UNIVERSITY FOR DEVELOPMENT STUDIES

INDIGENOUS NUTRITIONAL KNOWLEDGE AND CONSUMPTION OF INDIGENOUS FOODS BY MOTHERS IN THE NABDAM DISTRICT OF THE UPPER EAST REGION OF GHANA

ROSEMARY ANDERSON AKOLAA

A THESIS SUBMITTED TO THE DEPARTMENT OF AFRICAN AND GENERAL STUDIES, FACULTY OF INTEGRATED DEVELOPMENT STUDIES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY IN ENDOGENOUS DEVELOPMENT DEGREE

2019

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BY:

ROSEMARY ANDERSON AKOLAA [PHD IN DED]

STUDENT UDS ID NO.: UDS/DED/0047/12

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2019

DECLARATION

Student

I hereby declare that this thesis is the result of my own original work with due reference and acknowledgement made where necessary, and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: …… **Date**: …….

Name: Rosemary Anderson Akolaa

Supervisors

We hereby declare that the preparation and presentation of this thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University for Development Studies.

Principal Supervisor:

Signature: …… **Date**: ……

Name: Professor Philip Baba Adongo

Co-supervisor:

Signature: …… **Date**: ……

Name: Professor Sylvester Z. Gaala

ABSTRACT

Many intellectuals and other authorities have perceived that the growth and prosperity of a nation is heavily dependent on the wellbeing, nutrition and development of the people. This has been presumed to be further dependent on peoples' nutrition knowledge of foods found in their localities and the frequency of their consumption. There is a rich habitation of natural foods that might probably promote food security, nutrition and health, hence, an appropriate and sustainable intervention in nutrition using indigenous food resources can improve several key development outcomes. In Ghana, under nutrition contributes to about half of all child deaths beyond early infancy, which is unacceptable. This study sought to assess the indigenous nutritional knowledge and consumption of indigenous foods by mothers in the Nabdam district of Ghana.

The concurrent approach of mixed method was adopted. Four hundred individual respondents for the quantitative aspect were selected through a simple random sampling technique. Purposive sampling adopting the snowball technique was used to sample 9 individuals for the in-depth interviews. Again, purposive sampling technique was used to select participants for the focus group discussions. A total of seven focus group discussion was carried out in seven communities. STATA 13 and NVivo 11 software were used in the analysis for quantitative and qualitative data respectively. Multivariate logistic regression was used to determine association between dependent and independent variables. The mean age of respondents for the quantitative survey was 33.3, with a standard deviation of 10.9. Only few (21.5%) of the respondents were able to differentiate indigenous foods from all the food categories presented. Indigenous nutritional knowledge was high (77.7%) and majority (64.8%) of

mothers consumed indigenous food. However, Indigenous cereal was less consumed (43.8%) as compared to non-indigenous cereals (56.2%). Indigenous nutritional knowledge was significantly associated with consumption of indigenous food (p=0.015). Marital status, age, educational level, and sources of knowledge were statistically significant and associated with mother's indigenous nutritional knowledge. Mothers who attained JHS/MS/Tech and Tertiary were 33% and 100% less likely to consume indigenous food as compared to those without formal education (aOR = 0.67, 95% CI = 0.3238, 2.3711) and (aOR=0.00, 95% CI = 0.4623, 6.4023) respectively.

The study concluded that the high indigenous nutritional knowledge displayed by the mothers in the Nabdam district was skewed towards the elderly, and for that matter calls for rigorous knowledge transfer. Even though the overall score on the consumption of indigenous foods was averagely high, it leaves much to be desired, since the consumption of indigenous cereals and indigenous fruits were low. Nutritional knowledge does not influence consumption on its own, but other critical influencing factors such as environment (cultural, availability and institutional), lifestyle/behavioural and other personal factors may interact to strongly inform consumption of indigenous foods. The study also concludes that culture and lifestyle have great influence on the consumption of indigenous foods among mothers. The study again concluded that the culture of transferring indigenous knowledge to the younger generation is not easy with the fast growing society, with modernity being one obstacle, and the fact that the younger generation are not ready and not prepared to learn the indigenous skills.

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I will always thank the Lord, I will praise him for what He has done; the Almighty has worked marvels for me and great is his name. The intercession of the Queen of the Universe and mother of perpetual help cannot be over looked. Accept my gratitude Lord, for this piece of work wouldn't have been possible without your wisdom and direction.

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DEDICATION

This thesis is dedicated to my immediate family: Dr. Andrew Adugudaa Akolaa (Husband), Ethel Aputerebuno Akolaa (Daughter) and Michael Andrew Aduko Akolaa (Son). I also dedicate this work to my late grandmother Mma Ayampoka Abugbono and my late father Mr. Samuel Anofo Anderson, and to my mother, Mrs Beatrice Ayimbisah Anderson.

LIST OF ABBREVIATIONS

AC	African Check
AIFC	African Indigenous Food Crops
AILVs	African Indigenous Leafy Vegetables
BAMS	Berlin Agriculture Ministers' Summit
BMI	Body Mass Index
BMJ	British Medical Journal
BWFC	Berlin World Food Conference
CD	Could Differentiate
CDCP	Centre for Diseases Control and Prevention
CIFF	Children's Investment Fund Foundation
CND	Could Not Differentiate
CSIR	Council for Scientific and Industrial Research
CSIR	Council for Scientific and Industrial Research
ED	Endogenous Development
EU	European Union
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FNS	Food and Nutrition Security
GFFA	Global Forum for Food and Agriculture
GLSS	Ghana Living Standards Survey
ICN	International Conference on Nutrition
IDA	Iron Deficiency Anaemia
IDD	Iodine Deficiency Disorders
IDI	In-Depth Interview

IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
MDG	Millennium Development Goal
NCHS	National Centre for Health Statistics
ORAC	Oxygen Radical Absorbent Capacity
PEM	Protein Energy Malnutrition
RDHS	Regional Directorate of Health Services
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
TBA	Traditional Birth Attendance
UIE	Urinary Iodine Excretion
UN	United Nations
UNICEF	United Nations Children's Fund
USA	United States of America
USAID	United States Agency for International Development
VAD	Vitamin A Deficiency
WFP	World Food Programme
WHA	World Health Assembly
WHES	World Hunger Education Service
WHO	World Health Organisation
WIAD	Women in Agricultural Development

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Many intellectuals and other authorities have perceived that the growth and prosperity of a nation is heavily dependent on the wellbeing, nutrition and development of the people (Jalal-ud-Din, 2014; Thomas & Frankenberg, 2002; Welch, 2001) This has been presumed to be dependent further on peoples' nutrition knowledge of various foods grown within their localities and the frequency of their consumption. A study conducted by Benzie and Choi (2014) showed a statistically significant correlation between nutrition knowledge and dietary behaviour. Vardanjani, Reisi, Javadzade, Gharli-Pour and Tavassoli (2015) emphasized explicitly that proper nutrition plays an essential role in protecting people against chronic and preventable diseases, in addition to enhancing their physical and intellectual proficiency. Good nutrition in children is an important determinant of human development and economic growth. Poor nutrition perpetuates the cycle of poverty and deficiency diseases through losses caused by disease; losses in productivity caused by poor physical standing, losses in schooling caused by poor mental development; and losses caused by increased health care costs. It is also important to note that the economic costs of malnutrition are very high and hence improving nutrition contributes to productivity, economic development, and poverty reduction by enhancing human capacity, capabilities, cognitive development, school performance, and health through the reduction of diseases and mortality. Meyer, Yoon and Kaufmann (2013) identified that in major tribal environments and other parts of

the world, there are rich habitation of natural foods that might probably be accustomed to promote nutrition and health in these communities. Thus, tapping into the vast knowledge and use of indigenous foods is one of the numerous ways to curb malnutrition in households (Meyer et al., 2013).

Appropriate and workable interventions in nutrition can enhance several significant development outcomes in Ghana, including child survival, educational attainments, and ultimately economic output. The 2011 Ghana Profiles results projected that, during the period 2011–2020, more than 30,000 children's lives could be protected by reducing the prevalence of underweight, more than 25,000 children's lives could be protected by reducing ascorbic acid deficiency, and more than 4,500 mothers' lives could be protected by decreasing maternal anemia. In the developing world, a projection of 230 million (39%) children under the age of five years are persistently malnourished and close to 54% of deaths amidst children younger than five years are connected to malnutrition (UNICEF, 2014). Malnutrition is a main public health and development concern, undoubtedly in Sub-Saharan Africa, and has health and socioeconomic impacts. In Sub-Saharan Africa, the prevalence of malnutrition among the group of under-fives is projected at 41% (UNICEF, 2014).

Recent evidence shows that under-nutrition contributes to mortality levels among children in developing countries and under-nutrition weakens children's immune systems, which places them at greater risk of diseases and death (WHO, 2018). In Ghana, 1 in 13 children die before their fifth birthday and under nutrition contributes to about half of all child deaths beyond early infancy,

making this a major contributor to child mortality. Also, every year, 12,000 children die because their weight is too low for their age (underweight) and maternal anaemia is on the ascendency. It is predicted that, for the period 2011–2020, 97,000 deaths of children under 5 years of age would be recorded in relation to stunting alone, about 52 million children under 5 years wasted, whiles 17 million severely wasted and 155 million stunted (WHO, 2018).

It is established that where there is no dietary diversity, there is serious effects on the nutrition and health of rural and urban inhabitants. Poor dietary diversity goes a long way to deprive rural farmers of the chance to generate income from their produce, however dietary diversification is widely accepted as a cost-effective and sustainable way of reducing malnutrition (Kennedy, Kershaw, Coates, 2018). Abandoned and less consumed food resources are the base of the variety in traditional and indigenous food systems of developing countries. Also, production and the use of traditional and indigenous foods are not so harmful to the environment and address cultural needs and preserve the cultural heritage of local communities (Pinstrup-Andersen, 2013).

Indigenous people existing in rural areas have food resources but are also not knowledgeable in these foods, neither are these foods completely understood by agriculture and health sectors and nutrition experts (Weiler, Hergesheimer & Brisbois, 2015). This means that the usual procedures of nutrition assessment and identification of food-based approaches for micronutrient upgrade cannot take into full accounts these unfamiliar food resources. In effect, indigenous people are often the most side-lined and underprivileged regarding health care

and other resources for well-being, and extreme poverty is often the result (Pinstrup-Andersen, 2013). Thus, most governments designate their indigenous people as those most in need of public health attention and food security without considering the indigenous food resources. For people living in developing countries, the 'contemporary lifestyle and nutrition transition', experiences, exposure to non-indigenous foods as well as food advertisement might mean decreasing consumption of fish, wildlife, domestic animals and locally grown crops (indigenous foods) which are rich sources of micronutrients (Pinstrup-Andersen, 2013). There may be the situation where underutilized species and traditional foods are available at the local level through women's production and/or collection efforts, but with some stigma attached to the eating of 'wild' or 'famine foods' people will shy away from eating these indigenous foods. (Weiler, Hergesheimer & Brisbois, 2015). According to empirical literature, food advertisement can influence food preferences, either healthier or unhealthier preferences (Chernin, 2008), The social environment, physical environment and the media environment all have significant influence on food consumption. Hence, tapping into the indigenous food resources will require taking advantage of tools that may enhance preferences for indigenous foods.

Reduction in the consumption of indigenous foods has contributed to the increase in chronic diseases among infants and children (FAO, 2013). Diseases such as cardiovascular diseases and cancers which were alien to the African continent are now being rapidly recorded among infants and children, constituting a worrying trend which needs immediate intervention for possible remedies in order to achieve the Sustainable Development Goals (3) which is to

guarantee healthy lives and promote well-being for all at all ages (Webb & Block, 2012). The Ghana Shared Growth and Development Agenda document states that nutrition and food security are vital cross-cutting issues in addressing the complete human resource development. Hence Ghana's needs to reduce child malnutrition, prevent and control nutrient deficiency and ensure household food security so as to reduce child and maternal mortality.

The Demographic Health Survey from the Ghana Living Statistical Survey (2014) showed that in Ghana, out of 10 children, 3 were too short for their age (stunted), also, 1 out of 7 children's weight was too low for their age (underweight) and 1 in 10 children was wasted (weight too low for height). Again, 2% suffered from severe forms of wasting. According to the MDG Report (2012), Eastern, Upper East, Central and Northern regions recorded incidences of stunting of at least 32 percent, while the rest of the six (6) regions recorded lower incidence than the national average of 28 percent. On a more disturbing note, underweight is high in regions such as Upper East (27%) and Northern (21.8%) (GLSS, 2014). The Ghana Statistical Service (2014) also reported on the stunting incidence in Northern Ghana, which ranged from 31.5 to 37.4 %, indicating a disturbing trend. Also, the 2018 half year review report of the Nabdam district health directorate showed that, anaemia in pregnancy in the district was as high as 45% at registration, and on a more disturbing note, anaemia at 36 weeks of pregnancy was recorded to be as high as 50% in the district. The low birth weight recorded in the Nabdam district was as high as 12%, as compared to that of the Upper East Region which was 9% (GDHS, 2014).

1.2 Research Problem

Records from Ghana Statistical Service (2014) reveals high rate of poverty, malnutrition and poor socio-economic status in the Nabdam district with evidence showing that the district is one of the poorest in Ghana with a poverty incident of 63%, although richly endowed with natural indigenous food resources such as millet, bambara beans, frafra potatoes and many others that can promote good health, however, these indegenous foods remain heavily untapped and neglected.

The undesirable attitude and behaviour of individuals towards indigenous foods, contributes to the non-consumption of these indigenous foods. Again, the fact that policies and information that distinguishes appropriately the significant role of indigenous foods in food security and health are not given priority, contributes to the lack of interest in consuming indigenous foods, as most indigenous foods are excluded from the official statistics on the economic value of natural resources (Bharucha & Pretty, 2010). The lack of advocacy to promote indigenous foods, has contributed to the loss of interest in these indigenous foods. Indigenous food systems when lost are difficult to restore. For that reason, the emphasis is on the importance for appropriate documentation, compilation as well as dissemination of fading knowledge of biodiversity and the utilization of indigenous food culture, for encouraging sustainable, healthy and adequate diets (FAO, IFAD & WFP, 2014).

There have been several nutrition interventions by UN agencies and NGOs carried out all over the World including Ghana. These interventions have always

been largely a top-down approach and mostly with resources that are not indigenous and are foreign to the target communities. One example is the supply of plumpy nuts to malnourished children, where sustainability is unrealistic and becomes practically impossible, especially among the rural poor who probably cannot afford. (Rice, 2010).

Indigenous food resources in the Nabdam District have been relegated to the background by the people in the district (GSS, 2014), because these foods are often considered as food for the poor, hence, rendering these foods less consumed by households in the community. Most of these indigenous foods are already out of the urban household routine food menu and are also gradually getting out of the indigenous household daily food menu.

The emergence and increase in technological advancements, especially in the 21st century, people have gravitated towards modernity with new trends of lifestyles, influenced by their interactions with the environment, and transcending into the transformation of peoples' food culture. Westernization, urbanisation and modernity have also contributed greatly to the non-interest and loss of knowledge of indigenous foods among people. In addition, higher social status and higher income levels have deepened the digression of dietary patterns from indigenous/traditional foods, resulting in the heavy dependence on chemically processed foods. Consequently, indigenous foods have been underexplored with some almost near extinction. As the global community is increasingly working towards finding means of sustainable nutrition for the growing population across all countries, much emphasis is needed in identifying

indigenous foods resource acceptable to communities for easy access to local folks, without making any purchases in some cases and within traditional locality/natural environment (Sharif, Zahari, Noor, Salleh, Ishak, Muhammad, 2012).

While literature has established that indigenous foods are rich in nutrients and play an important role in the nutritional status of children as well as the entire household members in Ghana, the increasingly shifting to exotic and refined foods with less nutrients, increases the risk of malnutrition, especially in poor rural-urban communities (Acipa, 2013). This is quite too much alarming, as a number of scientific researchers have drawn attention to the high nutritional values contained in several indigenous/traditional foods, particularly in relation to combating malnutrition among children (Acipa, 2013; Meyer et al., 2013; WHO, 2013).

Unfortunately, these indigenous foods are not being used to supplement the diet of children, and these could be as a results of various reasons which include among others; globalisation, modernisation, power dynamics, culture, lifestyle and the fact that priority and prestige is given to the non-indigenous foods (foreign foods). Meanwhile, there is poverty within the Nabdam district, yet all these indigenous foods that are rich in micronutrients, could help in minimising malnutrition in the district especially among children under the age of 5 years.

Lots of work have been done in the quest of looking for sustainable solutions to fight malnutrition, especially in the rural settings of developing countries which

includes Ghana. Nutritional knowledge have been reported by Benzie et al., (2014) to be significantly associated with consumption. Literature also indicates how valuable and nutritious indigenous foods are, and how they can greatly contribute in curbing malnutrition. This dissertation therefore aimed at assessing the indigenous nutritional knowledge and consumption of indigenous foods among mother's in the Nabdam District of the Upper East Region of Ghana.

1.3 Research Questions

The major research questions developed for the study are:

1. Is there any existing indigenous knowledge on the nutritional value of indigenous foods among mothers in the Nabdam district?
2. What is the extent of consumption of indigenous foods among mothers in the Nabdam district?
3. How does culture and attitude affect the consumption of indigenous foods in the Nabdam district?

1.4 Research Objectives

Main Objective: To assess the indigenous nutritional knowledge and consumption of indigenous foods among mothers in the Nabdam District of the Upper East Region of Ghana.

Specific Objectives

1. To explore the existing indigenous nutritional knowledge on indigenous foods among mothers.

2. To assess the extent of consumption of indigenous foods by mothers in the study area.
3. To examine how culture and attitude affect the consumption of indigenous foods in the community.

1.5 Significance of the Study

Understating the dynamics between mother's indigenous nutritional knowledge and the consumption of indigenous foods will enable sustainable, cost effective, workable and acceptable nutrition intervention programs that will encourage and motivate mothers to patronize indigenous foods and again help mitigate some of the negative aspects of resent trends of malnutrition in the Nabdam district. It will enable the indigenous people to own any nutrition intervention program, and make them control the intervention process which is good for sustainability, while maintaining the indigenous food culture of the people. It is therefore imperative for researche to be conducted to unearth issues relating to the knowledge and consumption of indigenous foods in communities and propel further sustainable interventions, create awareness about the importance and value of these indigenous foods and also enhance the transfer of knowledge on indigenous foods.

This study would further serve as a recommendation for health institutions, policy makers, and other stakeholders in relation to the making and amendment of policies/laws regarding food and nutrition to nurture a healthy population and curb malnutrition and under-nutrition among children. This study would again serve as an up-to-date, current documentation of the various kinds of indigenous

foods in the Nabdam District for consumption, exports, income generation as well as reference point for the food and nutrition experts and other researchers pursuing programmes in the same field of endeavour.

The result of this study is thus, a contribution to highlighting the importance of documenting and harnessing the consumption and preservation of indigenous foods at the local and household level. This research on the indigenous nutritional knowledge and consumption of indigenous foods could help in reducing poverty and malnutrition, it is also important because once mothers have knowledge on the nutritional value and importance of these indigenous foods, they will utilize them to the greater enhancement of their children's health and the entire community.

1.6 Organization of the Study

This dissertation is made up of six chapters: Chapter One deliberated on the background of the study, research problem and significance of the study, research questions and objectives, the organization of the study and definition of terms. Chapter Two reviewed related literature of the study and the discussion of relevant and related theories of the study as well as the empirical review of the study. Chapter three discussed the methodology of the study. Chapter Four analysed the results. Chapter five discussed the results of the findings of the study and Chapter six summarized, concluded and suggested recommendations on the findings of the study for consideration.

1.7 Definition of Terms

Terms	Definition
Consumption:	Mother's use of the various food categories to feed their children
Often consume:	The consumption of a particular food category within 1-7 days
Not often consume:	The consumption of a particular food category within 8 days and above.
Indigenous Nutritional knowledge:	Mother's lay knowledge on the role and function of each food category in the body.
Indigenous foods:	Foods that are originally found in the locality and not introduced. Again, they constitute foods that people can easily have access to within their locality, and within traditional knowledge and the natural environment, from farming or from wild harvesting.
Indigenous knowledge:	The accumulated wisdom that societies use in carrying out their socio-economic life, social interactions, spiritual connections, healing rituals and their life aspirations.
Tuo Zaafi (TZ):	A staple meal in the study area. Made from cereals

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section of the study reviewed what other researchers, commended authorities and scientific institutions have done so far in relation to nutritional knowledge of indigenous foods, the consumption of indigenous foods and the use of indigenous resources (indigenous foods) to enhance under 5 nutrition.

2.2 Endogenous Development

The importance of development in nations, regions and communities cannot be underestimated and continues to mount in this 21st century as poverty, malnutrition and deaths ascends. Poverty in the form of resource deprivation has been persistent among most of the world's populations and cultures with high concentrations in developing regions, especially in the Northern part of Ghana (GLSS, 2014).

Endogenous Development (ED) in recent times have been employed to improve lives of indigenes through participatory and sustainable development of local communities. Millar, Apusigah and Boonzaaijer (2008) defined ED as the development of a community based on the local peoples' own principles of development, taking into account the material, social and spiritual wellbeing of the people. ED takes into account local cultures as the most important/critical starting point of development, using them as the social progress and inter-cultural exchanges. Millar et al., (2008) postulated that ED is achieved by harnessing local resources, values and strategies in the area to enhance

development, building and inciting local actions to affect community changes within their existing system.

Apusigah (2005) noted that by its definition, ED is geared towards sustainable, practical and people-centred development, looking inwards for development but in the same vein, not discarding external influences such as contemporary science and modern technology. ED utilizes traditional systems and often draws resources from beneficial external sources to help boost and enhance local developmental initiatives, without doing away with or sacrificing local resources. Emphasis is normally placed on local initiatives, utilisation of local resources in starting and negotiating their own development paths (Millar et al., 2008).

Components of ED include the material, social and spiritual wellbeing of the people. The integration of these components into developmental approaches have become widely recognised and acceptable in community developments. Thus a balance in the material, social and spiritual well-beings of indigenes have reflected in sustainable and progressive community developments. COMPAS (2007) identified key concepts within the ED which are:

1. Allowing local control over developmental processes;
2. Actively inculcating cultural values into developmental processes;
3. Balancing traditional resources, external resources and knowledge to manage change that are traditionally significant and suitable.

ED is perceived to be quite different from mainstream development as ED seeks to empower local communities take control and charge over their own development processes with little or no influence from external sources. However, mainstream development involves the process whereby the government, stakeholders, management and other official in various positions initiate development in localities and who have the sole responsibility of ensuring their completions. The views of community members are however not taken into consideration during the implementation of these initiatives. In addition, the local communities or indigenes are not empowered to take control of their own development processes, this does not make the development process participatory, and in this case, the project stand a risk of failing, Vázquez (2016).

The insurgence of ED is necessitated by the fact that indigenous people need to find effective ways of building and strengthening their economic activities, building strong capacities for sustaining development. There is also the need to harness the effective use of local resources such as natural resources (in this case indigenous foods), human resources, and financial capital, among others in propagating development in a bid to improve the quality of life and standard of living for the local people. The existence of the natural resources and indigenous foods in Nabdam area cannot be overlooked; hence the need to access the indigenous nutritional knowledge and consumption of indigenous foods as one means for sustainable nutrition interventions that embraces local content.

2.2.1 Promoting Indigenous Foods as a Community Livelihood to Boost Endogenous Development

There has been the active existence of endogenous development in communities for centuries, with ample evidence of African countries leading and managing their own communities and development in their own cultural settings. Endogenous Development (ED) which constitutes the localized development and change initiated from within communities (UNDP, 2011) seeks to organize and harness local resources for the benefits of the locality. In this, indigenes collectively undertake local developmental projects, initiatives and activities themselves within the communities to improve the well-being of the people. They themselves lead and control almost all aspects of the project, as well as drawing both internal and external resources for the projects sustenance and success.

As local communities are well endowed with natural resources and lots of indigenous crops which thrive well even in harsh climatic conditions, there is the increasing need for the local people to engage and use the local resources to enhance their livelihood. In effect, local developments should be initiated and enhanced to generate economic gains, improve socio-economic status of individuals and households, learn new ideas for the sustenance of the initiative and possibly organize and negotiate for the investment of these resources (Cloete & Idsardi, 2013).

Cloete and Idsardi (2013) noted that the endogenous development involves the peoples own criteria of development on the basis of their material resources,

social resources, and spiritual well-being. Vázquez (2016) highlighted the need to encourage endogenous development to strengthen local communities take control of their development process, with little governmental and external interference. He indicated this in order for the local communities to increase economic and cultural diversity, reduce environmental degradation and seek a self-sustaining local and regional agricultural and food exchange.

UNDP (2011) stressed on the need to boost endogenous development especially in African countries by implementing certain changes in the people's local leadership and governance systems. In that, leaders in local communities should create a strong common vision of the well-being of the people, include and assign roles to empower more women, and broaden the base of leadership to enhance development processes. In addition, traditional institutions and spiritual leaders should be included to help create mutual identity and purpose in development initiatives. This is due to the fact that most indigenous people take their culture, faith and values very seriously which provide the basis for their everyday moral, practical decision-making processes and actions.

Many rural areas especially in Africa are guided by traditional authorities who play major roles in taking charge and are accountable for decisions in agriculture, land use, health or conflict resolution, management, etc. Hence to establish the use of indigenous foods as a source of livelihood and to boost endogenous development, local and traditional authorities cannot be side-lined, nor can local cultures and traditions be ignored (Cloete & Idsardi, 2013). These local cultures, which are difficult to understand by people from other cultural

backgrounds, have played prominent roles in the lives and activities of the indigenes. Thus for endogenous activities to succeed, Vázquez (2016) stressed the need for the cultural values of the people to be taken seriously by appreciating them and including them in their developmental processes. He emphasized that "… if the cultural aspects are not taken seriously, well-meaning development efforts are bound to fail" (pg. 13).

The Centre for Indigenous Knowledge and Organisational Development (2010) also stressed that governmental agencies and other stakeholders need to support endogenous development. This may take the form of strengthening local markets, support farmers defend their right to access land, water and other natural resources, support local innovation, learning, experimenting and communication. They also noted the importance of understanding the local practices of the people, prevalent leadership structures as well as their cultural practices. Vázquez (2016) indicated that endogenous development is a slow process, thus, time is needed for local communities, institutions and public administrations to come together and communicate properly and persuasively about their overall view of endogenous development, especially ED through preventive health. Persuasive communication about the use of indigenous foods is essential, thus, it will improve people's health status through good nutrition and subsequently lead to development. It is therefore important for the local population to actively engage in the developmental processes within their communities. For endogenous development in the area of preventive health to make strives or succeed, it calls for persuasive communication and sustainable

interaction of the various interest parties, which can be classified into the indigenous people and their culture, the society and the environmental influence.

2.2.2 Indigenous knowledge

Indigenous know-how has been stated by Dei (2000), as the epistemic saliency of cultural traditions, values, notion systems, and worldviews that in any indigenous society are communicated to the more youthful generation by the elders through cultural rituals, word of mouth and observations (CSIR, 2017). Again, according to Senanayake (2006), indigenous knowledge is the exclusive knowledge limited or restricted to a particular culture, community or society. It is sometimes referred to as folk knowledge or traditional wisdom/Science. Indigenous knowledge is developed overtime and transferred by the indigenous people, groups, communities and/or societies over a period (Senanayake, 2006). The indigenous knowledge of any community, group or society is generated from experimentation, observations and learning experience. Indigenous knowledge comes as a results of the day to day interaction with the environment where people's worldview shapes the community's relationships with the surrounding environments (Dei, 2000; Senanayake, 2006). The direct experience of nature and indigenous people and its relationship with the environment, information, awareness and understanding are important for the survival of society, these are primarily based on cognitive understandings and interpretations of the social, physical, and spiritual environment. It includes principles, ideals, perceptions and experiences of indigenous peoples and their natural and human built environments. (Bandura, 1977; Dei, 2000).

From this position, knowledge and awareness of indigenous food and consumption has been part of the African from time immemorial. It must also be said that knowledge forms basis for the preparation and processing of food as well as consumption pattern. As knowledge systems have emerged from years of practice and critical reflection, it is imperative for this acquired knowledge to be practiced and passed on to the next generation. The Council for Scientific and Industrial Research (CSIR, 2017) noted that "…… managing indigenous Knowledge using information management standards in libraries is a new phenomenon worldwide but in Ghana it is virtually absent". It is not common for libraries to acquire, process and store indigenous knowledge in any form. Digitisation of Indigenous knowledge of food resources is very essential for its preservation and future use, especially in targeting future generations in its utilization. Among other objectives of the CSIR (2017) are the identification, documentation and digitisation of indigenous knowledge on forest foods and medicinal plants, the creation of a database of indigenous knowledge, as well as sharing the useful indigenous knowledge identified.

If there has been a gap in knowledge progression of indigenous products, then it can be attributed to the influx of colonization in the African continent. For instance, Mutva (1999) argued that since the imperial forces of Europe began expanding their empires through the colonization of sub-Saharan Africa, olden indigenous knowledge, including a treasure of knowledge about food traditions and practices, health and longevity has gradually been eroded. Similar concerns were raised in other parts of the world especially in North America and Australia (Bodirsky & Johnson, 2008; Rowley et al., 2000). Studies have revealed that

Indigenous technologies of food processing and distribution were disappearing as more and more Indigenous peoples moved away from their traditional lands, local food, and cultural knowledge (MOH, 2014; Sharif et al., 2012).

The erosion of Indigenous knowledge in food gathering, production, preparation, preservation, consumption and the whole area of traditional pharmacology and its preventive cures was implicated in the upsurge of chronic diseases among the indigenous people of sub Saharan Africa (Raschke & Cheema, 2007). In other instance, the high prevalence of chronic disease in Indigenous communities was attributed to the disruption in the cultural identity, spiritual life, environment quality, stability of local economies and political institutions which otherwise, partly, anchored healthy diets in Indigenous communities (Kuhnlein & Receveur, 2014). These two outcomes should remind policy makers to have system of preservation and knowledge transfer of indigenous products in the African lands. Sadly, this has become a big problem given the late penetration of technology into the economic and information needs of the African society.

According to Batimo and Herman (2013), indigenous knowledge is the accumulated wisdom that societies use in carrying out their socio-economic life, social interactions, spiritual connections, healing rituals and their life aspirations. Batimo and Herman (2013) further stated that, children attained their indigenous knowledge by constant contact with both the adult world and the physical environment around them. For the purpose of this study, the indigenous knowledge includes knowledge about the food environment, the

understanding of the traditional food system and their food values. Batimo and Herman (2013) in their study observed that, the younger generation have not acquired the same quantity and quality of the Sukuma ecological knowledge, and they blamed it not only on the depletion of the ecosystem but also to the reduced exposure of the younger generation to their own indigenous environment.

2.2.3 The Impact of Technologies on Availability and Consumption of Indigenous Foods

The availability and accessibility of indigenous foods is critical and significant to achieving food security and nutrition at the household level. Using indigenous technological knowledge in solving food scarcity is a powerful way of sustaining household food security, especially at the rural settings (Ibnonf, 2012). Women in developing countries, especially Sub-Sahara Africa, process indigenous vegetables, fruits and other indigenous foods in times of abundance to be used during the lean season or in times of food scarcity. Some of the indigenous techniques that are usually used include; drying, boiling, smoking, fermentation and other indigenous preservation techniques (Ibnonf, 2012). This may contribute in the provision of affordable nutritious indigenous foods in times of need, but with the fast growing population, the acquisition and application of contemporary science and technology will be of great benefit.

For years, scientific and technological advancements have benefited farmers in the industrialized world by driving agriculture production. However, smallholder farmers who are responsible for 80 percent of the food in the developing world have yet to see similar gains (IFAD, 2011). These farmers,

majority of whom are women, lack access to many of the tools needed to be successful, such as modern irrigation practices, crop management products, fertilizers, postharvest loss solutions, improved seeds, mobile technology, as well as access to information and extension services (FAO, 2013). The use of new production technology in the production of indigenous foods can help enhance food sustainability, conserve food, increase productivity yields, reduce postharvest losses and food wastage and hence curb hunger and malnutrition (FAO, 2013). These technologies as well would give farmers access to real-time information and services in the field, and even improve the nutritional content of foods. The use of technologies in the production of indigenous foods have been known to impact and improve livelihoods of farmers and their families by producing more and higher quality crops and further enhanced the nutritional value and safety of the foods to improve the health and wellbeing of the people (FAO, 2013).

Most industries have experienced scientific advancements that have led to profound achievements, and in many cases, have enabled them solve many identifiable challenges in those respective industries, thus increasing the availability and consumption of refined foods. The use of technology in the stages of production of indigenous foods holds great benefits for the farmers and in the long run boost the knowledge, awareness, patronage and subsequent utilization of indigenous foods. These technologies can be implemented in the following areas of the growth of indigenous foods. Thus, using the right modern tools to increase the production of indigenous foods, communicate the values

and benefits of indigenous foods, and creating the right atmosphere/environment that will sway individuals to consume indigenous foods.

The importance of food to human existence has compelled global efforts to guarantee ample food in all parts of the world to address the problem of malnutrition. Paradoxically, as the human population keeps increasing, the genetic varieties of food crops and animal species that constitute food for humans keeps dwindling (FAO, 2013). The mindful efforts of selection and promotion of particular crops and animal species as the genuine human food has led to the downgrading of indigenous crops and the resultant food insecurity in developing countries where these crops were a means of sustenance.

African Indigenous food crops, a main source of income and sustenance have well adapted to the climatic conditions. Some of these food crops are cereals (millet, sorghum, African rice); tubers (wide variety of yams); oil plants (oil palm, shea-butter); fruit trees (dawadawa, ebony, baobab); and a range of African Indigenous Leafy Vegetables (AILVs) such as amaranths, African night shade, spider plant, jute mallow and pumpkin. With the arrival of modern mechanized farming, most of the AILVs were considered to be weeds, and that has contributed to their depletion and extinction (Lutz, 2013). It is important to take advantage of modern technology to boost indigenous foods production and increase its consumption. The downgrading of African indigenous food crops has eroded most of what was seen as first generational foods of Africans. These African indigenous food crops have been less consumed by the growing

population, which would have otherwise alleviated malnutrition, increased higher intake of micronutrients, and improved farmers' livelihoods.

Numerous studies on nutrition knowledge and use of indigenous foods have been done all over the World, especially in Canada, India, Tanzania and Botswana, looking at various aspects that could inform practical policies towards enhancement of human health and development as well as sustainable interventions in the fight to reduce malnutrition. Studies have looked at preserving and transmitting indigenous knowledge; fruits and vegetables consumption in children and adolescence; the influence of culture, religion and traditional knowledge on food and nutrition security in underdeveloped countries; indigenous peoples' food systems, health and many others (Ghosh-jerath et al., 2019; Ghosh-jerath et al.,2018; Mansuri et al., 2016; Mmari, Kinyuru, Laswai, & Okoth, 2017; Oduro, Buchner, Andrade, & Toussaint, 2018; Roche, Ambato, Sarsoza, & Kuhnlein, 2018; Shokrvash, Majlessi, Montazeri, & Nedjat, 2013).

A study in Botswana reported that, arable crops alone in rural and dry areas of Botswana would not improve the health of the rural household and the community at large, unless other alternatives such as indigenous foods which is rich in micronutrients are incorporated in their food basket (Legwaila et al., 2011). Ministry of Agriculture, Ministry of Health and other NGOs, tried to showcase the indigenous foods of Northern Ghana, in their various food security and nutrition intervention projects, there by acknowledging the contribution indigenous foods can bring to bear when it comes to reducing malnutrition.

2.3 Review of Indigenous Foods

2.3.1 Indigenous Foods from the Americas

"Food is at the center of our culture… it feeds our bodies and it feeds our spirit" (NDWP, 2013). They likewise cited that "traditional foods help leverage human and natural resources to promote sustainability, traditional food ways and improve". For decades, American communities have been retrieving health traditional foods and practices as an essential component of their Indigenous food sovereignty movement, which encapsulates their "identity, history, tribal sovereignty, traditional ways and cultural practices to address health" (NDWP, 2013). Park, Hongu and Daily (2016) reported in their study that 60% of the current world food supply originated in North America, who developed new varieties of corn, beans and squashes to have abundant supply of nutritious food. These native foods continue to be greatly consumed to enrich the diets of their people and these foods have also been passed down to their modern generation.

