UNIVERSITI PUTRA MALAYSIA

EFFECTIVENESS OF TRIPLE BENEFIT HEALTH EDUCATION INTERVENTION ON KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS MALNUTRITION AMONG ADOLESCENT GIRLS, BORNO STATE, NIGERIA

CHARLES RUTH SHAPU

FPSK(p) 2021 26

EFFECTIVENESS OF TRIPLE BENEFIT HEALTH EDUCATION INTERVENTION ON KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS MALNUTRITION AMONG ADOLESCENT GIRLS, BORNO STATE, NIGERIA

By

CHARLES RUTH SHAPU

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

April 2021

COPYRIGHT

DEDICATION

This study is dedicated to my parents Mr Charles Shapu and late Mrs Patum Charles Shapu, and to all adolescent girls, the future mothers.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

EFFECTIVENESS OF TRIPLE BENEFIT HEALTH EDUCATION INTERVENTION ON KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS MALNUTRITION AMONG ADOLESCENT GIRLS, BORNO STATE, NIGERIA

By

CHARLES RUTH SHAPU

April 2021

Chairman : Associate Professor Suriani Ismail, PhD
Faculty : Medicine and Health Sciences

Addressing the gap in poor knowledge, attitude and practice (KAP) among adolescent girls are important as malnutrition has a negative effect on their future generation. The adolescence phase comes with a rapid increase in height, changes in body composition, mental, reproductive system, and social development. The objectives of the study are to determine knowledge, attitude and practice of adolescent girls towards malnutrition and to develop, validate, implement and evaluate the effectiveness of a Triple Benefit Health Education Intervention to improve knowledge, attitude and practice of adolescent girls towards malnutrition in Maiduguri Metropolitan Council, Borno State, Nigeria. The methodology of this study was conducted in two phases, Phase I was a cross-sectional study while Phase II was a Randomised Control Trial (RCT). Data was collected using KoBo Toolbox in Government Girls College (GGC), Government Girls Secondary School (GGSS), Yerwa Girls Secondary School (YGSS), Zajeri Day Secondary School (ZDSS), Bulabulin Day Secondary School (BDSS), and Shehu Garbai Day Secondary School (SGDSS), 612 respondents were randomly selected based on the inclusion criteria of the study. Among the eligible respondents, 562 consented and were interviewed with a response rate of (92%) for Phase I. Majority of the respondents were in their middle adolescent stage (49.8%), (86.8%) resides in an urban area, while (55%) had a household size of ≥ 9 (nine) family members. Poor knowledge was reported among (80.2%) of respondents, more than half of respondents (57.3%) showed poor attitude, while about (49.5%) had poor practice towards malnutrition. Triple Benefit Health Education Intervention module was developed for Phase II according to the information, motivation and behavioural skills model (IMB). A two-stage random sampling technique was used. First stage four out of the six secondary schools in Phase I was randomly selected and two classes were randomly selected in each grade level/set. A total of 424 respondents were randomly selected and 417 were eligible

for participation (208 in the intervention group and 209 in the control group at baseline) using opaque sealed envelopes. Data were collected at baseline, at three and six months post-intervention and follow up using a questionnaire. There was no significant difference in sociodemographic characteristics, knowledge, attitude and practice between the intervention and control group at baseline. There was a significant difference between intervention and control group for knowledge (AOR = 9.595, 95% CI: 6.371 – 14.449, p <0.001; AOR = 14.993, 95% CI: 9.919 – 22.662, p < 0.001), attitude (AOR = 1.949, 95% CI: 1.451 – 2.616, p <0.001; AOR = 2.276, 95% CI: 1.692 – 3.060, p < 0.001) and practice (AOR = 1.545, 95% CI: 1.164 – 2.051, p = 0.003; AOR = 1.422, 95% CI: 1.083 – 1.867, p = 0.011) respectively from baseline to post-intervention and follow up after the Triple Benefit Health Education Intervention. The findings from this study provide evidence for the effectiveness of Triple Benefit Health Education Intervention in improving knowledge, attitude and practice among adolescent girls in Maiduguri Metropolitan Council, Borno State, Nigeria. The study suggests that knowledge, attitude and practice towards malnutrition will reduce the burden of malnutrition, improve healthy lifestyle among adolescent girls and their future offspring.

Keywords: Malnutrition, adolescent girls, knowledge, attitude, practice, KoBo Toolbox

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEBERKESANAN INTERVENSI PENDIDIKAN KESIHATAN TIGA KEBAIKAN TERHADAP PENGETAHUAN, SIKAP DAN AMALAN TERHADAP KEKURANGAN ZAT MAKANAN DI KALANGAN GADIS REMAJA, NEGERI BORNO, NIGERIA

Oleh

CHARLES RUTH SHAPU

April 2021

Pengerusi : Profesor Madya Suriani Ismail, PhD
Fakulti : Perubatan dan Sains Kesihatan

Menangani jurang dalam pengetahuan, sikap dan amalan (KAP) di kalangan gadis remaja adalah penting kerana kekurangan zat makanan mempunyai kesan negatif kepada generasi masa depan mereka. Fasa remaja datang dengan peningkatan pesat dalam ketinggian, perubahan dalam komposisi badan, mental, sistem reproduksi, dan pembangunan sosial. Objektif kajian adalah untuk membangunkan, mengesahkan, melaksana dan menilai keberkesanan Intervensi Pendidikan Kesihatan Tiga Kebaikan untuk meningkatkan pengetahuan, sikap dan amalan remaja perempuan terhadap kekurangan zat makanan di Majlis Metropolitan Maiduguri, Negeri Borno, Nigeria. Metodologi kajian ini dilakukan dalam dua fasa, Fasa I adalah kajian keratan rentas sementara Fasa II adalah Percubaan Kawalan Rawak (RCT). Data telah dikumpulkan melalui Kotak alat KoBo di Kolej Perempuan Kerajaan (GGC), Sekolah Menengah Perempuan Kerajaan (GGSS), Sekolah Menengah Perempuan Yerwa (YGSS), Sekolah Menengah Hari Zajeri (ZDSS), Sekolah Menengah Hari Bulabulin (BDSS), dan Sekolah Menengah Hari Shehu Garbai (SGDSS), 612 responden telah dipilih secara rawak berdasarkan kriteria kemasukan kajian. Di kalangan responden yang layak, 562 bersetuju dan telah ditemuramah dengan kadar tindakbalas sebanyak (92%) untuk Fasa I. Majoriti responden yang berada di peringkat remaja pertengahan mereka (49.8%), (86.8%) menetap di kawasan bandar, manakala (55%) mempunyai saiz isi rumah yang lebih besar daripada sembilan ≥ 9 (sembilan) ahli keluarga. Pengetahuan yang lemah dilaporkan dikalangan (80.2%) responden, lebih daripada separuh responden (57.3%) menunjukkan sikap buruk, manakala kira-kira (49.5%) mempunyai amalan buruk terhadap kekurangan zat makanan. Modul intervensi pendidikan kesihatan tiga kebaikan dikembangkan dalam Fasa II mengikut maklumat, motivasi dan kemahiran tingkah laku (IMB). Satu teknik persampelan rawak dua peringkat telah digunakan. Peringkat pertama empat daripada enam buah sekolah menengah di Fasa I telah dipilih secara rawak dan dua

