimbrell (2002) described as the 'Tragedy of Industrial Agriculture'.

In his book 'Agro-Ecology, the science of sustainable agriculture', Altiery (2001) provided a critical scientific perspective of the healthier and sustainable nature of this form of agriculture and food production system. Pretty (2000) also noted in her book, 'Agri-Culture, reconnecting People, Land and Nature', that indigenous people's

interaction with land for food production is one of deep respect for land as a living gift of nature which must be protected tenderly to ensure good yield and harvest. Also, the global emphasis on organic food and agricultural sustainability is a confirmation of the natural food nature of indigenous food systems. This is what Pretty (2002), Pilgrim and Pretty (2010) envisage as the 'new form of production and consumption founded on more ecological principles and in harmony with the cultures, knowledges, and collective capacities of the producers themselves'. For a more sustainable and meaningful food and agriculture the relationships, linkages and interdependencies between nature, people, land, culture and biological diversities need to be respected, preserved and cared for. While Pretty and Pilgrim's argument are quite valid in terms of the bio-cultural diversity of agriculture, it must be noted that the harmonization of production and consumption with ecological principles, cultures and Knowledges should not be regarded as new.

5.7.3 Diversity in Food Varieties

In appreciation of the nutritional (physical) social and spiritual needs of diverse foods, indigenous peoples have kept in principle and in practice, a large variety of food crops and animals that serve as food to them. For the nutritional needs of their physical bodies, they know that having different varieties of plants and animals as food serves the body better than a single variety. This diversity also makes indigenous people's foods multi-purpose (i.e food for food, and medicine among others). They have therefore maintained several varieties of food in accordance with the natural seasons. For them therefore, the seasonality of certain foods is not a mistake by nature but rather a perfection of the need to feed the body with different foods at different times.

As noted by Bodeker (2007:24) biodiversity provides a substantial benefit to rural peoples health through important medicinal plants.

Secondly, due to the relationship that indigenous people hold with the social world of the living, the dead and the yet unborn generations, it is known that the living, the dead and the yet unborn beings have different food needs hence the need to maintain a diversity of plants and animals that served as food for them.

Thirdly, indigenous people use different types of foods as offerings to the spirits. It is a common practice both in the research community and among indigenous peoples to find a mixture of two or more types of food species in a calabash at a cross road or T-junction. This is usually a spiritual offering to the gods either for protection, to ward off some evil spirits or cause some spell on someone, something or some situation. This function of food has a significant impact on the need to keep diverse food varieties.

5.7.4 Tastier Foods

Taste is one of the most important determinants of edibility or non-edibility of food (Kiples and Ornelas, 2000). Indigenous foods are held to be relatively tastier partly because indigenous people maintain their foods as they were discovered with minimal alteration in the genetic composition of the food. Food additives are also not a very common practice among indigenous foods. While food additives were acknowledged, these were in themselves very natural elements such as dawadawa. Taste, according to the research communities, was an important component of a particular food variety

and once this is lost or significantly changes, to an unpleasant one, it is accorded a low value and low consumption. Accordingly, the taste of food is influenced by several factors from cultivation to utilization all subject to the individual. The quality of land has a significant impact on the taste of food from the land. The type of feed available to poultry and livestock affects the quality of the meet. By interfering with these myriad of factors, the taste of food also changes. For instance, among the knowledge holders, it was revealed that the application of chemical fertilizers during cultivation of yam has resulted in a significant reduction in its taste leading to less demand. Additionally, such fertilized yams are held to be highly perishable within a short time frame relative to non fertilized ones. Indigenous people have therefore tried to maintain the taste of their original yam (larabaku / Kpina) foods by avoiding the application of fertilizers to them.

5.7.5 Healthier Food

Healthier food is subjective to different interpretations in the literature. For some, it is a cultural issue while others perceive it as a strictly physical phenomenon. Using nutritional data from modern science, healthy food is considered to be food that provides a good balance of the various micronutrients to the body. It must not be poisonous to the body. Similarly, healthy food is influenced by several factors from cultivation to processing, preparation, cooking and storage. Food can get unhealthy at cultivation if the right methods are not applied during cultivation, processing, preparation (cooking) storage and consumption. Because indigenous people believe in maintaining the purity of food for themselves, the spirits, the ancestors and the yet unborn generations, maintaining its ‘purity’ is of paramount importance. Thus, natural

methods are used right from cultivation, to management, harvesting, processing, storage and consumption. Through low application of technology, indigenous people are able to maintain the natural constituents of their foods thereby keeping them. For instance, storage of grains in earth silos is held to maintain the nutritional value of the grains.

Also, by not interfering with the genetic material of food, its natural purity is held intact. Kiple and Ornelas (2000) testify to the healthier nature of indigenous foods when they wrote that, …'these additives along the entire spectrum of the food system has been responsible for a greater percentage of food related illness and in fact made modern food systems less healthier than indigenous ones' (Kiples and Ornelas, 2000).

5.8 WEAKNESSES OF INDIGENOUS FOOD SCIENCE

Data collected from the research communities and the case study conducted in the Tamale Metropolis reveal that there are four main weaknesses to indigenous food science namely, high labour and time requirement for cultivation, processing and cooking, small scale nature of food production, more time to cook and less convenience.

5.8.1 More Time to Cultivate and Process

Due to the application of low levels of technology, indigenous food cultivation requires a relatively longer time to prepare and till the land, manage food such as weeding and harvesting. These processes rely mainly on family and community labour which are though adequate for the local level of production, but usually

inadequate to ensure large farm sizes and food production. The hoe and the cutlass are still seen as the main implements. It is argued therefore that, this system of food may not be able to meet the needs of particularly urban societies.

5.8.2 More Time to Cook

Most indigenous foods take a relatively longer time to cook. The process involved in food preparation is relatively longer. For instance, from the data collected from restaurants and hotels in Tamale, it takes an average of 25 minutes to prepare a typical modern science food and an average of fifty minutes to prepare an indigenous food such as TZ or bambara beans. This is held to be due to the naturally long time it takes to get some indigenous foods boil to get cooked. Bambara beans and guinea peas are typical examples, taking an average of about four hours to cook to donness. With the low application of technology especially genetic engineering, these foods will remain this way for time. Reducing the time required to cook may require some laboratory adjustments to the genetic material that makes the food resistant to heat and for that matter cooking. Also, for an indigenous food like TZ, the process of preparing the porridge to stir the T.Z in addition to the time required to prepare the soup are just unbearable for some commercial eaters. But at a household level, there is no problem with this. However, in one of the research communities - Kpambu, this weakness is actually perceived as strength. The reason being that, there is a lot of art and exercise involved in cooking and therefore healthy for the body.

5.8.3 Small Scale

Because of the low application of technology, indigenous food science is held to be weaker in its ability to produce food in large quantities. This allegedly makes it uncompetitive in feeding the increasing global population.

5.8.4 Less Convenience

Inconvenience associated with preparing, serving and transporting indigenous food has posed challenge to indigenous food science. It is argued that most indigenous foods come in forms that make their handling and eating difficult. For instance, it is noted that it is extremely difficult to manage fufu or TZ in a travel journey.

5.9 STRENGTHS OF MODERN FOOD SCIENCE

5.9.1 Agricultural Mechanization in food cultivation and processing

One of the celebrated 'successes' in modern food (and agricultural) science is the development of equipment and machinery that aids land preparation, cultivation, processing, harvesting, and transportation.

5.9.2 The Application of Fertilizers

In order to increase yield per hectare modern food science has developed the technology of fertilizers. In most cases, the application of fertiliser has given significant increases in food crop yields that make more food available though neither accessible nor affordable to the general population.

5.9.3 Food Fortification for Nutritional Value Increase

The addition of micronutrients to some foods to increase their nutritional value is considered strength of modern science. With increasing ill health due to nutritional deficiency, artificial addition of selected minerals, vitamins etc have aided to supplement these foods with the requisite nutrient levels.