However, River (2014) reported that the introduction of foods from Europe and Asia has dramatically changed the diets of Native American people. Only few of the descendants of the American people still eat foods of their ancestors although many of these native foods have been incorporated into cuisines and other cookeries worldwide. Listed in table 2.1 are some native foods from the Americas:

Table 2.1 Common Foods that Originated from the Americas

Food	Region of Origin	Nutrients
Cassava	Brazil	Carbohydrates
Chili and bell peppers	Central America	Vitamin C, Flavonoids
Jerusalem Artichoke	North America	Probiotic fiber, minerals, B vitamins
Lima Beans	South America	Protein, B vitamins, minerals
Pole Beans: black turtle, pinto, navy and kidney beans	North and South America	Protein, minerals, fiber, B vitamins
Potatoes	Peru	Carbohydrates, Potassium
Sweet Potatoes	South and Central America	Vitamin A, folate, Minerals
Pumpkin	North America	Vitamins A and C
Amaranth	Mexico	B vitamins, Protein, Minerals
Corn (maize)	Mexico, Central America	Protein, B vitamins, magnesium, potassium
Quinoa	South America, Andes	Protein, B vitamins, minerals
Wild rice	North America	Protein, B vitamins, minerals
Pecan	Southern USA, Mexico	Protein, fatty acids, B & E vitamins, minerals
Sunflower	North and South America	Fatty acids, protein, B & E vitamins, minerals
Bison (Buffalo)	North America	Protein, B vitamins, iron
Maple Syrup	North eastern USA	Sugar, minerals

Source: Adapted from Park, Hongu and Daily's (2016) publication on: Native American foods: History, culture, and influence on modern diets.

Indigenous foods, either eaten raw or cooked, over the years have spread greatly among the many regional tribes in America largely due to well-organized trade road maps. The wealth of these indigenous foods in the Americas made the people have possible balanced and highly palatable diets. Virtually, all edible plants and animals were used as foods, with the hunting of dears and bears, and other traditional methods of fishing. Park et al., (2016) noted that the exact makeup of the Native American diet depended on the indigenous plants and animals in the area where they lived. Park et al., (2016) highlighted that in an attempt for the Americans to conserve their indigenous foods, strategic and active approaches have been implemented which includes meeting with the community, checking on tribal leaders with challenges they face, as well as identifying knowledge keepers and holding food education sessions with them.

2.3.2 Indigenous Foods from the European Region

Europe has been recorded to have a large number of traditional foods for centuries with a decline in its usage with the passage of time. Kuhnlein (2016) identified the importance of promoting indigenous foods by the improvement of access to traditional local foods, the reduction of prices of healthy foods with an increase in education of the consumption of indigenous foods. Ferguson, Brown, George, Miles, Wilson and Brimblecombe (2017) in their study reported that early Europeans were lean and healthy; which was attributed to active lifestyles and nutrient-dense diets (high protein, polyunsaturated fat, fiber and slowly digested carbohydrates). These diets were obtained from uncultivated plant foods and wild animals. However, since colonization, the people's nutritious diets have been substituted by high intakes of refined cereals, added sugars, fatty

domesticated meats, salt coupled with low consumption of fibers. Thus Ferguson et al., (2017) noted that has led to major diseases (diabetes, cardiovascular diseases and chronic diseases) in recent times. Efforts are now being implemented to reverse the trend to the consumption of traditional food, which plays a key role in nutrition and health (Kuhnlein, 2016). Traditional foods remain an integral part of the traditional European diets which have immensely been connected to identity, culture and country. Listed in table 2.2 are some indigenous European foods.

Table 2.2 Common Foods that Originated from the European Region

Food	Region of Origin	Nutrients
Perinaldo Artichokes	Greece	Fiber, vitamin C, folic acid, minerals
Formby Asparagus	Russia	protein, fiber, vitamin B6, calcium, magnesium, and zinc
Filder Pointed Cabbage	Central and western Europe	beta-carotene, vitamins C and K, fiber
Turnip	Norway	Vitamin C and potassium
Gourds	Greece	Iron, magnesium, vitamins, fiber, potassium and antioxidants
Corn (maize)	Norway, Germany	Carbohydrates
Bandicoot, Guayabo	Germany	Protein, Vitamins, mineral and antioxidants

Source: Adapted from the works of Ferguson, Brown, Georga, Miles, Wilson and Brimblecombe (2017) on '*Traditional food availability and consumption in remote Aboriginal communities*'

These indigenous foods are often eaten raw, roasted, baked or boiled. Ferguson et al., (2017) reported of the near-extinction of the Bandicoot and Guayabo, although most of these foods are now modernised and commercially cultivated. Ferguson et al., (2017) further noted the need to encourage people to make a complete overhaul of their food choices and a permanent change in lifestyle. There is therefore the need to understand the importance of indigenous foods and consume healthier food alternatives to achieve good health, proper nutrition and longevity.

2.3.3 Indigenous Foods from the Asian / Pacific Region

Climate change has remained one of the most serious problems facing the world today with recent happenings of rampant and severe floods in parts of Asia (FAO, 2015). Durst (2014) indicated that, although most countries in the region have attained self-sufficiency in crops production, their availability is still relatively low, leading to the importation of food crops with financial huge costs. Despite the fact that the region has many indigenous foods, their potentials are either under exploited and untapped (Durst, 2014). These indigenous foods could have rather been used to promote the nutrition of the people and enhance their livelihoods to curb hunger and malnutrition.

The Asia / Pacific Region, which consists of countries such as Indonesia, China, India, Fiji, Malaysia, Papua New Guinea, Thailand and the Philippines are blessed with the following indigenous foods:

- **Fruits**: Apple, Japanese barberry, Kiwifruits, Chamoe, Mango, Jackfruit, Banana, Wood apple, Orange, bitter melon (vitamins and minerals)
- **Vegetables**: Moringa oleifera, Cooking banana, Okra, Trichosanthes cucumerina, Coccinia grandis, Eggplant, Pigeon pea, Vigna mungo (minerals and antioxidants)
- **Proteins**: Zebu, Red jungle fowl, Grey jungle fowl, Insects, Legumes, Shiitake mushrooms
- **Carbohydrates**: Barley, Rice, Potatoes, Millet

From these, Durst (2014) in his study identified the near-extinct indigenous foods to include bitter melon, Shiitake mushrooms and certain Asian insects which are now rarely consumed in homes.

2.3.4 Indigenous Foods from Africa

As severe drought and water shortage continue to occur in certain parts of Africa, it is certain that its devastating effect will negatively affect the food sector (FAO, 2015). Indigenous foods continue to be sought to remain the main solution in curbing food shortage, hunger and malnutrition for the African continent (Kuhnlein et al., 2010). It therefore remains imperative to promote the consumption of indigenous foods in the continent which is gradually being replaced with western "junk" foods. Simoloka (2016) asserted that Africans over the century relied heavily on some foods for nutrition, medicine as well as healing a number of ailments. Hence modern science is now working in

collaboration with African traditionalists / indigenous food experts to harness and utilize the properties / benefits of indigenous foods.

Simoloka (2016) further highlighted that indigenous foods found on the African continent became less preferred with the introduction of other foods from other continents. These deserted foods however provided rich nutrition to the people whiles surviving harsh climatic conditions. He noted that because the indigenous foods were given little or no scientific investment, most of them have been lost over the decades; thus, the publication in FAO's (2015) report of the essence of African governments and other stakeholders to implement sustainable measures in investing in efforts to better understand the potentials of these indigenous foods for enhanced agricultural productivity, increased food supplies for Africa's nutritional well-being.

Prevailing indigenous food resources found on the African continent include but not limited to the following:

Amaranth: A common boiled green vegetable found in Africa's humid lowlands, they are generally consumed in Togo, Liberia, Guinea, Benin, and Sierra Leone. Amaranths are a great source of protein, vitamins, essential minerals, calcium, iron, magnesium, potassium and zinc.

Moringa Tree: The Moringa tree is known for its highly nutritious and edible pods, leaves, seeds and roots. Noted for its protein and mineral contents, it also serves as a source of various medicinal values for the indigenes.

Cowpea: Having originated from central Africa, cowpeas are known one of Africa's oldest crops. Cowpeas are a very good source of protein with their leaves consumed as vegetables for vitamins and minerals.

African Cabbage: A green leafy vegetable, African Cabbage grows all the way through Africa and it is known for its high content in protein, antioxidants, vitamins and micronutrients.

African Eggplant: An important indigenous African crop, they thrive well in drought-resistant regions. The plants and leaves are consumed and possess high content in vitamin E, riboflavin, calcium and folic acid.

Argan: The Argan tree, found mostly in southern coast of Morocco produces fruit and seeds with rich oil extracted from it which is highly nutritious in in Oleic, Linoleic, Palmitic and Stearic fatty acids.

Shea tree: A very important African traditional tree, produces a solid, butter-like vegetable fat used for cooking, skin and hair care as well as an active ingredient in some cosmetics.

Potatoes: These tropical potatoes, high in carbohydrates, also contain other nutritional values such as calcium, vitamin A, and iron (Simoloka, 2016).

Most of these foods are still prevalent and consumed on the continent due to the knowledge of their nutritious values as well as their economic values.

2.3.5 Indigenous Foods from Ghana

Ghana, being a small coastal country of West Africa is noted for its well-endowed natural resources, inclusive being plants for food and medicinal purposes. The land, ranging from the northern zone to the southern sector, has major indigenous crops; either wildlife or cultivated growing on it which can

serves as sources of nutritious foods or income. However, with the prevalence of food scarcity and families' inability to adequately provide for their families, especially in the Northern region, there is now the dire need to fall on indigenous foods which often thrives well on dry awry lands. The idea of returning to the consumption of indigenous foods have been well embraced mostly by women leaders, women groups, families and farmers in the rural sectors (Ministry of Health, 2016) to augment good food and nutrition in their homes.

Ghana abounds in several indigenous food species, although, not endemic to Ghana, some of which are listed under the following nutritional values:

Carbohydrates: Yam, cassava, plantain, sweet potatoes, frafra potatoes, cocoyam, maize, water yam, millet, sorghum, brown rice, among others.

Plant and Animal Protein: Legumes, guinea fowls, cattle, goats, fowls, fishes, crabs, oysters, shrimps, insects, birds, snakes, lizards, frogs, snails, pigs.

Vitamins and Minerals: Citrus fruits, melons, turkey berries (abedru), grapes, soursop (alungutugui), dandelion, spinach, okro, shallots, pepper, tomatoes, kontomire, spices, among others.

Fats and oils: Shea butter, palm oil, coconut oil, palm kennel oil, groundnut oil and baobab oil.

The Ghanaian diet has predominantly been dependent on starchy roots (cassava, yams and cocoyam), fruits (oranges, mangoes, pear, pineapple) and cereals (maize, rice, millet, sorghum). There has however been the minimal consumption of recommended amounts of proteins, minerals and vitamins in the diets of most families, especially in the cases of children (Ministry of Health, 2016). Although most of the indigenous food crops found in Ghana are by large

still in existence especially in the rural areas, consumption has diminished in the urban areas with the continual urbanization and westernization of the Ghanaian culture (Logan, 2012).

Kuhnlein (2016) opined that indigenous people do not separate their food from medicine; depending on the food they consume, as they are knowledgeable of the health benefits they would acquire from them. The indigenous foods that are near-extinction in Ghana include groundnut oil, baobab oil, oyster, soursop (alungutugui), palm kennel oil, snakes, lizards, frogs, water yams, etc. although they play important roles in enhancing our nutrition and establishing our culture (MOH, 2016).

2.4 Malnutrition

Malnutrition has generally been referred to as under-nutrition or the term used to refer solely to a deficiency of nutrition. Many factors cause malnutrition, most of which relate to poor diet or severe and repeated infections, particularly in underprivileged populations. Inadequate diet and disease, in turn, are closely linked to the general standard of living, the environmental conditions, and whether a population is able to meet its basic needs such as food, housing and health care. Malnutrition is thus a health outcome as well as a risk factor for disease and exacerbated malnutrition, and it can increase the risk both of morbidity and mortality. Malnutrition itself can have far-reaching impacts on the environment, and can induce a cycle leading to additional health problems and deprivation.

More than one-half of the 9.7 million child deaths worldwide are linked to under nutrition. Malnutrition alone not only kills, but also exacerbates the burden of infectious diseases (USAID, 2010). WHO (2018) also estimated that around 45% of deaths among children under 5 years of age are linked to under-nutrition. Since deaths from under nutrition occur among young children, the loss of healthy life years is even more substantial. In developing regions, children in rural areas are more likely to be underweight than children living in cities (Smith, Ruel, & Ndiaye, 2005). South eastern Asia, sub Saharan Africa and northern Africa have succeeded in reducing child malnutrition more rapidly in rural area and in narrowing the gap with the urban population, demonstrating that more equitable progress is indeed possible (Khan, Bana, & Salam, 2006). Across the developing world, children from the poorest household are twice as likely to be underweight than children from the richest household (Ahmmed, 2013). The disparity is more dramatic in regions with a high prevalence of underweight children.

Women of reproductive age and children of school going age are considered the most vulnerable in terms of malnutrition. Thus the nutritional status of women and children are particularly important, as it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations. A malnourished mother is likely to give birth to a low birth-weight baby susceptible to disease and premature death, which only further undermines the economic development of the family and society, and continues the cycle of poverty and malnutrition (Blossner, De Onis, & Prüss-Üstün, 2005). Although child malnutrition declined globally during the 1990s, there is still the

prevalence of malnutrition, under-nutrition, wasting and other diet-related diseases among children especially in sub-Sahara Africa (WHO, 2018).

2.4.1 Direct Causes of Malnutrition

Malnutrition is associated with irregular physiological condition caused by insufficiencies, excesses or disproportion of food nutrients. The etiology of early maternal and childhood malnutrition is complicated and multi-factorial. Although the immediate cause is recognised to be deficiencies in protein and carbohydrates (energy), behind these nutrient deficiencies lies a myriad of other factors such as culture, availability, power dynamics, lifestyle and many others, acting individually or interacting with one another to influence the consumption of healthy foods, which thus affect their nutritional status and health. The direct reasons for malnutrition in children are insufficient nutritional consumption, illness, and emotional stress. It is a well-known fact that if one does not eat well, (intake of adequate diet daily) the person can easily become sick and children under the age of five years are the most vulnerable group. In adequate diet may mean that food intake may not be up to the required quality and quantity, thus the daily nutrients required for proper and healthy growth may be missing in the daily diet of children. Poor nutritional status reduces immune responses and thus increases susceptibility to and other opportunistic diseases such as infections that may lead to malnutrition and possibly death (Moratwa, Tsholofelo, & Hope Matla, 2008). Malnutrition is mostly coursed by the luck of nutrients that are needed in small quantities (micronutrient) which can be found mostly in natural indigenous food.

2.4.2 Micronutrient and Malnutrition

Malnutrition that is coursed by poor micronutrient, is the insufficient dietary intake of foods rich in micronutrients such as vitamin A, iron and iodine, it affects the health and survival of more than 2 billion people worldwide (Aphane, Chadha, & Oluoch, 2002). Deficiency of these three micronutrients is closely linked with childhood illness and mortality (WHO, 2015). In 2015, WHO recorded that 1 out of 3 people in developing countries are affected by vitamin and mineral deficiencies.

Vitamin A is one of the most important vitamin in terms of health consequences for poor people in developing countries. Vitamin A Deficiency (VAD) can cause night blindness and reduce the body's resistance to diseases. It can also cause growth retardation in children (Aphane et al., 2002). Between 100 and 140 million children are vitamin A deficient, and an estimated 250,000 to 500,000 VAD children become blind every year with about half of them dying within 12 months of losing their sight (WHO, 2006. Aphane et al., 2002). The estimated prevalence of VAD is 23.4%, suggesting that there are about 83 million VAD school-aged children in developing countries, of whom 10.9% (9 million, at an overall prevalence of 2.6%) have mild xerophthalmia which is known as night blindness or Bitot's spot (Singh & West, 2004). Constant intake of indigenous vegetables, legumes, and fruits is the most reliable, effective and sustainable approach to minimising micronutrient malnutrition in Sub-Sahara Africa (Aphane et al., 2002).

Iodine Deficiency Disorders (IDD) affects over 740 million people, thus, about 13 percent of the world's population are affected and bout 50 million people have some degree of mental impairment caused by IDD (WHO, 2010). IDD jeopardize children's mental health and most often their very lives. Serious iodine deficiency during pregnancy may result in stillbirths, abortions or congenital abnormalities such as cretinism which is a grave, irreversible form of mental retardation that affects people living in iodine-deficient areas of Africa and Asia. IDD also causes mental impairment that lowers intellectual prowess at home, at school, and at work (WHO, 2000). Altogether on the average, the prevalence of total goitre among 6-12-year-old children is about 4%, which is below the WHO cut off level of 5.0%. Also urinary iodine levels in children (6-12 years) indicated that 56.6% of urban children and 51.1% of rural children were biochemically iodine replete and had Urinary Iodine Excretion (UIE) levels ≥10µg/dl. Urban children (29.4%) and rural children (37.1%) were found to have goitre, thus iodine deficiency in school-going children affects their learning ability and concentration power (WHO, 2015). Even mild deficiencies of micronutrients (vitamin A, iron, folic acid, zinc etc.) affect their children's growth, development and immunity as malnourished children tend to have lower I.Q. and impaired cognitive ability which affects their school performance and productivity in later life (Diaz, De Las, & Rodriguez, 2003). Dietary diversification and increase in the consumption of indigenous foods can contribute greatly to the reduction of micronutrient malnutrition.

Iron deficiency is one principal cause of anaemia. About two billion people, thus, over 30% of the world's population are anaemic, mainly due to iron

deficiency, and in developing countries, Iron deficiency is frequently worsened by malaria and worm infections. The health consequences include premature births, low birth weight, high infection rates and elevated risk of death. Later, physical and cognitive development is impaired, resulting in lowered school performance (WHO, 2017). Nutritional anaemia due to iron and folic acid deficiency is widely prevalent among young children and adolescents. Thus, iron deficiency anaemia is a public health problem among school children and is seen across various cities in developing countries.

Iron status can be considered as a range from iron deficiency with anaemia, to iron deficiency with no anaemia, to normal iron status with varying amounts of stored iron, and finally to iron overload – which can cause organ damage when severe. Iron deficiency is the result of long-term negative iron balance and it's defined as a condition in which there are no mobilizable iron stores and in which signs of a compromised supply of iron to tissues, including the erythron, are noted. The more severe stages of iron deficiency are associated with anaemia. When iron-deficient erythropoiesis occurs, haemoglobin concentrations are reduced to below optimal levels. Nutritional anaemia is not a disease but may be considered a syndrome caused by malnutrition in its widest sense. It is a condition in which the haemoglobin content of the blood is lower than the normal due to deficiency of either a single or more essential nutrients regardless the cause of such deficiency (WHO, 2015). Iron Deficiency Anaemia (IDA) is an important public health problem in most developing countries (Soekarjo et al., 2006). Iron deficiency is impairing the mental development of 40-60 percent children in developing countries. Worldwide, $50 billion in GDP is lost annually

in Low-Estimates of Economic Losses from IDA (Cognitive & Productive) as % of GDP income countries due to IDA's effect on productivity (World Bank & IFPRI, 2010). Anaemia may produce academic under-achievement and behavioural disturbances in school children. A departmental study showed that anaemia is likely to adversely affect physical work capacity and cognition in young adolescent girls undergoing pubertal development. Adolescence is a time of increased iron requirement because of the expansion of blood volume and increase in muscle mass. During adolescence, requirement for growing boys also jumps up significantly due to muscle mass development. The deficiency gets further aggravated due to food habits that are out of order, lack of awareness, inadequacy of nutritious food intake, and poverty (Mittal, 2008).

The July 2012 executive brief of the Food and Agriculture Organization of the United Nations (FAO) on the acute food crises in the Sahel region of West Africa, estimated that about 1 million children under the age of five are at risk of severe acute malnutrition (FAO, 2013). Poor nutrition leads to iron deficiency. Iron deficiency contributes to the deaths of young women during pregnancy and childbirth and is a leading cause of anaemia. Sub-Saharan Africa has the highest prevalence of anaemia among preschool-age children and both pregnant and non-pregnant women, making African countries to have among the highest risk of iron deficiency in the world (FAO, IFAD & WFP, 2014).

2.4.3 Importance of Nutrition

School going children are the future generation of any country and their nutritional needs are critical for the well-being of society. The complex myriad

of physiological as well as psychological changes, accompanied by rapid growth and increase in physical activity, creates special nutritional needs that are higher during adolescence than at any other time in life. Failure to consume adequate diet at this time can potentially retard physical growth, intellectual capacity and delay sexual maturation; advocacies from WHO (2018) still enforcing the need for the promotion of nutrition and accountability. Addressing the nutrition needs of school going children could be an important step towards breaking the vicious cycle of intergenerational malnutrition, chronic diseases and poverty. Investment in effective nutrition programs at scale could also result in earlier school admission, children staying in school longer, and better school performance. In addition, investing in nutrition now would result in economic gains through improved productivity. By decreasing stunting alone, economic gains could exceed 720 million cedis (US$504 million) by 2020.

Epidemiological evidence from both the developed and developing countries indicates that there is a link between foetal under-nutrition and increased risk of various chronic diseases during adulthood (Weiler et al., 2015).

School going period is considered as a nutritionally critical period of life for several reasons:

- Firstly, the dramatic increase in physical growth and development puts greater pressure on the need for nutrients. During this period, children will experience a weight gain equivalent to 65% of their weight at the beginning of the period or 40% of their final weight, and a height gain equivalent to 15% of their adult height.

- Secondly, there may be socio-cultural factors or change of lifestyle and food habits of children that can affect both nutrient intake and needs.
- Thirdly, growing children have increased nutrient requirements.
- Fourthly, school age can be the second opportunity to catch up growth if environmental conditions, especially in terms of nutrient intake are favourable.
- Finally, psychological changes and development of their own personality can impact on their dietary habits during certain phases of their lives (WHO, 2018; Vardanjani et al., 2015; & Ministry of Health, 2014).

School going children have typically been considered a low risk group for poor health, and often receive few healthcare resources and scant attention. However, their health can be improved by healthy lifestyles and proper nutrition (FAO, IFAD, UNICEF, WFP & WHO, 2017). Good nutrition during school age is critical to cover the deficits suffered during childhood. Dietary intake with respect to adequate availability of food in terms of quantity and quality (particularly, the mean caloric intake), ability to digest, absorb and utilize food and the social discriminations against girls can greatly affect the adequate nutrition of these children (Claxton, 2014).

2.4.4 The Situation of Malnutrition in Africa and Ghana

The Food and Agriculture Organisation (FAO, 2013) projected a total of 925 million people malnourished in 2010 and close to 162 million children under the age of five in developing countries are stunted due to chronic under-nutrition. Also, 148 million children are recorded to be underweight. Malnutrition affects

close to 2 billion people (over 30 percent of the world population) with severe public health concerns (FAO, 2013). This major health issues for developing countries has generated unacceptable health implications with grave consequences on human development and economic growth (FAO, 2013).

Africa is the continent with the second largest number of hungry people, as Asia and the Pacific had 578 million, principally due to the much larger population of Asia when compared to sub-Saharan Africa (FAO, 2010). Sub-Saharan Africa actually had the largest proportion of its population undernourished (30% in 2010) (FAO, 2010). Thus almost one in three people who live in sub-Saharan Africa were hungry, far higher than any other region of the world, with the exception of South Asia. The principal causes of hunger were deduced to be poverty, harmful economic systems, conflicts, environmental factors such as drought and climate change, and fast population growth (WHES, 2012).

The FAO (2010) noted that the principal underlying cause of poverty and thus hunger in Africa and elsewhere is the ordinary operation of the world's economic and political systems. Essentially, control over resources and income is based on military, political and economic power that typically ends up in the hands of a minority, who live well, while those at the bottom barely survive. The role that harmful economic systems play cannot be underestimated and ignored. Controlling the government and other sources of power and income is a fundamental way of obtaining income. A senior food and nutrition adviser to Nepad, the development arm of the African Union, claimed that twelve people die of hunger every minute in Africa. If true, it would mean that 94,000 people

die of hunger every five-and-a-half days, hence 5-million people die of hunger in Africa every year. In a programme which focused on food insecurity and widespread malnutrition in Africa, the WHO (2013) stated that "about 300 million Africans are undernourished. That is simply unacceptable. Twelve people die of hunger and malnutrition every minute". Four documents were provided supported the claim: a joint Action Plan on "nutrition security" that was drawn up by the European Union and the United Nations Children's Fund; a 2012 Nepad Seminar Report on Nutritional Strategies in Eastern and Southern Africa; a 2010 African Union food and nutrition security discussion paper; and a draft of Nepad's ten-year strategy for reducing vitamin and mineral deficiencies (WHO, 2013).

Africa Check (2013) indicated in their publication that the vast majority of children, who due to the fact of not having the right nutrition in the very earliest parts of their lives, are very susceptible to infectious diseases, like measles. They further indicated that a child who had good nutrition would just shrug it off, but for a child who is really fragile and has a compromised immune system, infectious diseases becomes really life threatening. Their comments were re-echoed that people don't die of hunger, but rather from acute malnutrition and/or related diseases. Simply attributing it 'due to hunger' isn't precise enough. In reality, people – mainly children – die from malnutrition or related pathologies, which is different from hunger: one can pack the stomach of a child with wheat and water, he/she won't be hungry but will become malnourished because of the lack of proteins, vitamins and minerals" (AC, 2013).

According to WHO mortality data, about 9.5-million people died in Africa in 2011. Of those deaths, only 396,161 were attributed to "nutritional deficiencies". "When talking about malnutrition, it is estimated that malnutrition is the underlying cause of 35% to 40% children's deaths," With an estimated 7-million children under the age of five dying every year globally, this means some 2.6-million deaths of children are linked to malnutrition globally" (WHO, 2013). Hunger and malnutrition pose serious challenges on the African continent and even the number of people dying as a result of "nutritional deficiencies" is devastating and unacceptable. To combat hunger and malnutrition in a targeted manner, aid organizations and governments need to put in all and work, as well as putting in stringent measures and devise policies to properly work with scarce allocated resources, and to encourage the cultivation and consumption of resistant and nutritious indigenous food crops.

In Ghana, increasing numbers of people have gained access to basic services, but progress is not uniform. Ghana's capacity and willingness to harness its economic and social potential have yielded impressive results, particularly over the last decade (GSS, 2014). However, the progress is not uniform. In Ghana's northern regions, the majority of the population continues to go without basic services and those who are poorest are seeing little benefit from Ghana's growth.

Malnutrition is a significant indirect cause of child mortality, contributing to one-third of all childhood deaths. Although levels of malnutrition in Ghana have dropped, 23% of children are stunted and 57% are anaemic (GSS, 2014), probably due to poor nutrition in Northern Ghana, where almost two in every

five children are stunted and more than 80% of children suffer from anaemia (IFPRI, 2015). WHO (2010) in their report stated that non-communicable diseases are the leading global causes of death, causing more deaths than all other causes combined, and they strike hardest at the world's low and middle income populations. These diseases have reached epidemic proportions, yet could be significantly reduced, with millions of lives saved and untold suffering avoided, through the reduction of their risk factors, early detection and timely treatments. Ghana happens to be one of the countries with high proportion of children less than five years being under-nourished. Over the years, the government of Ghana, in collaboration with her local and international partners has put in place deliberate programs to help curb the menace of under-nutrition among infants and young children in the country. It is important to find out if these programs have had an impact on child under-nutrition in the country. This is particularly vital because in Ghana, most of the analyses in this area focus on the national level trends.

The factors responsible for under-nutrition included stunting (prolonged deprivation of nutritious food) and wasting and underweight which are as a result of acute significant food shortage and/or disease and indication of extreme hunger. Ghana made some gains in the reduction of under-nutrition among children under-five years old. Stunting for instance was decreased among Ghanaian children from 34% in 1993 to 26% (a 23% reduction) by 2008. Although, the decrease is a positive development, the 23% reduction over 15 years was not good enough for Ghana to be able to meet the target set by the WHO that every country should endeavour to reduce childhood stunting by 40%

by 2025. One cannot however lose sight of the fact that worsening under-nutrition in the rural and urban settings is worrying and needs an urgent attention. Under-nutrition has worsened among children of mothers with no formal education. There is a need for effective programs that will effectively address stunting and wasting which still remain high among children in the country. Targeted interventions such as education and advocacy for the use of indigenous foods and the importance of dietary diversity are therefore needed to address this trend.

2.4.5 Importance of Growth Monitoring

The best global indicator of children's wellbeing is growth, as growth monitoring has been defined as the regular measurement, recording and interpretation of child's growth change. The assessment of growth does not only serve as a means of evaluating the health and nutritional status of children but also provide an excellent measure to decide future action that comes with numerous advantages which includes the early identification of children at high risk of malnutrition. This enhances the transfer of nutritional information by providing data concerning children's growth patterns that can be used in tailoring nutritional advice and interventions. Growth is the fundamental physiological process that characterizes childhood. Growth monitoring has been widely regarded as an essential element of primary health care. The potential of growth monitoring lies in its use as a diagnostic tool for identifying a child with nutritional or health problem, thus enabling action to be taken before the child's nutritional status is seriously jeopardized (De Onis 2016). The main anticipated benefits for growth monitoring in developing countries includes the following:

1 Early intervention when growth faltering is more easily remedied,

2 Improved knowledge about the effect of diet and illness on growth,

3 Families motivated and enabled to take effective action,

4 Greater self-reliance and self-esteem,

5 Fewer referrals for curative care; cost saving and communities mobilized to address underlying socio economic causes of poor health.

Monitoring child growth and development is a routine part of child health care in many countries. In a typical scenario, the health care worker plots heights and weights on a reference diagram, and assesses whether the growth pattern of child deviates from that of the reference population. The best way to measure nutritional change of children is taking the anthropometric measurements of children (De Onis, 2013).

2.5 The Global Food Situation and Nutrition

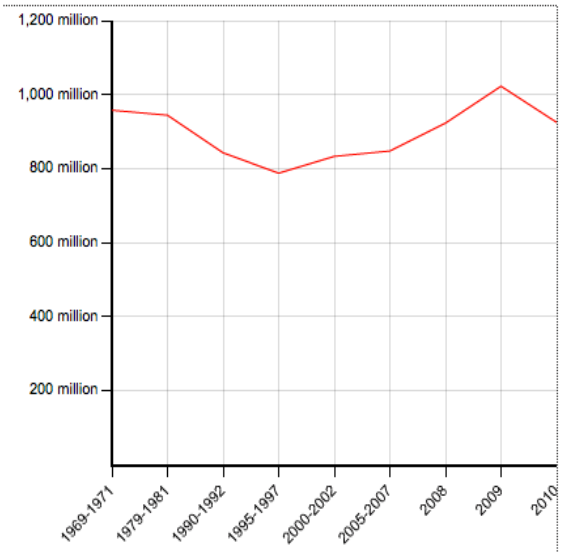
About 870 million people currently suffer from hunger and chronic malnutrition. The economic and financial crisis, the consequences of climate change, and the decrease in the amount of usable agricultural land worldwide have aggravated the situation (FAO, 2013). Hence with the adoption of a joint communiqué by the Berlin Agriculture Ministers' Summit (BAMS), the Global Forum for Food and Agriculture (GFFA) and the 2016 Berlin World Food Conference (BWFC), deliberated on the topic: "How to feed our cities – Agriculture and rural areas in an era of urbanisation" and called for the issue of food security, a policy that should be made a priority on the global agenda. United Nations Secretary-General at that time, Ban Ki-Moon also emphasised in the GFFA 2016

conference that "…ensuring that everyone in growing urban cities has access to nutritious food is crucial to achieving the goal of ending hunger".

In agreement, the International Food Policy Research Institute (IFPRI), in their Global Nutrition Report in 2015, highlighted food and nutrition security as vital to sustainable development as well as actions and accountability to advance nutrition and sustainable development with a strong signal sent for the fight against hunger and for food and nutrition security. A comprehensive picture of the global food and nutrition situation was emphasized in the report with the fact that poor nutrition plays a role in all countries of the world, be it in the context of the fight against hunger and malnutrition, be it in the form of anaemia and stunting or in the form of excess weight among children and adults in industrialised countries (IFPRI, 2015). It was further pointed out that the improvement of global nutrition required interdisciplinary analysis and actions as "…health issues play an important role in this context, as do water supply and sanitation, food production, and information and education campaigns on the consequences of poor nutrition (IFPRI, 2015). Fighting malnutrition has become the focus of IFPRI under the special initiative 'One World – No Hunger' as every year, a billion euros are provided from the budget of the Federal Ministry for Economic Cooperation and Development for food and nutrition security projects. Haddad, Nisbett, Barnett and Valli (2014) in their report also emphasised that healthy nutrition was vital to sustainable development in all countries. National governments, civil society and the private sector need to jointly shoulder responsibility for fighting hunger and malnutrition, with strongly coordinated actions. Their findings and recommendations of the report

informed the debate on the new Sustainable Development Goals (SDGs) that was adopted by the United Nations, which was not only relevant for the goal of a healthy and balanced diet for millions of people, but also in terms of the risks which continuing malnutrition posed to the achievement of other goals.

The Global Nutrition Report was a wake-up call for the international community, making a convincing case for pushing nutrition to the top of the development agenda. “With the launch of the Sustainable Development Goals, there is the window of opportunity to put health and nutrition at the centre of the food system. Low cost nutritious products should be available to all individuals, regardless of where in the world they live” (IFPRI, 2015). Good nutrition therefore signals the realization of people’s rights to food and health and it reflects a narrowing of the inequalities in our world. Without good nutrition, human beings cannot achieve their full potential. When people’s nutrition status improves, it helps break the inter-generational cycle of poverty, generates broad-based economic growth, and leads to a host of benefits for individuals, families, communities and countries. The graph below shows records of the number of people hungry globally with their respective years:



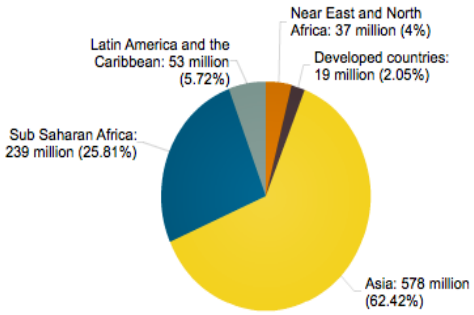


***Figure 2.1**: Impact of Global Food Shortage on malnutrition*

Source: FAO, (2010)

From the graph, 98 percent of hungry people live in developing countries with 63 percent in Asia and 25 percent in Sub Saharan Africa. The reason for these worrying rates of increase, despite a concerted global effort to reduce hunger and increased food production over the same time period, owes itself to many factors. Physical factors are often a trigger for acute hunger episodes, like famines but there are long term overarching human factors that affect food price and impact peoples' ability to afford food despite its availability. An important factor driving increased hunger in the world today has to do with the free market. European Union, USA and multilateral institutions have pursued free market conditions to create competition and new markets, developing countries have been opened up to the global food supply. This direct connection with European and American subsidised food supply created a number of backlashes. Firstly, cheaper refined foods import undermined local indigenous food production and alongside reduced domestic support, local farmers found it difficult to compete

on price. This led to smaller incomes and increased food insecurity. Secondly, global food supplies were volatile to price changes based on global conditions, including oil price as well as commodity trading. This trade in food as a commodity, left people to be more at risk to food shortage as prices increased. Furthermore, the cost of food in family budgets increased greatly in developing countries than for families in developed countries. Increases in food prices therefore had a more immediate and damaging impact on food security in developing countries (FAO, 2010).

2.5.1 Food Crisis and Its Impact on Nutrition

Africa has been experiencing several episodes of acute food insecurity causing an immense loss of life and livelihoods over the past decades. Indigenous foods deserted and scorned by many in the farming communities as well as by urban consumers, could have been a vital component in easing hunger and starvation. FAO (2013) stated in their report that globalization has reduced plant species used for food and other purposes from roughly 100,000 to about 30,000. While the global population is expected to reach around 9 billion by 2050. FAO is disturbed that the world may not be able to produce sufficient food to meet demand. Much of this growth will be concentrated in Sub-Saharan Africa (SSA), where annual population growth rates are expected to range from between 1.6% to slightly more than 2.4% between 2010 and 2050 (FAO, IFAD & WFP, 2014). How will Africa be able to cope with its food security challenge? How can Africans feed themselves and the rest of the world? Although Africa is the most endowed arable and rich land in the world, the question still remains, why is it in this state? The causes of food insecurity and malnutrition in Africa are diverse,

multi-factorial and interlinked. Poverty and food shortage are the main catalysts of food insecurity in Africa. Despite the rapid economic growth rate in SSA over the past decade, there is historical evidence that this has not been converted into poverty reduction as effectively as in other developing regions, like East Asia and the Pacific (FAO, IFAD & WFP, 2014). Poverty constrains the ability of farming households to invest in productive assets and agricultural technologies, resulting in insufficient agricultural productivity. In addition, African importers are unable to profitably bring in the food needed to make up national food deficits, simply because poverty is so great that insufficient demand is expressed through the market system.