kelas dipilih secara rawak dalam setiap tahap/set gred. Sejumlah 424 responden telah dipilih secara rawak dan 417 layak untuk penyertaan (208 dalam kumpulan campur tangan dan 209 dalam kumpulan kawalan pada garis dasar) menggunakan sampul surat tertutup legap. Data dikumpulkan pada peringkat awal, pada tiga dan enam bulan selepas intervensi dan susulan menggunakan soal selidik. Tidak ada perbezaan yang ketara dalam ciri-ciri sosiodemografi, pengetahuan, sikap dan amalan antara intervensi dan kumpulan kawalan pada garis dasar. Terdapat perbezaan yang ketara di antara intervensi dan kumpulan kawalan untuk pengetahuan (AOR = 9.595, 95% CI: 6.371 – 14.449, p <0.001; AOR = 14.993, 95% CI: 9.919 – 22.662, p < 0.001), sikap (AOR = 1.949, 95% CI: 1.451 – 2.616, p <0.001; AOR = 2.276, 95% CI: 1.692 – 3.060, p < 0.001) and amalan (AOR = 1.545, 95% CI: 1.164 – 2.051, p = 0.003; AOR = 1.422, 95% CI: 1.083 – 1.867, p = 0.011) masing-masing dari peringkat awal hingga selepas intervensi dan susulan selepas Intervensi Pendidikan Kesihatan Tiga Kebaikan. Penemuan daripada kajian ini memberikan bukti untuk keberkesanan Intervensi Pendidikan Kesihatan Tiga Kebaikan dalam meningkatkan pengetahuan, sikap dan amalan di kalangan gadis remaja di Majlis Metropolitan Maiduguri, Borno State, Nigeria. Kajian menunjukkan bahawa pengetahuan, sikap dan amalan terhadap kekurangan zat makanan akan mengurangkan beban kekurangan zat makanan, meningkatkan gaya hidup sihat di kalangan gadis remaja dan keturunan mereka di masa depan.

Kata kunci: Kekurangan zat makanan, gadis remaja, pengetahuan, sikap, amalan, Kotak alat KoBo, Tiga Kebaikan

ACKNOWLEDGEMENTS

I am very grateful to God, the maker of the universe, for his guidance, protection, preservation and divine provision throughout my study in Universiti Putra Malaysia, to him be all glory, honour and adoration.

My sincere appreciation goes to Associate Prof. Dr Suriani Ismail, Chairman supervisory committee and members of the committee, Dr Norliza Ahmad, Dr Lim Poh Ying and Prof. Ibrahim Abubakar Njodi, for their technical support, without which this work would not have been possible.

Nobody has been more important to me in my academic pursuit than the members of my family. Most importantly, I wish to thank my parents Mr Charles Shapu and late Mrs Patum Charles Shapu whose love and guidance are with me in whatever I pursue. I would like to thank my loving and supportive siblings, Bitrus, Yadika and his family, Serah and her family, Samson and his family and Daniel, who provided me with unending inspiration. To my parents and siblings, you are just the best.

I would want to appreciate the effort of Dr Hussaini Garba Dibal (Department of Physical and Health Education, University of Maiduguri, Borno State, Nigeria) and Mrs Elizabeth Tanko (Department of Nursing, College of Nursing and Midwifery, Maiduguri, Borno State, Nigeria) who assisted in validating the study instruments. I remain grateful to Mr Hamidu Shuaibu, state officer National Bureau of Statistics, Maiduguri branch for assisting with the measurement tools. I also wish to acknowledge Mr Simon Karanja (Nigeria Nutrition Sector Coordinator UNICEF), Amina Atta (UNICEF), Joseph Bangnikon (Senior Technical Advisor, Project Concern International, Washington DC), Majinga Samuel Amos (Forestry Research Institute of Nigeria), Kingsley Clement and Mr Samuel Audu Balami for their numerous input in the course of my study.

My sincere appreciation goes to the Ministry of Education, Management and Students (respondents) of Government Girls College Maiduguri, Government Girls Secondary School Maiduguri, Government Girls Secondary School Yerwa, Shehu Garbai School, Zajeri Day Secondary School, and Bulabulin Day Secondary School for actively participating in the study. Special thanks to my enumerators for the kind support during data collection.

Finally, I wish to thank my friends and all those who have contributed directly or indirectly to the success of this work, they are; Dr Ladi Peter Mshelia, Dr Onyiyechukwu Ada Agina, Adetutu Elizabeth Awosan, Onesimus Mahdi, Dr Musa Samaila Chiroma, Dr Abel A. Adeyi, Dr Innocent Peter, Dr Bura Paul Gadzama, Dr Yusuf Lekko Madaki, Sunday Elijah, Ovye John Abari, Dr Saman A Hashim, aunty Fatima Mele, Ibrahim Kawaifa, Dr Panmial Damulak, Piritmwa Shemu, Monica

Opara, Isaac Ndahi, Ahmed Saidu, Zanak, Dr Ahmed Dahiru and his wife Hadiza and my wonderful family the youth fellowship EYN LCC Pompamari among others.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Suriani Ismail, MD, MPH, PhD
Associate Professor (Medical)
Faculty of Medicine and Health Sciences
Universiti Puta Malaysia
(Chairman)

Norliza Ahmad, MD, MPH, PhD
Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Puta Malaysia
(Member)

Lim Poh Ying, B.Sc., MSC, PhD
Senior Lecturer
Faculty of Medicine and Health Sciences
Universiti Puta Malaysia
(Member)

Ibrahim Abubakar Njodi, B.Sc., MSC, PhD
Professor
Faculty of Education
University of Maiduguri
Nigeria
(Member)