5.9.4 Genetic Engineering for More Food

Genetic engineering in food and agriculture is seen as one of the most important strengths or achievements of modern time. Manipulation of the genetic material (DNA) of plant and animal scpecies has enabled scientists working in the laboratory to manufacture artificial food varieties with particular characteristics, supposedly to enable them to withstand certain conditions, such as heat, flood, diseases and pests and so on or to increase yield astronomically. The birth of the green revolution is usually hailed as the success story of modern food science in this direction. Since Malthus's theory on the possibility of population outstripping food production, global agriculture has witnessed a tremendous revolution in terms of the efforts to produce more food using fewer inputs, thus efficiency. This has resulted in several technologies whose application cut across agricultural inputs such as land, seeds, knowledge, water, air, labour and so on. The most popular naming of these efforts which blends technology and industrialization is the green revolution which has been controversially / arguably successful in some parts of the world at a severe cost to others especially developing countries. From a probably genuine interest to produce more food to feed the world, a more mischievous and cruel objective became more

relevant; a few countries and corporations now aim to reap supernormal profits at the expense of the lives of the majority of people in developing countries (Via Campesina (1996).

The so-called efficiency of industrialized agriculture depends on externalizing core environmental, public health, and social costs from prices and on taxpayer subsidies to compensate for farm gate prices that are below the cost of production. A production system that continues to count depletion of natural capital as economic growth cannot be made "green" through a technology fix (Supan, 2008). According to him, instead of experimenting with less chemically dependent agro ecological methods, the proponents of industrial agriculture count on taxpayers to pay the costs of their environmental and public health damage. This approach to agricultural development continues to perceive as outmoded and inefficient, indigenous forms of food and agricultural production by small scale farmers.

5.9.5 Preservation

Food preservation is yet one of the key strongholds of modern food science. In western literature, it is noted that, food preparation and processing were only an 'art' rather than a science until population concentrations started shifting toward the urban areas (Bowers, 1992). At this stage, thinking around how to meet the demands of the rising urban migrant population caused early scientists like Nicholas Appert and Louis Pasteur to experiment and establish their heat preservation of food based on Pasteur's conclusion that microorganisms were responsible for food spoilage (ibid,1992).

Bowers (1992) stated categorically that "The study of food as a science emerged from several disciplines". Before the 1930s, chemists studied the composition of food and bacteriologists identified microorganisms of importance to food safety and preservation. USDA chemists published tables on the nutritional composition of food. During the last two decades of the 1800s, several American investigators analysed the composition of foodstuffs. Results of those investigations were compiled and published as the Chemical Composition of American Food Materials (Atwater and Bryant, 1896). Water, protein, fat ash and caloric content of food were reported. The Pure Food and Drug Act of 1906 influenced the development of methods for analysis of food products. Federal agencies established the standards of purity and tests to detect adulteration. Books were published on food commodities including Sherman's (1914) 'Food Products' which covered agriculture food production and preparation for the market, production statistics, composition, digestibility, nutritive value, sanitation, standards, law and regulations covering these subjects – comprehensive coverage all in one book. Eastwood (2003) wrote comprehensively on the Principles of Human Nutrition as an emphasis on the western mind's focus on the nutritive value of food as the centre of food theory and food science.

5.9.6 Convenience

Convenience is probably the single largest factor responsible for the growth of the muilti-billion dollar fast food industry in the west. The short time of cooking, convenience of preparation and handling has made most modern foods very attractive to the growing working class. Food is needed within very short time intervals and in packages that can easily be taken away on a journey to enable people go about their

businesses while eating or to finish eating while travelling without having to dedicate another precious time for it. Consequently, food has been engineered to reduce cooking time to the demands of the urban lifestyle. The proliferation of fast food restaurants in most parts of Accra as stated in chapter two is part of this argument.

5.10 WEAKNESSES OF MODERN FOOD SCIENCE

5.10.1 Heavy Chemical Dose

One of the most lambasted weaknesses of modern food science is its excessive use of chemicals in the entire value chain of food from conception to utilization. From conception, seeds for food production are genetically engineered in the laboratory with the aid of several chemicals. At land preparation and cultivation, high doses of weedicides such as round-up are used to kill weeds before tilling the land. After food is planted, once again, weedicides, chemical fertilizers, and insecticides are applied to support plant growth and to kill pests and insects. In her scholarly writing on sustainable agriculture, Pretty (2005) 'The Pesticide Detox: Towards a More Sustainable Agriculture', exposed that though agricultural production per person has increased by a third since world population doubled in the 1960s, this growth in production has masked enormous hidden costs arising from widespread pesticide use - massive ecological damage and high incidences of farmer poisoning and chronic health effects. These costs are grossly underestimated in traditional cost-benefit analysis. Increasingly however, the external costs of pesticides, to environments and human health, are being seen as unacceptable.

In response to this trend, recent years have seen millions of farmers in communities around the world reduce their use of harmful pesticides and develop cheaper and safer alternatives. After harvest, insecticides and preservatives are again added to food to preserve them for longer periods. At the point of utilization as food, food colorants, flavourings, taste enhancers, and many other things are added to the food. These additives along the entire spectrum of the food system has been responsible for a greater percentage of food related illnesses and in fact made modern food systems less healthier than indigenous ones (Kiples and Ornelas, 2000).

5.10.2 Increasingly Unnatural

With the application of 100% science and technology to food production, it is unexpected that man would be closer to nature in terms of the food that he produces. Heavy mechanization limits space between modern food science and the land that he tills. The experience is not one of care for nature for the gift of land, but on the power of equipment to cause massive destruction to land through heavy earth-moving machinery. Planters are used to plant seeds, sprays are used to destroy weeds, harvesters are used to harvest matured food crops. In the end, there is limited contact between man and nature. Worse still, with genetic engineering, food varieties that have never been meant to be by nature are being manufactured from the laboratory by combining different kinds of living and non-living things in the laboratory to create other things. This has particularly raised a lot of opposition and disagreement within the same modern scientific community about the ethics of creating entirely new plant and animal species from the laboratory as food (Altieri, 2000; Cummins (2008). For this, Pilgrim and Pretty (2010) noted that “the application of western scientific

thought, education and research marked the beginning of an unfriendly way of man's interaction with nature for the purpose of finding food". The birth of the green revolution and other food related technologies is a perfection of this ideology (Rosset, 2000). This in no doubt also marked the beginning of an unpredictable and aggressive reaction by nature to man's search for food.

5.10.3 Poor Taste

At both Bau and Kpambu, it was emphasized that modern foods are less tasty as compared to indigenous foods. They are said to be 'galvanized' by food additives and flavours. In one of the case studies from the urban food culture case study in the Tamale metropolis, it was found that even though indigenous foods are more naturally tasty, they are largely unavailable in the quantities and frequencies required by the consuming public.

5.10.4 Unhealthy and a Danger to Human Health

The American Academy of Environmental Medicine (AAEM) urges doctors to prescribe non-GMO diets for all patients. They cite animal studies showing organ damage, gastrointestinal and immune system disorders, accelerated aging, and infertility as some of the side effects of the modern food system. Human studies show how genetically modified (GM) food can leave harmful material inside the human body possibly causing long-term health problems. Genes inserted into GM soy, for example, can transfer into the DNA of bacteria living inside us, and that the toxic insecticide produced by GM corn was found in the blood of pregnant women and their unborn foetuses. In the USA, numerous health problems increased after GMOs were

introduced in 1996. The percentage of Americans with three or more chronic illnesses jumped from 7% to 13% in just 9 years; food allergies skyrocketed, and disorders such as autism, reproductive disorders, digestive problems, and others are on the rise. The American Public Health Association and American Nurses Association are among many medical groups that condemn the use of GM bovine growth hormone; because the milk from treated cows has more of the hormone IGF-1 (insulin-like growth factor 1) —which is linked to cancer.