Violent conflicts have thwarted all efforts to establish food and nutrition security in Central and East Africa. Violent conflicts, as well as ethnic unrest involving fights over water and grazing resources, the stealing of livestock, inter-tribal conflicts and quarrels over border lines, have contributed to the displacement of people, disruption of transportation and market transactions and subsequently, lack of access to food (FAO, 2013). Also, over the past 30 years, Africa had become subject to erratic weather patterns and was often plagued by prolonged droughts followed by floods. These natural shocks triggered adverse consequences, including widespread food insecurity. Sub-Saharan Africa is the second-most severely affected region for climatological disasters among the developing regions of the world. This is because the temperatures are generally already high, and most of the region's inhabitants depend on rain fed agriculture for their livelihoods. Only 4% of cropland in SSA is irrigated, compared with a global level of almost 20% (FAO, 2013). Furthermore, the rural farming

populations are the most affected because of their extremely low adaptive capacity, which is linked to acute poverty levels. It is believed that prolonged drought experienced in certain regions of the continent frustrated the expected reduction in poverty and food insecurity, despite the economic growth experienced across the continent over the last decade. Drought related acute food shortage in the Sahel region of West Africa and the Horn of Africa have resulted in the deaths of tens of thousands of people (FAO, 2013).

Food insecurity and malnutrition had given rise to many consequences for health and development, with mothers and children most vulnerable to the devastating effects. Malnourished mothers are at a greater risk of dying at childbirth and of delivering low-birth-weight babies who fail to survive infancy (GSS, 2014). Undernourished babies who make it through infancy often suffer stunting that cripples and shortens their lives. Malnutrition is a direct effect of food insecurity. Malnutrition is a silent killer that is under-reported, under-addressed and consequently under-prioritized. The United Nations Standing Committee on Nutrition (SCN) 5th report described malnutrition as the largest single contributor to disease, taking a particularly severe toll on preschool children. One in three developing country pre-schoolers children under the age of five – suffered from stunting as a result of chronic malnutrition (GSS, 2014).

2.5.2 Demographic Impacts on Food Insecurity

There have been concerns related to population pressure and food supply. Food insecurity often arises at the regional scale, within fragile climatic zones and impoverished regions of countries. Food supply at the global scale is often

considered to be of a lesser concern. Sources of increased production had been significantly achieved and it is predicted that the increases are due to arable land, increases in crop intensity and increases in yield. According to the summary report of "World agriculture: towards 2015/2030", FAO (2010), they cited that: *"Globally there will be enough food for a growing world population, however, hundreds of millions of people in developing countries will remain hungry as many of the environmental problems caused by agriculture remain serious".*

The population over the years have increased rapidly. Rural population, despite experiencing rapid rates of out-migration, have also increased considerably. The differential rates of growth have caused the migration of people out of rural food insecure regions into urban food secure regions. Sub-Saharan Africa has one of the world's fastest growing populations (approximately 2.2% a year), and is expected to be home to over a billion people by 2025. In recent years, population growth rates have declined from 2.4 percent in 1997 to an expected rate of less than 2.3 percent today (FAO, 2010). Since only a small portion of the total land area of the Sahel is suitable for agriculture, the ratio of inhabitants to available agricultural land thus presents a much darker picture than low population density might suggest. This scale of population pressure on fragile cultivable land creates enormous stress. Consequently, food insecurity is increased, leading to a number of stresses including, over-cultivation as a result of monocultures and overgrazing from livestock. These problems are compounded by inheritance laws that subdivide land amongst sons.

With regards to trade policies and food dumping, small import-dependent countries, especially in Africa, are deeply affected by food shortage and economic crises (Hunger Report, 2016). Larger countries (e.g. Asia) were able to protect themselves more through restrictive trade policies but this trade insulation only served to increase prices and volatility on international markets. Small importing African countries were really badly affected as domestic staple food prices rose substantially in these countries. These trade policies were an important factor on outcomes as many countries imposed export restrictions or reduced import barriers (Hunger Report, 2016). In addition to trade policies, releasing public stocks and providing consumer subsidies were among the most common measures adopted as countries attempted to contain the problem of rising prices (Hunger Report, 2016).

2.6 Nutritional Knowledge of Indigenous Foods

The indigenous nutritional knowledge of indigenous foods and its consumption still remains unacceptable in present day Africa and Ghana. These indigenous foods remain an important and main source of nutrition for a lot of indigenous people in their local communities (WHO, 2013). Hence malnutrition, hunger, and poverty can be minimised through the conservation and patronage of these indigenous food crops that contain high nutrient in their natural state. Studies on indigenous foods have been highly beneficial in the bid to acquiring knowledge on the richness of biodiversity, its importance in diets and other measures for its conservation and utilization (Dias & Ryder, 2011; Aijuka, 2013; Biodiversity International, 2013). The lack of nutritional and agronomic knowledge of indigenous foods has a negative effect on its consumption, preservation and the

resultant non-implementation of policies to recognize its important roles in food security and health (FAO, IFAD & WFP, 2014). Also, because much knowledge does not exist, there is the lack of advocacies to champion the course of these indigenous foods in most localities (Aijuka, 2013).

FAO (2013) indicated that traditional and indigenous food systems, when extinct, are difficult to restore, and so underlined the importance for appropriate documentation, compilation and dissemination of fading knowledge of these indigenous foods. FAO (2013) further noted that abandoned indigenous foods can be an important element for poverty and hunger alleviation, curb malnutrition as well as protect the environment. In addition to the under-utilization of indigenous foods in Ghana, many stakeholders and other relevant authorities (e.g. hospitals, ministries, health sectors) have little to no knowledge and no records of indigenous foods of communities for future references, as Abukutsa-Onyango, Kavagi, Amoke and Habwe (2010) indicated that African indigenous vegetables have lots of high nutritional and health benefits that are yet to be researched and exploited. Almost all indigenous foods, both plants and animals, contain nutrients essential for fully nourishing the human body. Abukutsa-Onyango et al., 2010 demonstrated in their study that, African indigenous vegetables have high nutritional value and so have high potentials in the use of nutrition intervention programs. The high malnutrition rate in developing countries is a predicament of Protein energy malnutrition (PEM) (Butt & Batool, 2010).

Several institutions, individual researchers, health personnel, academic scholars, and food nutritionists continue to seek evidence-proved answers to the relevance of nutrition knowledge on food choices, healthy eating, and the value of nutrition education (World Bank, 2013). Benzie and Choi (2014). The International Food Policy Research Institute (2015) highlighted the importance of nutrition knowledge in public health nutrition, with recent works suggesting its significant and pivotal role played in the adoption of healthier food habits. Hence the implication of paying greater attention to the development of the people, taking account of their personal food goals, habits and similarly related factors informing their acquisition of nutrition knowledge. Thus nutrition knowledge has been shown to be associated with food consumption, as it plays a vital role in adopting optimal nutrition practices, planning healthful menus, conducting nutrition education activities and routinely introducing basic nutrition concepts. The lack and exhibit of seemingly lackadaisical attitude towards the essence, acquisition, and utilization of nutrition knowledge has been one of the main reasons for improper practice and consequent nutrition problems, which has led to several complications and health issues such as malnutrition, obesity and non-contagious diseases especially among children (Centres for Disease Control and Prevention (CDC), 2013). Discussed below are the nutritional benefits of proteins, carbohydrates, fats/oil, vegetables, and fruits.

2.6.1 Protein

Proteins are responsible for the development as well as the upkeep of all the body cells and structures. Proteins help to develop the bones, muscles, blood cells, skin and the hair. They are the building blocks of enzymes that contributes

in facilitating many of the chemical reactions within the body, these include food breakdown. Animal proteins have all the essential amino acids and therefore are considered to be of greater nutritional value. However, proteins from plant sources are equally important for the sustenance of the human body (Galan, 2016). A study from Modern Lifestyle (2010) noted the importance of consumption of both animal and plant protein for the body to obtain higher nutritional values. Ryan (2016) highlighted on the moderate consumption of meat with Moffett (2015) limiting the daily consumption of meat products to 6 oz. Protein found in meat has been noted for the promotion of healthy muscles, nerves, heart, maintaining a healthy immune system, repair damaged cells and manufacture new cells.

Dairy products are another essential body building food product produced from the milk of mammals and are considered nutrient-rich. They are a good source of calcium, vitamin D, phosphorus, potassium, magnesium, vitamin A, B12 and riboflavin. Dairy products are known to contribute to the development and maintenance of strong and healthy bones, as well as reducing the risk of cardiovascular disease and type-2 diabetes. (Liang, Patel, Matia-Merino and Golding, 2013) noted the essence of consuming dairy products in moderation as they can contribute to significant amount of cholesterol and saturated fat to the body.

2.6.2 Carbohydrates

The body's main source of energy comes from carbohydrates, and these are mainly starch. It is generally known that we have two types of carbohydrates,

and these are simple carbohydrates and complex carbohydrates. The simple carbohydrates are mostly found in fruits and vegetables products. Youdim (2016) noted the essence of complex carbohydrates found mostly in cereals and fats/oils. Cereals such as rice, maize, wheat, barley, sorghum, millets and oats have provided limitless health benefits to the human race as their principal food. These being high in complex starch, gives ample energy and aid in the prevention of cancers, constipation, colon illnesses, diabetes and also improve one's total health. Modern Lifestyle (2010) also cited the health benefits of complex carbohydrates by noting how it lowers blood cholesterol levels as well as keeping off heart diseases. In general, there are two forms of carbohydrates. These are in the form of refined carbohydrate and whole carbohydrate. Whole carbohydrates are unprocessed and contain essential nutrients and high in fiber, they include, fruits, legumes, whole grains cereals and some vegetables and consuming these whole carbohydrates that are natural generally enhances one's health (Wu, Ding, Tanaka, & Zhang, 2014). On the other hand, the refined carbohydrates are processed carbohydrates with their natural fiber stripped out, these include white pasta, sweetened beverages, pastries, white bread, and polished perfumed rice. To mention a few. Consuming these refined carbohydrates is associated with health problems like obesity and type 2 diabetes (Liu, 2002).

Sugars have been known to be mostly found naturally in fruits, vegetables and carbohydrate. Most commonly used sugars such as table sugars, honey, and high fructose corn syrup contain glucose which is the fuel used by the brain and the primary fuel used by the working muscles and provides the body with energy.

(Moffett, 2015). Sugars such as glucose, fructose and sucrose are found in fruits and vegetables, and they occur naturally and are healthy to consume (WHO, 2015).

2.6.3 Fats and Oil

Fats and oil, found in foods such as peanuts and olive fruits, contains cholesterol, phospholipids, in addition to triglycerides. Many have advocated the consumption of very little fat to maintain good health. It is significant to note that the quality of fat eaten as well as its quantity is important. Fats and oils in diets are mainly to furnish energy to operate the human body, hence Moffett (2015) also advocating its consumption in moderation as a tablespoon (about 5mls) of fat or oil has about 120 calories. Fats and oils are often obtained from different sources. Vegetable Oil can be obtained from peanut, soya bean, sunflower, sesame, coconut, olive, and other vegetable, while Animal Fats are from lard, fish oil, and butter and also from fats in milk, meat and under the skin of the animals. Hydrogenated oil which is vegetable oil that has been hydrogenated are not healthy hence should be avoided and even partially hydrogenated oil, thus, vegetable oil that has been hydrogenated to some degree should also be avoided. Moffett (2015) made observations of studying and taking note of which particular fats and oil one should consume in the presence of unhealthy oils on the market.

2.6.4 Vegetables and Fruits

There are lots of health benefits in eating fruits and vegetables. Making vegetables and fruits part of one's diet will reduced the risk of some chronic

diseases. Dietary fiber from vegetables, as part of an overall healthy diet, supports in the reduction of blood cholesterol levels and also lowers the risk of cardio vascular diseases. The fiber in fruits and vegetables are important for excellent bowel functioning, by preventing constipation and diverticulosis. Foods with high fiber such as vegetables and fruits gives a feeling of fullness. They however contain fewer calories. Vegetables and fruits are vital for health and maintenance of the body, they are essential sources of many nutrients, including potassium, dietary fiber, folic acid, vitamin A, and ascorbic acid. Almost all vegetables are naturally low in fats and some vegetables stand out from the rest with additional proven health benefits, such as the ability to fight inflammation (Moffett, 2015).

Fruits have formed the human diet over the entirety of human history. They are eaten raw, chilled and in ever creative combinations with other fruits. Fruits are a good source of vitamins and minerals. Fruit do not have high calories and are low in fats. Also, we get simple sugars, fibre, vitamins and some minerals from fruits, which are indispensable in the improvement of peoples' health. Fruits offers a lot of soluble dietary fibre, which helps in the removal off cholesterol and fats from the human body. It again helps in smooth bowel movements as well as offering relief from constipation. Moffett (2015) indicated that fruits are protective foods which are composed of many anti-oxidants that helps the body to be protected from oxidant stress, diseases, and cancers, and also, helps the human body build the capacity to fight against these diseases by boosting the body's resistance level.

The health benefits of fruits are embedded in their richness in vitamins, minerals, micro-nutrients and pigment anti-oxidants. These rich compounds rooted in fruits help the body check or prolong aging by protecting the body cells from damage and rejuvenating cells, tissues, and organs as well. Again, fruits do help preserve the bone mass and muscle tissue. Benzie and Choi (2014) in a study on clinical trials, established that when one consumes any diet rich in fruits becomes healthier and reduces the risk of heart diseases as well as other protracted diseases. They anticipated more than 20% of all cancer cases can be prevented and roughly 200,000 deaths that are linked to cancer could be avoided yearly. They also suggested that intake of fruits rich in antioxidants and anti-inflammatory components will help in slowing down age-related cognitive drops and the risk of developing neurodegenerative illness (Benzie & Choi, 2014).

2.7 Consumption of Indigenous Foods

It is evidenced that Africans are blessed with promising domesticated food plants and animals in global terms; as a result, few animal and crops species were exported from other continents (Hunger Report, 2016). This is supported by Webb and Block (2012) who asserted that Africans are in fact blessed with foods that suit their environment which prevents them from developing strange illnesses, as most of the indigenous crops in Africa are medicinal by their nature. Earlier literatures also suggest that African Indigenous foods are best in terms of their efficacy in controlling disease (Bangana, Dossou, Wade, Guiro & Lemonnier, 2005; Raschke et al., 2007). These foods could therefore be explored as a means of solving food insecurity in Africa.

Africa has been identified to have a large representation of food diversity of over 150 food crops of which 115 are indigenous (Fanzo, 2012) and it has been estimated that 45% of crop species are endemic to tropical Africa. One phenomenon that has contributed to the underutilization and non-consumption of African crops is the globalization of the world food system by the capitalist economy, resulting in many governments based research institutions paying little or no attention to African Indigenous crop species and their potential for local crop improvement. The simple reason for the underutilization of Indigenous African crops is that most government research institutions are funded by overseas partners who set the priorities for research based on what they consider relevant. In such cases, indigenous crops that have little international appeal or do not promote global trade are considered irrelevant (HLPE, 2017).

The concept of food in global terms is erroneously grounded in the narrow sense of what the Western world validates and promotes as proper food; and the variance allocation of food constitutes an injustice to the European authority. This was supported by an emerging encounter between postcolonial theory and food studies that demonstrated how this hegemony permeates the imagination of humans (Roy, 2010; Tompkins, 2012). The wrongs of industrial capitalism are manifested in the ways food is grown and distributed, from seed (Kloppenburg, 2009) to retail and waste (Royte, 2008).

African Indigenous Food Crops (AIFC) are noted to be the indigenous food crops that are indigenous to a particular region or introduced to the region from

another geographical area, but have been used over a long period of time. AIFCs are sometimes referred to as traditional food crops or vegetables. Smith and Eyzaguirre (2007) distinguished indigenous food crops from traditional food crops of Africa. They explained that indigenous food crops are those that have their natural habitat in Sub-Saharan Africa, while traditional food crops were introduced over centuries ago and due to long use, have become part of the food culture in the sub-continent (Smith & Eyzaquire, 2007). Some of the characteristics of Indigenous or tradition food crops include: grown locally on small scale, often resistant to local diseases and pests, withstand environmental stress and well adapted to the local climate.

Indigenous foods have played and continues to play an important role in ensuring food security for farming communities and the entire nation. Notwithstanding this contribution, these indigenous foods have continually been side-lined for other foreign foods (Acipa, 2013). The cultivation and utilization of indigenous foods is therefore gradually declining due to little or no attention paid to them, this has further placed the rural communities at the risk of food insecurity. Indigenous foods constitute foods that people can easily have access to within their locality, and within traditional knowledge and the natural environment, from farming or from wild harvesting, without having to necessarily purchase them (Aijuka, 2013). In Ghana therefore, indigenous foods are defined broadly to comprise foods introduced into Ghana before 1900s and have been naturalized and modified to local conditions. These are more than just foods for they touch a broad spectrum of indigenous peoples' lives. Although the knowledge of indigenous foods tends to be the main tool that can help to

alleviate hunger and malnutrition among the rural communities, it is also used as part of culture as indigenous foods are prepared on special occasions such as traditional marriages, child naming ceremonies, circumcision, burials rituals and festivals (Claxton, 2014).

Indigenous foods, which are sometimes undervalued and classified as 'foods of the poor' or 'forgotten foods' – play an important role in alleviating hunger and malnutrition since they contribute to dietary diversity and are generally reported to be a good source of nutritional values such as macro and micronutrients. Some of these indigenous foods are also believed to be medicinal, and are used for curing different kinds of ailments (Acipa, 2013). These indigenous foods include brown rice, millet, shea butter used as cooking oil, cosmetics, and medical use, locust beans (Dawadawa) which is believe to cure inflammation is used for stews and soups and also used to promote good eye sight and helps to cure or manage hypertension and disease conditions like stroke and diabetes, groundnuts for stews and soups, which are high in protein, calcium, potassium, phosphorus, magnesium and healthy fats. Root crops include potatoes, cassava, cocoyam and yams which have the potential to provide one of the cheapest sources of dietary energy in the form of carbohydrates (Aijuka, 2013).

Ghana is rich in agro-biodiversity hence it is not far-fetched to agree with the indigenes to 'go local', so as to enhance local food security and maximize the utilization of locally available foods. This can be achieved through advocacy, education, publicity and creation of the enabling environment that will lead to a

better understanding of the indigenous foods that will help in changing the mind-sets of people on indigenous foods.

The big question still remains; are these potentially viable indigenous foods consumed to their fullest or barely eaten whiles other foods are used as substitutes? First of all, westernization and eating habits throughout history and in contemporary times have made people adopt different food items, modes of food preparation and ways of serving and eating particular foods, which were previously not part of their food culture. Not forgetting the change in tastes and food preferences being influenced by cultural contacts through migration, urbanization, trade and change in religious membership or beliefs (Claxon, 2014). The adoption and diffusion of food has occurred in every part of the world. For example, food items such as coffee from Africa and tea from Asia contributed significantly to the development of the Western world through making the West and the North the industrial hub of the world (Claxon, 2014).

Secondly, dietary preferences have been seen as a course of the non-consumption of indigenous foods as a complete class of sociocultural concerns are related to food shortages which is related to food utilization patterns and food preferences (Cloete & Idsardi, 2013). It is easy to think of these as relatively unimportant, because for instance, a preference for maize over millet in a food-short region might be seen as unimportant relative to total calorie availability. Meanwhile, food preferences are one set of issues that influences and determine what foods are cultivated and whether farmers, as in the case of drought-prone Sub-Saharan Africa (SSA), sow and harvest drought-tolerant sorghum or sow a riskier maize crop that totally fails in drier seasons (Turner, Plotkin & Kuhnlein,

2013). In view of this, the World Bank (2013) has recognised the overutilization of some non-indigenous cereals such as wheat and rice and that they are a key contributory factor to the African agricultural crisis: importations of these cereals have soared over the last twenty years to the disadvantage of the cultivation of other local and staple crops. Wheat and rice can both be grown in most African countries but only at costs far greater than the price of imports. Whether tastes for these imports grew in an era of economic prosperity, as was the case during the Nigerian oil boom years, or as a result of dearth relieved by food aid, dependence on imports persists and has created a mismatch between economically feasible local production possibilities and consumer demand (FAO, 2013).

Another major factor is the inability of guardians or mothers to feed families with indigenous foods as indicated by Women in Agricultural Development (WIAD, 2013) as mothers are to be blamed for the poor consumption of indigenous foods. The poor consumption of local dishes and snacks by Ghanaians, especially children, has been blamed largely on mothers and operators of restaurants and not merely because of low demand. The Director of WIAD of the Ministry of Food and Agriculture revealed in the Ghana News Agency and cited ignorance of traditional food recipes and their nutritive values by parents in homes and in contemporary time as a major factor. She indicated that *"...when you go to our restaurants today, it is all about plain rice, fried rice, colour rice and or jollof rice. If you are lucky you will find Waakye, (rice and beans) there. You hardly even find fufu. If you want fufu, it is upon request. As for Kokonte, never!"* she said. She continued *"...Our children don't eat the*

local dishes because their mothers don't introduce them to it. And when they prepare, the children think it is medicine because it is green. Our mothers are failing us; If our children are eating our traditional foods, it means the food crops being produced by farmers will be bought and there will be ready market for our farmers and therefore our policy as a Ministry for creating wealth for our farmers it will become a reality" (WIAD, 2013).

2.7.1 Factors Influencing Food Choices

Studies have compiled several factors that informs the food choices of a person. Wansink et al., (2007). Asserted that, the average person makes more than 200 food choice decisions daily and that these food choice decisions are influenced by a myriad of interrelating factors. The concept of food choices involves complex process that depends on culture, social, economic, emotional factors and availability and accessibility. Wouters et al., (2010) revealed in their study that environmental factors such as the availability of food is a strong predictor of food choices. Pearson et al., (2009) revealed in their studies that fruit and vegetables availability in the home was positively associated with children's fruit and vegetable consumption.

Parents are a major influence on the food choices of their children. They make decisions about which foods are available at home, and where and when foods can be eaten in the house. As enforcers of food rules, parents seek the delicate balance between setting rules about food choices and ensuring that they are followed. For example, a parent may decide to limit or increase the supply of certain foods at home since its availability is positively associated to

consumption. In the same way, mothers will make food choices from the available and accessible foods in the community amidst other factors. Food availability, accessibly and consumption are all influenced by culture and religion. However, several studies identify poverty as a major determinant of dietary and health choices and in some cases cultural and religious considerations are of equal or higher importance. For instance, pregnant women may choose to abandon cultural food restrictions if the proscribed foods were to become available and affordable to them (Elena, 2015; Power, 2005).

Modernization and globalization are fast moving, and in the process have led to the availability and abundance of unnatural refined foods. It has also led to the adoption of sedentary Western lifestyles and leading to poor food choices and its related diseases among children and adults (Lieberman., 2003). Modern marketing and promotion of processed/refined foods using persuasive communication procedures and modern tools such as bill boards, radios, television, social media and internet is dominating, and this has oriented more people towards the consumption of these refined non-indigenous foods. These modern ways of promoting and advertising processed foods have a direct impact on nutritional knowledge, preference, consumption patterns and subsequently poor health (Cairns, Angus, Hastings, & Caraher, 2013).

2.7.2 Culture and Lifestyle on the Consumption of Indigenous Foods

Culture plays a major role and has a significant effect on the consumption of indigenous foods in communities. Many foods and indigenous crops have been avoided by the new generation due to factors such as westernisation, the

introduction of refined and processed foods and new lifestyles (Cloete & Idsardi, 2013). Modern lifestyles, work habits and new trends seem to aggravate the situation as families and individuals depend heavily on 'quick-fixes' in a bid to avoid early morning vehicular traffic in urban cities. Even in the rural communities where these indigenous foods are very prevalent, the situation of non-consumption has always existed, with the patronage of polished refined foods in high demands. Over years, this mere avoidance of certain foods has turned into a lifestyle of people which has also progressed into a tradition. Owen (2007) noted various factors which lead to the avoidance of certain foods. He noted that growing up in a typical culture, is bound to influence one's lifestyle, belief system and diet. In as much as there is the prevalence of 'modern foods', indigenous foods offer more health benefits leading to a healthy lifestyle. Owen (2007) further indicated that as people from one culture become integrated into another, their diets change, and sometimes not always for the better. A good instance is the shifting away from traditional eating patterns to a higher-fat and sugary diet leading to the increase in non-communicable diseases in our present generation. The olden days saw the consumption of indigenous foods which led to high life expectancy rates, good health coupled with low heart disease rates.

Cloete and Idsardi (2013) emphasized that in the midst of food insecurity, indigenous foods, which are regarded as 'poor people's food' can be deployed as interventions to unlock the potentials of these crops to enhance household food security levels. Cloete and Idsardi (2013) found out from a survey data that there is a link between the income levels and the consumptions patterns of these foods. This hence means that the higher the income level of people, the less

likely they consume indigenous foods nor are they likely to encourage others to do so. In this instance, the health benefits of these foods are unknown to them nor their processing method, preparation or overall knowledge known. Turner, Plotkin and Kuhnlein (2013) in their study also found that the consumption of indigenous foods is intimately connected to their socio-cultural, ecological, spiritual life and health. Because of their immense health and socio-economic benefits, a policy framework with clear directives on the acknowledgement of indigenous foods and associated knowledge systems needs urgent promotion using persuasive procedures.

2.8 Theoretical Review and conceptual framework

2.8.1 Communication / Persuasion Model of Dietary Change

The Communication/Persuasion Model of dietary change, propounded by McGuire (1989) sought to emphasize the modification of the attitudes of people as a way of changing their behaviour. These attitudes he noted, are predisposed to issues around, environmental situations, home stability and many other factors, either favourable or unfavourable. Behaviours ranging from general attitudes towards specific foods and dietary intake are subject to change if nutrition and health are to be achieved and enhanced. In this regard, communication and persuasion are very relevant and hold dominant positions in mediating between the acquisitions of new knowledge to cause the needed change. It is known that if certain behavioural changes are not implemented in avoiding certain foods, serious health implications would be incurred. Chaiken and Stangor (1987) in their review, noted that the acquisition of new knowledge is believed to produce new attitudes which in turn would produce new

behavioural changes in people. For instance, the acquisition of new knowledge on the composition of certain foods and their health implications makes one to either avoid or consume those foods.

Communicating dietary facts (education) plays an essential role in improving health. This communication process is a multi-dimensional/faceted transaction influenced by a number of factors. All aspects of the communication process (sender, message, receiver, understanding, feedback) needs full consideration in implementing this model. For instance, the application of this model in relation to nutritional knowledge is relevant in the following areas: of the message of nutritional foods, liking the message, understanding the message and concept, agreeing to the message, gaining skills to act on the message, making decisions and performing the action. Tones and Green (2004) noted that this model has clear planning stages which can be followed to obtain an outcome. Also, this theory can be used to achieve health/nutrition behavioural changes. McGuire (1989) criticised that the theory has an overly restrictive steps in achieving behavioural changes and may limit concentration on a single variable at a time. He added that the theory does not have a linear process which may make recipients perceive it as complex to comprehend.

Persuasive communication influences one's attitude and behaviour, this means that the content of the message must be critically considered since the intension is to sway the hearts and minds of people, even though there are other environmental factors that influences one's attitude and behaviour as stipulated by Albert Bandura.

2.8.2 Bandura Theory of Social Learning

Social Learning Theory originated from Bandura (1977), who believed that behaviourism alone could not explain all there is about learning. He believed that behaviour and the environment affected each other. The changes Bandura observed in a child's behaviour after watching an adult show aggression triggered him to his social learning theory. Bandura believed behaviour can be controlled through self-regulation. This requires a person to be observant, do critical analysis and make judgments about our environment and ourselves, and self-response. People both influence and are influenced by the world around them. Social learning theory also known as observational learning, occurs when an observer's behaviour changes after viewing the behaviour of a model. From the diagram below, Bandura shows an interactive or reciprocal relationship among knowledge, behaviour and the environment.

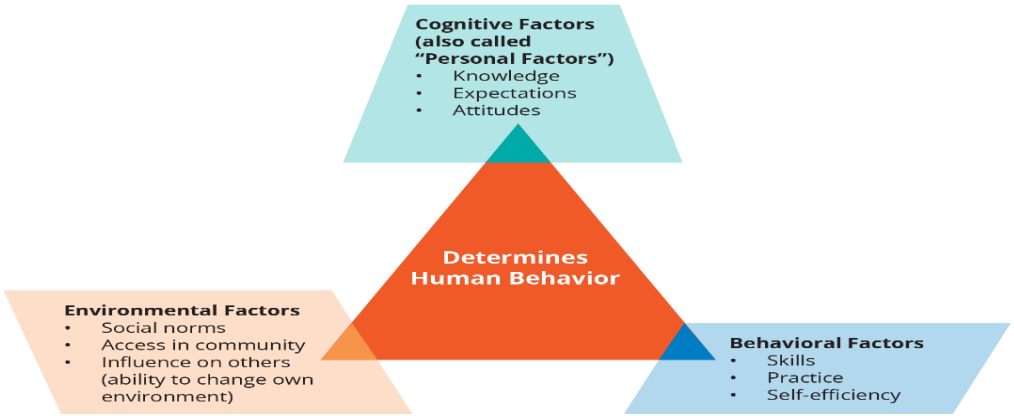


***Figure 2.2**: Bandura Theory of Social Learning*

Source: Adapted from Bandura's (1977) Study on "*Self-efficacy: The Exercise of Control".*

According to Lou (2013), Learning Theory stipulates that people can learn new behaviours by observing others. This also refers to the reciprocal relationship

between social characteristics of the environment, how they are perceived by individuals, and how motivated and able a person is to reproduce behaviours they see happening around them. Furthermore, Bandura demonstrated that in observational learning children learn and imitate behaviours they have observed in other people. The children in Bandura's studies observed an adult acting violently toward a Bobo doll. When the children were later allowed to play in a room with the Bobo doll, they began to imitate the aggressive actions they had previously observed.

In terms of indigenous nutritional knowledge and consumption of indigenous foods, what are the relationships in terms of personal factors, behaviour and the environment? Aligning Bandura's social learning theory to this study would mean that, knowledge about indigenous food and nutrient could be ascertained as a result of observing and interacting with the community (environment) and response to consumption will be based on the person's cognitive judgement of the information received from the environment. Therefore, it is expected that indigenous nutritional knowledge and consumption of indigenous foods will be influence by the environment, behaviour and the kind of knowledge available (food culture/taboos). Thus, if the environment has a cultural belief that eating certain food are forbidden, that will form the knowledge of the people and may reflect in their behaviour towards those particular foods. Again, if there are certain foods that are being downgraded by people within an environment, it could equally form part of the people's knowledge and would reflect in their behaviour towards those foods.

2.8.3 Conceptual Framework

This study adapted the Social learning theory by Bandura and the Communication/Persuasion Model of dietary change, propounded by McGuire (1989) as the conceptual framework to underpin the study. This is in recognition that the theory/model have tenets that are relevant to the purpose of the study; indigenous nutritional knowledge on indigenous foods; culture and lifestyle affect the consumption of indigenous foods; and the extent of consumption of indigenous foods. The theory has conceptualized that adoption or acquiring knowledge about indigenous food for instance, is a function of environmental / community factors such as culture and other community factors, as well as individual factors such as individual knowledge, lifestyle and socio-demographic factors (Bandura, 1977). The environmental factors may not be able to modify people's attitude towards indigenous foods in isolation, thus, persuasive communication is very relevant and holds a dominant position in facilitating the acquisition of new knowledge that may cause the desired change (McGuire, 1989). It is therefore prudent and practical for the various human institutions within a given community with all the environmental factors concerning indigenous foods, to document and persuasively disseminate the importance and advantages of consuming indigenous food.

Knowledge of indigenous foods has been captured by Social Learning Theory as cognitive or personal factors (Bandura, 1977). This includes knowledge of what constitute indigenous foods, nutritional value of indigenous foods and balance diet. Knowledge of indigenous foods has been explained to be a results of reciprocal interaction between environmental factors such as availability and

access of nutritional information, availability and access of indigenous foods, social norms, tradition and culture and personal factors including socio-demographic characteristics (Bandura, 1977). Nutritional information on indigenous foods and the subsequent consumption of indigenous foods can be achieved if institutions such as households, clinics, schools, chieftaincy, community radio, community base organizations and other community based institutions, collectively pursue indigenous food consumption agenda using a persuasive communication method, as it will have a direct impact of attitudinal change on dietary choices (McGuire, 1989).

The individual skills and attitude towards the use of indigenous foods cannot be overlooked, as the knowledge of how to prepare some special indigenous dishes that are of dietetic value, such as millet TZ and Tubaani are fading as the older women die (Kuhnlien et al., 1996). These individual skills, attitude and behaviour towards indigenous foods can be positively influenced by the environment and the institutions.

Fitting the conceptual framework into Bandura's social learning theory and the persuasive communication model, these additional components (institutions and institutional factors), were observed by this study as important and critical component that could greatly contribute to determining a person's attitude and subsequent consumption of indigenous foods. Institutions such as schools, households, clinics, NGOs as well as local institutions which engulfs the chiefs/elders, district assembly, and the religious institutions, if put in place institutional factors such as policies on indigenous foods and persuasive

programs that attaches prestige to indigenous foods, will sway the hearts and minds of the indigenous people and will greatly contribute to the consumption of these foods as illustrated in Figure 2.2.

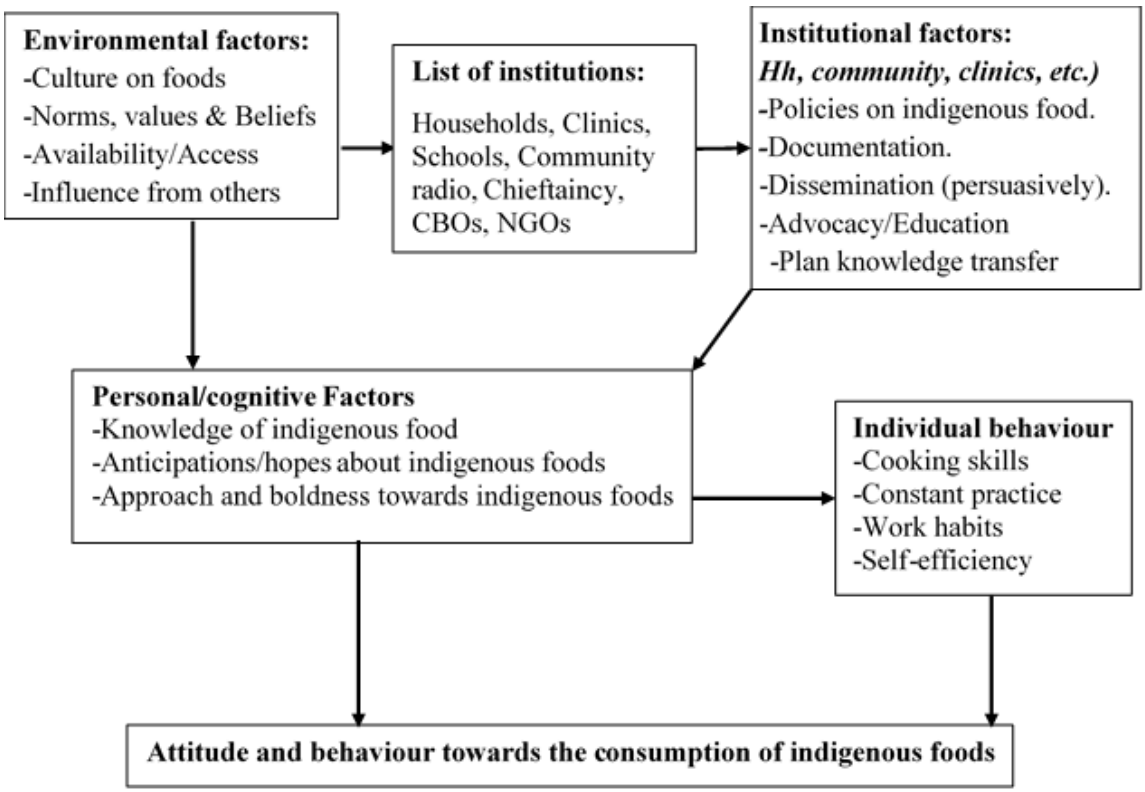


Figure 2.3: *Conceptual Framework*

Source: Researcher's Construct, 2017.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The methodology employed covered processes through which the research was conducted. It described and discussed the different methodological issues that were used in the thesis such as the research design, population, sample, sampling procedures, sources of data, data gathering methods, techniques for data analysis. The study used both qualitative and quantitative approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research (Creswell & Plano, 2007).

3.2 Brief on the Study Area

The study was carried out in the Nabdam District of the Upper East Region of Ghana. The Nabdam District Assembly was established by the Local Government Instrument (L.I. 2105), it is one of the newly created Districts, carved out from the then Talensi-Nabdam District Assembly in 2012. The District is divided into three area councils namely, Nangodi, Sakoti and Zoliba. The Nabdam District is located in the Upper East Region of Ghana with its capital at Nangodi. The District lies between latitudes 10° 47″ and 10° 57″ North and Longitudes 0° 31″ and 1° 15″ west. It has a total land area of 244.94km^2 (GSS, 2000). In relation to ethnicity and language, the inhabitants of the district are mainly Nabit and Guruni speaking people, both belonging to the Nabdam ethnic group.