_____
ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 12 August 2021

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

RCT	Randomised Control Trial
CRCT	Cluster Randomised Control
GGC	Government Girls College
GGSS	Government Girls Secondary School
GGSS Yerwa	Government Girls Secondary School Yerwa
SGDSS	Shehu Garbai Day Secondary School
BDSS	Bulabulin Day Secondary School
ZDSS	Zajeri Day Secondary School
MUAC	Mid Upper Arm Circumference
BMI	Body Mass Index
MMC	Maiduguri Metropolitan Council
IMB	Information Motivation Behavioural
OR	Odds Ratio
AOR	Adjusted Odds Ratio
CI	Confidence Interval
UNICEF	United Nations Children Funds
UPM	Universiti Putra Malaysia
WHO	World Health Organisation
ACC/SCN	Administrative Committee on Coordination/Sub-Committee on Nutrition
UN	United Nations
IFPRI	International Food Policy Research Institute
FMoH	Federal Ministry of Health
NPC	National Population Commission

WFP	World Food Program
DFID	Department of International Development
MDG's	Millennium Development Goals
SSA	Sub-Saharan Africa
SD	Standard Deviation
SE	Standard Error
IQR	Inter-Quartile Range
JSS	Junior Secondary School
SSS	Senior Secondary School
HFIAS	Household Food Security Access Scale
ND	No Data
USAID	United State Agency for International Development
FAO	Food and Agricultural Organisation
FFQ	Food Frequency Questionnaire
DD	Dietary Diversity
DDS	Dietary Diversity Score
UBE	Universal Basic Education
GPS	Global Positioning System
WASH	Water Sanitation and Hygiene
ITT	Intention to Treat
GEE	Generalised Estimating Equation
CDC	Centre for Disease Control
AMDR	Acceptable Macronutrient Distribution Range
PTA	Parents Teachers Association

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Adolescents are young individuals that are between the ages of 10 and 19 years- old that can be affected by malnutrition which is insufficiency, excess, or inequality in an individual energy intake or nutrients. Inadequate food consumption is the greatest cause of malnutrition, the burden is increasingly becoming difficult to ignore most especially in the case of adolescent girls in underdeveloped and developing countries, this is relevant to maternal nutrition, child survival, chronic diseases and unhealthy development affecting individual and community's economic productivity (Robert et al., 2013; World Health Organization, 2018).

Malnutrition has become a huge global burden, its prevalence differs between nation and also within regions of the same country (Abdulkarim et al., 2014). In advanced countries, overnutrition (overweight and obesity) is the major concern while undernutrition has become a major burden to the underdeveloped and developing countries. Malnutrition is on the increase due to the rising trend of poverty, inadequate knowledge, attitude, practice and inadequate food, especially in the northeastern part of Nigeria where humanitarian crises have persisted since 2009 exposing most of its citizens to untold hardship and malnutrition (Abdulkarim et al., 2014; Ogunniyi et al., 2016; United Nations Development Programm, 2017).

The adolescence stage is one of the challenging periods in life as it is the era of speedy growth and maturation from the phase of childhood to adulthood, adolescents gain about 15 to 20% of their height, and 25 to 50% of their weight between the ages of 10 to 19 years old. Adolescent girls do not gain weight during pregnancy and lactation but rather lose weight leading to stunting, underweight and anaemia, to meet their growth and development requirements there is a need to improve their knowledge, attitude, and practice on malnutrition, nutritional intake and healthy lifestyle through multi-sectoral health education intervention (Abdulkarim et al., 2014; Christian & Smith, 2018; Mokhtari et al., 2017).

The burden of malnutrition harms the adolescents in poor growth and development, morbidity, poor cognition, poor school performance, poor economic productivity in the future, and even mortality (Ghosh Smritikana, 2020; United Nations Children's Fund (UNICEF), 2019). While the importance of having good knowledge, attitude and practice on nutrition are irrefutable to prevent malnutrition, there is little or no doubt that monthly household income and household infrastructure are a critical factor in determining the health and nutrition of children and adolescent. In developing and underdeveloped countries, low household income earners are prone to malnutrition due to the tendency of consuming less nutritious whereas, inadequate household infrastructures such as poor water sanitation and hygiene facilities have

proven to increase exposure to faecal pathogens and in the long run increasing the burden of disease and malnutrition (Alice Goisis & Melissa Martinson, 2019; Thomas et al., 2014). Children and adolescents living in urban settings were found to be healthier with better nutritional status compared to their counterparts residing in the rural settings, as a result of the more improved health care system and other socioeconomic factors peculiar to urban-rural difference (Charmarbagwala et al., 2004; Ghosh, 2011). The dietary habit of adolescents in low and middle-income countries are poor generally, as half the number of adolescent girls in low and middle-income countries eat less than three times a day with the majority of them missing meals and skipping breakfast (United Nations Children's Fund (UNICEF), 2019). Early marriage also adds to the burden of malnutrition among adolescent girls as the impact is compounded yearly by 2.5 million birth among under 16 years and 16 million birth among 15 to 19 years old placing the adolescent girl and her child in a disadvantaged state (WHO, 2018).

Other factors such as poor access, availability, utilization, and stability of food in both macro and micronutrient expose adolescent girls to deficiencies especially during their reproductive years which may have short and long term negative impact on the individual and the society as it relates to gender discrimination for the girl child (Asian Development Bank, 2013; Oxfam, 2019). The price of food in Nigeria has increased since 2003, reaching its peak in 2010, this has impacted negatively on the populace (Matemilola & Elegbede, 2017; Samuels et al., 2011). It is observed in Nigeria that women have been reduced to second class citizens, where they are seen by the general belief system that the best place for women is the kitchen. This has misrepresented the right of women at both the family and societal level since the societal structure enables men to dominate women. Women are discriminated against in most cases, especially in acquiring formal education and decision making which has reduced their cultural values, thereby influencing their contribution to nutrition-related issues within the family cycle (Makama, 2013).

Though malnutrition itself is a problem found among both boys and girls, the adverse effect is more on the girl child. If an adolescent girl enters into the reproductive cycle in a malnourished state, she will grow up into a malnourished adult and give birth to a malnourished child, as shown in Figure 1, contributing to an unproductive community and the cycle of intergenerational transfer of malnutrition. The key to breaking the cycle of intergenerational transmission of malnutrition is to improve the nutrition of adolescent girls, in general, to ensure longer-term sustainable results in reducing malnutrition, poverty, and food insecurity. Without adequate knowledge, attitude, and practice towards malnutrition among adolescent girls and young women before, during and after pregnancy, it will be impossible to have a healthy community (Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN) The UN system forum for Nutrition, 2000; John et al., 2015; John et al., 2013; Zulfiqar et al., 2013). Evidence has shown that health education intervention is key to improving the health and nutrition needs of adolescent girls (Ramakrishnan et al., 2012)