5.10.5 Uni-Logic Theory

From the modern scientific worldview food is perceived simply as any substance consumed to provide nutritional support for the body'. It is usually of plant or animal origin, and contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals. The substance is ingested by an organism and assimilated by the organism's cells in an effort to produce energy, maintain life, or stimulate growth. According to the Encyclopedia Britannica; food is "material consisting essentially of protein, carbohydrate, and fat used in the body of an organism to sustain growth, repair vital processes and to furnish energy"[20]. This definition obviously cannot be representative of global worldviews about food because among the people of the Mantaro Valley of the Andes for example, food is consumed in order to preserve the health of the people as well as the land and the animals. Additionally, "food is used in

[20] http://www.britannica.com/EBchecked/topic/212568/food

rituals and festivities in order to preserve the health of pachamama or Mother Nature (Zambrano and Miranda, 2000). Therefore, the presentation and definition of food as a physical or material phenomenon only is deficient of the multiplicity of logic across the physical, social and spiritual worldviews that generate positive re-inforcements to the meaning of food among different peoples of the world. Modern Science is therefore deficient in its utilization of only the physical worldview logic to food which cannot therefore be generalised to be the only truth about food in the world.

5.10.6 High Commodificaation of Food Leading to a More Hungry World

One weakness of modern food science is its application of the principles of 'commodity' to food. In other words, the value of food as a critical life support has been downgraded to one from which economic profits has to be maximised even at the expense of life. Consequently, sharing food is not a critical value system of modern food science. By design, an institutional and regulative framework dictates the direction and pace of food and agriculture around the world. The fate of the world's food, agriculture and farmers are under the mercy of unethical neoliberal economics engineered by the Bretton Woods' institutions under the leadership of the World Trade Organization with direct and indirect funding by multinational food and food related companies working tirelessly and insatiably on profit making at the expense of human lives. What is at stake according to Rosset (2006), is the very future of our global food system and of each country's agricultural and farming systems. The livelihoods of rural people in industrial but more especially developing countries are under threat. Food is not just another commodity, but something which goes to the heart of human livelihood, culture and security. Rosset proposed an

alternative vision for global agricultural policy which suggests taking agriculture completely out of the WTO's ambit. The challenge with Rosset's suggestion or desire though is the power relations that surround the institutions of global governance of which the WTO is one. Developing countries and their institutions especially the South Centre has done quite a lot in this direction. It is necessary therefore to engage with different strategies in order to secure the food and agricultural future of indigenous people.

Reviewers of Magdoff and Tokar's work on Agriculture and Food in Crisis; Conflict, Resistance, and Renewal, summed it all that; "The failures of "free-market" capitalism are perhaps nowhere more evident than in the production and distribution of food. Although modern human societies have attained unprecedented levels of wealth, a significant amount of the world's population continues to suffer from hunger or food insecurity on a daily basis. In 'Agriculture and Food in Crisis', Fred Magdoff and Brian Tokar (have assembled an exceptional collection of scholars from around the world to explore this frightening long-term trend in food production. Agricultural production is shaped by a system that is oriented around the creation of profit above all else, with food as nothing but an afterthought. As the authors argue, it is technically possible to feed the world's people, but it is not possible to do so as long as capitalism exists. Toward that end, they examine what can be, and is being done to create a human-centered and ecologically sound system of food production, from sustainable agriculture and organic farming on a large scale to movements for radical land reform and national food sovereignty" (Magdoff, and Tokar, 2010). This has probably been influenced by the ontological view of food by modern scientists as simply "any substance consumed to provide nutritional support for the body".

Clearly, the historical fact that people secured food through two methods, thus, hunting and gathering, and agriculture seem to be losing connection with modern agriculture. Today, most of the food consumed by the world population is supplied by the food industry, which is operated and directed by multinational corporations that use intensive farming and industrial agriculture to maximize system output and profit at the expense of many hungry people around the world.

In contrast to the highly mechanistic, linear food production, distribution, and consumption model applied in the industrialized food system, indigenous food systems are best described in ecological rather than neoclassical economic terms. In this context, an indigenous food is "one that has been primarily cultivated, taken care of, harvested, prepared, preserved, shared, or traded within the boundaries of our respective territories based on values of interdependency, respect, reciprocity, and ecological sensibility". As the most intimate way in which indigenous peoples interact with our environment, indigenous food systems are in turn maintained through our active participation in traditional land and food systems[21].

According to the United Nations Food and Agricultural Organization, the conception, cultivation and utilization of food from indigenous food systems preserves a lot of environmental integrity.

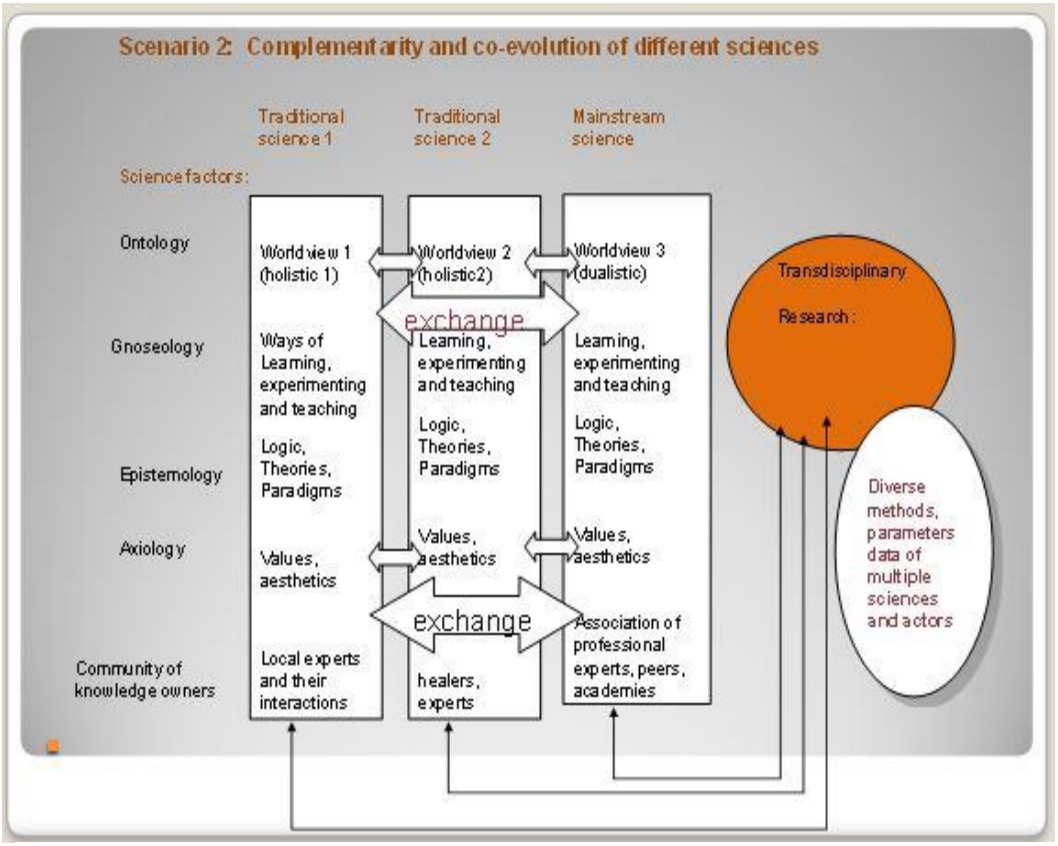
[21] (http://www.indigenousfoodsystems.org/.