The climate of the District is tropical with two distinct seasons. The erratic rainy season runs from May to October each year and the dry season is characterized by warm and hazy weather with hardly any rains stretching from October to April each year. The mean rainfall ranges between 88mm-110mm but with an annual rainfall of 950mm. The area experiences a maximum temperature of 45 degrees Celsius in March and April and a minimum of 12 degrees Celsius in December each year. The vegetation is guinea savannah woodland consisting of short widely spread deciduous trees and a ground flora of grass. This situation affects the amount of rainfall in the area and hence the quantity of water underground. The extreme temperatures and prolong dry season facilitate bush burning, affecting rejuvenation processes and promoting land degradation.

With regards to the occupation of the employed populace in Nabdam District, about 84.9 percent are engaged in agricultural, forestry and fishery workers, 4.4 percent in service and sales, 4.1 percent in craft and related trade, and 2.3 percent are engaged as managers, professionals, and technicians. The Nabdam District is predominantly an agricultural based economy. A greater proportion of the households (i.e. 85.9 percent) in the district are engaged in the cultivation of crops, rearing of animals, planting of trees among others. About 49.3 percent of those actively engaged in agricultural practices are males while 50.7 percent are females (GSS, 2000).

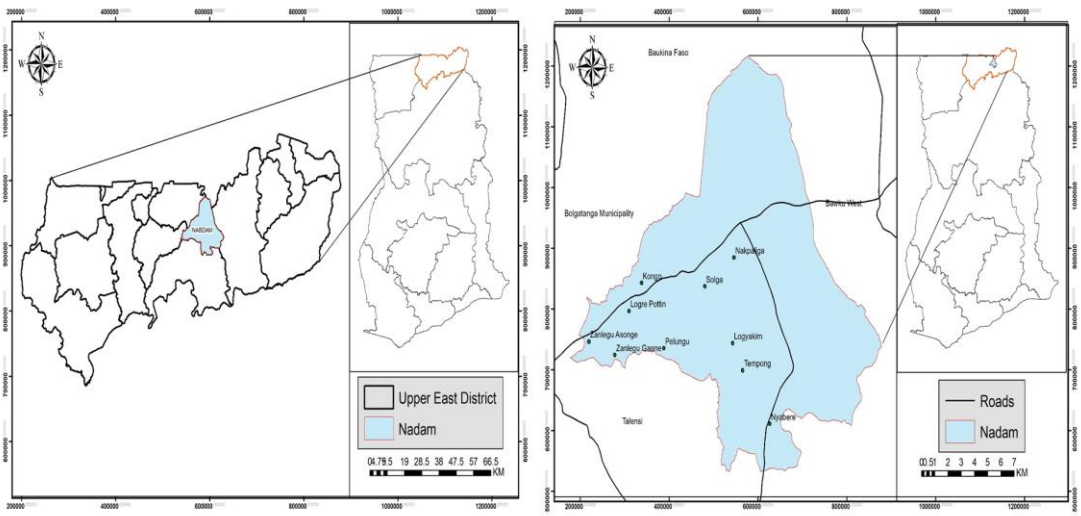


***Figure 3.1**: Map of Upper East Region of Ghana showing the Location Map of the Study Areas*

Source: Department of Geography and Resource Development, RSGIS LAB-UG Legon 2019.

3.3 The Philosophy of the Study

In relation to this research, the philosophical position I took was pragmatism. As Pragmatic philosophers argue that it is not possible to access 'truth' about the real world through a single scientific method. nor was it possible to determine social reality as constructed under the Interpretivist stance (Creswell, 2003; Kivunja & Kuyini, 2017). Pragmatics "recognise that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities" (Saunders, Lewis, & Thornhill, 2012; Creswell, 2003). These theorists sought for methods that could be more practical and varied, which could allow a combination of methods that could shed light on the actual indigenous nutritional knowledge of participants, the beliefs behind the knowledge, and the

consequences that are likely to follow from the knowledge (Kivunja & Kuyini, 2017).

With regard to this research, the pragmatic stance was based on relational epistemology, where relationships in this study were best determined by what the researcher deemed appropriate. As pragmatics advocate for a non-singular reality ontology, which means, there is no single reality, and that individuals have their own unique interpretations of reality (Kivunja & Kuyini, 2017). Therefore, in line with the research aim and questions, it was determined that the pragmatic approach is the most suited for this study. hence, this study employed both quantitative and qualitative methods.

3.4 Research Study Design

The research design adopted for this study was the Mixed research design (Johnson & Christensen 2017) which employed the use of both quantitative and qualitative data collection tools. According to Johnson and Christensen (2017) mixed methods research is the type of research in which a researcher combines elements of qualitative and quantitative research approaches (e. g., use of qualitative and quantitative viewpoints, data collection, analysis) for the broad purposes of breadth and depth of understanding and corroboration. This method allows for the application of all approaches that support quantitative and qualitative analysis. The study took into account the six fundamental characteristics in a mixed methods study design which according to Teddlie and Tashakkori (2010) are;

1. It should have a philosophical foundation of both quantitative and qualitative paradigms.
2. Convincing and laborious procedures for the qualitative and quantitative methodologies.
3. Using specific mixed methods design that involves a concurrent or sequential integration.
4. A collection of both qualitative and quantitative data in response to a data collection tool.
5. An analysis of both qualitative and quantitative data.
6. An integration of the two data sources either through merger, linking, or entrenching.

The quantitative aspect of the study interviewed women using a structured questionnaire as the data collection tool. The structured questionnaire was administered to mothers who had children under the age of 5years to elicit information on nutritional knowledge about indigenous foods as well as the level of consumption (extent of feeding their children with indigenous foods) of the indigenous foods. The survey also collected information on the socio-demographic characteristics of the women. For the qualitative, apart from collecting data on mother's knowledge and use of indigenous foods, the research again adopted an inspirational phenomenological approach where the study looked at respondent's experiences with the socio-cultural factors that affects the consumption of indigenous foods. The study adopted the concurrent mixed approach to the collection of data.

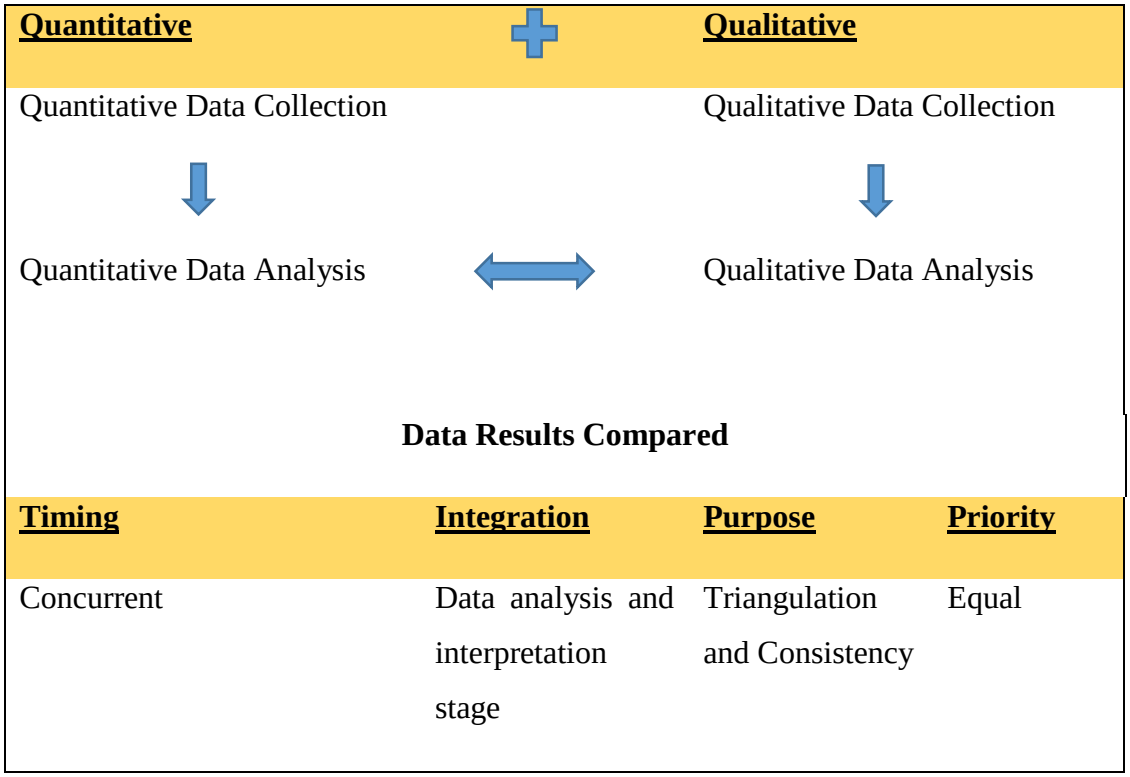


***Figure 3.2**: Diagrammatic Representation of the Methodology*

Source: Creswell et al., 2003.

3.5 Selection of Study Area

3.5.1 Regional Selection

The Upper East Region was purposively selected by the researcher for the study based on the following reasons: I. the Upper East Region happens to be one of the three regions in Ghana with high poverty head count; II. According to the 2013 Ghana Statistical Service (GSS), the Upper East Region has the highest incidence of extreme poverty (22%) as compared to the national average of 8%. III. Again, in the region, the standard of living is insufficient to meet their basic nutritional requirements. Table 3.1. shows an improvement from 2006 to 2013.

Table 3.1 Poverty Incidence in the Region

No	Regions	2006	2013
1	Western	22.9	20.9
2	Central	23.4	18.8
3	Greater Accra	13.5	5.6
4	Volta	37.3	33.8
5	Eastern	17.8	21.7
6	Ashanti	24.0	14.8
7	Brong Ahafo	34.0	27.9
8	Northern	55.7	50.4
9	Upper East	72.9	44.4
10	Upper West	89.1	70.7

Source: The Ghana Poverty and Inequality Report (March 2016)

3.5.2 District Selection

The Nabdam district was purposively selected by the researcher for the study based on the following reasons:

1. At the time of the study, the Nabdam district was one of the newly created Districts carved out from the then Talensi-Nabdam District in 2012; this means the district will need accurate data for meaningful planning purposes towards sustainable development.

2. It is one of the Districts with very high pregnancy anaemia (45%), low birth weight (12%) and under 5 malnutrition (18%) (GHS Nabdam District, 2016).
3. The Nabdam district is one of the four poorest district in the Upper East Region with poverty depth of 31.3%. even though it was not the poorest district among the four, the researcher selected the district based on proximity, accessibility and convenience.

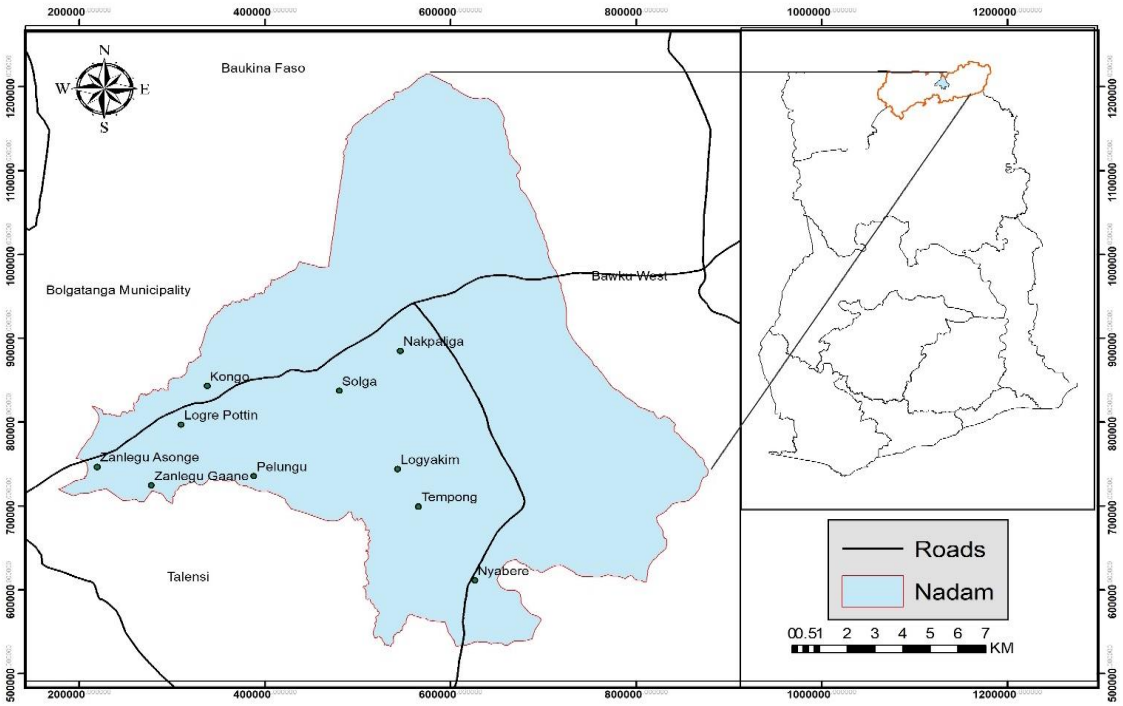


Figure 3.3: *Map of Nabdam District*

Source: Department of Geography and Resource Development, RSGIS LAB-UG Legon (2019).

Table 3.2 Poverty and Inequality Estimates of Upper East Region by District

Region	Household Population	Poverty Head Count (%)	Poverty Depth (%)
Upper East Region	1,034,688	45.9	22.2
Districts			
Builsa North	56,163	54.3	26.3
Kasena Nankana West	69,965	13.1	4.7
Kasena Nankana East	107,435	24.2	9.6
Bolgatanga Municipality	129,696	27.9	11.7
Talensi	80,596	56.5	27.0
Bongo	***83,996***	***67.4***	***36.4***
Bawku West	***93,028***	***68.1***	***37.2***
Garu Tempane	128,623	54.5	26.7
Bawku Municipality	97,221	42.0	17.8
Builsa South	***36,431***	***84.4***	***51.8***
Nabdam	***33,576***	***63.0***	***31.3***
Binduri	60,878	43.3	18.7
Pusiga	57,080	43.3	19.0

Source: Ghana Statistical Service, Population and Housing Census (2010).

3.5.3 Selection of Study Communities

According to the 2010 Population and Housing Census, the twenty largest communities in the Districts are; *Kongo, Pelungu, Nangodi Nakpaliga, Zanlerigu*

Gaane,Nangodi Soliga, Sekote Nyabare Nafoung, Daliga Zopelig, Sekote Nkparig, Logre Pottin, Daliga Bulbong , Ziemboug , Zanlerigu Asonge , Sekoti-Tengpong, Kongo Dasabligo, Sekoti-Logyakim, Gurugu Sabligo, Sekoti Nkuni, Sekoti Kotentabiga, Logre Nayire and Logre Dabore. The researcher stratified these communities as per the existing three sub districts (Zoliba, Sakote & Nangodi) and proportionately selected a total of ten out of the twenty top most populous communities in the District. For the reason that, all the communities in the Nabdam district are homogenous in nature and selecting the most populous communities will give the researcher a sample size that is representative of the population. See selected communities in table 3.3.

Table 3.3: Selected Communities in the Nabdam District

Sub-District	Community	Population	Sample size
Sekoti	Sekote-Logyakim	134	26
	Sekote-Tengpong	128	24
	Sekote Nyabare Nafoung	177	34
			84
Zoliba	Pelungu	328	62
	Zanlerigu Gaane	172	33
	Zanlerigu Asonge	87	17
	Logre Pottin	138	26
			138
Nangodi	Kongo	419	80

	Nangodi Soliga	185	35
	Nangodi Nakpaliga	331	63
			178
Total		**2,099**	**400**

Source: GSS Population Data (2010)

3.6 Methods

As discussed in the research design, a mixture of quantitative and qualitative methods was employed and the concurrent approach of mixed method was adopted.

3.6.1 Quantitative Methods

Here, the data collection tools, the population, sampling and sampling procedures, the variables and analysis of the data that was employed in the quantitative study was described.

3.6.2 Target Population for Quantitative Survey

The target population for the quantitative study encapsulates mothers and female guardians of children under five (5) years of age in the Nabdam District of the Upper East Region. The study population include both natives and mothers who are not originally natives of the study area, but have lived there long enough to answer the questions. The choice of mothers with these characteristics was based on the study goal which was basically aimed at examining the indigenous nutritional knowledge of mothers on indigenous foods and the use of indigenous

foods by mothers in feeding their children in the study area. This will help establish the relationship between nutritional knowledge of indigenous foods and its consumption.

3.6.3 Sample Size Determination

From the GSS PHC (2012), the population and housing census of the Nabdam District as at 2010 stood at 33,826. With this population information, the study utilized Yamane's formula in its sample size determination as this was the most ideal formula to use with regards to having knowledge of the population size.

$$n_Y = \frac{N}{1 + N\,I^2}$$

Where:

N – The population size (Nabdam population = 33,826)

e – The desired level of precision or level of acceptable error = 0.05

$$n_Y = \frac{33{,}826}{1 + 33{,}826\,(0.05)^2}$$

$$n_Y = \frac{33{,}826}{33827 \times 0.0025}$$

$$n_Y = \frac{33{,}826}{33827 \times 0.0025}$$

$$n_Y = \frac{33{,}826}{84.57} = 399 \text{ approx. } 400$$

So, the sample size for this study was approximately 400 women.

3.6.4 Sampling Techniques

All mothers with children under 5 years were invited to a meeting point with the help of the assembly men. They were then told about the study, and the total sample required, thus the sample size per each community was sampled using the simple random method (the lottery method). This was done by writing numbers up to the number of respondents required, using small pieces of papers and folding them. Potential participants were then asked to pick a piece of paper that will allow her to participate in the study or not.

3.6.5 Variables of Interest in the Quantitative Survey

Variables in any research are simply symbols or concepts that can assume any one of a set of values (Davis & Cosenza, 1985). Dependent variables (DV) are always the variables that are of primary interest to the researcher (Sekaran and Bougie, 2010), as the researcher seeks to improve or explain these dependent variables. The dependent variables are the variables which the researcher wants to primarily study or to find possible solution to enhance the dependent variables. The Independent variables (IV) are variables that affect, influence or contribute to changing the dependent variable. The independent variables are those variables that a researcher manipulates to measure the effect of the manipulation on another dependent variables (Fan, 2010; Leatham, 2012).

In this study, the dependent variables were; mainly respondent's indigenous nutritional knowledge on indigenous foods and the indigenous food consumption pattern of respondents. The variables of interest were operationalized by quantifying the frequencies and using them for further bivariate and multivariate

analysis to establish a relationship as well as the strength of that relationship. The independent variables in this study were those related to the socio-demographic characteristics of the respondents, these include age, marital status, educational level, occupation, religion, household size, sources of nutritional knowledge and being a mother/caregiver.

3.6.6 Quantitative Data Collection Tools and Techniques

Structured questionnaires were used for collecting data from 400 sampled respondents in the study area. Data collected from a cross section of mothers and caregivers with children under 5 years of age. The questionnaire covered questions on knowledge of indigenous foods and their nutritional values (the role they play in the human body), the consumption pattern of indigenous foods, and also the role of culture and lifestyle on the consumption of indigenous foods.

The management of all the fieldwork and data collection, including the coordination of all research activities was done by the PhD student. Five research assistants were recruited to assist in the process, four assisted in the data collection exercise and one assisted in the data entry and cleaning processes. Before engaging the research assistants, attention was given to their educational level, they were all tertiary level graduates. Again, consideration was given to previous knowledge in interviewing people and effective documentation of responses and above all understanding of the language and culture of the study areas. A one day's rigorous training was given to the research assistants to enable them appreciate the aims and objectives of the study, and to support in the administration of the questionnaires and to also conduct the FGDs and

interviews. They were trained on appropriate translation of questions into the local language, note taking, tape recording of interviews, and techniques for approaching would-be respondents and relationship building before the start of interviews was given to all research assistants including the assistant who was engaged for the data entry and cleaning.

3.6.7 Community Entry

A level ground was established by building good relationship with the community gate keepers. Thus, community entry procedure was well established, hence, entry was easy. An introductory letter from my Institution was valuable in the community entry process. The letter served as a confirmation document, confirming my mission in the Region, District and Communities. Important offices and individuals were visited to explain the mission of the research team and to solicit their endorsement and support for the data collection exercise. Among the offices visited were the Regional Directorate of Health Services (RDHS) at the Regional Health Directorate in Bolgatanga, the District Health Directorate in Nangode and the District Nutrition office in Nangode. Among the individuals were the Sakote Paramount chief, the Nabdam district nutrition officer, some assembly members, group leaders, famers, and some head of households.

3.6.8 Pre-Testing

After recruitment and training of the field assistants, the questions were pre-tested. Pre-testing of the questionnaire was very necessary to check for its relevance in providing the essential response from would-be participants. The

data collection team including the primary researcher selected Gambibgo community for the pre-testing. The mother's in Gambibgo community have similar characteristics as the study population. Gambibgo is in the Upper East Region and quite close to the study district and has same socio-cultural, and environmental characteristics. A few changes were made to correct for repetitions and pre-coding errors after the pre-testing exercise.

3.6.9 Quantitative Data Analysis Tools and Techniques

The quantitative data consist of the survey data that was collected with the use of the data collection tool (questionnaire) and captured into a Microsoft excel software 2013, and then imported into stata-14 software. Data quality assurance was done by checking and removing inaccurate data. Critical checks were done to ensure that every data was captured correctly. A simple data summary analysis was done to help understand the structure of the data and to alien erroneous data through replacements, merging, dropping duplicate observations and sorting.

The analysis of the quantitative data involved the computation of frequencies, percentage and mean distribution of background characteristics of respondents, as well as a basic statistical analysis on the levels of nutritional knowledge and consumption of the indigenous foods in the study area. Additionally, a statistical analysis of variables of interest was done by performing tabulations and cross-tabulations with relevant variables. The relevant tabulations generated frequencies which was further used to describe the variables. The cross tabulations allowed for comparison between variables and so Chi-squares and P-values were obtained for testing the associations between these variables of

interest. After the binary analysis, multivariable logistic regression was used to determine the strength of association between categorical variables.

The indigenous nutritional knowledge assessment was done by asking individual respondent through a possible choice answers to the question that seeks the core functions of the various food categories. The approach was the direct rating method, in which a subjective rating is obtained of respondent's level of indigenous nutritional knowledge. This is consistent with social construct perspectives (Vygotsky, 1962). The standardized test with correct and wrong answers was used there by making the scoring easier.

In this study a simple scheme was developed with information from the nutrition source of Harvard University School of Public Health (Harvard, 2017) this was to aid respondents to provide the accurate answer and also used as a guide for the nutritional knowledge scoring. In the scheme, the core functions of the various food categories were placed in one or more of the following possible answers; 1. Protects the body, 2. Builds the body, 3. Heals the body, 4. Gives blood to the body and 5. Gives energy to the body. The sixth (6) possible choice answer was (I don't know). Respondents chose only one answer. The individual respondent's indigenous nutritional knowledge was measured on each of the food categories (cereals, roots, plant proteins, animal proteins, vegetables, fruits and fats/oils). The guide can be seen in Table 3.4.

Table: 3.4: Scheme for Nutritional Knowledge Assessment

Indigenous Foods	Nutritional Knowledge on Food Categories	
	High Knowledge	**Low Knowledge**
Cereals and Roots	Gives energy	Gives blood, Build the body, protects the body, Heal the body
Plant and Animal proteins	Gives blood, Build the body	Gives energy, protects the body, Heal the body
Vegetables	Gives blood, protects the body	Gives energy, Heal the body, Build the body
Fruits	Protect the body, Heal the body, Gives energy,	Gives blood, Build the body
Fats and Oils	Gives energy	Gives blood, Build the body, protects the body, Heal the body

Source: Harvard University School of Public Health (2017)

The consumption of indigenous foods assessment was done by first assessing the general consumption pattern of the individual respondent on the various food categories (cereals, roots, plant proteins, animal proteins, vegetables, fruits, and fats/oils). They either consumed these foods often or not often (often = within one week, not often= anytime more than one week). A further detailed statistical analysis was performed on the most *often* consumed food category. The interest here was to ascertain whether the food consumed were indigenous foods or not. A bivariate and in some cases multivariate analysis were performed on the following;

- Respondent's being able to differentiate indigenous foods from non-indigenous foods
- Respondent's nutritional knowledge on the core functions of the various food categories
- Respondent's knowledge and practice on balance diet (adequate diet)
- Respondent's consumption pattern of the various food categories
- Respondent's consumption of indigenous foods
- A cross tabulation between respondent's nutritional knowledge and consumption of indigenous foods
- Factors influencing respondent's food choices.

3.6.10 Qualitative Methods

The qualitative methods employed Focus Group Discussions and In-Depth Interviews (IDIs). We focused on documenting as much as possible the existing indigenous foods in the communities. This documentation encapsulates the foods commonly consumed (indigenous foods and non-indigenous), assessing and documenting the nutritional knowledge on indigenous foods, the consumption pattern and the various reasons behind the consumption and non-consumption of these indigenous foods, and the underlying reasons, trends, opinions and motivations behind the population's actions and inactions. The quantitative element statistically validated both the knowledge base of respondents on the nutritional values and the consumption patterns of the indigenous foods.

3.6.11 Target Population for the Qualitative Study

The FGDs were all made up of mothers with children under 5 years of age. The IDIs on the other hand covered opinion leaders, chiefs and elders, who served as very important sources of information that was used to validate the data gathered from the quantitative respondents. This conforms to Polit and Hungler's (1999) assertion of a study population – "an aggregate or totality of all the objects, subjects or members that conform to a set of specifications".

3.6.12 Qualitative Study / Participants' Selection

A sample constitutes a part of the population selected for a research study. It is argued by Saunders, Lewis and Thornhill (2003) that the size of the sample and the way in which they are selected will definitely have implication for the confidence you can have in your data and the extent to which you can generalize. Cooper and Schinder (2011) specified that a sample is a group of cases, participants, events, or records consisting of a portion of the target population, cautiously selected to represent that population. The participants involved in the qualitative (FGD) study were selected through the simple random sampling mechanism from a group of women who were called for a meeting. Same was done in all the selected communities. Seven groups with 10-12 participants in each group was conducted in the study. The prospective participants for the Focus Group Discussion were mothers and caregivers with children under 5 years.

With the help of the field assistant's and the assembly members, the prospective participants were called to a meeting point where the final participants were

selected. In each situation, more prospective participants turned out and the participants selected from amongst them using the following simple random sampling procedure: A box with 12 papers stating select and the rest were blank papers was placed before the prospective to pick. The twelve (12) that chose the select sheet of paper were the participants for the Focus Group Discussion. The in-depth interview participants were purposively sampled using the snowball mechanism where key informants were identified and from whom other key informants were referred. These individuals included; Opinion leaders, Elders, Traditional birth attendance (TBAs), Sub chiefs, Famers, Women leaders and Paramount Chiefs.

3.6.13 Qualitative Data Collection Tools and Techniques

The qualitative data collection methods involved the use of semi-structured (a guide) and unstructured (follow up) tools. Techniques such as focus group discussions, and in-depths interviews, were used to elicit great detail and comprehensive views of the topic under study.

The three most common qualitative methods, are participant observation, in-depth interviews, and focus groups. Each method is particularly suited for obtaining specific type of data. This study employed in-depth interviews, and focus groups research techniques. With the help of the field assistance, the focus group discussions and the in-depth interviews were conducted. The data was captured on audio tape and on note pads, the audio-taped data was in the native language.

3.6.14 In-depth Interviews

In-depth interviewing is a qualitative research technique that involves conducting intensive individual interviews with one respondent or a small number of respondents to explore their perspectives on a particular idea, program, or situation (Boyce & Neale, 2006). It is more like an interview or a conversation with an individual conducted by a researcher that usually collects specific information about issues that are at stake.

According to Boyce and Neale (2006) the primary advantage of in-depth interviews is that they provide much more detailed information than what is available through other data collection methods, such as surveys. They also may provide a more relaxed atmosphere in which to collect information — people may feel more comfortable having a conversation as opposed to filling out a survey. However, there are a few limitations and pitfalls, such as bias from participant respondent and can be time-intensive (Boyce & Neale, 2006). The underlying assumption behind this approach is that the respondent's perspective on the phenomenon of interest should unfold as the respondent views it, and not as the interviewer views it (Marshall & Rossman, 1999).

A total of nine (9) individuals were involve in the in-depth interviews, the respondents included; traditional birth attendance (TBAs), Opinion leaders, Elders, Paramount chiefs, Famers, Women leaders and Sub chiefs. In-depth interviews (IDI) where optimal data from knowledgeable individuals were collected on their perspectives, and experiences, particularly on how culture and lifestyle impact or affect the consumption of indigenous foods and its

consequences on the nutritional status of household members especially under 5 years.

3.6.15 Focus Group Discussion

A focus group can be said to be a "formally constituted group which is brought together to address a specific issue within a fixed time frame, and in accordance with clearly spelled out rules and procedure" (Krueger, 1988). Again, according to Krueger, a focus group discussion is "a carefully planned discussion, designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment. Focus group discussions can be seen as a group discussion that gathers together people from similar background or experiences to discuss a specific topic of interest to the researcher (Krueger, 1988).

According to Krueger (1988), Focus groups involve 7-10 people; however, it can range from 4-12. The number varies somehow among investigators from the target population and also depending on the issues important to a particular study. It is important that the size of a focus group is big enough to provide diversity and small enough for everyone to have the opportunity to contribute to the topic under discussion.

In every focus group discussion there must always be a developed checklist of themes and semi- structured open-ended questions that is used to guide and direct the interview as desired (Shillingford, 2006). The study had between 10-12 participants in a group, there were variations in the number of participants per group. At least one community was selected from each sub-district (Sakote,

Zoliba & Nangodi). In the Sakote sub-district, the FGDs data was collected from; Logyakim, Tenpongin and Nyobare. In the Zoliba sub-district, the following communities participated in the FGDs; Zanlerigu Gaane, and Zanlerigu Asong. In Nangodi sub-district the FGDs was done in two communities, Nakpaliga and Soliga. See Table 3.5.

Table 3.5: Number of Participants Selected from Each Sub-District

Sub-District	Communities	Number
Sakote	Logyakim,	1
	Tenpongin	1
	Nyobare	1
Zoliba	Zanlerigu Gaane	1
	Zanlerigu Asong	1
Nangodi	Nakpaliga	1
	Soliga	1

Source: Ghana Statistical Service, Population and Housing Census (2010).

The study also employed the focus groups discussions (FGD) method, where the field assistants used sampled females who were mothers or caregivers with children under 5 years, in each of the above mentioned communities to obtain their understanding, perceptions, worldviews and their knowledge on indigenous foods and the extent to which they use these indigenous foods in curbing malnutrition especially in children under the age of 5, the community's culture, lifestyle and indigenous knowledge with regard to indigenous foods and nutrition

were also elucidated using the focus group discussion. In all, seven (7) focus group discussions were conducted although 10 communities were selected. This happened because, saturation point where realised since the same information was being collected over and over.

3.6.16 Qualitative Data Management and Analysis

All the qualitative data were collected in a form of audio-tapes and in the native language known as Nabt, using an electronic audio device except for the Paramount Chief whose interview was recorded in English. With the help of the field assistants, a verbatim transcription was done for all interviews and discussions and saved into Microsoft word. Some editing was done to the transcribed data to improve the readability, but still maintaining the original meaning of the statements from the respondents. The transcripts were then saved again in Microsoft word but in a rich text format (rtf) and imported into Nvivo 11 for analysis. The data were analysed by reading and rereading with the aim of identifying responses relevant to answering the research objectives as well as emerging themes. Thematic analysis was adopted in 104avourabl the qualitative data.

3.7 Ethics

The concept of informed consent was followed, and in this case ensured that individuals voluntarily participated in the research with full knowledge of the relevant risks and benefits. It is ethical that in a standard research, the persons involved must have all the information that might reasonably influence their willingness to participate and must be in a form that they can easily understand.

The researcher took time to explain the purpose of the research and the confidentiality of their responses was also assured. Again, Participants' rights to decline in the participation and to withdraw from the research once it has started, as well as the anticipated consequences of doing so was also made known.

3.7.1 Ethical Consideration

In the development of any research project, there are several ethical concerns that needs to be taken into accounts (Broom, 2006). this is very important, as research projects usually involves participants from varied backgrounds, different beliefs and values. At the time when this study was being developed and implemented, the Graduate School of the University for Development Studies had no ethical clearance procedures in place. Hence, the researcher therefore tried to ensure that at least the minimum requirement for research ethics was observed.

A letter from the department was sent to the research areas to confirm my status as a student and the fact that I have selected the Nabdam district as my study area. permission was sought from the District Chief Executive, chiefs and community leaders, assembly men of selected communities in the Nabdam District. Participants were assured of privacy, anonymity and confidentiality. Objectivity in the research was assured as the researcher's own personal biases and opinions did not get in the way of the research, to give the respondents fair consideration. Observations and reports were accurately represented on what was found on the field. Also, the responses from the interviews were not interpreted out of context.

3.8 Limitation of the Study

The study was conducted in one out of the four districts in the Upper East Region with the highest poverty head count. Also, it was conducted in one out of 13 district in the region and hence there may be a limit to the extent to which the findings can be generalized to the other districts that were not selected. However, the Upper East Region is largely rural with similar socio-cultural practices and for that reason transferability of the findings may be possible.

The study was largely limited to females with children under 5 years of age. No male was interviewed for the quantitative survey and this was based on researchers own common knowledge that males and females without children were not directly involved with children's nutritional issues. Nonetheless, during the in-depth-interviews, fewer men interviewed and on analyses of their views lots of useful insights were revealed, thereby suggesting that it would have been more helpful if men and other women were allowed to participate in the research. Not all the data collected in the questionnaire was analysed and presented, partly because of some gaps in the questionnaire design and also because of time and logistical limitations.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Introduction

This chapter presents the results of the study conducted in the Nabdam district of Ghana. Both the quantitative and qualitative data are presented and triangulated. The results are organized according to the specific objectives of the study. Results are also presented on the socio-demographic and economic characteristics of the participants. The mains sub-headings for the results are as follows:

1. Socio-demographics and economic characteristics of respondents;
2. Indigenous nutritional knowledge of mothers on indigenous foods;
3. Consumption of indigenous foods by mothers in the community; and
4. The effects of culture and Attitude on the consumption of indigenous foods.

4.2 Socio-Demographic and Economic Characteristics of Respondents and Households

Fifty-seven (14.3%) respondents were between the ages of 18 – 22 years; 89 (22.3%) were between ages 23 – 27; 72 (18.0%). The mean age of respondents was 33.3 with a standard deviation of +/-10.9 and the average number of children per mother being two (2). Majority, 332 (83%) of the respondents were married, while 18 (4.5%) and 50 (12.5%) were never married and widowed respectively. Also 62% of respondents had no formal education. One hundred and forty-four (36%) of women respondents were farmers, and, 133 (33.3%) of the women

respondents being traders/ artisans. For religious affiliation, majority 322 (80.5%) of the respondents surveyed were Christians and only 1.5% of mothers interviewed were Muslims, while 72 (18%) were traditional believers. Regarding the respondent's monthly earnings, 78 (19.6%) of the respondents earned less than GH¢ 100; 2(5.7%) earned between GH¢100 – GH¢190; 11 (2.7%) earned between GH¢200 – GH¢290; 18 (4.4%) and majority 270 (67.6%) had a monthly earning of GH¢300 – GH¢1090. Table 4.1 provides the detailed socio-demographic characteristics of respondents.

Table 4.1 Socio-Demographic Characteristics of the Respondents

Variable	N=(400)	Percent
Age (years)		
18 – 22	57	14.3
23 – 27	89	22.3
28 – 32	72	18.0
33 – 37	73	18.2
≥38	109	27.2
Marital Status		
Married	332	83
Not married	18	4.5
Widowed	50	12.5
Education Level		
No formal education	248	62
Primary	62	15.5
JHS/MSLC	67	16.7
SHS/Voc/Tech	18	4.5
Tertiary	5	1.3
Total	**400**	**100%**

Occupation		
Farmer	144	36.0
Professional	7	1.7
Trader/Artisan	133	33.3
House Wife	116	29.0
Religion		
Christianity	322	80.5
Islamic	6	1.5
Traditional	72	18.0
Monthly Earnings		
Less than 100	78	19.6
100 – 190	23	5.7
200 – 290	11	2.7
300 – 1090	18	4.4
Undisclosed	270	67.6

Source: Field Survey (2017)

Further demographic analysis in Table 4.2 showed that 83.0% of the household in the study area were predominantly headed by men, i.e. including (Husbands 58.7% and Fathers-in-law 24.3%) and the female headed household was 17.0%, these include; Wives, Mothers-in-law and others. Majority of respondents 268 (67.2%) had household's population between 5 – 9 persons; About 228 (57%) of respondents had less than 4 sleeping rooms; 158 (39.5%) had between 4-6 rooms, whiles only 14 (3.5%) had between 7 – 10 rooms.