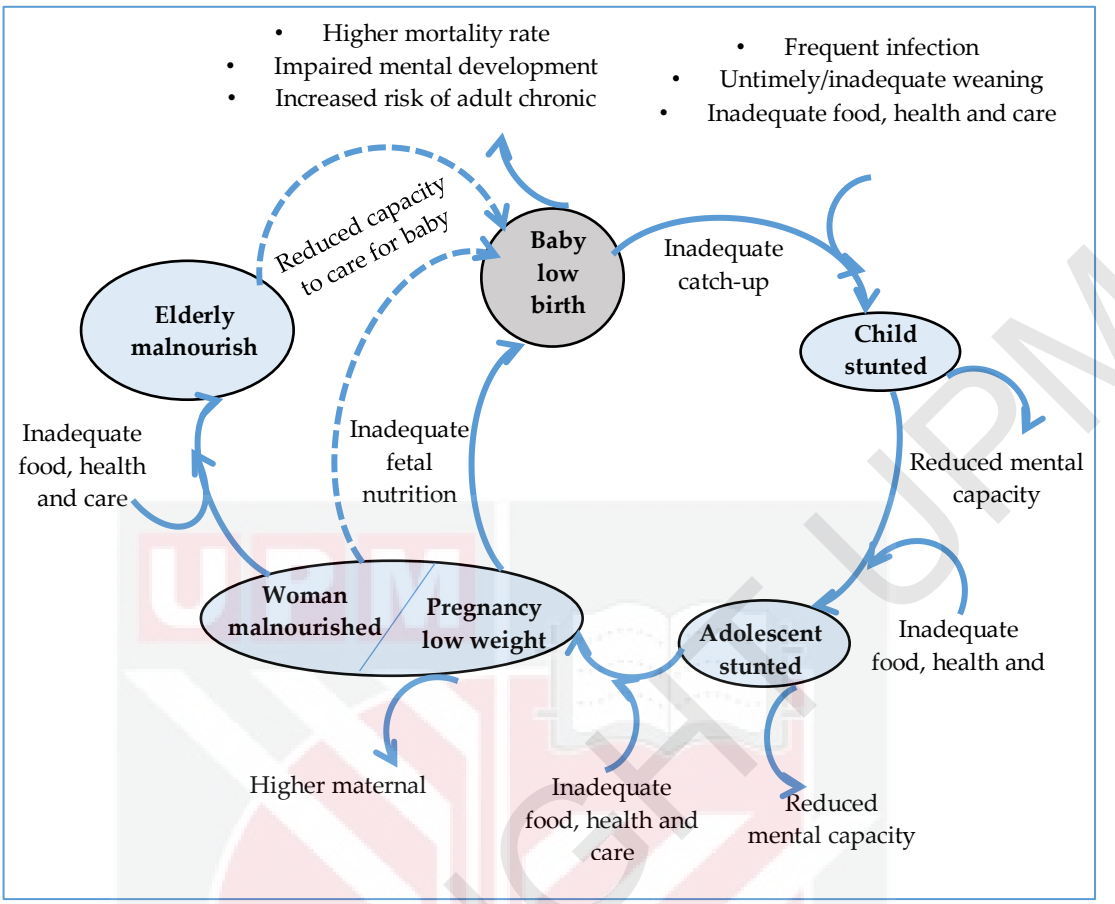

Figure 1.1 : Nutrition throughout the life cycle showing the effect of malnutrition on the adolescent girl and her unborn child (Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN) The UN system forum for Nutrition, 2000)

Earlier studies have revealed that acquiring more knowledge has a greater effect on the change of attitude and practice. Nutrition knowledge is a critical basis for adequate dietary practice (Spendlove et al., 2012). Nutritional knowledge alone will only change dietary practice, therefore, it is essential to tackle malnutrition and unhealthy lifestyle through the different multi-sectoral approach. WHO, 2006 stated that providing the health and nutritional needs of adolescents will reduce their vulnerability as their health at this critical period is very sensitive and will have a significant impact during their adult life. Adolescents make up about 1.25 billion a quarter of the world's population with about 90% living in middle and low-income countries (Christian & Smith, 2018; Save the Children, 2015; United Nations Children's Fund (UNICEF), 2011, 2019). In Nigeria adolescent constitute about 23% of the nation's population (Abdulkarim et al., 2014).

Most times researchers incorporate a theory-based approach into the study for the research to be successful. The information, motivation, behavioural skills model (IMB) has been used in promoting nutrition-related practices and also the development of the preventive intervention (Peyman & Monireh, 2016). Although

the IMB model works at the individual level, the construct of the theory is useful in presenting health behavioural changes through making individuals well informed by using their attitude and perception as motivation to make them comply with other wishes and act, possessing the essential behavioural skills for effective achievement. Information, motivation, behavioural skills model was used in developing the Triple Benefit Health Education Intervention to improve knowledge, attitude, and practice (KAP) of adolescent girls towards malnutrition. The intervention study was name Triple Benefit because it will better the health of adolescent girl now, improved well-being and productivity in her future adult life and reduced health risks better nutritional status and wellbeing of her future offspring. The school system in Nigeria was updated to 6-3-3-4 (6 years in primary school, 3 years in junior secondary school, 3 years in senior secondary school, and 4 years in tertiary education) similar to the American system. The Universal Basic Education (UBE) was introduced in 1999 to replace the 6-3-3-4 educational system to a 9-3-4 system involving 6 years primary school, 3 years junior secondary school (culminating in 9 years of interrupting schooling), 3 years in senior secondary school and 4 years in tertiary education. There are primary schools with UBE (6 years primary school and 3 years junior secondary school), and then full secondary school (3 years in junior secondary school, 3 years in senior secondary school) (Amaghionyeodiwe & Osinubi, 2006).

Educating adolescent girls to increase their knowledge, attitude and practice towards malnutrition might have a positive impact on reducing the burden of malnutrition, morbidity, mortality, intergenerational cycle of malnutrition and thus enhance survival. The effort of health education programs and the campaign is needed to highlight the nature of the causes, symptoms, consequences and the benefit of early prevention of malnutrition.

1.2 Problem Statement

Malnutrition is a global burden that every country is facing, one (1) in every three (3) individual suffer from one form of malnutrition or the other (International Food Policy Research Institute, 2015). In 2016, over 2.8 billion people suffer from malnutrition/undernutrition, over 1.2 million adolescent between the ages of 10 to 19 years old died in 2015 due to preventable and treatable burden like malnutrition globally (International Food Policy Research Institute (IFPRI), 2016; World Health Organization, 2017).