"The integrity of indigenous people's food system is intimately connected to the overall health of the environment. Recent declines in many aspects of environmental quality, from loss of biodiversity to environmental contamination, have combined with social, economic and political and cultural factors that threaten the health and wellbeing of indigenous peoples and ultimately of people everywhere. This has affected the quality of indigenous foods, restricted its availability and curtailed access to it. All of the global case studies of indigenous peoples in the Indigenous People's Food System for Health Program indicate concerns over environmental degradation as a major aspect of indigenous peoples declining use of their indigenous food" (Kuhnlein et al, 2013:1).

5.11 TOWARDS COMPLEMENTARITY

From the foregoing strengths and weaknesses of both indigenous and modern food science, a number of combinations and permutations can be drawn for a better food science and quality of life and death. The principle and objective of complementarity between the two sciences enhanced conception, availability, access and utilization of quality food. Figure 5.2 summarises the complementarity between indigenous and modern science which can give rise to a better world through the co-evolution of other sciences, exchange of different scientific perspectives and dialogue.

Figure 5.4: Complimentarity and Co-Evolution of Different Sciences



Source: Adopted from Millar et al (2012:116)

In transdisciplinary research, flow or exchange of data across different worldviews, logics, value systems, and an authentic community of knowledge holders gives rise to a more stable and socially relevant sense of reality as opposed to an only 'one valid' mainstream science' perspective. The diversity of actors, methods, and data enhances the quality of transdisciplinary research.

5.11.1 Theoretical and Strategic Complementarity

From the above therefore, the key conclusion drawn for complementarity between indigenous and modern food science is for both sciences to permit the following exchanges.

5.11.2 Modern Science

1. Modern Science and scientists need to permit bio-cultural food diversity as as a source of strength and mutual benefit.
2. Modern Science and scientists need to critically review genetic engineering in plants and animals that serve as food.
3. Modern science to reconsider the broad elements of the environment in which it produces food (environmental degradation / destruction).
4. Modern food science to review its objective for food production from an extremely profit base to a moderate profit and socio-spiritual demands.

5.11.3 Indigenous Science

1. Indigenous science to borrow associated high energy intense cooking technologies from modern food science to make its cooking faster to better serve the fast moving world.
2. Indigenous food science to improve documentation of their nutritional qualities.
3. Indigenous food science to improve on the environment for food preparation.

Complementarity is drawn at three levels;

a) Theoretical level

b) Empirical level

c) Policy / Political / Resource level

5.11.4 Theoretical level

At the theoretical level, indigenous food science recognizes modern food science as a legitimate worldview science. The indigenous however has something extra which modern food science lacks, thus, the spiritual and social dimensions of whose inter-ontological interactions reinforce positive outcomes in the physical worldview. Rather than dismiss therefore, modern scientists need to appreciate and in fact research further using appropriate methodologies into usefulness of incorporating the spiritual dimensions of other cultures in their food systems.

5.11.4.1 Empirical Level

At the empirical level, indigenous food science has evidence to substantiate its theoretical proposition of food as anything that the eater defines as such. This is justified by the diversity of 'things' that are eaten by differet people as food not for their nutritional benefit (Deutsch and Murakhver, 2012; Kiple and Ornilas, 2000). By this, modern food science lacks the needed empirical evidence to validate its theoretical proposition of 'food' as 'nutrition'. Complimentarity is therefore a reasonable compromise.

5.11.4.2 Policy / Political

Policy, politics and power are highly correlated. The powerful nature of modern science is a direct cause of the weak nature of indigenous science. This relationship does not only limit the potential of indigenous science but quite importantly, it limits the needed advancement in knowledge on and quality of food for humankind. Complimentarity will therefore be for the benefit of mankind and not soley indigenous people.

KEY ISSUE(S) ARISING

Overall, Indigenous Food Science compares favourably if not better with modern food science. The main sources of advantage of indigenous food science over modern food science are the complexity of two additional worldviews to the physical worldview. Complementarities are therefore mainly in the area of social and spiritual perspectives of food.

CHAPTER SIX

6.1 RESEARCH FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.2 INTRODUCTION

This chapter summarises the key findings of the research, the resulting conclusion and recommendations of the study. This is structured along the requearch questions and objectives of the study. Being informed by an extensive literature review and focused data analysis, it reports the findings of the study from the analysis conducted and draws a conclusion along with recommendations. It sets out 12 - 13 fundamental principles towards improving understanding on the relative strengths and weaknesses of both indigenous and western food science and how these weaknesses and strengths can be used to improve both sciences towards a healthier and sustainable food and agricultural system. Analysis are presented to establish whether or not the realities, knowledges and practices of indigenous people in the East Gonja District about food constitute science. Literature related to the subject and sub-objective is revisited in an effort to substantiate empirical data with pertinent literature on the subject.

6.3 RESEARCH FINDINGS

The research produced four key findings as follows;

i. The Trilogic Food Theory and Framework
ii. The realities, knowledges and practices of the research participants constitute a rational expression of their daily reality and for that matter their science.
iii. ‘Purpose-Driven or Multifunctional Food’
iv. Strengths, weaknesses and complementarities: At theory, Policy and Practice levels of complementarity

v. The Trilogic Food Framework (TFF) Uncovered

6.3.1 THE TRILOGIC FOOD THEORY AND FRAMEWORK (TFF)

The Trilogic Food Framework (TFF) as explained above is the key finding of the study. It is a 3-stage (Status - process – outcome) theoretical framework based on the three ontologies (world views) of modern and indigenous sciences. It is aimed at improving theoretical understanding with empirical evidence of local food systems for enhanced policy, regulatory and resource support. It is premised on the following **general** and **specific** principles.

6.3.1.1 Specific Principles of the Framework

a) What counts as 'reality' is relative over time and space.
b) Three main worldviews (ontologies) currently known to manare the physical or natural, the social and the spiritual.
c) The social and spiritual realms are realities for most people of the world and do not need to be accepted or approved by others before they become.
d) Food is the second most important life support system of nature after water.
e) That which is understood as 'Modern' / Western' Science is not infallible (it lives with significant error and uncertainty).

6.3.1.2 General Principles of the Framework

The conceptual framework for understanding and improving on the strengths and weaknesses of indigenous and modern / western food science is based on the following principles and or assumptions.

a) The diverse physical needs for food is a reality for indigenous people

b) That diverse spirituality regarding food is a daily reality for indigenous people

c) The Social which comprises the living, the dead and yet unborn generations (tri-generational food) is a daily reality for indigenous people.

d) The linkages between the physical, the spiritual and the social realms of food are a rational existence for indigenous people in their right to life and death. It provides the central argument for understanding and strengthening indigenous food systems in complementarity with western or other food sciences and concepts.

e) The evidence to the reality and rationality of the purpose-driven concept of food among the research communities is the reality of the existing cultural practices of all ethnic groups in Ghana.

f) A denial of any of the above realities is to deny the diversities of the current knowledge systems and daily practices of various ethnic groups of Ghana and elsewhere in Africa.

g) The framework is a living thing adjustable to the social, spiritual and physical diversities and dynamics of life and death.

h) The framework does not claim superiority over other frameworks in its effort to provide a better understanding of indigenous and western food sciences but it challenges western food science to proof its relevance and explanatory power to the social and spiritual realities of indigenous people in the East Gonja District and for that matter among all spiritually and socially inclined people in Ghana.

i) It challenges current national food policy and strategy focus as theoretically and practically disjointed and 'context-blind' in its efforts to promote agricultural development and food security in Ghana.

j) It argues that with western food science still struggling to provide adequate quantities and quality of food to feed Ghana's 24 million people since colonization, indigenous food science deserves a fair national attention. This is evidenced by the increasing food insecure people in Ghana and the decreasing contribution of the agricultural sector to Ghana's GDP (MoFA, 2011).

k) The current concept of food security is not relevant for the context for which we place it.

l) Finally, it seeks to suggest practical ways of promoting sustainable agriculture and food security through a blend of the theoretical strengths and contextual realities of indigenous and western food sciences.