Table 4.2: Household Characteristics

Household Characteristics	Frequency (n-400)	Percentage (100%)
Head of Household:		
Wives	15	3.8
Mother-in-law	10	2.5
Husband	235	58.7
Father-in-law	97	24.3
Others (Aunties & Sisters-in-law)	43	10.7
Household size:		
Less than 4 people	14	3.7
5 – 9 people	268	67.2
10 – 14 people	74	18.5
15 – 19 people	42	10.5
20 people and above	1	0.3
Number of under 5 children in the household:		
One Child	263	65.7
Two Children	92	23
Three children and above	45	11.2
Livestock in mothers household:		
Sheep	181	45.3
Goat	280	70.0
Cattle	110	27.5

Pigs	124	31.0
Rabbits	3	0.8
Poultry	320	80.0
Donkey	14	3.5
Mother / Caregiver:		
Mother	344	86.0
Caregiver	56	14.0
Number of Sleeping Rooms:		
1 – 3	228	57.0
4 – 6	158	39.5
7 – 10	14	3.5
Sources of nutrition knowledge		
Home (Elders)	248	62.0
Open market	53	13.2
Formal education	12	3.0
Clinic	87	21.8

Source: Field Survey (2017)

In relation to possession of livestock, the survey revealed the following results: 70% of the respondents had goats; 80% had poultry; less than 50% of the respondents possessed sheep, pigs, cattle, rabbits and donkeys. From the respondents, most mothers got their nutritional knowledge from the elderly in their homes and community which constituted 248 (62.0%); From the clinics, 87 (21.8%) of mothers got their nutritional knowledge; For the open market and

formal education, 53 (13.2%) and 12 (3.0%) got their nutritional knowledge respectively.

4.3 Nutritional Knowledge on Indigenous Foods

This section presents results on respondent's familiarity and awareness of the foods consumed and the ability to differentiate non-indigenous foods from the indigenous foods. Also the study explored mother's nutritional knowledge and understanding of the functions of the various food categories in the body. The foods were categorized into cereals, roots, plant proteins, animal proteins, vegetables, fruits and fats/oil. In addition, the section assessed mother's basic knowledge and practise on balance diet (adequate diet).

4.3.1 Respondents Awareness of Foods Consumed

Some of the common indigenous foods identified among participants were; *Millets (naara, zah); Sorghum (kah-zie);* and *Frafra potatoes* (*persah).* Participants also mentioned maize, wheat, polish rice, yam, beans and some fruits and vegetables. In total, participants identified 93 familiar foods, with 65(70%) being indigenous.

Table 4.3: Familiar Carbohydrates (Cereals, Root Crops and Fats and Oils)

Botanical Names	Common Names	Indigenous-(Guruni)	Non-indigenous
Cereals			
Pennisetum americanum	Early maturing millet	Naara	-
Pennisetum americanum	Late maturing millet	Zah	-
Sorghum bicolor	Sorghum (red millet)	Keh-morliga or kah-zie	-
Eleusine coracana	Sweet red millet	Kotok	-
Oryza sativa	Local red rice	Mui-morliga	-
Oryza sativa	Local white rice	Mui-peliga	-
Digitarria exilis	Hungry rice	Mui-zom	-
Oryza sativa	Polished rice	-	Perfumed polished rice
Triticum aestivum	Wheat	-	Wheat
Zea mays	Local maize	Kariyena	-
Zea mays	Corn	-	Maize (white)
Sourghum vulgare	Global 2000	-	Global 2000 sasakawa
Root crops			
Solenostemon rotundifolius	Frafra potato	Persah	-
Ipomoea batatas	Sweet potato	Nuwbemtoh	-
Solanum tuberosum	Irish potato	-	Irish potato

Dioscorea spp	Yam	Nuwya	-
Fats and oils			
Butryospermum paradoxum	Shea Butter	Kaanmemgo	-
Arachis hypogaea (oil)	Groundnut oil	Sukaan kaan	-
Adansonia digitate (oil)	Baobab oil	Tuoro kaan	-
-	Frytol,	-	Frytol oil
-	Vegetable oil	-	Veg cooking oil
Glycine max (oil)	Soya oil	-	Soya oil
Arecaceae spp (oil)	Palm oil	-	Palm cooking oil
Cocos nucifera (oil)	Coconut oil	-	Coconut oil
-	Margarine	-	Margarine

Source: Field Data, 2017.

From Table 4.3, the research participants were able to identify and distinguish 12 cereals with 8 being indigenous and 4 being non-indigenous. Four (4) root crops with 3 being indigenous and 1 being non-indigenous. Participants identified 9 cooking fats and oils used in the study area with 3 of these fats and oils being indigenous and the rest of the four non-indigenous. In Table 4.3, a total of 25 carbohydrates and fats and oils were mentioned. Out of this 25 energy given foods, 56% were identifies as indigenous foods.

Table 4.4: Familiar Proteins (Plants and Animal Proteins)

Botanical Names	Common Names	Indigenous-(Guruni)	Non-indigenous
Plant protein			
Vigna unguiculata	Beans (Black eye)	Thea	-
Voandzeia subterranean	Bambara beans	Sumah	-
Sesamum indicum	Sesame seeds	Saa-areh	-
Cucumis melo	Nearee	Sarma	-
Parkia biglobosa	Dawadawa seeds	Koligor	-
Arachis hypogaea	Groundnuts (peanut)	Sukaan	-
Cucurbita pepo	Pumpkin seeds	Yourk bilho	-
Voandzeia subterranean	Sweet Bambara beans	Sumpeal	-
Cyperus esculentus	Tiger nuts	Suun-subah	-
Glycine max	Soya	-	Soya Beans
Cucumeropsis manii	Agushie	Agushie	-
Animal protein			
Neochanna burrowsius	Mud Fish	Bungulgah	-
Channidae	Snake fish	Duolung	-
-	Dog meat	Baa ninor or Numeri	-
-	Beef	Naahor-ninor	-
-	Mutton	Burwah-ninor	-

-	Lamb	Paersko-ninor	-
-	Pork	Kurikuri-ninor	-
-	Local chicken	Nuah-ninor	-
-	Eggs	Geelah	-
-	Fresh milk	Eelum	-
-	Amani	-	Herrings
-	Mixed shredded meat	-	Mixed shredded meat
-	Poultry chicken	-	Poultry chicken
-	Poultry Eggs	-	Poultry Eggs
-	Processed milk	-	Processed milk

Source: Field Data, 2017.

Table 4.4 presents 26 familiar proteins with 11 of them being plant protein and 15 being animal proteins. Out of the 11 identified plant proteins, 10 were indigenous and again, out of the 15 animal proteins 10 were indigenous to the study area. In all, 77% of the identified proteins were indigenous proteins.

Table 4.5: Vitamins and Minerals (Vegetables and Fruits)

Botanical Names	Common Names	Indigenous-(Guruni)	Non-Indigenous
Vegetables			
Moringa oleifera	Moringa leafs (fairy plant)	Kokpatee	
Corchorus olitorius	Jute (mallow)	Ayoyo	
Amaranthus retroflexus	Amaranthus	Alefu	
Hibiscus cannabinus	Kennaf	Bitor	
Vernonia amygdalina	Bitter leaves	Sourwaka	
Phaseolus vulgaris	Bean leaves	Bamtoh	
Adansonia digitata	Baobab leaves	Tokaara	
Telfairia occidentalis	Pumpkin leaves	Yourkvuuro	
Cucurbita maxima	Pumpkin	Yourkah	
Rubus fruticosus	Black berry leaves	Aahrrah vuuro	
Agaricus bisporus	Local mushrooms	Urgla	
Solanum macrocarpon	local garden eggs	Kunmah	
Solanum macrocarpon	local garden eggs leafs	Kunvuuro	
-	Wild slimy vegetable	Saalum	
Cleome gynandra	spider plant vegetable	Nanginah	
Abelmoschus esculentus	Okra	Ma-anah	
	-	Vormah	
	-	Ba-owra	

Ceiba pentandra	kapok leafs	Gun-vuuro	
Water plant	Borkorbokor	Borkorborkor	
Brassica oleracea	Cabbage	-	Cabbage
Daucus carota	Carrots	-	Carrots
Lactuca sativa	Lettuce	-	Lettuce
Capsicum annuum	Pepper	-	Pepper
Solanum lycopersicum	tomatoes,	-	tomatoes,
	garden eggs,	-	garden eggs,
	garden eggs leafs	-	garden eggs leafs
Fruits			
	Date family	Kekor	-
Adansonia digitate	Boabab fruits	Tuoro	-
Diospyros mespiliformis	African Ebony fruits	Gean	-
Vitis vinifera	Local grapes	Sisibi	-
Irvingia gabonensis	local Mangoes	Montor	-
Parkia biglobosa	Dawadawa	Duoro or Duort	-
Tamarindus indica	Tamarin	Pusah	-
Butryospermum paradoxum	Sheanuts	Taamah	-
Dialium cochinchinense	black berries	Aahrrah	-
-	-	Nkagere or Kon,	-

-	-	Nsorbera,	-
Mangifera indica	Mangoes	-	Agric mangoes
Ananas comosus	Pineapple	-	Pineapple
Musa acuminata	Bananas	-	Bananas
Citrus X sinensis	Oranges	-	Oranges

Source: Field Data, 2017.

Table 4.5 is a compilation of familiar fruits and vegetables. A total of 42 foods were identified and 74% was indigenous foods. Out of the 42 fruits and vegetables identified 27 were vegetables, with 20 being indigenous. The number of fruits that were identified was 15 with 4 being non-indigenous and 11 being indigenous.

Linking the findings in Table 4.3 to the qualitative findings, where about 67% of the cereals identified were indigenous to the community, majority of the participants from the FGD and the IDI mentioned the same cereals and further said there were many more different varieties of indigenous cereals, but most were extinct. This is supported by an FGD participant from Zanlerigu Gaane;

> *"It is very difficult for us to remember the names of most of the cereals our fore fathers consumed, I only remember I use to eat some very nice and healthy foods made from these cereals."* ***[A member from the Zanlerigu-Gaane Focus Group]***.

Pictures of some of these cereals are displayed in Table 4.6.

Out of the root crops identified, 75% were indigenous to the community. Participants from the qualitative study mentioned that, these indigenous root crops were seasonal, and also not cultivated in larger amounts hence not available all year round. Hence root crops are not so much of a staple in the community. In the case of fats/oils, participants identified three locally produced fats and oils, these were *Kaanmemgo, Skaan Kaan and Tuoro Kaan.* Participants further stated that *Kaanmemgo* was the most commonly produced fats and oil in the study area.

Ten different indigenous plant proteins *(Thea, Sumah, Saareh, Saamah, Sukaan, Yourk bilho, Sumpeal, Koligor, Agushie and Suun-subah)* were identified by participants of the study. During the qualitative study, it was mentioned that, there were different varieties of beans *(Thea) (Thea Sabligah, Thea moligah and Thea Pealigah)* and groundnuts *(Sukaan) (Sukan, Menkah and Endorbah).* The indigenous animal protein source that was identified included; *Bungulgah, Duolung, Ninor or Numeri, Nuah, Geelah, and Eelum.*

Twenty indigenous vegetables were identified by participants these were; *Kokpatee, Ayoyo, Alefu, Bitor, Sourwaka, Bamtoh, Tokaara, Yourkvuuro, Yourkah, Aahrrah Vuuro, Urgla, Kunmah, Kunvuuro, Saalum, Nanginah, Ma-anah, Vormah, Ba-owra, Gun-vuuro, and Borkorbokor.* Participants identified all these as leafy vegetables except for *Urgla, Kunmah, Ma-anah, Vormah and Ba-owra* that comes in different form. See pictures in Table 4.8.

The indigenous fruits that was identified by participants in this study were eleven, these included; *Tuoro, Gean, Sisibi, Duoro or Duort, Pusah, Taamah, Nsorbere,*

Nkagere or kon, montor and Aahrrah. They said the fruits were seasonal and so were not available all year round.

Pictures of Indigenous Foods and their Local Names Listed Below

Table 4.6: Indigenous Cereals and Roots

 	 
Local name- ***kah-zie***, English name- **Red millet**	Local name- ***Zah,*** English name- **Late Millet**
 	
Local name-***Naara,*** English name- **Early millet**	Local name-***Mui Morliga,*** English name- **Red rice**
	
Local name- ***Persah***, English name- **Frafra potatoes**	Local name-***Dankali***, English name- **Sweet potatoes**

Table 4.7: Indigenous Fruits

	
Local name- ***Gean***, English name- **Ebony**	Local name- ***Taamah***, English name- **Sheanuts**
	
Local name- ***Nsorbera***, English name-	Local name- ***Sisibi***, English name- **Local grapes**
	
Local name- ***Tuoro***, English name- **Baobab fruits**	Local name- ***Aahrrah***, English name- **black berries**
	
Local name-***Yooyi*** English name-***Velvet Tamarind***	Local name-***Pusah*** English name-***Tamarind***

 	
Local name-***Duort,*** English name-**Dawadawa**	**Kekor- in the date family**

Source: Researcher's Field Pictures (2018)

Table 4.8: Fresh and Dry Indigenous Vegetables

	
Local name- ***Ba-owra***,	Local name- ***Urgla*** English name-Local mushrooms
	
Local name- ***Vormah,***	Local name- ***Saalum***, English

 	 
Local name- ***Tokaara***, English name- **Baobab leafs**	Local name- ***Ma-anah*** English name- dry and fresh Okro
	
Local name- ***Nanzuhee,*** English name-**Local pepper**	Local name- ***Alefu*** English name- **Amaranthus**
	
Ayoyo Local name- ***Ayoyo***, English name- **Jute**	Local name-***Nsorbera,*** English name- local garden egg
	
Local name- ***Nanginah,*** English name- Spider veg. leafs	Local name-***Yourkvuuro,*** English name-**Pumpkin leaf**

	
Local name-***Yourkah,*** English name-**Pumpkin**	Local name- ***Bamtoh***, English name-Bean leafs
	
Local name- ***Bitor,*** English name-**Hibiscus**	Local name- ***Sourwaka***, English name-**Bitter leaves**

Source: Researcher's Field Pictures (2018)

Table 4.9: Indigenous Plant Proteins

	
Local name-***Sumpeal*** English name- **Sweet Bambara beans**	Local name-***Sumah,*** English name-**Bambara beans**

	
Local name- ***Sukaan,*** English name- **Groundnuts**	Local name-***Susubah,*** English name- **Tiger nuts**
	
Local name- ***Thea,*** English name- **Beans**	***Saamah or Naeree***

Source: Researcher's Field Pictures (2018)

4.3.2 Ability of Respondents to Differentiate Indigenous Foods from Non-Indigenous Foods

Analysing the ability of mothers to differentiate indigenous foods from non-indigenous foods, Table 4.7 gives a summary of the Univariate analysis results. Eighty-six (21.5%) of the respondents were able to differentiate the indigenous foods from all the food categories. Thus, the results showed that a large percentage 314 (78.5%) of respondents could not differentiate the indigenous food from the non-indigenous foods in all the food categories. Differentiation among all the foods categories was low, except for fats and oils where almost half 192 (48.1%) of the respondents could differentiate the indigenous fats/oils from the non-indigenous ones.

Table 4.10: Ability of Respondents to Differentiate Indigenous Foods from Non-Indigenous

Food Categories	Could Differentiate (CD) N (%)	Could Not Differentiate (CND) N (%)	Total N (%)
Cereal	97 (22.7)	309 (77.3)	400 (100%)
Root crops	85 (21.2)	315 (78.8)	400 (100%)
Plant protein	83 (20.7)	317 (79.3)	400 (100%)
Animal protein	135 (33.7)	265 (66.3)	400 (100%)
Vegetables	143 (35.7)	257 (64.3)	400 (100%)
Fruits	117 (29.3)	283 (70.7)	400 (100%)
Fats and oil	192 (48.1)	208 (51.9)	400 (100%)
Overall Ability	86 (21.5)	314 (78.5)	400 (100%)

Source: Field Survey, 2017

A further bivariate analysis was conducted to determine the relationship between respondent's socio-demographic characteristics and the ability to differentiate these foods into indigenous and non-indigenous. The results showed a statistically significant relationship with the following socio-demographic characteristics (Age, marital status, educational level, occupation, sources of nutritional information and being a mother/caregiver) with p-values ($p<0.0001$), except for religion and household size that showed a statistically insignificant relationship, with p-values of ($p=0.143$) and ($p=0.071$) respectively. The summary results are shown in Table 4.8.

For age, 8 (14.0%) of those within the ages of 18-22 years could differentiate the indigenous foods from the non-indigenous foods. For mothers within the ages of

23-27 years, only 12 (13.5%) were able to differentiate the indigenous foods from the non-indigenous foods. Respondents within the 28-32 years' age group, only 7 (9.7%) could differentiate the indigenous foods among the foods consumed in the study area. For the mothers between the ages of 33-37 years, 20 (27.4%) could distinguish between the foods presented to them. Finally, 39 (35.8%) of the mothers within the ages of 38 years and above could differentiate the indigenous foods from the non-indigenous. See Table 4.8.

For marital status, 18 (38%) of widowed respondents could differentiate indigenous foods, as compared to the married and not married respondents, where 66 (19.6%) and 2 (11.1%) could differentiate indigenous foods respectively. Educational level was statistically significant at ($p<0.0001$). Sixty-five (26.3%) of the respondent who had no formal education could differentiate the indigenous foods from the non-indigenous foods. The results showed a graduated decrease in the percentage of respondents who could differentiate these foods, as the educational level moved higher. From Table 4.8, no respondent from the tertiary group could differentiate these foods. Again, it can be seen from Table 4.8, that respondent's sources of knowledge were statistically significant at ($p<0.0001$) with 46 (52.7%) of those who got their knowledge from the clinics being able to differentiate these foods. The differences across the other sources of knowledge (elderly at home, open market, and formal education) were; 33 (13.3%), 5 (9.4%) and 2 (16.7%) respectively.

Table 4.11: A Relationship between Socio-Demographics and the Ability the Differentiate Indigenous Foods from Non-Indigenous

Socio-demographics	CND, n (%)	CD, n (%)	Df	X^2	p-value
Age (years):					
18-22	49 (86)	8 (14)	(4,400)		
23-27	77 (87)	12 (13)		**77.5871**	
28-32	65 (90.3)	7 (9.7)			<0.0001
33-37	53 (72.6)	20 (27.4)			
>37	70 (64.2)	39 (35.8)			
Marital status:					
Married	266 (80.4)	66 (19.6)	(2,400)		
Not married	16 (88.9)	2 (11.1)		29.8289	<0.0001
Widowed	32 (62)	18 (38)			
Educational level:					
No formal education	183 (73.8)	65 (26.2)	(4, 400)		
Primary	54 (87.1)	8 (12.9)		31.6994	
JHS/MS/Tech	55 (82.1)	12 (17.9)			
SHS	17 (94.4)	1 (5.6)			<0.0001
Tertiary	5 (100)	0 (0)			
Occupation:					
Farmers	104 (72.2)	40 (27.8)	(3, 400)		
Professional	7 (100)	0 (0)		47.4126	<0.0001

Traders/Artisan	108 (81.2)	25 (18.8)			
Housewives	95 (82)	21 (25)			
Religion:					
Christianity	256 (79.5)	66 (20.5)	(2,400)	4.2877	
Islam	5 (83.3)	1 (16.7)			=0.143
Traditional	53 (73.6)	19 (26.4)			
Household size:					
< 4 people	12 (85.7)	2 (14.3)			
5-9 people	203 (75.7)	65 (24.3)	(4. 400)		
10-14 people	65(87.5)	9 (12.5)		9.6530	=0.071
15-19 people	34 (80.9)	8 (19.1)			
≥20 people	0 (0)	2 (100)			
Source of knowledge:					
Elderly	215 (86.7)	33 (13.3)	(3.400)		
Open market	48 (90.6)	5 (9.4)		182.2340	<0.0001
Formal education	10 (83.3)	2 (16.7)			
Clinics	41 (47.3)	46 (52.7)			
Mother/caregiver:					
Mother	286 (83.1)	58 (16.9)	(1,400)	94.0140	
Caregiver	28 (50)	28 (50)			<0.0001

Source: Field Survey, 2017.

From the qualitative data analysed, general concerns were raised by the FGD participants in connection with the inability of mothers to differentiate the indigenous foods from the non-indigenous foods. They stated that most of them were born to meet these foods being eaten in the community, some of the mothers said they got into the community by virtue of marriage, and thus could not differentiate which of the foods were not primarily cultivated in the community. The following illustrate these views from the participants:

> *"The young generation met all these foods being eaten in the community, some mothers too got into this community through marriage, and so it is very difficult to distinguish which food is originally from this community, except for those foods that are obviously not cultivated in the community."* ***[From the Nangodi-Nakpaliga Focus Group]***

> *"The youth of today are not too keen in learning about indigenous foods, and so do not ask questions relating to indigenous foods. Also, the elderly mothers at home and the community are equally reluctant in the transfer of indigenous knowledge, and so has contributed to the loss of some indigenous knowledge."* ***[A member of the Zanlerigu-Asonge Focus Group]***

> *"The schools have been teaching our children things that are not about their environment, and by the time they complete higher education, they do not know anything about their hometown. Unless they come home during vacations and are also ready to learn from immediate relatives and friends, knowledge about out indigenous foods will gradually disappear."* ***[Paramount chief of Sakote]***

4.3.3 Awareness of Extinct Indigenous Foods

Both Focus Group Discussion and IDIs participants indicated that some indigenous foods were at the verge of extinction whilst others had extinct and therefore no longer available for consumption in the community. Some of the foods that were mentioned as foods that were at the verge of extinction were, *Naara (early millet), peasah (frafra potato), saareh (sesame seeda) and naeree*. Respondents also mentioned a few extinct indigenous foods these included, *Kotoh, kuboloo, nwaeenlan* and *bondondaa*. These were identified as food that were currently not available in the community for consumption. See Table 4.9.

Table 4.12: 'Near-Extinct and Extinct' Indigenous Foods Noted

Food Category	'Almost Extinct' Foods	'Extinct' Foods
Staples (carbohydrates)	Early Millet (Naara), Frafra potatoes (peasah)	Sweet red millet (Kotok), Fonio, Kuloboo, Nweenlan, Bondondaa, Bondonyang, Fanya, Npoklatuarin
Plant proteins	Sesame seeds (saareh), Saamah (naeree)	Sumpree *(Sweet Bambara beans)*
Animal proteins	Mud Fish, Eggs,	_
Vegetables	Local mushrooms (Ugla), Saalum	Nanginah (Spider vegetable)
Fruits	Boabab (toro), Ebony (gean), Local grapes (sibisibi), Dawadawa, Tamarin (Pusaah), Sheanuts (Taamah), Black Berry (Ahrra), Nsorbera, Nkagere, Kon	
Fats/oils	Shea Butter, Groundnut oil	Baobab oil

Source: Field Data, 2017

Some of the reasons given by FGDs and IDIs participants for this phenomenon of extinction of some local food resources are as follows; Participants were of the view that climatic change had resulted in the deterioration of soil fertility which has negatively affected the nutrients in the soil, hence crops are not able to grow well; Use of chemical, especially in farming, was said to have a negative effect on the soil, it renders the soil less potent and hence not able to provide the needed nutrients to promote plant growth, especially the growth of these extinct food resources; Preference for the cultivation of non-indigenous food crops with high yielding capacity and shorter gestation period. Hence many farmers have stopped cultivating indigenous foods. The following illustrative quotes support these assertions by participants:

> *"Our soils are very old and are no longer fertile and so many crops no longer do well in terms of yields. The yields of most indigenous crops are very poor and that is why farmers no longer grow certain crops, which has contributed to the extinction of these food crops."* ***[From the Sakote- Logyakim Focus Group]***

> *"The cultivation of some crops requires lots of time, energy, and patience. But the youth of today are too lazy and will not venture or attempt to cultivate these crops and that is equally contributing to the extinction of many crops. One example is Sumpee (Sweet Bambara beans). It is very difficult to cultivate and that is why people have stopped growing it."* ***[From the Sakote- Tengpong Focus Group]***

> *"The wild vegetables like the local mushroom (Ugla), Saalum, and spider plant (Nanginag) are vanishing because of the use of chemicals on the soil."* ***[From the Pelungu Focus Group]***

"The introduction of high yielding and shorter gestation period maize has slowed down the cultivation of early millet (Naara) and the sweet red millet (Kotok) over the years, and that is one of the reasons why we are losing most of these indigenous millet varieties." ***[From the Zanlerigu Gaane Focus Group]***

"All the indigenous fruit trees are getting extinct because tree planting is not a culture here. I grew up believing that when anyone plants a tree, the person will die when the tree is just about to bear fruit. This is why we don't plant fruit tree, we allow them to grow by themselves and this does not happen easily." ***[From the Nangodi Soliga Focus Group]***

Other points that resonated from the interviews were that unity in farming was lost in the community, so farmers no longer cultivate crops together as a community at the same time, which would have rather reduced the impact on crop losses that arises as a result of birds' invasion. Again, respect for the land lords (Tengdaana) is no longer in existence, thus when it is time to cultivate crops and they announce the rules for the season (e.g. everybody should restrain their animals and allow people to farm), these rules are no longer obeyed. These have all contributed to the extinction of some food crops as no farmer is ready to plant the early crops first. The following illuminate these points:

"The early red millet, Kuloboo, kotok, Nweenlan, bondondaa, bondonyang, fanya Npoklatuarin, have just vanished from the system. The early millet (Naara) is also vanishing. This is because there's no unity in our communities again. First, they used to respect the land owners (Tengdaana), who will announce that everybody should confine their animals and allow people to farm and they will comply. But we can't get this anymore" ***[Zanlerigu Community In-Depth-Interview 5]***

"Farming in this community is becoming more and more individualistic, we no more plant crops together at the same time, and that is not helping us, because the maturity time defers and so birds turn to consume all."
[Zanlerigu-Asonge IDI 6]

4.4. Nutritional Knowledge

4.4.1 Nutritional Knowledge Assessment

Majority, 387 (96.7%) of participants were able to indicate that cereals provide the body with energy, 308 (77%) indicated root crops as sources of energy, and 366 (91%) said plant proteins provided the body with blood. Two hundred and eighty (70%) of participant believed animal proteins provide the body with blood, whilst 355 (88.7%) believed vegetable food sources were essential in providing the body with blood. More than half (54%) of mother's could not indicate the nutritional functions of fruits, thus adding (14.3% + 12.7 + 27%). Also, 56.8% of mother's had no idea the functions of fats and oils in the body. The summary can be seen in Table 4.13.

Table 4.13: Respondents' Indigenous Nutritional Knowledge on the Role of Food Categories

Food Categor	Cereal	Root crops	Plant protein	Animal protein	Vegetables	Fruits	Fats & oil
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Protect the bo	1 (0.2)	3 (0.7)	1 (0.2)	42 (10.5)	0 (0)	141 (35.3)	10 (2.5)
Build the bod	2 (0.5)	1 (0.2)	0 (0)	0 (0)	18 (4.5)	51 (12.7)	15 (3.8)
Heal the body	0 (0)	5 (1.2)	13 (3.2)	14 (3.5)	8 (2.1)	0 (0)	16 (4)
Gives blood	3 (0.8)	30 (7.6)	366 (91.6)	280 (70)	355 (88.7)	57 (14.3)	12 (3)
Gives energy	37 (96.7)	308 (77)	10 (2.5)	30 (7.5)	10 (2.5)	43 (10.7)	173 (43.2)
Don't know	7 (1.8)	53 (13.3)	10 (2.5)	34 (8.5)	9 (2.2)	108 (27)	174 (43.5)
Total	400 (100%)	400 (100%)	400 (100%)	400 (100%)	400 (100%)	400 (100%)	400 (100%)

Source: Field Data, 2017.

During the qualitative interviews, participants showed high level of knowledge on the nutritional value of cereals. They stated how the indigenous cereals were healthier than the non-indigenous cereals. The statements from the interviews resonated with the results, and represent the opinion of the majority of the discussants. They stated that, TZ made from millet was more filling and healthier. The following quotes buttress these points from participants:

> *"Whenever we eat TZ made from maize, we get hungry in no time. All the food melts off very fast. On the other hand, when we eat TZ made from millet; it can sustain us for a longer period. It makes us drink lots of water. Millet TZ is healthier and gives more strength than maize TZ."* ***[From the Nangodi-Nakpaliga Focus Group]***

> *"Any food made from cereals gives energy to the body, and the children need this energy to grow. That is the more reason why we always have more of cereals in almost every meal we give our children."* ***[From the Nangodi Soliga Focus Group]***

> *"Our indigenous cereals are classified as "Peleim", meaning life sustaining foods. They give energy to the body and help the muscles grow well."* ***[In-depth interview 3-sub-chief Sakote]***

Mothers who responded correctly to the indigenous nutritional functions of roots were 308 (77%). Results from the qualitative research component largely corroborated with the findings in the survey report as they stated that root crops provided the body with energy. A FGD participant in Zanlerigu-Asonge had this to say;

> *"The root crops provide the body with energy. Our sweet potatoes and frafra potatoes are very healthy foods. Whenever*

we eat any of these foods, we drink water throughout the day, which signifies it is good food." ***[From the Zanlerigu-Asonge Focus Group]***

Another participant from the Nangodi Soliga FGD stated that:

"We know that any food that has a sticky nature is food that will provide the body with energy. Most of these foods are white in nature even though there are other energy giving foods that have different colors like the red millet, gray millet and yellow potatoes." ***[From the Nangodi Soliga Focus Group]***

With plant proteins, 366 (91.5%) of mothers had the correct scores to the indigenous nutritional functions of plant protein, while 280 (70%) of the participants affirmed that animal proteins provides blood to the body. From the qualitative discussions, the FGD participants also indicated that proteins provides blood to the body. Other respondents however believed that proteins are added to meals just to improve its taste as illustrated in the following statements:

"Plant protein gives us blood and helps in the growth and development of our children. For instance, Beans and Bambara beans are very healthy, as they provide the body with blood and energy and also help build the growing child. We try to eat food made from beans or Bambara beans at least once or twice in a week. Foods like Tubani and Waakye or even soup porridge (Kunkorgre) are fed to our children so that they grow well". ***[From the Sakote- Tengpong Focus Group]***

"Animal proteins give us blood. It helps in the growth and development of children and also makes us grow fat when taken

in excess especially red meat." ***[From the Pelungu Focus Group]***

"The most popularly used animal protein is Amani. It is purposely used for meals just to make the meal palatable". ***[From the Nangodi-Nakpaliga Focus Group]***

The percentage of mothers who responded correctly to the indigenous nutritional function of fruits were 46%. From the discussions, participants said they were aware that fruits had some nutritional benefits, but were not able to state them. The following quotes represent the opinion of a large majority of the participants;

"We know that fruits have some nutritional value, but because we have not made fruits to be part of our core meals, we have not considered understanding their nutritional values as much as we have done for those food categories that are highly consumed." ***[From the Nangodi-Nakpaliga Focus Group]***

"We know the baobab fruits make the children eat more, thus, it expands the stomach and gives them huge appetite. Because of that, it is mostly added in the preparation of TZ, especially for the sick and those recovering from illnesses so that they can eat well." ***[From the Sakote- Tengpong Focus Group]***

"The Dawadawa fruit, for example, is of great health benefit to us and the children. The yellow pulp, when eaten makes one have loose stool and so does not constipate. The seeds are also very medicinal, it is very good for inflammation and the peals can be used as blood tonic." ***[In-depth interview 4 – Women organizer, Tengpong]***

> *"The peals of dawadawa can be boiled and used as enema for children, to clean their stomach."* ***[From the Nangodi Soliga Focus Group]***

> *"The shea fruits can help relieve constipation. Shea butter is extracted from the seeds of shea fruits which are used for cooking food and for treating other ailments."* ***[From the Pelungu Focus Group]***

A traditional birth attendant from Logyakim community said that seeds from the *dawadawa* fruits were very healthy and can prevent a child from becoming sick and can aid in the healing process of a sick and malnourished child.

It was observed that 355 (88.7%) of the mothers indicated that a person gets blood from consuming vegetables, and related statements resonated from the qualitative discussions as participants said vegetables helps in the purification of one's blood, and again enhances the blood level in the body. Thus, the quotes resonating with the results were as follow;

> *"If we don't feed the children with vegetables they will be short of blood and become anaemic."* ***[From the Sakote- Tengpong Focus Group]***

> *"Vegetables are healthy foods. It purifies your blood and keeps you strong and healthy."* ***[From the Pelungu Focus Group]***

One of the respected elderly women from Tengpong community, and other interviewees, were of the view that leafy green vegetables gives good eyesight and for that reason feeding the children with lots of vegetables helps in the development of good eyesight.

"Vegetables help in the developing the good eyesight." ***[In-depth interview 4- Women organizer, Pelungu]***

Mothers who had good indigenous nutritional knowledge on fats/oil was 173 (43.2%), meanwhile 227 (56.8%) said they did not know anything about the nutritional functions of fats and oils. Observations from the qualitative work resonated with the quantitative results. Participants were of the view that, intake of foods containing fat and oil can make one fall sick. Despite this, some participants indicated that foods containing fat and oil add taste to food as illustrated:

"Fats and oils make us sick when we take too much". ***[From the Sakote- Logyakim Focus Group]***

"I am not sure of what we get from fats/oils". ***[From the Nangodi-Nakpaliga Focus Group]***

"Fats and oils make food tasty for us to eat; that is all". ***[From the Sakote- Tengpong Focus Group]***

Conclusively, the respondents in both the qualitative and quantitative research had good indigenous nutritional knowledge except for fruits and fats and oils.

Results from the weighted scores on respondent's indigenous nutritional knowledge showed very high scores for cereals 387 (96.7%), plant proteins 366 (91.5%) and vegetables 355 (88.7%). The overall weighted scores for those with high indigenous nutritional knowledge were 311 (77.7%) as shown in Table 4.14.

Table 4.14: Weighted Indigenous Nutritional Knowledge on Various Food Categories

Food categories	Low Knowledge N (%)	High Knowledge N (%)
Cereal	13 (3.3)	387 (96.7)
Root crops	92 (22.0)	308 (77.0)
Plant protein	34 (8.6)	366 (91.5)
Animal protein	120 (30.0)	280 (70.0)
Vegetables	45 (21.3)	355 (88.7)
Fruits	216 (54.1)	184 (45.9)
Fats and oil	227 (56.8)	173 (43.2)
Overall knowledge	89 (22.3)	311 (77.7)

Source: Field Data, 2017.

A bivariable analysis was done to ascertain the relationship between respondent's socio-demographic factors and their nutritional knowledge. The results showed that, age, marital status, educational level and sources of nutritional knowledge were associated with indigenous nutritional knowledge. Occupation, religion, household size, and being a mother/caregiver, on the other hand were not associated with respondent's indigenous nutritional knowledge and were statistically insignificant at p-values of ($p = 0.068$), ($p = 0.662$), ($p = 0.523$) and ($p = 0.190$) respectively.

The difference across the various age groups was statistically significant at ($p<0.0001$). The results show a graduated increase in indigenous nutritional knowledge scores as age increases. About 36.8% of respondents between the ages of 18-22 years had high indigenous nutritional knowledge. For those between the ages of 23-27 years, 71.9% had high indigenous nutritional knowledge. Mother's within 28-32 years' group had 76.4% of their respondents having high indigenous nutritional knowledge. Also, 87.7% of the mothers within the ages of 33-37 years had high indigenous nutritional knowledge. One hundred and seven (98.2%) respondents within the age group of 38 years and above had high scores in the nutritional knowledge assessment. Marital status was statistically significant at ($p<0.0001$), with 84.0% married mothers scoring high, followed by the widowed group with 62.0% and finally the singles with 5.6%. Educational level and sources of nutritional knowledge were statistically significant at ($p<0.0001$).