The prevalence of malnutrition increases from 11% in 2003 to 18% in 2013, Nigerian demographic and health survey 2013 reveals that about 23% of adolescent girls are malnourished similar to a study in Ibadan which shows that 23% of them are malnourished (FMOH, 2013; National Population Commission (NPC) [Nigeria] and ICF International, 2014; Omobuwa et al., 2014; UNICEF, 2013, 2017). A study among adolescent in Ibadan, Nigeria reveals that 42% were underweight and 1.6% were stunted in private schools while 25% were underweight and 5.8% were stunted in public schools. The differences in the prevalence of high stunting in Government than private schools may suggest chronic malnutrition slowing the metabolic process

of maturation (Senbanjo et al., 2011). The existence of a high prevalence of underweight among respondents in private school was really surprising, but it may be due to poor social and health services in developing countries (Boma et al., 2014). Wide range of age groups in the two schools (Asiegbu et al., 2017). Skipping of meals as children from private schools are mostly children of the elites who rely on candies neglecting their meals (Faith & Prosper, 2016). Inadequate KAP, geographic area and the timing gap during data collection (Yisak et al., 2021). Studies in Port Harcourt reveals that 33.7% of adolescent girls were underweight and 34.7% were stunted respectively (Bolanle et al., 2017; Esimai, & Ojofeitimi, 2015). This may be due to lifestyle, sociodemographic characteristics of children and their parents as well as poor social and health facilities (Adesuwa et al., 2012; Syahrul et al., 2016).

There is no existing data on the overall current prevalence of malnutrition, knowledge, attitude and practice related issues among adolescents in Nigeria. The trend of malnutrition among women aged 15-49 years with adolescents inclusive has been stable for the past 10 years reporting 12% from 2008 to 2018 (National Population Commission (NPC) [Nigeria] & ICF, 2019). Overall, based on mid-upper arm circumference (MUAC), about 6.9% of Nigerian women aged 15-49 years were reported to be acutely malnourished while 3.8% were severely malnourished. Furthermore, the prevalence of acute malnutrition among older adolescents was 19% about four times higher compared to 4% among adult women aged 20-49 years in Nigeria. About 6.1% out of 14% of women between 15-49 years pregnant particularly in the northeast and northwest Nigeria were adolescent girls aged 15-19 years old. More so, anaemia is also a trending concern among 58% of women aged 15-49 years leading to increased burden of maternal mortality, poor birth outcome and reduced productivity (National Bureau of Statistics (NBS), 2018; National Population Commission (NPC) [Nigeria] & ICF, 2019). Childbearing among adolescent girls is significantly associated with a high risk of pregnancy complication outcome (Christian & Smith, 2018). The findings from the 2018 national survey call for urgency in the development of an intervention to improve nutrition among adolescent girls for better health, birth outcome and nutrition throughout their life cycle. Taming malnutrition among adolescent girls is key to improving the nutritional status of the family and the entire population.

The rising trend of poverty and low income has remained a complex, chronic and pervasive problem, an estimated 40.1% of the Nigerian population live below the poverty line where children from the poorest economic quartile were reported to be four times likely to be malnourished compared with children from the rich households. Malnutrition is a serious consequence of food insecurity (National Bureau of Statistics, 2020; Owoo, 2020). The level and dimension of hunger and food insecurity have become a public health concern in Nigeria. Agricultural production in Nigeria is largely dependent on rainfall at a subsistent level on a small scale. Government investment in agricultural production has not contributed to the reduction of malnutrition significantly to meet the national development goal, as the inadequate storage system, crop seasonality, inadequate transport system has significantly influenced the food distribution system in Nigeria (National Bureau of Statistics, 2020; Nwozor et al., 2019; The Federal Republic of Nigeria, 2016). Persistent humanitarian crises especially in the northeastern part of Nigeria has

greatly exposed the people to untold hardship. Knowledge, attitude and practice towards malnutrition and nutrition-related studies among adolescents have not yet been studied in the northeastern part of Nigeria (comprising of six states).

There are several policies and programmes put in place by the Nigerian to address the problem of malnutrition among children including national policy on food and nutrition in Nigeria (International Food Policy Research Institute (IFPRI), 2019; Ministry of Budget and National Planning, 2016), national strategic plan of action (health sector response), the food security bill, National Plan of Action on Food and Nutrition in Nigeria and the micronutrients control programme among others to address the issue of malnutrition and food insecurity at all level in Nigeria (Federal Ministry of Health, 2005). Nevertheless, the implementation of these programmes and policies continue to be a challenge with a persistently high level of malnutrition among children (Adinma, 2017; Federal Ministry of Health, 2005; Save the Children, 2016). There are no existing nutrition programmes and policies for adolescents as the national food and nutrition policy in Nigeria made little or no reference to nutrition-related issues of the important aspect of the population (adolescents). The strategic plan of action and most of the intervention are geared towards under-five children, pregnant and lactating mothers overlooking the plight of the adolescents. There is a need to revisit the national strategic plan of action in Nigeria to include interventions targeting adolescent for good of the future in all seriousness. Nonetheless, amid the trending burden of malnutrition, there is no existing comprehensive health education program on malnutrition targeting adolescents in Nigeria, though there are policies to reduce the burden of malnutrition, the implementation is yet a challenge. The triple benefit health education intervention was introduced to look beyond the 1000 days of the little one's life (from conception to the 2nd birthday), before the preconception period to productive adult life in the future and the health and wellbeing of their offspring.

In a study conducted in Sokoto, Nigeria only 8.3% of girls had excellent nutritional knowledge (Essien et al., 2014). Poor knowledge, attitude and practice on nutrition-related information place the future of the adolescent girls and their unborn child at risk of malnutrition, pregnancy-related complication, morbidity, mortality and also an intergenerational cycle of malnutrition. Adolescent especially girls are particularly vulnerable to malnutrition due to the increased requirement of iron for both growth and replacement of menstrual blood losses. Pregnancy and lactation at an early stage before they are fully grown can seriously affect their development and that of the unborn child (Bindra, 2017; Essien et al., 2014; John et al., 2013).

The majority of interventions and policies in underdeveloped and developing countries with Nigeria inclusive are targeting pregnant and lactating mothers with children under 5, overlooking the wellbeing of the adolescent girls (Krebs et al., 2017). Previous studies on nutrition-sensitive health education intervention have suggested integrating nutrition-related interventions with water, sanitation and hygiene (WASH) in addressing the nutrition-related problem and for a healthy generation (Abdur Razzak et al., 2016). Nigeria losses over US$ 1.5 billion (equivalent to ₦611,235,000,000.00, RM6,189,750,000.00) in gross domestic

product to the treatment of only vitamin and mineral deficiencies annually (WorldBank, 2018).

Identification of gaps in knowledge, attitude and practice related to malnutrition and the evidence-based intervention will reduce malnutrition and promote healthy behaviour. Adolescent girls should be informed about the forms, causes, symptoms, consequences and preventive measures of malnutrition to enable them to live a healthy and productive life (Krebs et al., 2017).