6.4 UNDERSTANDING THE FRAMEWORK

The following provide critical information for understanding how the framework works.

a) It is all about food, quality life and death.

b) Consider yourself at the '**Status Quo'** column of the framework in reality; hungry or satisfied is currently the case at least in Northern Ghana.

c) You are striving for a better quality life at the 'Outcome' column of the framework.

d) Two Food Sciences (modern and indigenous food sciences) are available to you as combined or alternative means to getting 'over there' for the better life.

e) Food is the scientific vehicle or tool that will take you there (among other possible vehicles such as water, shelter, etc but these are not the most important or available because they are not the focus of the study)

f) You must necessarily get to the '**Outcome'** column of the framework for a confortable life or you die out of hunger and malnutrition.

g) How you get over to the outcome column of the framework depends on the food science with which you VIEW and ACT for food

h) The critical question is: How does the science with which you VIEW and ACT for food re-enforce its availability, access, quality and utilization towards the expectant happy life that you are seeking?

6.4.1 Stage One: The Status

The framework explains the current state of man's existence and knowledge about food. It however does not indicate a static phenomenon. The said existence and knowledge constitute an undoubtable reality that is informed by three main worldviews, thus, the physical or natural or material worldview made up of all the things we can see and feel. This worldview is the commonest and most known and understandable to man partly because it is very observable through our bodily senses. This worldview is the sole basis of the modern / western science. The second is the social worldview which is made up of the physical living world, the world of the dead people and animals, and the world of the yet to be born children (future generations). Finally, the third and final is the spiritual worldview which comprise essentially of experiences that cannot be observed by the bodily senses but by the high disposition of the mind to critical thinking and reflection about the supreme creator.

6.4.2 Stage Two: Process

This stage explains the socio–physical or material interactions between man and his environment for survival through food, shelter, sex etc. Being the focus of the study, food becomes our centre of discussions. It highlights that there is a problem about food which confronts man in his various identities and cultures. The main problem is broken down into the following key words: conception, availability, quality, access and utilization of food. These are currently problems for human society (please see research problem and literature review). This stage requires an action driven by a

certain science (modern and indigenous) to reinforce the conception, availability, quality, access and utilization of food towards a better quality life (in stage 3).

6.4.3 Stage Three: The Outcome

This stage denotes the ultimate outcome sought by everyman on his or her food life in our physical worldview- a **better quality of life**. A better quality life is subject to diversities in worldviews about reality. Once this stage is achieved, the framework system is assumed to stabilise.

6.5 EXPLANATORY POWER OF THE TRILOGIC FOOD THEORY

6.5.1 Reinforcements within the Worldviews

The indigenous Trilogic Food Theory (TFT) as opposed to the modern unilogic food theory possesses an internal mechanism that ensures stability within itself through specific interactions and reinforcements among the three worldviews. Two questions however become immediately important. 1) How do these three worldviews reinforce each other towards a stable holistic system 2; and How do these internal reinforcements in turn reinforce **food availability, access, quality and utilization** in the physical worldview? These reinforcements come in six permutations of the three worldviews;

a) How the **Sp**iritual reinforces the **Ph**ysical: SP →PH
b) How the **Ph**ysical in turn reinforces the **Sp**iritual: PH →SP
c) How the **Sp**iritual reinforces the **So**cial: SP →SO

d) How the **So**cial in turn reinforces the **Sp**iritual: SO→SP

e) How the **Ph**ysical reinforces the **So**cial: PH→SO

f) How the **So**cial in turn reinforces the **Ph**ysical: SO→PH

6.5.2 How Do These Interactions Reinforce Each Other?

6.5.2.1 How the Spiritual realm reinforces the Physical: SP →PH

The pursuit of good values and societal norms are guided by a perception of spiritual reality. The promise of eternal reward for 'good' and punishment for 'bad' is one of the potent weapons of seeking the ultimate good of the material world. In the research communities and some parts of the upper East Region, it is revealed that it is a taboo (breach of which is severely punished by the spirits) to harvest or collect Shea nuts at a certain time of the year. One significance of this taboo for the physical world is that, the stated period during which the harvesting is prohibited is the same period during which pollination birds are said to carry good seeds of shea nuts for germination. Harvesting around this period means that all good seeds will be collected for consumption and not available for regeneration. This could mean an extinction of the entire plant species.

"Food taboos are known from virtually all human societies. Most religions declare certain food items fit and others unfit for human consumption. Dietary rules and regulations may govern particular phases of the human life cycle and may be associated with special events such as menstrual period, pregnancy, childbirth, lactation, and – in traditional societies – preparation for the hunt, battle, wedding, funeral, etc. On a comparative basis many food taboos seem to make no sense at

all, as to what may be declared unfit by one group may be perfectly acceptable to another. On the other hand, food taboos have a long history and one ought to expect a sound explanation for the existence (and persistence) of certain dietary customs in a given culture. Yet, this is a highly debated view and no single theory may explain why people employ special food taboos. This section wants to revive interest in food taboo research and attempts a functionalist's explanation. However, to illustrate some of the complexity of possible reasons for food taboo five examples have been chosen, namely traditional food taboos in orthodox, Jewish and Hindu societies as well as reports on aspects of dietary restrictions in communities with traditional lifestyles of Malaysia, Papua New Guinea, and Nigeria. An ecological or medical background is apparent for many, including some that are seen as religious or spiritual in origin. On one hand, food taboos can help in utilizing a resource more efficiently; on the other, food taboos can lead to the protection of a resource. Food taboos, whether scientifically correct or not, are often meant to protect the human individual and the observation, for example, that certain allergies and depression are associated with each other could have led to declaring food items taboo that were identified as causal agents for the allergies. Moreover, any food taboo, acknowledged by a particular group of people as part of its ways, aids in the cohesion of this group, helps that particular group maintain its identity in the face of others, and therefore creates a feeling of "belonging"[22].

[22] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2711054/

According to the United Nations Food and Agriculture Organization, the conception, cultivation and utilization of food from indigenous food systems preserves a lot of environmental integrity Gyampoh, Amisah, Idinoba, and Nkem, (2010),. "The integrity of indigenous people's food system is intimately connected to the overall health of the environment. Recent declines in many aspects of environmental quality, from loss of biodiversity to environmental contamination, have combined with social, economic and political and cultural factors that threaten the health and wellbeing of indigenous peoples and ultimately of people everywhere. This has affected the quality of indigenous foods, restricted its availability and curtailed access to it. All of the global case studies of indigenous peoples in the Indigenous People's Food System for Health Program indicate concerns over environmental degradation as a major aspect of indigenous peoples declining use of their indigenous food" (Kuhnlein et al, 2013:1).

According to the Centre for Indigenous Peoples' Nutrition and Environment (CINE) "In recent decades Indigenous Peoples globally have experienced rapid and dramatic shifts in lifestyle that are unprecedented in history. Moving away from their own self-sustaining, local food systems into industrially derived food supplies, these changes have adverse effects on dietary quality and health. The Centre for Indigenous Peoples' Nutrition and Environment (CINE) based in McGill University, Canada, responded to requests from indigenous leaders from

around the world to help stop loss of traditional food system knowledge with research and community-driven activities that bridge the generations."[23]

6.5.2.2 How the Physical in turn reinforce the Spiritual: PH →SP

The physical hosts and provides a home for the spiritual. It provides the needs of the inhabitants of the spiritual world. It was revealed in Kpambu that the spirits rely on the physical existence of the people especially the shrine lord to ensure their activity in the spiritual realm such as the provision of food to them through periodic and circumstantial sacrifices.

6.5.2.3 How the Spiritual reinforce the Social: SP →SO

The Social has a centre which is the physical living. This centre is already connected to the physical worldview through living beings which in turn reinforce its extreme dead ancestors and yet to be born (children) generations.