Table 4.15: Association between Socio-Demographic Factors and Nutritional Knowledge of Respondents

Socio-demographic	Low n (%)	High n (%)	p-value
Age (years)			<0.0001
18-22	36 (63.2)	21 (36.8)	
23-27	25 (28.1)	64 (71.9)	
28-32	17 (23.6)	55 (76.4)	
33-37	9 (12.3)	64 (87.7)	
>37	2 (1.8)	107 (98.2)	
Marital status			<0.0001
Married	53 (16.0)	279 (84.0)	
Not married	17 (94.4)	1 (5.6)	

Widowed	19 (38.0)	31 (62.0)	
Educational level			0.0001
No formal education	39 (15.7)	209 (84.3)	
Primary	21 (33.9)	41 (66.1)	
JHS/MS/Tech	27 (40.3)	40 (59.7)	
SHS	2 (11.1)	16 (88.9)	
Tertiary	0 (0.0)	5 (100.0)	
Occupation			0.068
Farmers	27 (18.8)	117 (81.2)	
Professional	2 (28.6)	5 (71.4)	
Traders/Artisan	32 (24.1)	101 (75.9)	
Housewives	28 (16.9)	138 (83.1)	
Religion			0.662
Christianity	46 (14.3)	276 (85.7)	
Islam	2 (33.3)	4 (66.7)	
Traditional	41 (56.9)	31 (43.1)	
Household size			0.523
< 4 people	5 (35.7)	9 (64.3)	
5-9 people	57 (21.3)	211 (78.7)	
10-14 people	14 (18.9)	60 (81.1)	
15-19 people	13 (30.9)	29 (69.1)	
≥20 people	0 (0.0)	1 (100.0)	
Source of knowledge			0.0001
Elderly	13 (6.5)	188 (93.5)	
Open market	52 (71.2)	21 (28.8)	
Formal education	3 (14.)	18 (85.7)	
Clinics	21 (20.0)	84 (80.0)	
Mother/caregiver			0.190
Mother	83 (24.1)	261 (75.9)	
Caregiver	6 (5.4)	50 (94.6)	

Source: Field Survey (2017)

The results again revealed in a multivariable logistic regression analysis, that mothers between the ages of 38 years and above were 2.7 times more likely (aOR = 2.72, 95% CI = 1.2890, 2.3678) to be knowledgeable in the nutritional value of the various food categories than those within the 18-22 years. Married women were 3.7 times more likely (aOR = 3.70. 95% CI = 3.2816, 5.0897) to be knowledgeable than widows and single women. With educational level, the results revealed that those within the tertiary group were 3.0 times more likely (aOR = 3.01, 95% CI = 2.0123, 5.8751) to be knowledgeable than the other educational levels considered in the study. Respondents whose source of nutritional knowledge was from the elderly were 3.0 times more likely (aOR = 3.03, 95% CI = 2.0113 – 5.8641) to be knowledgeable than those with their sources coming from the others considered in the study. The summary of the multivariate analysis is seen in Table 4.16.

Table 4.16: Multivariate Analysis on the Association between Respondents Socio-Demographic Factors and Nutritional Knowledge

	Unadjusted			Adjusted		
Socio-demographic	**OR**	**p-value**	**95% CI**	**OR**	**p-value**	**95% CI**
Age (Years)						
18-22	1.00	-	-	1.00	-	-
23-27	1.21	0.041	0.0131-0.0931	1.11	0.033	0.2378-0.6310
28-32	1.01	0.037	0.0897-0.1891	1.31	0.021	
33-37	2.01	0.031	1.9823-9.8721	2.53	0.001	2.1874-7.2319
>37	3.32	0.001	2.1472-8.2718	2.72	<0.0001	1.2890-2.3678

Marital status						
Not Married	1.00	-	-	1.00		
Married	4.30	<0.0001	2.8712-6.1562	3.70	0.001	3.2816-5.0897
Widowed	0.42	0.541	0.6902-5.7991	0.31	0.751	0.8723-8.0123
Educational level						
No formal education	1.00	-	-	1.00	-	-
Primary	1.12	0.032	0.6712-0.8713	1.01	0.031	0.5423-0.8791
JHS/MS/Tech	1.57	0.023	1.8972-8.2348	1.42	0.011	1.1262-6.9121
SHS	2.23	0.033	4.8123-7.0123	2.12	0.041	3.9871-6.1278
Tertiary	3.23	0.001	3.0987-7.0782	3.01	<0.0001	2.0123-5.8751
Source of knowledge						
Open market	1.00	-	-	1.00	-	-
Elderly	3.25	0.001	3.0976-7.0767	3.03	<0.0001	2.0113-5.8641
Formal education	2.95	0.029	4.6123-7.1123	2.73	0.307	0.6861-6.1167
Clinics	2.78	0.024	2.4275-7.2489	2.56	0.221	0.5729-6.9084

Source: Field Data, 2017

4.4.2 Knowledge and Practice of Balanced Diet

The survey observed that 235 (58.8%) of the mothers did not know what a balance diet entailed, and about 362 (90.5%) of the mothers did not feed their children on a balance diet daily, thus, the practice of feeding the children on a balance diet was as low as 9.50% as shown in Figure 4.1.

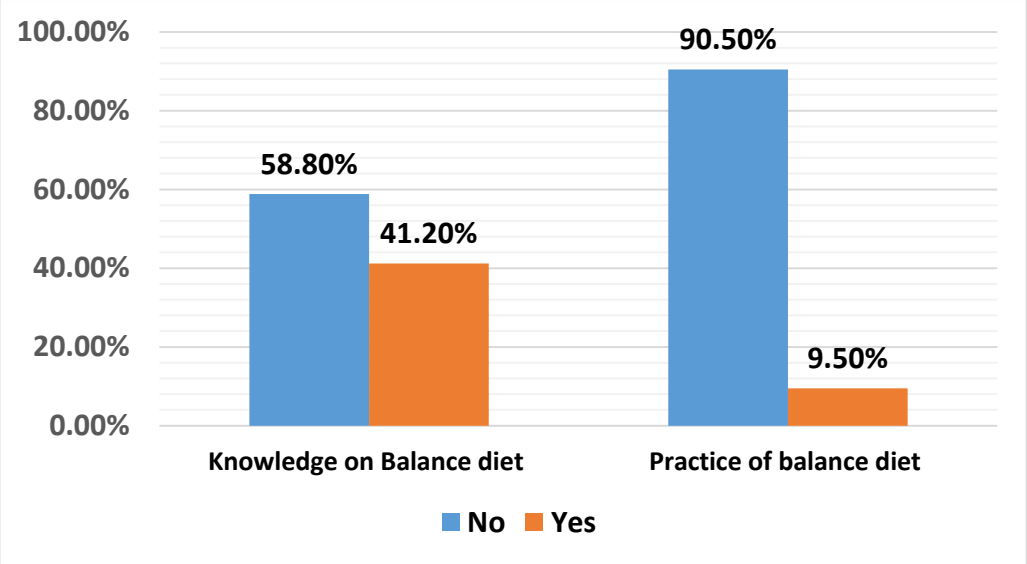


Figure 4.1: *Knowledge and Practice of Balance Diet*

Source: Field Data, 2017.

Further analysis was conducted to ascertain possible association between respondent's socio-demographic factors and their knowledge and practice of balance diet. The study first looked at a bivariate analysis with respondent's knowledge on balance diet and how it relates to their socio-demographic factors. The results revealed that age, marital status, educational level, occupation and source of knowledge were statistically significant, while religion, household size and being a mother were statistically insignificant.

Among the respondents within the ages of 18-22 years, only 19 (33.3%) had knowledge on balance diet (adequate diet). The percentages graduated to 35 (39.3%) among the respondents within the ages of 23-27 years and 28 (38.9%) among the age group of 28-32 years. The percentage further increased to 30 (41.1%) within the 33-37 years' age group. For the respondents who were within 38 years and above, 54 (49.5%) knew what balance diet (adequate diet) entailed.

The difference across the various age groupings was found to be statistically significant at (p = 0.006). Marital status was found to be statistically significant at (p = .0044) with the widowed group having the least 18(36.00%) percentage of respondents and the not married group the highest 10 (55.6%) percent. The married group of respondents had 138 (41.6%) who knew about balance diet (adequate diet).

Educational level was statistically significant at (p = 0.010) as all the respondents within the SHS and tertiary groups knew about balance diet (adequate diet). Thirty-five (52.2%) of those within the JHS/MS/Technical group knew about balance diet and for respondents within the primary and no formal education group, among those who knew about balance diet were 18 (29%) and 90 (41.9%) respectively. Occupation was statistically significant at (p = 0.017) and source of knowledge was significant at (<0.0001).

Table 4.17: Association between Socio-Demographic Characteristics of Mothers and Knowledge on Balance Diet (adequate diet)

Socio-demographic	Don't know n (%)	Know n (%)	X^2	df	p-value
Age (years)			294.6254	4,400	
18-22	38 (66.7)	19 (33.3)			0.006
23-27	54 (60.7)	35 (39.3)			
28-32	44 (61.1)	28 (38.9)			
33-37	43 (58.9)	30 (41.1)			
>37	55 (50.5)	54(49.5)			
Marital status			6.2651	2, 400	
Married	194 (58.4)	138 (41.6)			0.044

Not married	8 (44.4)	10 (55.6)		
Widowed	32 (64)	18 (36)		
Educational level			24.5641	4, 400
No formal education	158 (58.1)	90 (41.9)		0.010
Primary	44 (70.9)	18 (29.1)		
JHS/MS/Tech	32 (47.8)	35 (52.2)		
SHS	0 (0)	18 (100)		
Tertiary	0 (0)	5 (100)		
Occupation			12.0671	3, 400
Farmers	89 (61.8)	55 (38.2)		0.017
Professional	3 (42.9)	4 (57.1)		
Traders/Artisan	72 (54.1)	61 (45.9)		
Housewives	70 (60.3)	46 (39.7)		
Religion			1.5725	2, 400
Christianity	191 (59.3)	131 (40.7)		0.456
Islam	3 (50)	3 (50.00)		
Traditional	40 (55.6)	32 (44.4)		
Household size			9.6173	4, 400
< 4 people	6 (42.9)	8 (57.1)		0.061
5-9 people	154 (57.5)	114 (42.5)		
10-14 people	47 (63.5)	27 (36.5)		
15-19 people	26 (61.9)	16 (38.1)		
≥20 people	1 (100)	0 (0)		
Source of knowledge			294.6254	3, 400
Elderly	191 (77.1)	57 (22.9)		<0.0001
Open market	9 (16.9)	44 (83.1)		
Formal education	2 (16.7)	10 (83.3)		
Clinics	32 (36.8)	55 (63.2)		
Mother/caregiver			0.7948	1, 400
Mother	203 (59.1)	141 (40.9)		0.373
Caregiver	31 (55.4)	25 (44.6)		

***Source**: Field Data, 2017.*

Again, a bivariate analysis was conducted to assess the relationship between respondent's socio-demographic factors and feeding children on balance diet. The results showed a statistically significant relationship with educational level, occupation and household size but was statistically insignificant for age, marital status, religion, source of knowledge and being a mother/caregiver as summarised in Table 4.18.

The difference across the various educational levels were significant at ($p = 0.007$) with 100% of the respondents within the tertiary and SHS groups feeding their children on balance diet, while the group with no formal education, only 10 (4%) of the respondents fed their children on balance diet. Again, the differences across the various occupation was statistically significant at ($p = 0.042$) with 100% of respondents within the professional group feeding their children on balance diet, while those within the other occupations, less than 10% fed their children on balance diet daily. Household size was statistically significant at 95% degree of significance ($p<0.001$).

Table 4.18: Relationship between Socio-Demographic Factors and Practice of Balance Diet

Socio-demographic	Practicing the feeding of adequate diet (balance diet) to children under 5			
	Not feeding, n (%)	Feeding, n (%)	df	p-value
Age (years)			4,400	0.591
18-22	56(98.2)	1 (1.8)		
23-27	88 (98.9)	1 (1.1)		
28-32	70 (97.2)	2 (2.8)		
33-37	68 (93.2)	5 (6.8)		
>37	80 (73.4)	29 (26.6)		
Marital status			2, 400	0.517
Married	317 (95.5)	15 (4.5)		
Not married	9 (50)	9 (50)		
Widowed	36 (72)	14 (28)		
Educational level			4, 400	0.007*
No formal education	238 (95.9)	10 (4.1)		
Primary	58 (93.5)	4 (6.5)		
JHS/MS/Tech	66 (98.5)	1 (1.5)		
SHS	0 (0)	18 (100)		
Tertiary	0 (0)	5 (100)		
Occupation			3, 400	0.042*
Farmers	134 (93.1)	10(6.9)		
Professional	0 (0)	7 (100)		
Traders/Artisan	123 (92.5)	10 (7.5)		
Housewives	105 (90.5)	11 (9.5)		
Religion			2, 400	0.239
Christianity	300 (93.2)	22 (6.8)		
Islam	3 (50)	3 (50)		
Traditional	59 (81.9)	13 (18.1)		
Household size			4, 400	0.001*
< 4 people	10 (71.4)	4 (28.6)		

5-9 people	245 (91.4)	23(5.6)		
10-14 people	68 (91.9)	6 (8.1)		
15-19 people	37 (88.1)	5 (11.9)		
≥20 people	1 (100)	0 (0)		
Source of knowledge			3, 400	0.592
Elderly	236 (95.2)	12 (4.8)		
Open market	50 (94.3)	3(5.7)		
Formal education	6 (50)	6 (50)		
Clinics	70 (80.4)	17 (19.5)		
Mother/caregiver			1, 400	0.373
Mother	316 (91.9)	28 (8.1)		
Caregiver	46 (82.1)	10 (17.9)		

Source: Field Data, 2017.

An additional cross tabulation analysis was done to establish the relationship between mothers' knowledge on balance diet and practicing of balance diet using the Pearson Chi-Square test. The relationship was statistically significant with Pearson Chi-Square = 60.92 and P< 0.0001. One hundred percent (100%) of mothers who did not know what balance diet entailed, did not feed their children with balance diet on a daily basis. Interestingly, among the respondents who had knowledge on balance diet, only 23.5% fed their children on a balance diet daily.

A statement from a participant which resonated with the survey findings was that;

> *"It is not as if we don't know what is good for the children, it is just that we are poor and so we give the children the same food everyone eats at home, and we can only eat what is available."*
> ***[From the Zanlerigu-Gaane Focus Group]***

A FGDs participant from Pelungu had this to say;

> *"Feeding our children on adequate diet means they have to be fed more than three times a day. But usually the children get to eat breakfast only when there are some left over from the previous day's dinner. If not, they get to eat late breakfast and dinner, meaning they mostly eat two times a day, but the very little ones sometimes get to snack between the two main meals" [**From the Pelungu Focus Group**]*

Again, during the IDI with one of the elderly women in the community, she said this;

> *"Since I was borne, I have never heard of any mother having a feeding plan for their children, where she will make sure that all the required foods nutrients are fed to the children daily." **[In-depth interview 4- Women organizer, Tengpong]***

4.5 Mothers' Level of Food Consumption

This section presents results on the extent to with mothers fed their children (consumption) with indigenous foods and whether mothers' knowledge on the nutritional value of indigenous foods and impact on their food choices. Other factors that could possibly influence mothers' food choices were considered. Here, the researcher looked at the following; The general frequency and consumption pattern of the various foods categories; The frequency of mothers' feeding their children (consumption) with indigenous foods; The relationship between mothers' indigenous nutritional knowledge and feeding their children (consumption) with indigenous foods; and finally, factors influencing mothers' food choices; both quantitative and qualitative data were collected and analysed.

4.5.1 Frequency and Pattern in Consumption of the Various Food Categories

The survey results show that more than 80% of mothers fed their children often with cereals, plant proteins, animal proteins, vegetables and fats/oils while less than 20% of mothers fed their children with fruits and root crops often. As displayed in Figure 4.2 with the details in Table 4.19.

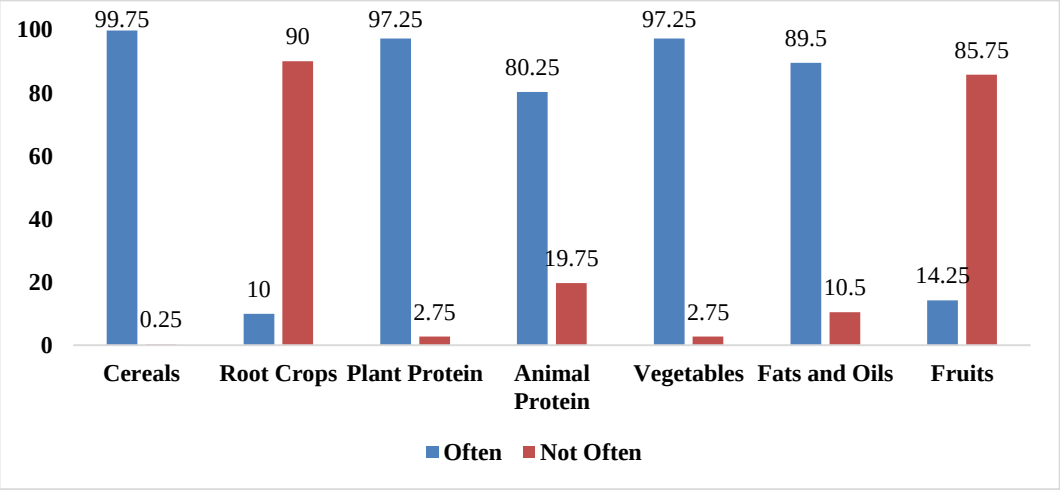


***Figure 4.2**: Distribution of How often Mothers use each of the Various Food Categories to Feed Children (In %)*

Source: Field Data, 2017.

Table 4.19: Mothers' Consumption of Food Category

	Not Often Consumed	Often Consumed
Food category	**N (%)**	**N (%)**
Cereals	1 (0.3)	399 (99.7)
Roots	360 (90.0)	40 (10.0)
Plant proteins	11 (2.8)	389 (97.2)
Animal proteins	79 (19.8)	321 (80.2)
Vegetables	11 (2.8)	389 (97.2)
Fruits	323 (85.8)	57 (14.2)
Fats/oils	42 (10.5)	358 (89.5)
Overall Consumption	89 (19.0)	311 (81.0)

Source: Field Data, 2017.

Results from the qualitative research component, largely corroborated the survey findings, except for animal proteins, where a large majority of the participants in both FGDs and IDIs said they hardly consume meat at the household level, and that common proteins that were fed to their children included; *Amani (herrings)* and once in a while eggs and processed milk.

Close to 100% of mothers fed their children often with cereals. The participants from the qualitative discussions said cereals were the most consumed food and

that cereals were consumed in almost every house hold on a daily basis. These quotes are representative of the opinion of most of the discussants.

> *"In this community, the culture is that TZ has to be prepared on a daily basis, and we know that TZ is prepared from cereals. If TZ is not prepared for dinner and any other meal is prepared, it means you have not cooked food."* ***[IDI 6, famer at Zanlerigu Asonge]***

> *"The body requires lots of energy to grow, for that reason, foods that give energy to the body, are always served in large quantities, and energy given foods are part of every meal. Cereals have become the most consumed energy food, because it is available all year round, as compared to roots that are purely seasonal".* ***[IDI 2, opinion leader, Tenpong]***

The results showed that, only 10% of mothers fed their children with root crops and respondents from the FGD said it was because root crops were not available and not so common. The discussants said;

> *"The root crops are seasonal and not available all year round, which is one reason why we do not consume them as much as the cereals."* ***[From the Sakote- Logyakim Focus Group]***

> *"We are not able to preserve the sweet potatoes and frafra potatoes very well, so we eat as and when they are in season and wait till the next season. Also, the root crops are not grown in large quantities, so we do not have enough to even try to preserve."* ***[From the Zanlerigu Gaane Focus Group]***

> *"The indigenous roots crops are not cultivated in large quantities for the reason that they are difficult to preserve in large amounts. We usually prefer eating them freshly harvested*

from the farms and the excess sold out." ***[From the Sakote-Tengpong Focus Group].***

With the proteins above 80% fed their children often with proteins. However, participants indicated that it was expensive to get milk and fish. Hence, majority of the people were unable to afford as illustrated by the following quotes:

"Our children get their source of animal proteins mostly from processed milk such as Nido, Ideal milk and Peak milk, and that is if only a mother can afford to purchase. Fresh cow milk is hardly available." ***[From the Pelungu Focus Group]***

"Amani (herrings) is the fish we mostly use in cooking our meals, but because it is expensive, most homes hardly use it, and even if they do get to use Amani to cook, it is in very small portions just to give the food some taste." ***[From the Sakote- Tengpong Focus Group]***

"It depends on the age of the child, if the child is between the ages of 6 months and 36 months, the processed milk is added for them, but with any child above that age, we hardly add milk." ***[From the Zanlerigu-Asonge Focus Group]***

"We hardly slaughter animals at home for the sake of preparing food, unless there is a special reason such as having an important visitor at home." ***[From the Zanlerigu-Gaane Focus Group]***

One major point that strongly emerged during the interviews was the fact that the animals reared at the homes were not meant for household consumption, but for solving problems whenever there is the need. Situations like paying school fees, marital rites, hospital bills, levies, and festivals, were given as examples.

A minority of the respondents however, said they purchase and cook meat from time to time.

> *"We rear the animals, but they are not meant for consumption. We sell them to solve financial problems in the family and cater for issues such as school fees, hospital bills but during festivals we kill some for the use of the family," [**IDI 2, Opinion Leader, Tengpong]***

The following statements highlight the low use of animal protein by mothers to feed their children in the study area. One of the elderly mothers at Pelungu, for instance, stated that, rearing of animals, especially cattle, has become very difficult and the reason she gave was that;

> *"Apart from the fact that grazing the cattle is not easy, one of the malaria control programme where we were asked to separate the cattle barns from our houses to control mosquitos, has contributed to the loss of interest by indigenes to rear cattle. The fact is that we were made to appreciate the role the cattle kraal plays in the breeding of mosquitoes. Hence many household heads stopped rearing cattle without any alternative." **[IDI 4, women elder, Pelungu]***

> *"At first every household had at least two (2) cattle, unlike today where just a few homes have cattle so we don't get to drink fresh milk anymore" **[IDI 1, Traditional birth attendant, Logyakim]***

The FGD participants said that plant proteins were often fed to children, especially the Bambara beans, groundnuts and beans. Mothers said these foods are quite expensive but they try to feed their children on them as often as they can.

For vegetables, 389 (97.2%) mothers fed their children often with vegetables. Issues that were raised during the FGD and the IDI concerning the consumption of vegetables were as follows;

> *"There is no day we don't feed our children with fresh, leafy and green vegetables during the raining season. Because we know that it is good for the body and gives blood. But during the dry season, they are fed on dry vegetables such as dry okro, or dry bitor (kannef)"* ***[IDI 4, women elder, Pelungu]***

> *"Most of the vegetables are easy to preserve, and so we try to preserve some by drying them so we can use during the lean season."* ***[IDI 6, Farmer, Zanlerigu-Asong]***

The results revealed that, 89.5% mothers fed their children often with fats and oils, and discussants from the FGD had this to say about the use of fats and oils in feeding their children;

> *"Practically, all our foods are cooked with some amount of fats or oil, this is why the children get to eat them often."* ***[From the Zanlerigu-Gaane Focus Group]***

The consumption of fruits or the feeding of children with fruits was trailing with 57 (14.2%) mothers who said they fed their children often with fruits. Some discussants had this to say on Fruits;

> *"Fruits are not particularly part of our meals. We just eat them as and when we get them. Mostly, we buy some and also hunt for them. Our children get to eat fruits when mothers come across them, then buy some for the children just to make them happy.*

Fruits are never part of the children's routine meals" ***[From the Sakote- Logyakim Focus Group]***

"Most of the local fruits like the sisibi (local grapes) have been branded food for the poor and hungry. People in the community will make mockery of you and conclude that you are from a poor home whenever you are seen eating them. Because of that, people shy away from eating our indigenous fruits." ***[IDI 4, women organizer, Pelungu]***

"We seriously have not recognized the value and contribution of fruits in the growth of a child and so we have not been given fruits the needed attention when it comes to feeding our children with it." ***[IDI 7, Paramount Chief Sakote]***

"In some cases, the children are mostly restricted from eating the baobab fruit because it expands their stomachs and gives them huge appetite, whereas we are always trying to manage the little food we have. We also restrict our children from eating Sisibi (local grapes) because the seeds block their rectum (constipate)." ***[From the Sakote- Logyakim Focus Group]***

Other respondents were of the view that the indigenous fruits were seasonal and not always available, hence scarcely consumed.

4.5.2 Consumption of Indigenous Foods

The study further analysed how often mother's fed their children with indigenous foods. It revealed that, less than half, 175(43.8%) of the mother's consumed indigenous cereals. Two hundred and sixty-four (68.5%) mothers fed their children with indigenous roots, while, 284 (71.0%) and 204 (51.0%) mothers, fed their children with indigenous plant proteins and animal proteins

respectively. Three hundred and twenty-nine (82.3%) of mother's fed their children with indigenous vegetables. One hundred and ninety-two, thus, 47.9% and 188 (47.0%) fed their children with indigenous fruits and fats/oils respectively. On the average, more than half [259 (64.8%)] of the mothers fed their children with indigenous foods. Table 4.20 has the summary.

Table 4.20: Consumption of Indigenous Foods by Respondents

Food Category Consumed	Indigenous N (%)	Non-indigenous N (%)
Cereal	175 (43.8)	225 (56.2)
Root crops	274 (68.5)	126 (31.5)
Plant protein	284 (71.0)	116 (29.0)
Animal protein	204 (51.0)	196 (49.0)
Vegetables	329 (82.3)	71 (17.7)
Fruits	192 (47.9)	208 (52.1)
Fats and oil	188 (47.0)	212 (53.0)
Overall Consumption	259 (64.8)	141 (35.2)

Source: Field Data, 2017.

A bivariable analysis was done to ascertain the association between respondents socio-demographic characteristics and the consumption of indigenous foods (feeding their children with indigenous foods). The differences in indigenous

food consumption across the various age groups was significant with p-value = 0.044. Only 2 (3.5%) of those within the 18-22 years' category fed their children with indigenous foods, while 99 (90.8%) of the respondents within the group, 38 years and above fed their children with indigenous foods. Educational level was significant at p=0.021. One hundred and seventy-two (69.4%) of those with no formal education fed their children with indigenous foods, while no respondent (0 %) within the tertiary group fed their children with indigenous foods. Occupation and household size were also significant at p<0.0001. details can be seen in Table 4.21.

Table 4.21: Socio-Demographic Factors and the Consumption of Indigenous Foods

Socio-demographic	Type of Food Consumed		
	Non-indigenous	Indigenous	p-value
Age (years)			0.044
18-22	55 (96.5)	2 (3.5)	
23-27	40 (44.9)	49 (55.1)	
28-32	23 (31.9)	49 (68.1)	
33-37	13 (17.8)	60 (82.2)	
>37	10 (9.2)	99 (90.8)	
Marital status			0.114
Married	114 (34.3)	218 (65.7)	
Not married	15 (83.3)	3 (16.7)	
Widowed	12 (24)	38 (76)	
Educational level			0.021
No formal education	76 (30.6)	172 (69.4)	
Primary	34 (54.8)	28 (45.2)	
JHS/MS/Tech	24 (35.8)	43 (64.2)	
SHS	2 (11.1)	16 (88.9)	

Tertiary	5 (100)	0 (0)	
Occupation			<0.001
Farmers	48 (33.3)	96 (66.7)	
Professional	7 (100)	0 (0)	
Traders/Artisan	46 (34.6)	87 (65.4)	
Housewives	40 (34.5)	76 (65.5)	
Religion			0.162
Christianity	99 (30.7)	223 (69.3)	
Islam	3 (50)	3 (50)	
Traditional	39 (54.2)	33 (45.8)	
Household size			0.001
< 4 people	7 (50)	7 (50)	
5-9 people	85 (31.7)	183 (68.3)	
10-14 people	31 (41.9)	43 (58.1)	
15-19 people	17 (40.5)	25 (59.5)	
≥20 people	1 (100)	0 (0)	
Source of knowledge			0.092
Elderly	88 (35.5)	160 (64.5)	
Open market	30 (56.6)	23 (43.4)	
Formal education	6 (50)	6 (50)	
Clinics	17 (19.5)	70 (80.5)	
Mother/caregiver			0.402
Mother	129 (57.5)	215 (62.5)	
Caregiver	12 (21.4)	44 (78.6)	

Source: Field Data, 2017.

A further multivariable logistic regression analysis revealed that, mothers within 38 years and above were 4.6 times (aOR = 4.63, 95% CI = 0.6821, 8.9881) more likely to feed their children with indigenous foods as compared to mothers within the ages of 18-22 years, also those within the ages of 33-37 years were 2.4 times (aOR = 2.40, 95% CI = 0.4352, 0.8661) more likely to feed their

children with indigenous foods relative to those within the ages of 18-22 years. Senior High School (SHS) graduates were found to have 1.5 times (aOR = 1.54, 95% CI = 0.0156-1.1042) the odds of feeding their children with indigenous foods relative to those with no formal education. However, 33% (aOR= 0.67, 95% CI= 0.3238, 2.3711) of those within the JHS/MS/Tech group were less likely to feed their children with indigenous foods as compared to those with no formal education. The results revealed that mothers within the tertiary group are 100% (aOR = 0.00, 95% CI = 0.4623, 6.4023) less likely to feed their children with indigenous foods, relative to those with no formal education. Details can be seen in Table 4.22.

Table 4.22: Multivariate Analysis on the Association between Socio-Demographic Factors and the Consumption of Indigenous Foods

	Unadjusted			Adjusted		
Socio-demographic	**OR**	**p-value**	**95% CI**	**OR**	**p-value**	**95% CI**
Age (Years)						
18-22	1.00	-	-	1.00	-	-
23-27	1.23	0.032	1.1769-7.4834	0.16	0.027	1.1244-6.8741
28-32	1.45	0.021	0.4451-3.4382	0.38	0.002	0.4903-0.9318
33-37	3.61	0.001	0.6413-0.7651	2.40	0.012	0.4352-0.8661
>37	5.44	0.760	0.7995-9.9870	4.63	0.648	0.6821-8.9881
Household size						

< 4 people	1.00	-	-	1.00	-	-
5-9 people	0.63	0.219	0.2968-1.3207	0.58	0.270	0.3387-0.9591
10-14 people	0.54	0.450	0.6483-2.6578	0.47	0.642	0.5975-2.3068
15-19 people	0.56	0.213	0.2033-1.8303	0.37	0.206	0.1865-1.7566
≥20 people	0.01	0.006	0.4018-0.8199	0.00	0.001	0.3392-0.8127
Educational level						
No formal education	1.00	-	-	1.00	-	-
Primary	0.10	0.000	0.2681-1.2467	0.08	0.001	0.3612-0.8977
JHS/MS/Tech	0.75	0.570	0.2755-2.0327	0.67	0.802	0.3238-2.3711
SHS	1.86	0.064	0.0132-1.1653	1.54	0.060	0.0156-1.1042
Tertiary	0.01	0.806	0.3187-4.3555	0.00	0.413	0.4623-6.4023
Occupation						
Farmers	1.00	-	-	1.00	-	-
Professional	0.01	0.734	0.3262-4.9060	0.00	0.020	0.3449-0.6478
Traders/Artisan	0.15	0.858	0.3767-3.2298	0.12	0.650	0.2771-2.2263
Housewives	0.13	0.007	1.5341-15.5330	0.09	0.031	1.1232-11.6685

Source: Field Data, 2017.

4.5.3 Factors Influencing Mother's Food Choices

The study also tested the relationship between some factors that informed mothers' food choices for their children. Factors such as cost, culture, nutritional knowledge, taste and availability were tested again the consumption of indigenous food. Using a cross tabulation in an estimated Pearson chi-square, the study presents the findings in Table 4.23.

Table 4.23: Influencing Factors and Choice of Indigenous Foods (In %)

	Consumption			
	No	**Yes**	**Chi-square**	**p-value**
Cost	69.7	30.3	5.07	0.024
Culture	32.6	67.4	22.56	0.000
Nutritional Knowledge	75.0	25.0	9.30	0.002
Taste	64.4	35.6	1.36	0.243
Availability	4.5	95.5	25.63	0.000

Source: Field Survey (2017).

Indigenous nutritional knowledge was assessed to be the least influencing factor on food choices, with, 100 (25%). About 382 (95.5%) of the mothers indicated that, the availability of food was their biggest and number one influencing factor in choosing any food. Furthermore, 270 (67.4%) of the mothers, placed culture second on the list of influencing factors, whilst taste, was placed third with 142 (35.6%). Interestingly, cost of food place fourth having 121 (30.3%).

A bivariable analysis was conducted to determine the association between the socio-demographic factors and the factors influencing mother's food choices.

All the socio-demographic factors were significantly associated with culture as an influencing factor, except marital status and occupation that were insignificantly associated at (p=0.481) and (P=0.382) respectively. Marital status, educational level, religion and being a mother/caregiver did not show any significant association with food availability as an influencing factor in food choices. However, age, occupation, household size and source of knowledge showed a significant association at $p = 0.002$, $p < 0.001$, $p = 0.032$ and $p < 0.001$ respectively. Interestingly, religion was insignificant for all except for culture ($p = 0.004$) and indigenous nutritional knowledge ($p < 0.001$). The details can be seen in Table 4.24.

Table 4.24: Association between Socio-Demographic Characteristics of Respondent and Factors Influencing Food Choices

		Cost			Culture			Nutritional knowledge			Availability		
		n	**Yes, n**	**X2**	**No, n**	**Yes, n**	**X2**	**No, n**	**Yes, n**	**X2**	**No, n**	**Yes, n**	**X2**
		%)	**(%)**	**p-value**	**(%)**	**(%)**	**p-value**	**(%)**	**(%)**	**p-value**	**(%)**	**(%)**	**p-value**
Age (years)				8.4367			24.5574			4.4147			16.4741
18 – 22		41	16	**0.077**	19	38	**<0.001**	44	13	**0.353**	3	54	**0.002**
		9)	(28.1)		(33.3)	(66.7)		(77.2)	(22.1)		(5.3)	(94.7)	
23 – 27		65	24		23	66		69	20		5	84	
		1)	(26.9)		(25.8)	(74.2)		(77.5)	(22.5)		(5.6)	(94.4)	
28 – 32		45	27		23	49		56	16		3	69	
		5)	(37.5)		(31.9)	(68.1)		(77.8)	(22.2)		(4.2)	(95.8)	
33 – 37		53	20		20	53		54	19		0	73	
		6)	(27.4)		(27.4)	(72.6)		(73.9)	(26.1)		(0)	(100)	
>37		74	35		47	62		78	31		8	101	
		9)	(32.1)		(43.1)	(56.8)		(71.6)	(28.4)		(7.3)	(92.7)	
Marital status				13.5600			1.4655			20.1432			4.2050
Married		231	101	**0.001**	110	222	**0.481**	248	84	**<0.001**	14	318	**0.122**
		(61.6)	(30.4)		(33.1)	(66.9)		(74.7)	(25.3)		(4.2)	(95.8)	

Not married		16	2		7	11		18 (100)	0		18	314	
		(88.9)	(11.1)		(38.9)	(61.1)			(0)		(5.6)	(94.4)	
Widowed		31	19		15	35		35	15		4	328	
		0)	(38.0)		(30.0)	(70.0)		(70.00)	(30.00)		(8.0)	(92.0)	
Educational l				22.4100			11.7608			10.7785			5.2124
No formal		59	79	**<0.001**	88	160	**0.019**	189	59	**0.029**	11	237	**0.266**
education		2)	(31.8)		(35.5)	(64.5)		(76.21)	(23.8)		(4.4)	(95.6)	
Primary		44	18		21	41		50	12		2	60	
		9)	(29.1)		(33.9)	(66.1)		(80.6)	(19.4)		(3.2)	(96.8)	
JHS/MS/Tech		50	17		19	48		45	22		5	62	
		6)	(25.4)		(28.4)	(71.6)		(67.2)	(32.8)		(7.5)	(92.5)	
SHS		14	4		3 (16.7)	15		13	5		1	17	
		8)	(22.2)			(83.3)		(72.2)	(27.8)		(5.6)	(94.4)	
Tertiary		1	4		1	4		4	1		0	5	
		0)	(80.0)		(20.0)	(80.0)		(80.0)	(20.0)		(0)	(100)	
Occupation				81.1906			4.1779			21.4637			40.1789
Farmers		83	61	**<0.001**	49	95	**0.382**	111	33	**<0.001**	7	137	**<0.001**
		(57.6)	(42.4)		(34.1)	(65.9)		(77.1)	(22.9)		(4.9)	(95.1)	
Professional		2	5		2	5		5	2		0	7	
		(28.6)	(71.4)		(28.6)	(71.4)		(71.4)	(28.6)		(0)	(100)	

Traders/Artisan	107	26		46	87		100	33		2	131	
	(80.4)	(19.6)		(34.6)	(65.4)		(75.2)	(24.8)		(1.5)	(98.5)	
Housewives	77	39		31	85		73	43		15	101	
	7)	(33.3)		(26.7)	(73.3)		(63.3)	(36.7)		(13.3)	(86.7)	
Religion			1.1009			11.2480			17.2752			1.1624
Christianity	26	96	**0.577**	111	211	**0.004**	244	78	**<0.001**	16	306	**0.559**
	2)	(29.8)		(34.5)	(65.5)		(75.8)	(24.2)		(4.9)	(95.1)	
Islam	4	2		0	6		2	4		0	6	
	7)	(33.3)		(0)	(100)		(33.3)	(66.7)		(0)	(100)	
Traditional	48	24		21	51		55	17		3	69	
	7)	(33.3)		(29.17)	(70.83)		(76.39)	(23.6)		(4.2)	(95.8)	
Household siz			4.6461			22.2341			44.9001			10.5320
< 4 people	9	5	**0.326**	1	13	**<0.001**	5	9	**<0.001**	0	14	**0.032**
	3)	(35.7)		(7.1)	(92.9)		(35.7)	(64.3)		(0.00)	(100)	
5-9 people	91	77		91	177		200	68		16	252	
	(71.3)	(28.7)		(33.9)	(66.1)		(74.6)	(25.4)		(5.9)	(94.1)	
10 – 14 people	49	25		21	53		58	16		1	73	
	(66.2)	(33.8)		(28.4)	(71.6)		(78.4)	(21.6)		(1.3)	(98.7)	
15 – 19 people	28	14		18	24		36	6		2	40	
	(66.7)	(33.3)		(42.9)	(57.1)		(85.7)	(14.3)		(4.8)	(95.2)	

≥20 people		1	0		0	1		1	0		0	1	
		(100)	(0)		(0)	(100)		(100)	(0)		(0)	(100)	
Source of knowledge				160.6545			319.0175			6.3709			50.3222
Elderly		78	70	**<0.001**	35	213	**<0.001**	174	74	**0.095**	5	243	**<0.001**
		8)	(28.2)		(14.1)	(85.9)		(75.0)	(25.0)		(2.1)	(97.9)	
Open market		21	32		31	22		41	12		3	50	
		6)	(60.4)		(58.5)	(41.5)		(77.4)	(22.6)		(5.7)	(94.3)	
Formal educat		2	10		8	4		7	5		0	12	
		7)	(83.3)		(66.7)	(33.3)		(58.3)	(41.7)		(0)	(100)	
Clinics		77	10		58	29		67	20		11	76	
		1)	(11.5)		(66.7)	(33.3)		(77.1)	(22.9)		(12.6)	(87.4)	
Mother / caregiver				0.0019			5.7560			1.5317			2.4722
Mother		39	105	**0.965**	109	235	**0.016**	261	83	**0.216**	15	329	**0.116**
		(69.5)	(30.5)		(31.7)	(68.3)		(75.9)	(24.1)		(4.4)	(95.6)	
Caregiver		39	17		23	33		40	16		4	52	
		(69.6)	(30.4)		(41.1)	(58.9)		(71.4)	(28.6)		(7.1)	(92.9)	

Source: Field Data, 2017.