There is a need for educational interventions among adolescent girls to raise awareness on malnutrition-related forms, causes, symptoms, consequences and preventive measures to reduce its burden and improve their confidence and the ability to better recognise and act on the symptoms. To the best of our knowledge, the Triple Benefit Health Education Intervention study is the first to be conducted among adolescent girls in trying to increase their knowledge, attitude and practice towards malnutrition in Maiduguri Metropolitan Council, Borno State, Nigeria.

1.3 Significance of the Study

The study attempted to determine the knowledge, attitude and practice of adolescent girls towards malnutrition, this can play an essential role in designing and implementing appropriate interventions to reduce the burden of malnutrition and improve health outcome among adolescent girls. The study further tried to evaluate the effectiveness of triple benefit health education intervention on improving knowledge, attitude and practice of adolescent girls towards malnutrition.

The findings from this study are useful to the public health experts in Nigeria and Borno State as the population under study are adolescents in Nigeria. This study explores the knowledge, attitude and practice of adolescent girls on the forms, causes, symptoms, consequences and preventive measures of malnutrition. The study further discovers food security and hygiene practice of adolescent girls. This intervention tried to improve the knowledge, attitude and practice of adolescent girls by improving their understanding of the forms, causes, symptoms, consequences, preventive measures of malnutrition, food security and hygiene and also enhancing their confidence and personal abilities to improve healthy practice.

Findings from this study will play a significant role in empowering primary and secondary schools' community to engage in the transfer of evidence-based knowledge, attitude and practice on the forms, causes, symptoms, consequences, preventive measures of malnutrition, hygiene and food security. Alongside, the findings will be useful in helping the government to better understand the need to target adolescent girls in the planning and implementation of effective and efficient health education intervention strategies that aimed at reducing malnutrition for long-term survival and future health outcome.

Identifying the level of knowledge, attitude, practice, food security and hygiene among adolescent girls in Maiduguri Metropolitan Council provide an opportunity for both national and international comparative purposes. More so, the study had the opportunity to evaluate information motivation and behavioural skills theory in improving knowledge, attitude and practice of adolescent girls towards malnutrition in Maiduguri Metropolitan Council. The outcome of this study can provide substantial practical support of the model and can also add more evidence on the performance of the model.

The result from this study can be useful for national nutrition strategy and programs in promoting optimal nutrition feeding practices in boarding schools in Borno state and Nigeria at large. The findings can be useful to the work of developers of public health and education project in Nigeria.

1.4 Research Questions

There is a clear evidence gap and dearth of information on adolescent malnutrition including factors contributing to malnutrition in north-eastern Nigeria and Borno state. The study was conducted in two Phases, Phase I cross-sectional study to ascertain the level of knowledge, attitude and practice towards malnutrition, and also factors that needed to be addressed during the triple benefit health education intervention for Phase II of the study.

1.4.1 Research Questions for Phase I (Cross-sectional study)

1. What are the predictors of knowledge, attitude and practice of adolescent girls towards malnutrition?
2. What is the nutritional status of adolescent girls?
3. What are the predictors of food security among adolescent girls?
4. What are the predictors of hygiene practice among adolescent girls?

1.4.2 Research Questions for Phase II (Intervention study)

What is the effectiveness of Triple Benefit Health Education Intervention on knowledge, attitude, and practice of adolescent girls towards malnutrition?

1.5 Research Objective

The study consists of two (2) phases.

1.5.1 General Objectives

Phase I: To determine knowledge, attitude and practice of adolescent girls towards malnutrition in Maiduguri Metropolitan Council (MMC).

Phase II: To develop, validate, implement and evaluate the effectiveness of Triple Benefit Health Education Intervention in improving knowledge, attitude and practice of adolescent girls towards malnutrition.

1.5.2 Specific Objectives

1.5.2.1 Phase I: Determine Knowledge, Attitude and Practice of Adolescent Girls towards Malnutrition

1. To describe the characteristics of the respondents
    a. Socio-demographic (age, class in school, ethnicity, religion, place of residence, household size, household income, head of household, age of father, father's education, father's occupation, age of mother, mother's education, mother's occupation, family type).
    b. Knowledge, attitude and practice towards malnutrition.
    c. Food security.
    d. Hygiene
    e. Information-motivation-behavioural skills
    f. Nutritional status
    g. 24-hours dietary recall
    h. Source of information
2. To determine the association between knowledge, attitude and practice towards malnutrition and respondent's characteristics.
3. To determine the predictors of knowledge, attitude and practice, towards malnutrition.
4. To determine the association between food security, hygiene and respondent's characteristics.
5. To determine the predictors of food security and hygiene.

1.5.2.2 Phase II: Develop, Validate, Implement and Evaluate the Effectiveness of Triple Benefit Health Education Intervention on Knowledge, Attitude and Practice of Adolescent girls towards Malnutrition

1. To develop, validate, implement and evaluate the effectiveness of Triple Benefit health education intervention on improving knowledge, attitude and practice of adolescent girls towards malnutrition.

2. To determine the baseline differences between intervention and control groups in

    a. Respondents' characteristics
    b. Respondents' nutritional status
    c. Respondents' 24-hours dietary recall
    d. Respondents' knowledge, attitude and practice towards malnutrition.
    e. Food security and hygiene.
    f. Information, motivation and behavioural skills
    g. Source of information.

3. To determine the changes in knowledge, attitude, practice, food security and hygiene towards malnutrition among adolescent girls between and within the intervention and control group at three (3) month's post-intervention and three (3) months follow up.

1.6 Research Hypothesis

Phase I

1. Respondent's characteristics have a significant association with knowledge, attitude, practice, food security and hygiene towards malnutrition respectively.

Phase II

2. There is no significant difference in respondents' characteristics, knowledge, attitude, practice, food security and hygiene towards malnutrition between intervention and control group at baseline.

3. There is a significant difference between and within intervention and control groups on knowledge, attitude, practice, food security and hygiene towards malnutrition at three (3) month's post-intervention and three (3) months follow up.

1.7 Operational Definition of Study Variables

1.7.1 Dependent Variable

I. Primary Variable

Knowledge Towards Malnutrition

In this study, knowledge towards malnutrition was defined as the ability of the respondents to identify malnutrition as insufficiency, excess, or inequality in an individual energy intake or nutrients, forms, causes, symptoms, consequences and the preventive measures of malnutrition.

Attitude Towards malnutrition

Malnutrition related belief, feelings and orientation towards malnutrition to describe the respondents' attitude towards malnutrition concerning poverty, the seriousness of malnutrition, what they think in regards to a certain food, the contribution of these foods to their health and wellbeing, and their views on expensive food.