6.5.2.4 How the Social in turn reinforce the Spiritual: SO→SP

The social through its triple internal interations provides the hub for the associations with the supreme being. Some sacrifices and practices in the social realm are believed

[23] (http://www.indigenousnutrition.org/ - Accessed on 29th March 2014).

to transit through the ancestors and the unborn generations to the Almight God. For instance, it is a very strong beliefe and expectation that because newborn babies have a lot of spiritual connections with the supreme being of their pure nature, they can cause a lot of good fortunes to their parents. They are also held to be able to communicate with beings in the spiritual realm. For this belief, every new born baby in Gonja is refered to as either **'Nyin-for'** (Male visitor) or **'Che-for'** (Female visitor). Indeed, since every visitor in the physical world has a place of origin, the place of origin of new borns is held to be from the supreme being.

6.5.2.5 How the Physical reinforces the Social: PH→SO

Through living beings, the physical realm connects with the ancestors (the dead) and unborn generations making **life, death and birth** (reproduction) equally important to ensure a balance in nature. Consequently, for the indigenous people, when a child is born, it is good news for everyone and that human generations are being replenished. When a person dies, people mourn but believe that they are still with them in spirit thereby necessitating several spiritual funeral performances to keep the relationship with the dead.

6.5.2.6 How the Social reinforces the Physical SO→PH

The social realm probably has one of the closest and complex relationships with the physical realm. As stated above and shown in figure 4.1, the social through the physical 'Living' connects with the physical realms through the unborn generations and through the spiritual realm through the ancestors.

6.6.1 How Do the Social and Spiritual Worldviews Reinforce the Physical Worldview for Greater Food Availability, Access, Quality and Utilization in the Physical Worldview?

The influences and implications of the social and spiritual worldviews over the physical worldview in terms of conception, access, quality and utilization are explained in Table 6.1.

Table 6.1: Food Worldviews and their Implications for Food Conception, Availability, Access, Quality and Utilization

	Desired Food Characteristics in the Physical Realm	**How?**
Spiritual	Conception	It is believed that the spiritual world excercises superior knowledge and power over the physical world. In the area of environment and agriculture, for instance, the spirits are held to have influence over crop yield and bumper harvest when they are well catered for. For bumper harvest therefore, farmers would also pacify the spirits such as k-jutoba as explained in chapter three.
	Food Availability	As the conceptual framework is established, farmers now try to guard against all practical physical measures that could affect yield and harvest such as bush fires. In the end, a combination of the conceptual framework and practical measure ensures that food is available for the community.
	Food Access	For fear of and respect for the gods of the land, most indigenous communities inculcate the habit of sharing food in various forms with fellow households and farmers to ensure that the whole community is food secured. This is probably one of the most indigenous ractices that can ensure effective food security for the world as opposed to capitalist oriented models of ownership and profit making that ignores social welfare.
	Food Quality	For indigenous people, quality transcends hygiene and nutritional quality. It includes, essentialy, a sense of moral uprightness in the cultivation, processing and utilization of food. This ensures that physical food quality is maintained as a minimum requirement in the physical world. A good example of morality and food quality is the horse meat scandal European Hose Meat Scandal in 2013. On Tuesday 22 October 2013 the UK Newspaper, 'The Guardian' reported that beef products from the leading beef processing

		company, Anglo-Irish Beef processing company tested positive for horse DNA, an indication of adulteration of beef with horse meat. Retailers such as TESCO and Burger King sold out several tons of the 'horse meat beef'to European and other countries most of whom were not known eaters of horse meat for several reasons including, the huge doses of chemicals that are used to breed the horse, spiritual and personal reasons. It was noted that, "it is the biggest food fraud of the 21st century; it led to the withdrawal of tens of millions of burgers and beef products across Europe and a promise from David Cameron that everything possible would be done to get a grip on a "very shocking" crime. However, 10 months on, the details of how horsemeat came to adulterate large parts of the British and Irish food chain are still being kept from the public"[24] This immoral behaviour by the company sparked a lot of row in Europe about food quality. Morality in food conception, production, availability, access and utilization is therefore crucial.
	Food Utilization	Utilization of food in the spiritual realm has positive implications on food conception, availability, access, quality and utilization in the sense of
Social	**Desired Food Characteristics**	**How?**
	Conception	The diverse food needs of the social world such as food for the living, food for the dead ancestors and food for the yet unborn generations engenders versatile and critical thinking about food.
	Food Availability	The diverse food needs of the social world such as food for the living, food for the dead ancestors and food for the yet unborn generations engenders practices that ensue that food is always available to satisfy the various social needs.
	Food Access	Indigenous food practices such as food sharing after seasonal harvest, gleaning (Kei Isa) helps to ease access to food for almost every community member even those who do not have the means to reciprocate.
	Food Quality	Indigenous food systems try to maintain food very pure to be able to serve the needs of the three existences within the social realm (physical, dead and unborn children). This helps to ensure that food is kept at the best quality level.

[24] (http://www.theguardian.com/uk-news/2013/oct/22/horsemeat-scandal-guardian-investigation-public-secrecy).

	Food Utilization	The practice of keeping food overnight, preservation of foods that are hunger sensitive helps to avoid wastage of food.

6.7 CONCLUSIONS

Indigenous 'Food Science' and 'Food' do not have a universally applicable definition. It is dependant on the diversity of cultures and biologies. Food is that which the user describes as such. It is context and purpose –driven and not necessarily eaten to nourish the body. The Science of food among the research participants is expressed by the physical, spiritual and social construction of reality. It transcends 'nutrition' and serves the living, the dead and the yet unborn generations. It has a Consistent and Coherent Ontology, epistemology, axiology, gnoseology and Knowledge Community. The main sources of advantage of indigenous food science over modern food science are the former's two additional worldviews or logics (Social & Spiritual) over the physical worldview and the availability of empirical evidence that corroborates its theoretical propositions.

From the forgoing it is hereby concluded that realities, knowledges and practices of the research participants constitute a rational expression of their daily reality and for that matter their science. Empirical evidence corroborates the theoretical propositions of indigenous food science of the research communities from its three ontological perspectives. Arguably, modern food science lacks the empirical evidence to substantiate its theoretical position of food as'nutrition' since much evidence exist per the literature reviewed to demonstrate that not all foods are consumed mainly to

nourish the body. E.g The Japanese poisonous puffer fish, carsu marzu among numerous others are *empirical evidence that corroborate the theoretical propositions of indigenous food science as purpose–driven food.*

Inherent in the Intra-Social trilogy (The dead, the living and the yet unborn) is the 'modern' concept of Intergenerational Equity'. Indigenous knowledge therefore recognized since time immemorial the need to ensure equity within and between generations.

It appears there is sufficient evidence to conclude that modern food science lacks the empirical evidence to substantiate its theoretical position of food as'nutrition' as not all foods are consumed for nutritional purposes. E.g The Japanese poisonous puffer fish, carsu marzu among numerous others are *empirical evidence that corroborate the theoretical propositions of indigenous food science against modern theory of food as nutrition* .

Also, through complementarity born out of the strengths and weaknesses of modern and Indigenous Food Science' society as a whole stands to benefit (Socially, Spiritually, and physically), rather than in part (Physically) as in the case of modern science.