4.6 The Effects of Culture and Attitude on the Consumption of Indigenous Foods

4.6.1 Introduction

This section presents finding on how culture impact on the consumption of indigenous foods and the influence of individual attitude on the consumption of indigenous foods.

4.6.2 Culture and Indigenous Food Consumption

A majority of the respondents said red millet (*Kah-morliga or Kah-zie*) is the only cereal that mostly has some consumption restrictions. The question was basically to find out if there were some cultural barriers hindering the consumption of some indigenous cereals. The following are consolidated statements from the majority.

> *"Traditional healers in some cases forbid some people from eating red millet because of some type of illness."* ***[IDI 8, Opinion Leader at Soliga]***

> *"There is a situation where a child is born and the family head says that child's deity taboos red millet and for that reason the child and the lactating mother cannot eat any food made from red millet. Also, in a situation where a mother loses her children three times in a role at birth, she is forbidden from eating red millet for it is believed that when she does that the next will stay (survive) and not die".* ***[IDI 3, Sub-Chief, Sakote]***

The results revealed that there were almost no cultural restrictions with the consumption of indigenous vegetables except for *Vormah,* and *Ba-owra*, where

they say it can make a person become blind. Ensuing are the follow up statements.

> *"Vormah is a tree vegetable and Ba-owra is a wild vegetable both are very nice when used for soup. It is however believed that it can course blindness that is why people hardly use them for meals."* ***[IDI 4, Women elder, Pelungu]***

> *"It is forbidden for pregnant women to eat the vegetables Ba-owra and Vormah, because it is believed that it will render the baby blind and also give the baby some kind of skin disease."* ***[IDI 8, Opinion Leader at Soliga]***

The results showed that in general, fruits were not often fed the children in the study area. Only 14.25% of the mothers tried feeding their children often with fruits, and out of the 14.25%, less than half, thus 47.9% of the mothers fed their children with indigenous fruits. The findings revealed that, even though fruits are not so much consumed, there were some restrictions on some of the indigenous fruits. Fruits such as Baobab (*Tuoro*), Local grapes (*Sisibi*) and black berry (*Aahrrah*) have some consumption restrictions. Respondents had this to say during the focus group discussions and in-depth interviews:

> *"We do not allow our children to eat the baobab fruits because it gives them huge appetite and it makes them eat a lot. The baobab fruits cause too much hunger in the children, and we don't have food, so the best is not to allow them to eat the fruit."* ***[IDI 1, Traditional birth attendant at Logyakim]***

> *"It is believed that whenever village undertakers (those who bury dead people) see a child eating the baobab fruit, that child will become malnourished."* ***[From the Zanlerigu-Asonge Focus Group]***

> *"The seeds of local grapes (sisibi) blocks the children's rectum, causing serious constipation which ends up in the hospital, because of that the children are prevented from eating the local grapes."* ***[From the Sakote- Tengpong Focus Group]***

> *"Culturally, it is believed that when one plants any indigenous fruit tree, the person will die as the tree begins to bare fruits, because of that people in this community hardly plant indigenous fruit trees. Those we have around us are either very old self-germinated trees or young self-germinated fruit trees, hence the extinction of these our indigenous fruits,"* ***IDI 1, Traditional birth attendant at Logyakim]***

Advancing on why the black berry fruits *(Aahrrah)* had some restrictions, respondents mentioned that, the people of the Nabdam district, do not allow the black berry fruits tree to grow near their homes. They also will not encourage the eating of this fruit inside the house, they will rather eat the black berry outside the house and dispose of the seeds very well by placing the seeds on ant hill, since they believe that the seed can turn into a snake. As they said;

> *"I know that the black berry fruit is loved by snakes and for that reason, no black berry tree is allowed to grow near a house in the community. We also forbid haphazard disposing of the seeds, but encourage that the seeds be placed on an ant hill where snakes will not go."* ***[IDI 4, Woman elder at Pelungu]***

In the case of animal protein, the cultural restrictions are mostly on religious bases. The Muslims do not eat pork, donkey meat, and dog meat. Christians eat everything unless one does not like it, has allergies or medical advice. For the

traditional believers, they have different taboos for different situations. The following are some statements that reflect the views of the respondents.

"It is a taboo for every firstborn child to eat chicken." ***[From the Pelungu Focus Group]***

"Nobody is allowed to eat the meat of hawks except the undertakers" ***[From the Pelungu Focus Group]***

"A pregnant woman is not allowed to eat mud fish and snake fish, because it is believed that the child's head will be as flat as the fish's head and in the case of the snake fish, the child would grow with a chackling habit." ***[IDI 1, Traditional birth attendant, Logyakim]***

"Children are not given meat because we believe that they will grow up and become thieves" ***[IDI 8, Opinion Leader, Soliga]***

"Some parts of the chicken (the head and the feet) are not fed to the children because we belief that it will give bad luck to them as they grow up." ***[From the Nangodi-Nakpaliga Focus Group]***

"The Zoliba clan (Damulg, daliga, Logkti, Pelungu and Zanlerigu) do not eat the snake piton because they believe that the piton is their great ground father (ancestor) who never died but turned into a piton after a very old age." ***[IDI 3, Sub-chief, Sakote]***

"The people of the Daliga clan for example are divided into two but are descendants of two brothers from one parent. One-part taboos dog meat and the other part eats dog meat. Out of respect and allegiance to dogs that saved our ancestors from serious

calamity, a taboo has been placed on its consumption." ***[IDI 3, Sub-chief, Sakote****]*.

Majority of the respondent stated that beans and groundnuts are the legumes that are commonly consumed at the household level. Never the less, the following are statements that reflect how the Nabdam culture affects the consumption of plant proteins:

> *"Most family heads, keep their Bambara beans after harvest, waiting for the funeral season, this is because, using Bambara beans for funeral celebration is one big cultural requirement."* ***[IDI 7, Paramount Chief, Sakote].***

> *"During funerals, the Bambara beans are used to prepare several dishes that are culturally required for the celebration. These dishes include; kenkirah, sumah, Tuntu and geingilimah."* ***[From the Nangodi Soliga Focus Group]***

In all, there were no such restrictions for indigenous roots and indigenous fats/oils.

4.6.3 Attitude towards the Consumption of Indigenous Foods

The study revealed that the people in the Nabdam traditional area consumed more cereals than all the other food categories. The non-indigenous cereals (Maize) were competing with the indigenous cereals (Millet) in terms of consumption levels. A large majority of the respondents stated that they use both millet and maize in the preparation of food (TZ) at the household level for their children. However, during the FGDs and the IDIs, majority of the respondents

said the young mothers always preferred feeding their children with maize to millet for several reasons as stated in the following statements:

> *"The preparation of millet TZ requires some amount of skills and without these skills the outcome of the TZ will be poor and no one can eat it. On the other hand, maize TZ does not need much effort; once the TZ cools down it can be consumed."* ***[From the Sakote- Tengpong Focus Group]***

> *"The young mothers are not ready to learn the skills of cooking millet TZ. This is because they feel millet TZ is inferior to the whitish maize TZ. They like to de-husk the maize before using it for any meal; they remove all the important fibre from the maize. They do this because they want the food (TZ) to look whitish and presentable"* ***[IDI 4, Woman organizer at Pelumgu]***

> *"The colour of millet TZ puts the children off and they sometimes refuse to eat foods made from millet, especially the red millet. They have given several derogative names to red millet which does not encourage its consumption. Names such as* ***commando, health insurance, and pig shit*** *are used to refer to TZ made from red millet"* ***[From the Pelungu Focus Group]***

It was revealed that mothers who had red millet (indigenous cereals) in stock, exchanged it for maize (non-indigenous cereals) or sold out to be used for *Pito* (a locally brewed alcohol).

The indigenous roots identified in the Nabdam district were frafra potatoes (P*ersah*) and Sweet potatoes (*Nuwbemtoh or Dankali*). Respondents said these root crops were seasonal food crops and were not available all year round. They said they feed these root crops to their children as and when they are available. The following statements resonate with many views of the study population:

"Processing the frafra potatoes (persah) into a meal is very difficult. The steps involved in removing the peels (the outer part) before it is washed and cooked is so cumbersome and not very hygienic as children are asked to constantly step on them till they are peeled off. This has thus resulted in too many young mothers not preparing it for household meals." ***[IDI 5, Farmer at Zanlerigu-Gaane Community]***

"Both frafra potatoes and the sweet potatoes are usually eaten for lunch and not dinner. This is because, it makes one drink lots of water after eating, and that sustains everyone in the family till dinner time." ***[From the Nangodi-Nakpaliga Focus Group]***

"We are not still able to preserve our root crops in large quantities; it is a cumbersome process, unlike the cereals where the preservation processes are not so difficult. That is why we grow more cereals than root crops and so cereals have become our staple." ***[IDI 5, Farmer at Zanlerigu-Gaane Community]***

Majority of the respondents stated that, the most commonly consumed legumes in the Nabdam district are groundnuts and beans. In this study, the quantitative survey revealed that, 97.25% of mothers fed their children on plant proteins, and 71% patronising indigenous plant proteins. The following are some consolidated statements from respondents;

"Groundnuts are mostly used for soups to be eaten with TZ or rice balls. We normally add vegetables to the soups. We can also use groundnuts to prepare different types of soups." ***[IDI 8, Opinion leader at Soliga]***

"We mix beans with rice and cook as a meal, mostly for late breakfast or early lunch. It is eaten with powdered pepper, salt

and oil. When the children are fed on this, they then drink water throughout the day as they wait for dinner." ***[IDI 4, Woman elder at Pelungu]***

"Bambara beans take more time to cook and needs more fire wood to cook as well. Because of that, mothers hardly cook Bambara beans at home, they prefer to buy the already cooked ones which is almost not available." ***[From the Pelungu Focus Group]***

"Cultivating Bambara beans come with a lot of hard work, and so the youth of today shy away from its cultivation that is why it is always scarce." ***[IDI 5, Farmer at Zanlerigu-Gaane Community]***

Majority of the respondent corroborated with the fact that Bambara beans were very expensive and at the same time not common like beans. They again indicated that the only time children get to eat Bambara beans at home was during harvesting time.

The consumption of animal protein is not common as revealed by the study. The indigenous people in the district do not consume meat or fish on a daily basis. They said they don't feed their children with fish or meat every day. The following are statements representing the views of the large majority:

*"Meat is a luxury and cannot be part of our daily meals and for that matter cannot be fed to children daily because we can't afford that.****" [From the Sakote- Tengpong Focus Group]***

"The animals we rear at home are not for daily consumption, these are a form of savings for the family, and we fall on that in

times of need. We normally sell these animals to solve family problems." ***[IDI 1, TBA at Logyakim]***

"The only time meat is cooked at home is when there is a very important visitor, or whenever there is a celebration of an event. Also, children get to eat meat when an animal dies suddenly." ***[IDI 7, Paramount chief at Sakote]***

"In the past, children use to get meat to eat from hunting for lizards, birds and frogs, but we hardly see our children doing that these days." ***[IDI 8, Opinion leader at Soliga]***

Respondents in the study area stated that there are some vegetables that are referred to as food for the poor people and so are less consumed. These vegetables include the Baobab leafs (*tokarah*). Black berry leafs (*Aahrrah vuuro)* and kapok leafs (*gun-vuuro*).

Only about 14.25% of the respondent said they make fruits part of their children's diet. And that they made sure the children eat fruits that were in season. A large majority of the respondents said their children eat fruits by chance. The following statements consolidates the views of the respondents.

"In this our community, fruits are not given such importance, we eat fruits as and when we get them, and give some to our children." ***[From the Sakote- Tengpong Focus Group]***

"When fruits are in season, our children pick them from the wild and eat and that is the only time they get to eat fruits." ***[From the Sakote- Tengpong Focus Group]***

"We hardly plant any indigenous fruit tree, they grow on their own, and so they are actually disappearing." ***[IDI 3, Sub-chief-Sakote]***

CHAPTER FIVE

DISCUSSION ON RESEARCH FINDINGS

5.1 Introduction

The chapter brings two joints into contact, the findings of the research as elaborated in chapter four, and the existing literature to discover points of congruence, disparities and justifications.

5.2 Mothers' Knowledge on Indigenous Foods

5.2.1 Identified Food Resources in the Study Area

In this study, participants were able to identify 93 different varieties of foods with 65(70%) being indigenous, which is in consonance with the findings of Fanzo, (2012) who identified Africa to have a food density of over 150 food crops, with majority, about 115 (76.7%) being indigenous crops. The breakdown for the 93 different foods identified were as follows; Twenty-seven (27) were vegetables, representing 29%; Twelve were (12) cereals, representing 13%; Root crops were 4, representing 4%; Participants identified 9 fats/oils, representing 10%; The number of fruits, plant proteins and animal proteins that was identified were, 15(16%), 15(16%) and 11(12%) respectively. In all, vegetables were the most listed foods. Twenty out of the 27 identified vegetables were indigenous. About 31% of the 65 indigenous foods listed in this study were vegetables, and the rest of the 69% shared among the other indigenous food categories (cereals, roots, plant proteins, animal proteins, fruits and fats/oils). The availability of an array of vegetables gives mothers the opportunity to diversify in feeding their children, given that they are knowledgeable about the

nutritional value of these vegetables, as well as have the cooking skills to process these indigenous vegetables into good meals. In general, participants agreed that indigenous leafy vegetables have numerous medicinal properties that can help in maintaining good health.

In support to this assertion, Aijuka, (2013) recorded that the use of Locust Beans (Dawadawa) for stew and soups helps in promoting good eye sight and treats hypertension and disease conditions like stroke and diabetes. In a related study by Bhattacharjee, Kothari, Priya and Nandi (2009) it was observed that there is a rich habitat of natural foods that could possibly be used to promote food and nutrition security, as well as healthy living in major tribal environments, and other parts of the world.

5.2.2 Losing the Indigenous Food Identity

In general, only 21.5% of the respondents were able to differentiate indigenous foods from all the food categories. Differentiation within all the food categories was low, except for fats/oils, where only about half (48.1%) of the respondents could differentiate the indigenous fats/oils from the non-indigenous ones. Reasons in connection with the inability of mothers to differentiate the indigenous foods from the non-indigenous foods were identified from the qualitative data. These included having been born to meet most of the foods without being told their origin. Also, the situation where one is not an indigene of the community, but migrated into the community by virtue of marriage, official transfer, or even for other reasons. It is important to note that the change of environment may affect the individual's knowledge on the indigenous foods.

Another reason that emerged during the study was that, the younger generation were not interested in learning about indigenous foods. This was confirmed by Nor et al (2012). They contended that, there is the refusal of the younger generation to learn, practice and transmit their ethnic knowledge of indigenous foods, culture and tradition into action. This makes indigenous food knowledge transfer difficult.

It is important to note that, the difficulties that comes with the indigenous knowledge transfer to the new generations is likely to lead to loss of vital knowledge that could save local communities from losing their indigenous food identity. Hence purposive transfers of indigenous knowledge about indigenous foods can change attitudes and behaviours. Indigenous foods have healthy and medicinal properties that help to manage, control, and to a very large extent, cure various ailments, and the near loss of such indigenous knowledge of local crops and foods by younger generations can give rise to several health related problems (Webb & Block, 2012).

Findings from the study also support arguments by Bodirsky and Johnson (2008), Mutva (1999), and Rowley et al., (2000) that indigenous knowledge, including knowledge about food habits has progressively been eroded due to colonization and globalization of sub-Saharan Africa. This study also realized that, movement of mothers from other communities into the study community affected their knowledge regarding the indigenous foods in the study community, and this is in congruence with the results of Ministry of Health (2014) and Sharif et al., (2012). They noted that knowledge of indigenous food is disappearing as more and more indigenous people moved away from their

traditional lands, their local food, and their cultural knowledge. Also, Botimo et al., (2013) in their study observed that the younger generation are not acquiring the same quality and quantity of the ecological indigenous knowledge, and blamed this not only on the depleting ecosystem, but also to the reduced exposure of the younger generation to their indigenous environment. This is again in line with Albert Bandura theory of social learning which stipulates that, people both influence and are influenced by the World around them.

Regarding change of environment that affects knowledge of indigenous food, Albert Bandura (1997) explains in his theory of social learning that environmental change has influence on the personal factors such as the individual's knowledge on the indigenous foods in the community. This also supports the argument of the framework that knowledge and other personal factors are context specific (Bandura, 1977). In the give-and-take situation, Albert Bandura expressed in his social learning theory that, personal factors are posited to affect the level and quality of knowledge the individual has, regarding indigenous foods and nutrition.

In this study, the results showed a statistically significant association between mother's age and their ability to differentiate the indigenous foods from the non-indigenous foods. The results showed that more mothers within the higher ages could differentiate these foods into the indigenous and non-indigenous categories. This shows that the elderly within the community are the indigenous knowledge holders and from which the younger generation ought to learn.

Mother's sources of indigenous food knowledge were largely from the elderly persons at home and in the community, followed by the clinics. It was noted that formal education provided little information on indigenous nutritional knowledge on indigenous foods to mothers. This observation could be as a result of the fact that 77.6% of the study population did not have any form of formal education.

It is important to note that the works of Salehuddin, Syaquif, Zain and Langgat, (2011) postulated that the transmission of traditional food knowledge is very important to ensure continuity of the use of traditional and indigenous foods, and to maintain the indigenous food system and culture from generation to generation. It is wealth mentioning that, the Council for Scientific and Industrial Research (CSIR, 2017) noted that *"managing indigenous knowledge using information management standards in libraries is a new phenomenon worldwide but in Ghana it is virtually absent"*. Most libraries do not acquire indigenous knowledge in any form let alone process and store it. Digitization of Indigenous knowledge of food resources is very essential for its preservation and future use, especially in targeting future generations in its utilization. More so, formal education syllabus must begin to list among others the study of indigenous food preparation, nutrition and its cultivation. The transfer and transmission of food knowledge, food culture, and the skill of cooking is positioned in the family tradition. Thus, knowledge is passed on within and among families and community members, as the position of Chenhall (2011) in his study was that, there is the need for family members, especially mothers, to take the initiative and responsibility to attract young generations into getting involved in the use

of indigenous foods. This could be because the culture of transfer of indigenous knowledge to the younger generation is virtually dying off, with modernity being one obstacle and the younger generation not prepared to learn the indigenous skills, because their perception is that learning the indigenous knowledge and skills is backward learning. The use of persuasive communication will help sway the younger generation into positive attitude and behaviour towards indigenous foods. It was observed in this study that the older mothers had more knowledge of indigenous foods than the younger mothers. The transmission and transfer of indigenous food knowledge from one generation to another, is a sure way to ensure that knowledge transfer is maintained and shared within the family environment and community members (Kwik, 2008).

Transmission of traditional food recipes and food production from one generation to another generation needs to form part of the educational programs of all institutions that have a stake in the indigenous knowledge development and transmission process. Such institutions like schools, clinics, households, communities, radio stations, NGOs and CBOs, if they get involve, would help to formulate a positive attitude in the younger generation, as it will have a direct impact of attitudinal change on dietary choices (McGuire, 1989). This is very important, since the young generation nowadays decline to get involved and shy away from their indigenous foods, which could be due to their ignorance, or negative perceptions about these foods. Hence, the growing concern about the loss of indigenous knowledge and low patronage of indigenous foods will be minimised, which will also mean that, the opportunity for mothers to diversify

in their meals for their children will increase, which might lead to good nutrition, poverty reduction and probably less difficulty in recreating the neglected and lost indigenous foods (Sharif et al., 2012).

5.2.3 Extinct Indigenous Food Resources

The study noted that some indigenous food crops in the study area were extinct, as respondents stated that the use of modern fertilizers destroy the soil structure, and also inhibit growth of certain crops. The local mushroom (Ugla), Saalum, and spider plant (Nanginag) were observed, to be vanishing (extinct) due to the use of chemicals in today's farming practices by farmers. This finding contradicts with the position of the United Nations Food Agriculture Organization of the United Nation, that states that the use of new production technology in the production of indigenous foods can help enhance food sustainability, conserve food, increase productivity, reduce post-harvest losses and food wastage, and hence curb hunger and malnutrition. Even though it can be agreed with FAO that new technologies would give farmers access to real-time information and services in the field, there is the need to reconsider the lasting impact where indigenous food crops are getting extinct and indigenous foods availability for the future generations. IFPRI, (2015) argues that, by maintaining soil fertility and maintaining the organic matter content of the soil, with the use of appropriate farming practices and by applying organic manure or compost, many indigenous crops could be saved for future use.

Climate change was another reason that was attributed to the fact that some indigenous food crops were extinct. Due to low rain fall patterns, it has become difficult and discouraging for farmers to continue the cultivation of certain crop,

and as these Indigenous food crops are deserted and not cultivated, they gradually get extinct. These indigenous food crops that are left and neglected to the point of getting extinct could play a vital role in easing hunger and starvation, which can contribute in the enhancement of nutrition in children. Although Africa is the most endowed arable and rich land in the world, the causes of food insecurity and malnutrition in Africa are diverse, multi-factorial and interlinked, as poverty and food shortage are the main catalysts of food insecurity in Africa (FAO, 2014). In this study, 95.5% of the mothers indicated that, food availability was the first factor considered when they are making food choices for their children, which is the more reason why these nutritious indigenous foods should not be allowed to extinct.

The preference for non-indigenous high yielding with shorter gestation period by farmers, has contributed to the extinction of most indigenous foods. Also, the individual skills, attitude and behaviour towards the use of indigenous foods cannot be ignored, since it affects the individual's knowledge of how to prepare some of these special indigenous dishes that are of dietetic value, such as millet TZ and Tubaani. These indigenous foods are fading out of the house hold menu, as the older women die (Kuhnlien et al., 1996). Most of the indigenous foods that are getting extinct, are of high medicinal and nutritional value, hence, it is prudent to conserve indigenous food crops. The assertion by (Aijuka, 2013) that says there are no advocacies to champion the course of these indigenous foods in most localities is worth considering.

5.2.4 Indigenous Nutritional Knowledge on Indigenous Foods

Despite mother's inability to distinguish indigenous food from non-indigenous foods, their indigenous knowledge on the functions of the various food categories in the body was high. This study found a high level of indigenous nutritional knowledge from both the qualitative and quantitative data. However, mother's indigenous nutritional knowledge on fruits and fats/oils was low. They attested high level of energy from cereals and roots, and that proteins help in growth and development, they also attested that vegetables were healthy as they provide the body with good blood and keeps one healthy. Twenty-seven percent (27% N = 108) of mothers said they did not know the functions of fruits in the body and 43.5% N = 173 mothers again said they did not understand the role of fats/oil in the body. The overall weighted scores for indigenous nutritional knowledge was high (77.7%) and this supports the argument by Kuhnlein (2016) that indigenous people are knowledgeable of the health benefits they would acquire from consuming some food.

Age, marital status, educational level, and sources of knowledge were found to be statistically significant and associated to indigenous nutritional knowledge. Mothers within the age of 38 years and above were three (3) times more likely to be knowledgeable in the indigenous nutritional knowledge than the other respondents below 38 years. This means that the elderly women, as well as the leadership of institutions within localities, must persuasively transmit and transfer the indigenous food knowledge and food culture to the younger generation (Kwik, 2008).

Botimo et al. (2013) and Albert Bandura (1997) noted that, individuals acquire their indigenous knowledge through their constant interaction with both the adult world and the physical environment around them. The exposure of the younger generation to their indigenous environment by the older generation will help in the transmission and utilization of indigenous knowledge.

5.3 The Consumption of Food by Mothers

5.3.1 Frequency and Pattern in Consumption of the Various Food Categories

This present study found that, above 80% of mothers fed their children often with cereals, plant proteins, animal proteins, vegetables and fats/oils while less than 20% of mothers fed their children with fruits and root crops often. The findings from the qualitative component largely corroborated the survey findings, except animal protein where a large majority of the participants in the qualitative study said they hardly consumed meat at the household level, but that the animal proteins that were sometimes fed to their children was *Amani*, eggs or processed milk. In this study, 58.8% mothers did not know anything about balance diet, while 90.5% mothers did not feed their children on a daily basis.

Reasons in connection with the poor consumption of animal proteins, as identified from the qualitative data were that; milk and fish were expensive to get, and so majority of the mothers were unable to afford. Also, animals reared at the homes were not meant for daily consumption, but for solving problems whenever there is the need. Situations like paying school fees, marital rites, hospital bills, levies, and festivals were given as examples. Meat was only

consumed on special occasion such as the presence of an important visitor at home. Ghosh-jerath and colleagues also, documented similar findings in India, where poor consumption of protein-rich foods like pulses, milk and meat products was observed (Ghosh-jerath et al., 2016).

The study findings that show poor consumption of animal proteins speaks to what was reported by Omari, that, typical traditional Ghanaian diets are largely composed mostly of staple carbohydrates, with little protein and minimal vegetables. He further found that, barriers that affect availability and consumption of animal products among Cocoa farmers in Ghana were, lack of money as well as influence from the traditional food culture (Omari, 2017). Also, the findings confirmed the argument by Kuhlein and Receveur (2014) that the decision to consume indigenous food could be a function of the individual's personal, cognitive and economic factors. Again, income (ability to access) has been captured by the framework as a personal factor that greatly influence a person's disposition to consume indigenous food. Bandura (1997) argued that resources (indigenous foods) at the disposal of a person enable the enforcement of its utilization, and this is supported by this study, as 95.5% mothers indicated that, availability of food happens to be the number one factor they consider when choosing any food to feed their children.

The conceptual framework which posits that cultural factors such as food norms and traditional farming system profoundly influence consumption of indigenous food was observed in the study, as the low consumption of animal proteins have been attributed to traditional food culture as well as animal rearing systems.

Animals are reared in the study communities mainly for commercial purposes, they serve as a form of savings and are tapped on occasionally to solve issues including paying of school fees, marital rites, hospital bills, levies, dues and festivals. Some mothers however feed their children with *Amani* and *milk* occasionally. In a related study by Adebooye and Opabode (2005), they discovered that indigenous food was not only meant to alleviate hunger and malnutrition among the rural communities but also used as part of culture. Indigenous foods were prepared during special ceremonies such as traditional marriages, child naming, circumcision, burials and festivals. In this instance, children are likely to be denied of nutritious indigenous foods just because they have been preserved and reserved for special rites and occasions. Meanwhile, the high malnutrition rate in developing countries is a predicament of Protein Energy Malnutrition (PEM) (Butt & Batool, 2010).

Galan (2016), highlighted the importance of proteins in body building, with emphasis on animal proteins being a greater source of nutrients due to the fact that all the essential amino acids can be found in animal proteins especially meat. Proteins found in meat are said to promote healthy muscles, nerves and manufacture new body cells. Hence the poor consumption of animal proteins in the Nabdam district could be contributing to the high levels of protein energy malnutrition (PEM) among pregnant women and children under 5 years.

This study observed that there were no conscious attempts by mothers to serve fruits as part of the dietary requirement at the household. Mothers did not have any recognition for the essential nutrients of fruits. Some indigenous fruits were

branded inferior and other fruits had myth surrounding their consumption. One of these myths is the belief that eating baobab fruit will expand one's stomach. These and many others have contributed to the low consumption of fruits, hence only 14.3% of mothers fed fruits to their children. Perceptions and beliefs within a community are potential factors that can influence the adaption of one's 194avourabl, as explained by Bandura (1997). The study findings support the framework that, community perceptions and beliefs are strong determinants of adaption and retention of behaviors and attitude, which was clearly revealed in how often mothers fed their children with fruits, because of the number of myths around some fruits.

Moffett (2015) noted that fruits play important role in ensuring healthy living. The emphasis was that fruits composed of many anti-oxidants that can help the human body to be protected from oxidant stress diseases, and cancers. Also, fruits help the body develop capacity to fight ailments and diseases by boosting the body's immunity level. Eliminating fruits from diet therefore exposes children to frequent illness such as infections. The low consumption of fruit and animal proteins should be a major concern to the study communities and households. Results from this study resonate with the United Nations Food and Agriculture and World Health Organization (FAO, 2018) report that noted that Sub-Sahara African has the highest proportion of the malnourished people globally. Nearly half of the children under five years old are undernourished or malnourished; many are stunted and suffer from anaemia. Creating a positive perception about fruits consumption by the community people through the

households, clinics and other institutions could help change attitudes and perhaps increase fruits intake that will help in combatting many diseases.

5.3.2 Consumption of Indigenous Foods

This present study found that less than half of mother's (43.8%) fed their children with indigenous cereals. Vegetable was the most consumed indigenous food (82.3%) followed by indigenous plant protein (71.0%). About 68.5% mothers fed their children with indigenous roots crops, out of the 14% that fed their children often with fruits, 47.9% fed their children with indigenous fruits. Interestingly, the results showed that, more than half (64.8%) of the mothers fed their children often with indigenous foods, even though only few (21.3%) of the mothers could differentiate between indigenous and non-indigenous food. This is an indication that, the ability to differentiate between indigenous and non-indigenous food does not really influence indigenous food consumption. It may also mean that the consumption of indigenous foods is not necessarily linked to its identity, but other factors like availability, cultural beliefs and the food culture in the community. Indigenous nutritional knowledge was statistically significantly associated with consumption of indigenous food ($p=0.015$) in a cross tabulation between indigenous nutritional knowledge and consumption of indigenous foods. Majority (56.23%) of mothers who had low scores on the indigenous nutritional knowledge did not consume indigenous foods. Therefore, the composite high consumption of indigenous food could be linked to the composite high indigenous knowledge. Hence, knowledge which is seen as a personal factor in the conceptual framework, have been confirmed by the findings to be influential in the use of indigenous food by mothers to feed their

children. Knowledge has been explained by Bandura (1997) in the framework as one of the initial factors that initiates the thought process and arrival at the decision to consume food before the individual considers any other interactive factors.

Interestingly, in a ranking analysis of factors that could possibly influence mother's food choices, nutritional knowledge was the least ranked (25%), however, in this analysis nutritional knowledge was statistically significant and associated with consumption. Food availability was the highest ranked influencing factor, as 95.5% mothers ranked food availability to be their first point of consideration, and culture was their second point of consideration as it was ranked second with 67.4%. Wouter et al., (2010) revealed in their study that environmental factors such as availability of food and culture beliefs are strong predictors of food choices. Again, Pearson et al., (2009) showed in their study that fruits and vegetables availability in the home was positively associated with children's fruits and vegetables intake.

In this study, mother's age and educational level of mothers were significantly associated with consumption of indigenous food. It was observed that the consumption of indigenous food increases with increasing age of mothers. Mothers within 38 years and above were 4.6 times (aOR = 4.63, 95% CI = 0.6821, 8.9881) more likely to feed their children with indigenous foods as compared to mothers within the ages of 18-22 years. This finding was consistent to what was reported by Kuhnlein (2016). He found that, traditional foods were to be consumed significantly less by younger people, who consumed more

market food, which may mean that young mothers are less likely to feed their children with indigenous foods as revealed by the study findings. These findings might be due to the fact that older mothers were observed to be 3 times more likely to be knowledgeable about the indigenous nutritional benefits of indigenous food, hence, fed them often to their children. The younger mothers being less likely to consume indigenous foods might be due to the fact that there is weak traditional knowledge about the nutritional function of indigenous food, and the influence of formal education, modernization, as well as exposure to junk food. Again, Albert Bandura's point on how environment and personal factors influences one's attitude and behaviour is affirmed and consistent with the findings.

The results revealed that the respondents within the tertiary group were 100% (aOR = 0.00, 95% CI = 0.4623, 6.4023) less likely to feed their children often with indigenous foods relative to those with no formal education, even though mothers within the tertiary were 3 times more likely (aOR = 3.01, 95% CI = 2.0123, 5.8751) to be knowledgeable. These are indications that as people attain higher and formal education, they begin to dissociate themselves from the indigenous ways of doing things, which includes the consumption of indigenous food. Hence, these findings could be as a result of the negative perception about everything traditional or indigenous, as mothers move higher and become more educated. Also, it could be due to the interactions with foreign culture, with the misconception of being of a higher and better social class (Kuhnlein & Receuver, 2014).

Again, it could be a clear demonstration of the relationship between modernity and the neglect of indigenous foods. It is important to note that the younger generation could not identify the indigenous foods amidst the common foods consumed in the study area, and this is an indication that the indigenous food identity is gradually getting lost. The culture, individual attitude and feeding practices that impede the intake of animal proteins and fruits could contribute greatly to nutrition related health issues among children in the district.

Findings from this study however disagree with what was reported by Laryea, Akoto and Oduro (2016) in Kumasi and Sekondi. They found that, there was no linear relationship existing between respondents' knowledge and consumption of traditional foods (*r* 0.50). Also, respondents' knowledge and consumption of traditional foods, did not depend on the demographic factors such as age and education (Laryea, Akoto & Oduro, 2016). These differences in findings might be due to geographical variation. The study by Laryea, Akoto and Oduro (2016) was conducted in a more industrialized population than this present study. Hence, the influence of industrialization and the presence of westernization could have contributed to these differences.

The poor consumption of indigenous cereals (millet) by mothers could be attributed to some of the cultural restrictions, as well as preference for non-indigenous cereals (maize) to local indigenous cereal such as the red millet (*Kah-morliga or Kah-zie*). Some of the cultural barriers restricting mothers from consuming certain foods are that, traditional healers forbid some people from eating red millet because of some type of illness. Also, in a situation where a

child is born, and the family head says that child's deity taboos red millet, for that reason the child and the lactating mother cannot eat any food made from red millet. In addition, in a situation where a mother loses her children three times in a role at birth, she is forbidden from eating red millet for it is believed that when she does that the next child will stay (survive) and not die. All these cultural beliefs impact negatively on the consumption of indigenous foods.

It was observed that, the younger mothers fed their children often with maize than millet. They preferred maize to millet for several reasons, among such reasons are; the preparation of millet TZ requires some amount of skills compared to maize TZ which is easy to prepare, and the young mothers are not ready to learn the skills of cooking millet TZ, also the transfer of these indigenous knowledge and skills have become ad hoc leaving everything to chance. Most of the young mothers also perceive that millet TZ is inferior to the whitish maize TZ. The study also observed that, the color of millet TZ puts children off, making them refuse to eat foods made from millet, especially the red millet.

In this present study, indigenous vegetables were the most consumed indigenous foods. Possible reasons for the high consumption of indigenous vegetables could be because of the absence of very strict cultural restrictions on the consumption of indigenous vegetables, except for these unpopular vegetables –*Vormah*, and *Ba-owra*, where they believe can course blindness to a person on consumption. Hence, people hardly use them for meals. Other reasons could be the fact that mothers are aware of the nutritional functions of vegetables and how it keeps the

body healthy, and also, availability of these vegetables could play a role as 95.5% of the mothers attested that availability of food is the number one factor that impacts on their food choices. In this study, it is important to note that mothers identified more indigenous vegetables than all the other food categories. Fitting this into Albert Bandura (1997) social learning theory, the indigenous nutritional knowledge of mothers could be seen as the personal factors while the availability of vegetables and the favorable cultural settings could be seen as the environmental factors which interact to enforce consumption.