Practice Towards Malnutrition

Practice in this study has to do with the actual behaviour or the application of ideas by respondents' relation to the number of times they eat in seven days and recalling what they have eaten within 24-hours.

II. Secondary Variables

Food security

Food security is when all people at all-time have economic, social, and physical access to sufficient and nutritious food that meets their dietary needs for an active and healthy life, that is food must be available, accessible, utilized properly and in stable condition (Ghattas, 2014; Global Network Against Food Crisis, 2020a).

Hygiene

Hygiene in this study refers to situation and practices that help to maintain good health, well-being and prevent the spread of diseases concerning handwashing, source of water, water storage, and local treatment of water.

1.7.2 Independent Variables

I. Triple Benefit Health Education Intervention

Triple Benefit health education intervention is a program design to provide information related to understanding malnutrition, definition, forms, causes, sign, and consequences of malnutrition, food groups, dietary diversity, local snacks, breaking the intergenerational cycle of malnutrition, water, sanitation and hygiene. This information is provided to respondents during the intervention phase in such a package to close the knowledge gap. The Triple Benefit Health Education Intervention package is composed of six modules in the printed form delivered through teaching, interactive session, brainstorming, role-play and practicals.

II. Sociodemographic Characteristics

Age of Respondents

Age refers to how old the respondent was in years at the time of the study.

Ethnicity of Respondents

This refers to the specific local dialect of the respondents including Bura/Kanuri/Hausa/Marghi, Shuwa/Fulani/Chibok, Gwoza and others).

Religion of Respondents

This is the respondent's self-reported faith or way of worship either Christianity or Islam.

Place of Residence

This refers to where the respondents' families are staying (Rural/ Urban area).

Household Size

This is the number of persons in the respondent family living together as a family.

Household Monthly Income

This refers to the monthly household income of respondent's family less than ₦18,000 (RM 150); ₦18,000-₦30,000 (RM 150-250); ₦310,000- ₦50,000 (RM 258-417); ₦51,000 (RM 425) and above.

Head of Household of Respondents

This refers to any person responsible for taking care of the respondent's family including father, mother, other relations (child-headed, grandmother, grandfather, uncle, aunty, others).

Age of Father/Mother

This refers to the age of the respondent's father/mother at the time of the study.

Education (Father/Mother)

This refers to the level of education of the respondent's father/mother as no education/primary education/secondary education/tertiary education.

Occupation (Father/Mother)

This refers to the current employment status of respondent father/mother to be civil servant/ trader/business/farmer/ others.

Information

This refers to the facts the respondent has on malnutrition related to preventive measures on what they eat, signs and what can be done to prevent malnutrition.

Motivation

This refers to support and encouragements the respondents receive from family, friends and the surrounding environment on eating nutritious food.

Behavioural Skills

In this study, this refers to the actual behaviour of respondents to how hard or easy it is to buy, store and cook nutritious food for themselves and their families.

REFERENCES

Abdelaziz, S.B., Youssef, M.R.L., Sedrak, A.S., Labib, J. (2015). Nutritional Status and Dietary Habits of School Children in Beni-Suef Governorate, Egypt. *Food and Nutrition Sciences*, 06(01), 54–63. https://doi.org/10.4236/fns.2015.61007.

Abd El- Lateef S. Ali; Howaida H. Fahmy; Shereen E. Mohamed; Lamiaa L. El Hawy. (2016). Effect of Health Education about Healthy Diet, Physical Activity and Personal Hygiene among Governmental Primary School Children (11-13 years old) in Sharkia Governorate-Egypt. *Journal of American Science*, *12*(6), 36–48. https://doi.org/10.7537/marsjas1206 1606.

Abdulkarim AA, Otuneye AT, Ahmed P, S. D. (2014). Adolescent Malnutrition : Prevalence and Pattern in Abuja Municipal Area Council, Nigeria. *Nigerian Journal of Paediatrics*, *41*(2), 99–103. https://doi.org/http://dx.doi.org/10.4314/njp.v41i2,4.

Abdulkarim AA, Otuneye AT, Ahmed P, S. D. (2016). Factors Associated with Adolescent Malnutrition among Nigerian Students. *Bangladesh Journal of Medical Science*, *15*(2), 243–248.

Abdur Razzak Md., Syed Mahfuz Al Hasan, Shaikh Shahinur Rahman, Asaduzzaman Md., F. M. J. & S. H. M. (2016). Role of nutrition education in improving the nutritional status of adolescent girls in North West areas of Bangladesh. *International Journal of Scientific & Engineering Research*, *7*(11), 1340–1346.

Abubakar Babagana. (2017). Kanuri Complete. *Fellow African Scientific Institute, Alumnus United Nations Institute for Training and Research Geneva, Switzerland.* https://www.researchgate.net/publication/320004428_Kanuri_Complete.(Issue January).

ACAPS. (2016). Nigeria : Borno State Crisis Profile Crisis overview Context. https://www.acaps.org/sites/acaps/files/products/files/acaps_crisis_profile_nigeria_borno_state_161125_0.pdf (Issue November).

Achenef Motbainor, Alemayehu Worku, A. K. (2016). Level and Determinants of Food Insecurity in East and West Gojjam zones of Amhara Region, Ethiopia : A Community based Comparative Cross-Sectional Study. *BMC Public Health*, *16*(1), 503. https://doi.org/10.1186/s12889-016-3186-7.

Action Against Hunger. (2021). Underlying Causes of Malnutrition. *Action Against Hunger*. https://actionagainsthunger.ca/what-is-acute-malnutrition/underlying-causes-of-malnutrition/.

Adesuwa F Adesina, Oliemen Peterside, Ifeoma Anochie, N. A. A. (2012). Weight Status of Adolescents in Secondary Schools in Port Harcourt using Body Mass Index (BMI). *Italian Journal of Pediatrics*, *38*(1), 11–15. https://doi.org/10.1186/1824-7288-38-31.

Adinma JIB, A. E. and U. O. (2017). Nutrition Policy and Practice Landscape on Adolescent, Pre-Pregnancy and Maternal Nutrition in Nigeria. *JOJ Nursing & Health Care*, *1*(2), 1–6. https://doi.org/10.19080/jojnhc.2017.01.555560.

Administrative Committee on Coordination/Sub-Committe on Nutrition (ACC/SCN) The UN sytem forum for Nutrition. (2000). Low Birthweight: Report of a Meeting in Dhaka, Bangladesh on 14–17 June 1999. *East African medical journal* (Vol. 63, Issue 2). https://doi.org/10.1016/s0140-6736(66)91186-x.