6.8 RECOMMENDATIONS

i. It is recommended that the Trilogic Food Theory and Framework be adopted for further research, teaching, policy and practice in agriculture in Ghana. This should start with educational and research institutions that offer programmes in African studies, development studies, agriculture among others. The University for Development Studies is a feasible starting point.

ii. Inter-Science Dialogue between Indigenous and modern Food Sciences needs to be enccouraged as a means to strengthening alternative knowledges and take advantage of complementarity Complementarity should be drawn at three levels, namely, theoretical, empirical and policy. At the institutional level, peer review of post-graduate level research work could be a good starting point. .

iii. The study has provided a broad and extensive discussion on the various aspects of the philosophy of science such as ontology, epistemology, axiology gnoseology and knowledge Community. While this gives a good understanding of the problem at stake, future research should focus on critical detail and focuced analysis on the various scientific elements such as ontology, epistemology, axiology, gnoseology and knowledge community. Graduate research could focus solely on the ontology of indigenous food science – making an effort to reveal, for instance, the various theoretical positions among indigenous people across different cultures.

iv. The establishment of indigenous Seed Preservation Banks is also highly recommended. This will help to promote biological diversity of indigenous food resources against any furture contamination and or extinction as professed by the builders of the DoomsDay Vault. The seed unit of the Ghana Ministryof Food and Agriculture has a major stage in this.

v. Awareness creation & Sensitization about indigenous foods is necessary across all spheres of life. Local and international NGOs need to appreciate and incorporate this into their program and project designs, monitoring, evaluation and learning frameworks / systems. In a country dominated by small scale farmers, the need for indigenous food varieties cannot be over emphasized.

vi. One way to promote and sustain the cultivation andconsumption of indigenous foods is to take them to the market'. That is, the food industry including hotels and local restaurants need to carefully profile, design and develop attractive menus based on indigenous foods. This will serve as an incentive for farmers to produce more of such foods.

vii. For the essential role that indigenous foods play in our social-spiritual and physicallives, it is recommended that the government through the Ministry of Food and Agriculture develops an appropriate food policy and regulatory framework that promtes indigenous. Though Intrnational Trade Agrrements and other deliberate trade policies and programmes of donor countries could hinder this effort, the absence of such a policy would only worsen the situation

of food insecurity in the country against of the background of global food aid, genetic modification and comoditification of food and seed.

viii. The last but not the least recommendation is for individuals and institutions to adopt the global food virtue of 'growing what you eat and eat what you grow'. A slight modification of this virture though would be to grow what you and your ancistors eat and eat what you and your ancestors grow'. This would not only help to conserve indigenus foods but also increase the share diversity of indigenous foods as much as there are cultural diversities.

6.9 A CONCLUDING QUOTE / REMARK FOR 'SCIENTISTS'

"The world of quantum mechanics is so strange, indeed, that even Albert Einstein found it incomprehensible, and refused to accept all of the implications of the theory developed by Schrodinger and his colleagues. Einstein and many other scientists found it more comfortable to believe that the equations of quantum mechanics simply represent some sort of mathematical trick, which just happen to give a reasonable working that conceals some deeper truth that corresponds more closely to our everyday sense of reality" (Gribbin, 1984:1).

In the light of the above quotation, the readers, and in particular, 'scientists' are challenged to reflect on whether the food realities of the research participants constitute a Science.

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8.1 ANNEXES

Annex 1: INTERVIEW GUIDE

CHAPTER 3: Sub-Objective

- Introduction
- Pertinent / Relevant literature related to the Sub-Objective One
- Findings under Sub-Objective One discussed with literature support
- Summaries and issues arising
- Conclusions

3.0 Research Problem

This study is about the science of food among indigenous people in the central Gonja District of the northern region of Ghana. Food has been part and parcel of the lives of indigenous people in this remote part of northern Ghana since time immemorial but it is unclear if its 'science' *is* or has equally *been*. Much of indigenous knowledge including food knowledge has been heavily critiqued by modern science as primitive, atheoretical, superstitious, irrational and therefore 'unscientific' (Geniusz, 2009). This position has affected indigenous food science as a body of knowledge. As a consequence, this body of knowledge and its foods face eminent contamination and extinction leaving behind needless hunger, food insecurity, unsustainable agriculture, complicated food related ill health and misplaced food policy and practice priorities at the local, national and global levels. The study therefore aims to investigate with rigour, the scientific basis of food among indigenous people in the Central Gonja

district of the northern region of Ghana as a case to rethink the way food is conceived, produced, distributed and utilised. Much is already known about the healthy, sustainable, tasty, multi-functional, medicinal, natural and high nutritional value of indigenous foods (Kiple, and Ornelas, 2000; Nestle, 2007). However, little is known or at least written about the ontology, epistemology, axiology, gnoseology, value systems and knowledge community of indigenous food 'science'. This is needed not to justify or legitimise indigenous food science as a body of knowledge but to investigate among other things, the explanatory power and empirical evidence of its claim as a time–tested, context driven, holistic science that serves the needs of not only the natural world as in the case of modern food science but also the social and spiritual needs and realities of human diversity. The study therefore seeks to bring a different perspective to the way food is conceived and analysed and to answer two seemingly simple but scientifically complex questions such as; 1) what *is* food? And 2) what is the science of food among indigenous people of the Central Gonja district of the northern region of Ghana relative to modern food science?

4.0 Main Research Question

What really *is* food? and what is the science of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science?

4.0.1 Sub-Research Questions

e) Do the realities, knowledges and practices of food among indigenous people in the Central Gonja District constitute a science?
   i. What is the power relationship between indigenous food knowledge and realities in relation to mainstream / modern food science?
   ii. Do some food varieties face contamination and extinction in the central Gonja district and why?

f) What is the theory of food among indigenous people in the central Gonja district and how does this relate to the definition and conception of food in other cultures?

g) What is / are the concept(s) of food among indigenous people in the central Gonja District? *(Will review existing food concepts such as food sovereignty and main stream notions of food (food production, food security, food as weapon, food as subject to subsidies and food as a commodity and the way these notions have resulted in development strategies including the green revolution, Low External Input and Sustainable Agriculture (LEISA), organic farming, slow food, food as weapon and food as subject to subsidies)*

h) What are the comparative strengths and weaknesses of indigenous and mainstream / modern food sciences and how could these complement each other in the twenty-first century and beyond?

i) What could be an appropriate framework for understanding and improving the strong and weak points of indigenous food science in the national system for food and agricultural research, policy and practice?

To find out what '*is'* food and the *'science'* of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science.

5.0.1 Sub Research Objectives

2 To establish whether or not the realities, knowledges and practices of indigenous people in the Central Gonja District about food constitute a science

2.9.1 To investigate the power dynamics between indigenous food science and modern food science and its effects on selected indigenous food varieties / species in the central Gonja District of the northern region.

3 To find the theory of food among indigenous people in Northern Ghana and how this relates to the definition and conception of food in other cultures?

4 To find the concept (s) of food among indigenous people in the central Gonja District. *(Will review existing food concepts such as food sovereignty and main stream notions of food (food production, food security, food as weapon, food as subject to subsidies and food as a commodity and the way these notions have resulted in development strategies including the green revolution, Low External Input and Sustainable Agriculture (LEISA), organic farming, slow food, food as weapon and food as subject to subsidies)*

5 To identify, compare and contrast the relative strengths and weaknesses of indigenous and modern food science and how these could complement each other.

6 To recommend an appropriate framework for understanding and improving the strong and weak points of indigenous food science in the national system for food and agricultural research, policy and practice.

SUB-OBJECTIVE ONE INTERVIEW GUIDE

Main research Objective:

To find out what 'is' food and the 'science' of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science.

Sub Research Objective 1: *To establish whether or not the realities, knowledges and practices of indigenous people in the Central Gonja District about food constitute a science*

6.9.1 *To investigate the power dynamics between indigenous food science and modern food science and its effects on selected indigenous food varieties / species in the central Gonja District of the northern region.*

Add more pages……..

SUB-OBJECTIVE TWO (2) INTERVIEW GUIDE

5.0 Main research Objective:

To find out what '*is'* food and the *'science'* of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science.

Sub Research Objective 2: To find the theory of food among indigenous people in Northern Ghana and how this relates to the definition and conception of food in other cultures?

Add more pages……..