Among all the indigenous food categories, fruits were the least consumed. However, fruits are very relevant in protecting the growing child from several diseases as it protects the body against infections. Hence the inadequate intake of fruits may predispose children to infection. The inadequate consumption of indigenous fruits could be attributed to the lack of indigenous nutritional knowledge about fruits, as found in the study, as well as cultural restriction of some fruits, such as the Baobab (*Tuoro*), Local grapes (*Sisibi*) and black berry (*Aahrrah*). Children are not allowed to eat baobab fruits because it gives them huge appetite and it makes them eat a lot and so the children are not allowed to eat them. In addition, it is also believed that whenever a village undertaker sees a child eating the baobab fruit, that child will become malnourished. The local grapes (*Sisibi*) were perceived to be fruits for the poor and destitute in the community. Also, seeds of local grapes (sisibi) block the children's rectum, causing serious constipation which ends up in the hospital; hence children are prevented from eating the local grapes. Culturally, it is believed that when one plants any indigenous fruit tree, the person will die as the tree begins to bare

fruits, because of that people in the community hardly plant indigenous fruit trees. Those in existence are either very old self-germinated trees or young self-germinated fruit trees, hence the extinction of some indigenous fruits. Black berry fruits tree was not allowed to grow near their homes. They also did not encourage the eating of this fruit in the house; they will rather eat the black berry outside the house and dispose of the seeds very well by placing the seeds on ant hill, since they believe that the seed can turn into a snake.

CHAPTER SIX

SUMMARY, CONCLUSION, RECOMMENDATIONS AND CONTRIBUTION TO KNOWLEDGE

6.1 Introduction

Using a mixture of quantitative and qualitative methods, this study assessed the indigenous nutritional knowledge and consumption of indigenous foods among mothers in the Nabdam district of the Upper East region of Ghana, with a view of finding some links that could encourage the use of healthy and available indigenous foods to enhance child nutrition in a sustainable way. This chapter of the study provides a summary of the major findings of the study in line with study objectives, and relevant conclusions for the objectives and some recommendations.

6.2 Key Findings of Study

The key findings of the study include the following:

1. Mother's nutritional knowledge was good, with an average score of (77.7%), but was higher among the elderly mothers as well as the mothers with tertiary education. This study revealed that, the elderly mothers were 5 times more likely to consume indigenous foods then the younger mothers. The study also showed that mothers with tertiary education were not likely to consume indigenous foods even though they displayed a high level of nutritional knowledge.
2. Mothers were knowledgeable on the functions and role of the various food categories except for fruits and fats/oils, interestingly, this

reflected in the low consumption of fruits, but fats/oils were highly consumed because it is used in cooking most of the foods consumed on a daily basis.

3. The study observed that respondents knew that the indigenous cereals (millet) were healthier and more sustainable than the non-indigenous cereals (maize). The results showed that cereals were the most consumed food category. The results also revealed that the food culture in the study area was such that TZ which is made from cereals is eaten daily, which accounts for the high consumption of cereals. However, less than half of the mothers fed their children often with indigenous cereals (millet). This was especially obvious among the younger mothers, which may be attributed to modern lifestyle and individual attitude.

4. The consumption of animal proteins in the study area was observed to be generally low, though it showed in the quantitative analysis that above 80% of mothers said they consumed animal proteins, these animal proteins were small amounts of *Amani* (dried herrings). The results again revealed that red meat was almost never consumed at the house hold level.

5. The overall consumption of indigenous foods was above average, with factors such as cost, culture, and availability playing critical role in influencing mother's food choices apart from nutritional knowledge.

6. The socio-cultural beliefs were shown to have a strong influence to mother's food choices for their children, as it informed their decision and ability to add animal proteins and fruits to their children's diet. Cultural beliefs limited the consumption of some indigenous foods especially fruits, meat and in some cases red millet.

6.3 Conclusions

The implications of these findings with regards to indigenous nutritional knowledge and consumption are in several folds. The study concluded that, the high indigenous nutritional knowledge displayed by the mothers in the Nabdam District was skewed towards the elderly, and for that matter calls for rigorous knowledge transfer. Even though the overall score on the consumption of indigenous foods was high, it leaves much to be desired, since the consumption of indigenous cereals and indigenous fruits were low. Nutritional knowledge does not influence consumption on its own, but other critical influencing factors such as environment (cultural, availability and institutional), lifestyle/behavioural and other personal factors may interact to strongly inform consumption of indigenous foods. The study also concludes that culture and lifestyle have great influence on the consumption of indigenous foods among mothers. The study again concludes that the culture of transferring indigenous knowledge to the younger generation is not easy with the fast growing society, with modernity being one obstacle, and the fact that the younger generations are not ready and not prepared to learn the indigenous skills.

6.4 Recommendations

This study aimed at assessing the indigenous nutritional knowledge and consumption of indigenous foods by mothers in the Nabdam district in the Upper-East region of Ghana, with a view of encouraging the use of indigenous resources, to enhance child nutrition in the study area. Looking at the findings and discussion of this study and within the given limitations of the study, the following recommendations were made;

6.4.1 Recommendations for Practice by Stakeholders

1. There should be more education programs, targeting young mothers in the district and beyond on the importance of biodiversity, and the advantages of feeding their children often with indigenous foods.

2. The elderly mothers should approach stakeholders like Ghana Health Service, NGOs, and other institutions to collaborate with them and ask that, they make calculated efforts to project indigenous foods in all their nutrition programs and projects.

3. There should be concerted efforts to create a positive perception about indigenous foods, especially fruits and animal proteins, and encourage mothers to feed their children often with indigenous food such as fruit, animal proteins and cereals. The findings of this study thus suggest that there is the need to step up education and the encouragement of local households to embrace the utilization of local fruits that have been found to be highly nutritious on the dietary and food baskets.

4. The various institutions working for the development of the district, including, households, clinics, schools, hospitals, radio stations chieftaincy, NGOs and others, should use persuasive strategies and advocate for the frequent use of indigenous foods by mothers to feed their children. This can be done through festivals and health durbars. Intensive door-to-door activities to educate, persuade and encourage mothers on the importance of indigenous foods to the children's health, household food security and community development.

6.4.2 Recommendations for Policy Makers

1. Interventions should tackle factors affecting the availability of indigenous foods and culture perception of feeding indigenous foods to children.
2. Institutions within the community such as homes, schools, clinics, NGOs and others should create an environment that gives a positive radiance to indigenous foods.
3. Community leaders should propose and enact a policy that will encourage mothers to often feed their children with fruits.

6.4.3 Recommendations for Future Research

1. I recommend that this study be extended to other districts and regions to observe whether the same findings hold.
2. Further investigations should be done to ascertain why highly educated individuals in the rural district are drifting away from the indigenous foods.

3. It would be good if this same research is done but limited to the individual food categories. For example, indigenous nutritional knowledge and consumption of indigenous fruits, or cereals, or animal proteins or plant proteins, or fats/oils.
4. I would like to recommend that, a study be conducted to establish the relationship between protein intake and child health in the district.

6.5 Contributions of the Study to Knowledge

1. The study identified institutions as a critical factor that can help in creating a persuasive environment that would influence the positive adaption towards the use of indigenous foods.
2. The study realized that, the non-consumption of indigenous foods by mothers is not exclusively limited to the luck of nutritional knowledge, but, it is also affected by other environmental factors such as availability and cultural beliefs.
3. This study added to the three factors considered in the Albert Bandura's social learning theory, the institutions and institutional factor, fitting in the persuasive communication ideas, where all institutions concern can strongly play a role in determining a person's behaviour, attitude and subsequent consumption of indigenous foods.

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APPENDICES

APPENDIX A

Study Information and Consent Form

Study Title: Indigenous Nutritional Knowledge and Consumption of Indigenous Foods by Mothers in the Nabdam District of the Upper East Region of Ghana

Name of Principal Investigator: Rosemary Anderson Akolaa

Name of Institution: Department of African and General Studies, Faculty of Integrated Development Studies, University for Development Studies

Introduction and Purpose of Study

My name is Rosemary Anderson Akolaa, and a student of the Department of African and General Studies, Faculty of Integrated Development Studies at the University for Development Studies. This study is being conducted to find out from you what you know about the local (traditional/indigenous) foods and how they are used in the community. What are the attributes that people attach to these foods? The study will gather essential information that will give a better understanding on how and why these indigenous foods are or might be used to better advantage of the individual, or to improve the nutritional status of children in the district.

You have been selected for the study by means of chance selection process. I will like to ask you some few questions on issues about our local (traditional/indigenous) foods, but you are free to refuse answering any question.

Your participation in this study is completely voluntary. You may terminate the interview any time. You can also refuse to participate in the study entirely without any problem. The interview will last approximately 45 minutes.

Possible Risk and Anxiety

This study has little risk. The questions are not personal, the only discomfort that may arise is the time factor.

Possible Benefits

Participants of this study will not get any direct benefit, however the possibility of indirect benefit exist, as the information you provide during this study will contribute to highlighting the importance of documenting and harnessing the preservation and consumption of indigenous foods at the local and household level.

Voluntariness

Participation in this study is absolutely voluntary. You can refuse to participate in the study at any given time of the study and there will not be any repercussions.

Confidentiality

All information collected from you will be kept in confidence and used strictly for the intended purpose. Your identity as an individual will not be disclosed or shown to anyone apart from the research team and my institution if required.

Persons to Contact for Additional Information

If you have any question about this study, please contact Rosemary Anderson Akolaa on phone number: 0244 689 550 or Email: rakolaa@gmail.com. You

may also contact Professor Philip Baba Adongo on phone number 0244 806 015 or Email: adongophilip@yahoo.com or Professor Sylvester Z. Gaala on phone number 0244 477 960, and on Email: sylvestergalaa@yahoo.com.

Consent Form

I have been adequately informed of the purpose, procedures and benefits of this study and I have had the opportunity to ask questions. The responses to the questions were satisfactory and based upon my understanding and appreciation of the purpose of the study, I have agreed to participate in this study.

Signing Consent Form

The consent form has been explained to my understanding and I agree to participate in this study.

Name of Participant: ……

Signature of Participant: …… Date……

Name of Investigator: ……

Signature of Investigator: …… Date…….

APPENDIX B

QUESTIONNAIRE

Individual interviews for understanding the knowledge and dietary food use and indigenous food intake patterns, and cultural context in the community, particularly for infants, children and mothers

QUESTIONNAIRE ABOUT KNOWLEDGE ON INDIGENOUS FOODS, USAGE AND NUTRITION

Greetings! My name is _____from_____. This study is conducted to find out from you what you know about the local (traditional/indigenous) foods and how they are used in the community. What are the attributes that people attach to these foods? The study will gather essential information that will give a better understanding on how these indigenous foods are or might be used to better advantage, or to improve micronutrient status. Also important are factors concerning current social and environmental advantages and constraints for using these indigenous foods.

You or household has been selected for the study by means of random or chance selection process. I will like to ask you some few questions on issues about our local (traditional/indigenous) foods, but you are free to refuse answering any question. Your participation in this study is completely voluntary. You may terminate the interview any time. You can also refuse to participate in the study entirely without any problem. The interview will last approximately 45 minutes. The information to be collected from you is confidential will not be shown to anyone. If you have any question about this study, please feel free to contact Rosemary Anderson Akolaa on phone number: 0244 689 550.

Name of community_____	
District_____	
Date of interview: (DD/MM/YYYY) __ __/__ __/2017	
Interviewee's name and number	Questionnaire number [ ][ ]

1.	Sex	Male [1] Female [2]
2.	How old are you as at last birth day? [ ]	
3.	What is your marital status	
	Married [1] Co-habiting [2] Single [3] Separated [4] Divorced [5] Widowed [6]	
4.	Which of the following describes your highest level of education?	

	None [1] Primary [2] Junior high [3] Senior high [4] Tertiary [5] Other (please specify)	
5.	Which of the following describes your employment status	
	Farmer [1] Public sector worker [2] Trader/Artisan [3] No work [4] House wife [5]	
6.	What is your religious affiliation?	
	Christian [1] Muslim [2] Traditional believer [3] No religion [4] Other (please specific)	
7.	About how much money do you earn in a month from everything that you do?	
8.	Are you a mother or a caregiver?	Mother [1] Caregiver [2] **** caregiver can be male or female***.
9.	How many persons are in your household?	
10	How many children (< 5 yrs) are there in your household?	
11	Who is the head of your household?	Husband [1] Wife [2] Mother-in-law [3] Father-in-law [4] Other _____
12	What is the number of sleeping rooms in your house?	
13	Do you have electricity connected to your home?	Yes [1] No [0]
14	Which of the following items do you have and use in your home?	Radio [1]

	(Please tick as many as you have)	TV [1] Frigrator [1] Eletrical stove [1] Gas cooker [1] Others _____
15	What is your mode of cooking?	Cold pot (charcoal) [1] Fire wood [2] Crop residue [3] Animal dropings [4] Gas [5] Others _____
16	If you rear livestock at home, please which of these livestock do you rear? And what is the size or number? ***(Please tick those you rear***	
17	Which of the following do you have at home as transport? ***(Please tick as many as you have)***	Bicycle [1] Moto bicycle [1] Donky cart [1] Moto king [1] Car [1] Others

Livestock	***Yes***	***Number***	
Goats			
sheep			
Cattle			
Pigs			
Rabbit			
Poultry			
Fish			

Is there any existing dietetic knowledge on indigenous foods that can be used to enhance child nutrition?		
18	What are the major ***cereals*** consumed in your household? ***(Please tick as many as you know)***	**cereals** Early Millet (gray) [1] Late Millet (gray) [1] Red Millet [1] Maize [1] Wheat [1] Sorghum [1] Local rice [1] Polish rice [1] Others__
19	Which of these ***cereals*** are **indigenous** to the community? ***(Please tick as many as you know)***	**cereals** Early Millet (gray) [1] Late Millet (gray) [1] Red Millet [1] Maize [1] Wheat [1] Sorghum [1] Local rice [1] Polish rice [1] Others__
20	What are the major ***root crops*** consumed in your household? ***(Please tick as many as you know)***	**root crops** Yam, [1] Sweet Potatoes [1] Irish potatoes [1] Frafra potatoes [1] Others_____

21	Which of these ***root crops*** are **indigenous** to the community? ***(Please tick as many as you know)***	**root crops** Yam, [1] Sweet Potatoes [1] Irish potatoes [1] Frafra potatoes [1] Others_____
22	What is the major ***Plant proteins*** consumed in your household? ***(Please tick as many as you know)***	**Plant proteins** Beans [1] Bambara beans [1] Sesamen seeds [1] Saamah (naeree) [1] Dawadawa seeds [1] Groundnuts [1] Soya Beans [1] Pumkin seeds [1] Others___
23	Which of these ***Plant proteins*** are **indigenous** to the community? ***(Please tick as many as you know)***	**Plant proteins** Beans [1] Bambara beans [1] Sesamen seeds [1] Saamah (naeree) [1] Dawadawa seeds [1] Pumkin seeds [1] Groundnuts [1] Soya Beans [1] Others___
24	What are the major ***Animal proteins*** consumed in your household?	**Animal proteins** Fish [1]

	(Please tick as many as you know)	Red Meat [1] Poultry [1] Eggs [1] Fresh Milk [1] Processed Milk [1] Others_____
25	Which of these ***Animal proteins*** are **indigenous** to the community? ***(Please tick as many as you know)***	**Animal proteins** Fish [1] Red Meat [1] Poultry [1] Fresh Milk [1] Processed Milk [1] Others_____
26	What are the major ***Vegetables*** consumed in your household? ***(Please tick as many as you know)***	**Vegetables** Ayoyo [1] Amaranthus (Alefu) [1] Kannef (Bitor) [1] Bita leafs (Sourwaka) [1] Bean leafs (bamtoh) [1] Baobab leafs (tokaara) [1] Pamkin leaf (yourkvoro) [1] Moringa leafs [1] Black berry leafs [1] Local mushrums [1] Cabbage [1] Carrots [1] Others_____
27	Which of these ***Vegetables*** are **indigenous** to the community? ***(Please tick as many as you know)***	**Vegetables** Ayoyo [1]

		Amaranthus (Alefu) [1] Kannef (Bitor) [1] Bita leafs (Sourwaka) [1] Bean leafs (bamtoh) [1] Baobab leafs (tokaara) [1] Pamkin leaf (yourkvoro) [1] Moringa leafs [1] Black berry leafs [1] Local mushrums [1] Cabbage [1] Carrots [1] Others_____
28	What are the major ***Fats/Oils*** consumed in your household? ***(Please tick as many as you know)***	**Fats/Oils** Shear batter [1] Groundnuts oil [1] Frytol [1] Vegetable oil [1] Soya oil [1] Palm oil [1] Coco nut oil [1] Magerine [1] Others_
29	Which of these ***Fats/Oils*** are indigenous to the community? ***(Please tick as many as you know)***	**Fats/Oils** Shear batter [1] Groundnuts oil [1] Frytol [1] Vegetable oil [1] Soya oil [1] Palm oil [1] Coco nut oil [1]

		Magerine [1] Others
30	What are the major ***Fruits*** consumed in your household? ***(Please tick as many as you know)***	**Fruits** Baobab (toro) [1] Ebonny (gean) [1] Local gripes (sisibi) [1] Mangoes [1] Pineapple [1] Bananas [1] Oranges [1] Dawadawa [1] Tamarin [1] Other_____
31	Which of these ***Fruits*** are ***indigenous*** to the community? ***(Please tick as many as you know)***	**Fruits** Baobab (toro) [1] Ebonny (gean) [1] Local gripes (sisibi) [1] Mangoes [1] Pineapple [1] Bananas [1] Oranges [1] Dawadawa [1] Tamarin [1] Other_____
32	Can you indicate the role these foods categories play in the body of children when fed to them? ***(Use form Q32)***	***(Use form Q32)***
33		

Indigenous Food Category	**Nutritional Knowledge on food**	**N value description** Protect the body (1) Build the body (2)

		Yes (1), no (2)	Heal the body (3) Gives blood (4) Gives energy (5) Others (6)	
	Cereals			
	Roots			
	Plant Proteins			
	Animal proteins			
	Vegetables			
	Fats/oils			
	Fruits			
34	Comparatively, which of the following do you have enough information on?		Indigenous food [1] Exotic food [2]	
35	From the list, indicate appropriately where you get information about indigenous crops in your community?		The elderly women [1] The elderly Men [1] From friends [1] Open market [1] From formal education [1] Others_____ [1]	
36	Does the nutritional knowledge you have on indigenous foods influence your choice of food for your children?		Yes [1] No [0]	
37	In the last six months, have you received health education on nutrition of children		Yes [1] No [0]	
38	Source of health education			

Source	**Yes** [1]	**No** [0]
Health worker		
Opinion leader		
Agric Ext officer		
Elderly mother		
Others (Specify)		

39 The content of education

Information	**Yes** [1]	**No** [0]
Feeding practices		
Types of nutrition		
Nutritional content of various food stuff		
Indigenous food and their nutritional content		

40 What is your preferred medium of information on child nutrition

Medium	Yes [1]	No [0]
Radio		
Television		
Information van		
Internet		
Face-to-face		

To what extent do mothers/caregivers use indigenous foods at the household's level to improve the nutritional status of children in the community?

41 How often do you feed your children under the age of 5years with the following food categories?

Very often = every day

Often = 1-7days

Not often = > 7days

Category	**Very often (daily) [1]**	**Often (1-7days) [2]**	**Not often >7days [3]**	**Others [4]**
Cereals				
Roots crops				
Plant proteins				
Animal proteins				

	Vegetables							
	Fats/oils							
	Fruits							
42	Do you prepare and eat indigenous foods at the household level frequently?					Yes [1] No [0]		
43	Do you prepare the children's food separately?					Yes [1] No [0]		
44	How many times per day do you usually feed your children who are between the ages of 0-5years?					1 = Once 2 = Twice 3 = Thrice 4 = Other (specify)		
45	For each of the foods categories listed below, how much of these foods fed to your children under 5 years are indigenous or foreign?							

Food category	All indigenous [1]	All foreign [2]	Mostly indigenous [3]	Mostly foreign [4]
Cereals				
Roots				
Plant Proteins				
Animals Proteins				
Vegetables				
Fruits				
Fats/Oils				

46	Comparatively, which of the following do you mostly use in feeding your children?	a. Indigenous food [1] b. Exotic food [2]

47 What is your reason for your answer to the question above?

Reason	**Yes** [1]	**No** [0]
Expensive		
Cheap		
Prestigious		
Availability		
Medical Advice		
Advertisement		

48 Do you feed your children with roasted cereals and plant protein (Tom brown)?

Yes [1]

No [0]

49 Do buy the tom brown from the market, or given at the clinic, or you process it yourself?

Market [1]

Clinic [2]

Self-made [3]

Others _____

50 Given the list of food categories below, which combination will provide the child with a balance diet (adequate diet)?

Class	**Category**	**Yes**	**No**
Carbohydrate	Cereals		
	Roots		
Proteins	Plant proteins		
	Animal proteins		
Vitamins and minerals	Vegetables		
	Fruits		
	Fats/oils		

51 On a daily basis, which combination do you feed your children with?

Class	**Category**	**Yes**	**No**

	Carbohydrate	Cereals			
		Roots			
	Proteins	Plant proteins			
		Animal proteins			
	Vitamins and minerals	Vegetables			
		Fruits			
		Fats/oils			

52	Do you ensure that the children under the age of 5years eat fruits daily?	Yes [1] No [0] Only when available [2]

	STATEMENTS ABOUT INDIGENOUS FOODS	**Strongly Disagree (1)**	**Disagree (2)**	**Agree (3)**	**Strongly Agree (4)**
53	You always decide on what to cook at home				
54	You always feed your children just to make sure that they fill their stomach with anything call food, it does not matter what it is.				
55	You know the nutritional value of the indigenous foods so you feed your children with these foods to keep them healthy.				
56	The foreign foods are more superior and nutritious than the local indigenous foods.				
57	Do you deliberately select and prepare particular foods for the child or the child is feed on what everyone at home is eating?				
58	Have you ever made any effort to improve the taste, presentation, or aroma of any indigenous food?				
59	Have you ever used the indigenous foods to create a new meal for your child/children?				

How Culture and Lifestyle Affect the Consumption of Indigenous Foods in The Community

		Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
60	Does society influence the kind of food you feed your children with?					
61	Do you care about what people will say when they see the kind of food you feed your children with?					
62	Do cultural beliefs prevent the usage of some indigenous foods in this community?					
63	Is there a time you have fed your children with indigenous foods that culturally you were not supposed to?					
64	Do you feed your children on foreign foods	Yes [1] No [0]				
65	Do you prepare the children's food at home or you buy already cooked food	Prepare at home [1] Cooked from outside [2]				
66	Does our culture promote the consumption of the indigenous foods?	Yes [1] No [0]				
67	Which of the following factors influence the choice of consumption of indigenous foods? ***(Please rank them accordingly)***	Cost [1] Culture [2] Knowledge of nutrient [3] The taste of the food [4] Availability [5] Other_____				
68	What are some of the cultural issues with indigenous food in your community?	Women not allowed into food bank[1] Girls don't eat chicken [1] Children not allowed to eat eggs [1]				

		Children not allowed to eat meat [1] Others_____
69	In terms of health, People have perception that indigenous food are…	Unhygienic [1] Hygienic [2] Highly hygienic [3]
70	How do you perceive indigenous foods?	Poor people [1] Rich [2] Both Poor and rich [3]
71	What type of brand is given to indigenous food in your community?	Poor people's food [1] Rich people's food [2] None of the above [3]
72	How does the brand given to indigenous food affected consumption?	Decreased consumption [1] No change in consumption [2] Increased consumption [3]
24 hour re-call on child feeding.		
73	How old is your child/children? *Tick the appropriate ones*	6 months – 1yr 1 yr - 2yrs 2 yrs - 3yrs 3 yrs - 4yrs
74	Do you feed your children/child yourself?	Yes No Not all the time
75	How many times do you feed your child/children in a day?	1 = Once 2 = Twice 3 = Thrice 4 = Other (specify)

76	You said you feed your child/children (number of times a day), please can you recall what you fed the child/children with? ***(recall for each of the time the child was fed)***
77	In general, why do you feed the child/children with those foods? …… …… …… ……

1st meal	**2nd meal**	**3rd meal**	**4th meal**	**5th meal**

THANK YOU FOR TIME

APPENDIX C

IN-DEPTH INTERVIEWS AND FOCUS GROUP DISCUSSIONS

GUIDE

DEMOGRAPHIC DETAILS QUESTIONNAIRE (KII) or (FGD)

Date:_____

Please answer the following questions in the spaces provided,

1. Age:……

2. Gender: □ Male □ Female

Tick the most appropriate options.

3. Where do you best fit?

- Wife
- Husband
- Youth and married
- Youth and not married
- Mother-in-law
- Father-in-law
- Caregiver
- Elder/opinion leader
- Mid wife
- Agriculture officer
- Other: (please describe) _____

4. What do you do for a living? _____

Thank you for taking the time to complete this questionnaire

Name of community_____

Group type /ID_____

District_____

Sex of group:

_____

No. of FGD members: No. Men [ ] No. Women [ ]

Date of interview:

(DD/MM/YYYY) __ __/__ __/2017

Interviewer name and number

FACILITATORS' WELCOME, INTRODUCTION AND INSTRUCTIONS TO PARTICIPANTS

Welcome and thank you for volunteering to take part in this discussion. You have been asked to participate as your point of view is important. I realize you are busy and I appreciate your time, thank you.

This discussion is designed to assess your knowledge of indigenous foods and how they are used at the households in the community by mothers or caregivers to curb malnutrition among infants and children under 5 in.

The discussion will take no more than two hours.

May I tape the discussion to facilitate its recollection? (If yes, switch on the recorder)

Anonymity: Despite being taped, I would like to assure you that the discussion will be anonymous. The tapes will be kept safely in a locked facility until they

are transcribed word for word, then they will be destroyed. The transcribed notes of the focus group will contain no information that would allow individual subjects to be linked to specific statements. You should try to answer and comment as accurately and truthfully as possible. I and the other focus group participants would appreciate it if you would refrain from discussing the comments of other group members outside the focus group. If there are any questions or discussions that you do not wish to answer or participate in, you do not have to do so; however please try to answer and be as involved as possible.

FOCUS GROUP DISCUSSIONS GROUND RULES:

- The most important rule is that only one person speaks at a time. There may be a temptation to jump in when someone is talking but please wait until they have finished.
- There is no right or wrong answers
- You do not have to speak in any particular order
- When you do have something to say, please do so. There are many of you in the group and it is important that I obtain the views of each of you
- You do not have to agree with the views of other people in the group
- Does anyone have any questions?

Is there any existing dietetic knowledge on indigenous foods that can be used to enhance child nutrition?

1. **Energy giving crops-carbohydrates**
   a. What are the food crops that when consumed, provides the body with energy?

b. Which of these food crops are cultivated in the community?
c. Which of these food crops are consumed in the community?
d. Which of these food crops are indigenous?
e. Which of them are foreign?
f. Why are these food crops cultivated?
g. Which of these food crops are cultivated for the:
    i. Market only? _____ (Any reason why?)
    ii. Household use only? _____ (Any reason why?)
    iii. Market and household use? _____ (Any reason why?)

h. Do you have these ***food crops*** all year round?
i. Do you know of any ***of these energy giving food crops*** that use to be grown in this community and it is no more in the system? ***If so***.
j. Do you know why these ***food crops*** are no more in the system? ***(if applicable)***
k. Currently which food crops are mostly consumed in this community?
l. Why are these ***food crops*** consumed mostly?
m. Which of these food crops mentioned above are fed to children between the ages of 6months and 5years?
n. In what ways do you use these ***food crops*** to feed your children under the age of 5 years?
o. Are there any cultural restrictions on the consumption of any of these ***food crops***? If so, what are they?

2. **PLAN PROTEIN**

a. What ***plant proteins*** do you know?
b. Which of these ***plant proteins*** are cultivated in this community?
c. Which of these ***plant proteins*** are consumed in the community?
d. Which of these ***plant proteins*** are indigenous (belong to the village community)?
e. Which of these ***plant proteins*** are foreign (introduced by Agric officers/others to the community)?
f. Why are these ***plant proteins*** cultivated?

g. Which of these cultivated ***plant proteins*** do you produce for the:
   i. Market only? _____ (Any reason why?)
   ii. Household use only? _____ (Any reason why?)
   iii. Market and household use? _____ (Any reason why?)

h. Do you have these ***plant proteins*** all year round?

i. Do you know of any ***plant proteins*** that use to be grown in this community and are no more in the system? ***If so,***

j. Do you know why these ***plant proteins*** are no more in the system? ***(If applicable)***

k. Currently, which ***plant proteins*** are mostly consumed in this community?

l. Why are these ***plant proteins*** consumed mostly?

m. Which of these ***plant proteins*** mentioned above fed to children between the ages of 6months to 5 years

n. In what ways do you use these ***plant proteins*** to feed your children under the age of 5 years?

o. Are there any cultural restrictions on the consumption of any of these ***plant proteins***? If so, what are they?

3. **ANIMAL PROTEIN**

a. What ***Animal proteins*** do you know?

b. Which of these ***Animal proteins do you rear*** in this community?

c. Which of these ***animal proteins*** are indigenous (belong to the village community)?

d. Which of these ***animal proteins*** are foreign (introduced by Agric officers/others to the community)?

e. Why are these ***animal proteins*** reared?

f. Which of these reared ***animal proteins*** do you produce for the:
   i. Market only? _____ (Any reason why?)
   ii. Household use only? _____ (Any reason why?)
   iii. Market and household use? _____ (Any reason why?)

g. Do you have these ***animal proteins*** all year round?

h. Do you know of any ***animal proteins*** that use to be reared in this community and are no more in the system? ***If so,***

i. Do you know why these ***animal proteins*** are no more in the system? ***(If applicable)***

j. Currently, which ***animal proteins*** are mostly consumed in this community?

k. Why are these ***animal proteins*** consumed mostly?

l. Which of these ***animal proteins*** mentioned above is fed to children between the ages of 6 months to 5 years

m. Can you tell me the role ***animal proteins*** play in the body when consumed?

n. In what ways do you use these ***animal proteins*** to feed your children under the age of 5 years?

Probe: Do you mix with other food categories?

o. Are there any cultural restrictions on the consumption of any of these ***animal proteins***? ***If so, what are they?***

4. **VEGETABLES**

a. What ***vegetables*** do you know?

b. Which of these ***vegetables*** are cultivated in this community?

c. Which of these ***vegetables*** are consumed in the community?

d. Which of these ***vegetables*** are indigenous (belong to the village community)?

e. Which of these ***vegetables*** are foreign (introduced by Agric officers/others to the community)?

f. Why are these ***vegetables*** cultivated?

g. Which of these cultivated ***vegetables*** do you produce for the:

   i. Market only? _____ (Any reason why?)

   ii. Household use only? _____ (Any reason why?)

   iii. Market and household use? _____ (Any reason why?)

h. Do you have these ***vegetables*** all year round?

i. Do you know of any ***vegetables*** that use to be grown in this community and are no more in the system? ***If so,***

j. Do you know why these ***plant proteins*** are no more in the system? ***(If applicable)***

k. Currently, which ***vegetables*** are mostly consumed in this community?

l. Why are these ***vegetables*** consumed mostly?

m. Which of these ***vegetables*** mentioned above fed to children between the ages of 6months to 5 years

n. In what ways do you use these ***vegetables*** to feed your children under the age of 5 years?

o. Are there any cultural restrictions on the consumption of any of these ***vegetables***? If so, what are they?

5. **FATS/OILS**

a. What are the major ***fats and oils*** consumed in this community?

b. Which of these ***fats and oils*** are indigenous (belong to the village community)?

c. Which of these ***fats and oils*** are foreign (introduced by Agricultural officers/others to the community)?

d. Why are these ***fats and oils*** consumed?

e. Which of these ***fats and oils*** is produce for the:

i. Market only? _____ (Any reason why?)

ii. Household use only? _____ (Any reason why?)

iii. Market and household use? _____ (Any reason why?)

f. Do you have these ***fats and oils*** all year round?

g. Do you know of any ***fats and oils*** that use to be consumed in this community and are no more consumed? ***If so,***

h. Do you know why these ***fats and oils*** are no more in the system? ***(If applicable)***

i. Currently, which ***fats and oils*** are mostly consumed in this community?

j. Why are these ***fats and oils*** consumed mostly?

k. Which of these ***fats and oils*** mentioned above are fed to children under the age of 5yrs?

l. Can you tell me the role ***fats and oils*** play in the body when consumed?

m. In what ways do you use these ***fats and oils*** to feed your children under the age of 5 years?

Probe: Do you mix with other food categories?

n. Are there any cultural restrictions on the consumption of any of these ***fats and oils***? ***If so, what are they?***

6. **FRUITS**

a. What are the major ***fruits*** consumed in this community?

b. Which of these ***fruits*** are indigenous (belong to the village community)?

c. Which of these ***fruits*** are foreign (introduced by Agric officers/others to the community)?

d. Why are these ***fruits*** consumed?

e. Which of these ***fruits*** is produce for the:

i. Market only? _____ (Any reason why?)

ii. Household use only? _____ (Any reason why?)

iii. Market and household use? _____ (Any reason why?)

f. Do you have these ***fruits*** all year round?

g. Do you know of any ***fruits*** that use to be consumed in this community and are no more consumed? ***If so,***

h. Do you know why these ***fruits*** are no more in the system? ***(If applicable)***

i. Currently, which ***fruits*** are mostly consumed in this community?

j. Why are these ***fruits*** consumed mostly?

k. Which of these ***fruits*** mentioned above are fed to children under the age of 5yrs?

l. Can you tell me the role ***fruits*** play in the body when consumed?

m. In what ways do you use these vegetables to feed your children under the age of 5 years?

Probe: Do you mix with other food categories?

n. Are there any cultural restrictions on the consumption of any of these ***fruits***? ***If so, what are they?***

7. Generally how do you get information/education on the values and benefits of foods in this community?
8. In general, what are the proportions of foods combined during cooking?

   Probe: proportions of*; (Carbohydrate, Proteins, Fat/oil, Vegetables, Fruits, others)*
9. Are there any special reasons for the various proportions during food preparation?
10. Are there special combinations done for feeding of children under 5 years? ***If so.***
    i. *Probe:* what are proportions of these combinations?
    ii. *Probe:* are there reasons why these combinations are done?

To what extent do mothers/caregivers use indigenous foods at the household's level to improve the nutritional status of children in the community?

11. How many times did you feed your children yesterday?
    i. Please give a breakdown of each meal you fed the children on.

Participants	***First meal***	***Second meal***	***Third meal***	***Fourth meal***	***Fifth meal***

    ii. *Probe:* Please give me reasons why you fed the children with those meals.
    iii. *Probe:* are these foods indigenous?
12. Do you know when a diet is said to be balanced?
13. What makes a diet balanced?

14. Can the indigenous foods alone be used to provide a balanced diet for growing children under 5?
15. Have you ever used the indigenous foods to create a new meal for your child/children?
16. Do you as mothers/caregivers deliberately feed your children with nutritious foods? ***If so,***
    i. *Probe:* Are these foods indigenous?
    ii. *Probe:* Are these foods foreign?
    iii. *Probe:* Are these foods a mixture of both indigenous and foreign?
17. Are there specific foods that are constantly fed to children in this community?
    i. *Probe:* Where do you get these foods from?
    ii. *Probe:* Are they indigenous foods?

Does culture and lifestyle influence the consumption of indigenous foods by mothers and caregivers for the purpose of enhancing child nutrition in the community?

CULTURAL / LIFESTYLE

18. Who makes decisions on the foods given to children?
19. Are there any cultural attributes (powers) that constrains the use of some type of foods in the community?
20. Generally who makes the decision on the kind of food the cook and eat at the household level?

    Probe: does it affect the nutritional status of household members?

21. Has today's modern lifestyle influence the choices of food consumed?

22. Are they any other reasons why some indigenous foods listed above are unused or less used?
    - *Probe:* Is it culturally related?
    - *Probe*: Is it socially related?
    - *Probe:* Is it physically related? (Taste, color, aroma and others)
    - *Probe:* seasonality issues?
    - *Probe:* cost (financial issues)?
    - *Probe:* Gender issues?
    - *Probe:* Religious reasons?
    - *Probe:* Modernization?

ADDITIONAL QUESTION FOR PROFESSIONALS AND EXPECTS : Agricultural officers, Nutrition officers, NGOs in nutrition, and Midwives for KII

23. As per the role you play in this community, do you organize health and nutrition programs for the community people? If so,
    - *Probe:* What are the specific areas?
    - *Probe:* What has been the impact?
    - *Probe:* How often?

THANK YOU FOR TIME