SUB-OBJECTIVE THREE (3) INTERVIEW GUIDE

5.0 Main research Objective:

To find out what 'is' food and the 'science' of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science.

Sub Research Objective 3: To find the concept (s) of food among indigenous people in

the central Gonja District. (Will review existing food concepts such as food sovereignty and main stream notions of food (food production, food security, food as weapon, food as subject to subsidies and food as a commodity and the way these notions have resulted in development strategies including the green revolution, Low External Input and Sustainable Agriculture (LEISA), organic farming, slow food, food as weapon and food as subject to subsidies)

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SUB-OBJECTIVE FOUR (4) INTERVIEW GUIDE

5.0 Main research Objective:

To find out what '*is'* food and the *'science'* of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science.

Sub Research Objective 4: To identify, compare and contrast the relative strengths and weaknesses of indigenous and modern food science and how these could complement each other

Add more pages……..

SUB-OBJECTIVE FIVE (5) INTERVIEW GUIDE

5.0 Main research Objective:

To find out what '*is'* food and the *'science'* of food among indigenous people in the Central Gonja district of the northern region of Ghana relative to mainstream food science.

Sub Research Objectives 5: To recommend an appropriate framework for understanding and improving the strong and weak points of indigenous food science in the national system for food and agricultural research, policy and practice.**Add more pages……..**

POSTGRADUATE RESEARCH CONSENT FORM

NAME OF RESEARCHER: SACHIBU MOHAMMED

INSTITUTIONAL AFILIATION: UNIVERSITY FOR DEVELOPMENT STUDIES

TITLE OF RESEARCH:

STARVING THE DEAD, OUR IDEA OF FOOD: AN EXPOSITION OF INDIGENOUS FOOD SCIENCE IN NORTHERN – CENTRAL & EAST GONJA DISTRICTS

PURPOSE OF THE RESEARCH: To find out what *'is'* food and the *'science'* of food among indigenous people in the Central and East Gonja districts of the northern region of Ghana relative to mainstream food science.

STATEMENT OF CONFIDENTIALITY:

I understand that any information regarding my identity obtained in connection with this research will remain confidential. I will not write my name or otherwise indicate my identity on any part of this research.

Authorization Statement:

In giving my consent by signing this form, I agree that the methods, inconveniences, risks, and benefits have been explained to me and my questions have been answered. I understand that I may ask questions at any time and that I am free to withdraw from the study at any time without causing bad feelings. My participation in this research may be ended by the investigator or by the sponsor for reasons that would be explained. Any information developed during the course of this study which may affect my willingness to continue in the research will be given to me as it becomes available. I understand that this consent form will be filed in an area designated by the Human Subjects Committee with access restricted to the principal investigator, **Sachibu Mohammed** or authorized representative of the Department

INVOLVEMENT OF PATICIPANTS

POSSIBLE RISKS:

1. Invasion of participant's food privacies.
2. Inconvenience
3. Wasting taking participant's time away from their farming activities or other daily engagements
4. All identified and felt risks would be discussed using methods recommended by the research participants.

PRECAUTIONARY MEASURES:

1. Re-assurance
2. Trust and confidence building
3. Commitment to come back to the participants with the key findings of the study
4. Commitment to invite the participant to the theses defence and to pay for their transportation, feeding and accommodation in Tamale as they may desire.
5. Commitment to engage a translator to translate all communication from English to Gonja especially questions that would be post by the vivo committee.
6. Commitment to serve a final copy of the study to the participants as prove that all information which they require to be private and confidential have been kept as such.
7. Commitment to translate key findings and recommendations of the stud in text and in audio to the research participants especially those who are illiterate.

BENEFITS:

1. Your support to the study, you would have contributed to the exposition of indigenous food science of northern Ghana.
2. Improved knowledge in the area of food science
3. Some of participants concerns on food science would be addressed through the principles of endogenous development.
4. Acknowledgement of knowledge base of research participants in the study and an explanation of the extent to which their knowledge could be read around the world.

NAME OF

WITNESS……DATE:…….

WITNESS SIGNATURE……

ETHICAL REVIEW FORMS

NAME OF RESEARCHER: Sachibu Mohammed

INSTTUTIONAL AFFILIATION: University for Development Studies

DEPARTMENT: Faculty if Integrated Development Studies (FIDS)

PROGRAMME OF STUDY: PhD in Endogenous Development

TITLE OF STUDY:

Starving the Dead, Our Idea of Food: An Exposition of Indigenous Food Science in Northern Ghana

PURPOSE OF RESEARCH:

To find out what '*is'* food and the *'science'* of food among indigenous people in the Central and East Gonja districts of the northern region of Ghana relative to mainstream food science.

DESCRIPTION OF METHODOLOGY

DESCRIPTION RESEARCH TARGET (person, animals, community resources etc)

The main target group of this study is indigenous, most likely illiterate, aged men and women in typical rural areas whose exposure to modernization is very limited and who still hold knowledge and practice of indigenous food science of Gonjas.

DESCRIPTION OF FIELD PROTOCOLS (Community entry, support)

As a Gonja, I observe the traditional community entry protocols of the community by first visiting the Chief's palace, observing all the traditions, disclosing my identity and disclosing the objectives of the research. Key among the disclosure of the research objectives is the emphasis on the fact that am actually in the community to learn (indigenous food knowledge / science)

DESCRIPTION OF SOURCES OF DATA

The main sources of primary data for the study are through ***learning interactions*** with indigenous knowledge holders at the community level.

Primary data on selected key words and terms of the study would also be collected from Gonja Language experts of the Bagabaga and Tamale Colleges of Education. A comprehensive list and explanations of the terms and terminologies have been prepared

Secondary data sources include literature reviewed from books, journal articles, reports and unpublished material.

RESEARCH AGREEMENT FORM

RESEARCHER: Sachibu Mohammed

DEPARTMENT: Faculty of Integrated Development Studies

TITLE OF RESEARCH: Starving the Dead, Our Idea of Food: An Exposition of Indigenous Food Science in Northern Ghana

C. Please indicate whether the following information has been addressed with a mark of X:

1. Identity / Background of the research X
2. Process of obtaining informed consent including sample cover letters to participants. Note specific guidelines for child participants X
3. Research Instruments. e.g Questionnaire, Structured interviews, experimental procedures etc X
4. Procedures for ensuring confidentiality / anonymity X
5. Means of discussing risks / benefits with participants X
6. Precautionary measure regarding risk and confidentiality X
7. Process of Dissemination of Research results to participants X

Declaration:

I am familiar with the current Ethical Procedures and those of relevant institutions in Ghana and elsewhere and have made provisions that adequately address all ethical concerns. As the principal researcher, I take sole responsibility of any eventualities.

UNIVERSITY FOR DEVELOPMENT STUDIES
(Office of the Dean of Graduate School)

Tel/Fax: +233(0)372022369

P.O. Box 1350
Tamale

08/10/13

Our Ref: UDS/DED/0045/11
Your Ref:

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION: MR. SACHIBU MOHAMMED(UDS/DED/0045/11)

Mr. Sachibu Mohammed is a registered graduate student of the University for Development Studies. He was admitted in the 2011/2012 academic year to pursue a five year sandwich programme leading to the award of Doctor of Philosophy degree in Endogenous Development.

We write to confirm that **Mr. Mohammed** is researching on the topic "*Starving the Dead. Our Idea of Food: An Exposition of Indigenous Food Science in Northern Ghana*", as a requirement for the award of the degree.

We would be grateful if he is accorded the needed cooperation in the data collection process, please.

Yours faithfully.

Gilbert Ansoglenang
Assistant Registrar
For: Dean

ASSISTANT REGISTRAR
GRADUATE SCHOOL
UNIVERSITY FOR DEV. STUDIES
P. O. BOX 1350, TAMALE

Cc:
File