Akram Karimi-Shahanjarini, Arash Rashidian, Nasrin Omidvar, R. M. (2013). Assessing and Comparing the Short-Term Effects of TPB Only and TPB Plus Implementation Intentions Interventions on Snacking Behavior in Iranian Adolescent Girls: A Cluster Randomized Trial. *American Journal of Health Promotion*, *27*(3), 152–162.

Ali Esmaeili Vardanjani, Mahnoush Reisi, Homamodin Javadzade, Zabihollah Gharli Pour, and E. T. (2015). The Effect of Nutrition Education on Knowledge, Attitude, and Performance about Junk Food Consumption among Students of Female Primary Schools. *Journal of Education and Health Promotion*, *4*(1), 53. https://doi.org/10.4103/2277-9531.162349.

Alice Goisis, Melissa Martinson, W. S. (2019). When Richer doesn't mean Thinner: Ethnicity, Socioeconomic Position, and the Risk of Child Obesity in the United Kingdom. *Demographic Research*, *41*(July 1), 649–678. https://doi.org/10.4054/DemRes.2019.41.2 3.

Amaghionyeodiwe, L.A., Osinubi, T. . (2006). The Nigerian Educational System and Returns to Education. *International Journal of Applied Econometrics and Quantitative Studies*, *3*(1), 31–40.

Ann Burgess, D. L. D. (2008). Undernutrition in Adults and Children: Causes, consequences and what we can do. *South Sudan Medical Journal*, *1*(2), 18–22. https://doi.org/10.4314/ssmj.v1i2.

Aparajita Dasgupta, Arindam Butt, Tushar Kanti Saha, Gandhari Basu, Amitava Chattopadhyay, A. M. (2010). Assessment of Malnutrition among Adolescents: Can BMI be Replaced by MUAC. *Indian Journal of Community Medicine*, *35*(2), 276–279. https://doi.org/10.4103/0970-0218.66892.

Asian Development Bank. (2013). Gender Equality and Food Security: Women's Empowerment as a Tool against Hunger. *Asian Development Bank, 6 ADB Avenue, Mandaluyong City 1550 Metro Manila, Philippines*. https://doi.org/10.18356/b1da803b-en.

Asiegbu, U. V., Asiegbu, O. G., Onyire, B. N., Ikefuna, A. N., & Ibe, B. C. (2017). Assessment of Gross Malnutrition among Primary School Children using Body Mass Index as an Assessment Tool in Abakaliki Metropolis of Ebonyi State, South-East Nigeria. *Nigerian Journal of Clinical Practice*, *20*(6), 693–699. https://doi.org/10.4103/1119-3077.208952.

Badrasawi MM, Shraim NY, A.-A. M. (2018). Knowledge of Physical Education Students about Nutrition : A Cross-Sectional Study from Palestine. *International Journal of Nutrition, Pharmacology, Neurological Diseases*, *8*, 101–107. https://doi.org/10.4103/ijnpnd.ijnpnd.

Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.). Six theories of child development. *Annals of child development* Vol.6. (pp. 1-60). Greenwich, CT: JAI Press.

Behailu Besha, Hailu Guche, Dawit Chare, Abebech Amare, Amelmal Kassahun, Engida Kebede, Yinager Workineh, Tomas Yeheyis, Mulugeta Shegaze, Adisu Alemayehu, A. Y. (2016). Assessment of Hand Washing Practice and it's Associated Factors among First Cycle Primary School Children in Arba Minch Town, Ethiopia, 2015. *Epidemiology*, *6*(3), 1–10. https://doi.org/10.4172/2161-1165.1000247.

Belachew, T., Lindstrom, D., Hadley, C., Gebremariam, A., Kasahun, W., & Kolsteren, P. (2013). Food Insecurity and Linear Growth of Adolescents in Jimma Zone, Southwest Ethiopia. *Nutrition Journal*, *12*(55), 1–10. https://doi.org/10.1186/1475-2891-12-55.

Bhagat, J. (2017). Causes of Malnutrition. *Health and Wellness*. 54, 1-4.

Bindra Vimee. (2017). Anemia in adolescence. *World Journal of Anemia*. 1(1), 18–19. https://doi.org/10.1016/S0025-7125(16)31948-4.

Bhowal K, Mukherjee I, C. D. (2015). Association of Iodine Status with IQ Level and Academic Achievement of Rural Primary School Children in West Bengal, India. *Indian Journal of Community Health*, *26*(5), 216–222.

Boma George O, Anthony Ikiba Prosper, George Mukoro Duke, Ebiwari Abiola, Fiateide Andrew, Daniel, McEteli D, Tarimobo Rugina, & Kalada Mefubara. (2014). Nutritional Status of Children in Rural Setting. *Journal of Dental and Medical Sciences*, *13*(1), 41–47. https://doi.org/10.9790/0853-13164147.

British council. (2014). Girls' Education in Nigeria. Report 2014: Issues, Influencers and Actions. *British council*. https://www.britishcouncil.org/sites/default/files/british-council-girls-education-nigeria-report.pdf.

Bruce W. Tuckman, M. A. W. (1981). Evaluating an Individualized Science Program for Community College Students. *Journal of Research in Science Teaching*, *18*(6), 489–495. https://doi.org/10.1002/tea.3660180603.

Carol L. Connell, Mark Nord, Kristi L. Lofton, and K. Y. (2006). Self-Administered Food Security Survey Module for Children Ages 12 Years and Older. In *Journal of Nutrition* 134(10), 2566-2572.

Catherine Laramee, Vicky Drapeau, Pierre Valois, Claude Goulet, Rapha€elle Jacob, Veronique Provencher, B. L. (2017). Evaluation of a Theory-Based Intervention Aimed at Reducing Intention to Use Restrictive Dietary Behaviors among Adolescent Female Athletes. *Journal of Nutrition Education and Behavior*, *49*(6), 497–505. https://doi.org/10.1016/j.jneb.2017.03.009.

Chang Sun Ju, Choi Suyoung, Kim Se-an, & Song Misoon. (2014). Intervention Strategies Based on Information-Motivation-Behavioral Skills Model for Health Behavior Change: A Systematic Review. *Asian Nursing Research*, *8*(3), 172–181. https://doi.org/10.1016/j.anr.2014.08.002.

Chanyalew Worku Kassahun, A. G. M. (2017). Knowledge, Attitude, Practices and their Associated Factors towards Diabetes Mellitus among non Diabetes Community members of Bale Zone Administrative Towns, South East. *PLOS ONE*, *12*(2), 1–18. https://doi.org/10.5061/dryad.r113f.

Chard, A. N. and M. C. F. (2018). Design, Intervention Fidelity, and Behavioral Outcomes of a School-Based Water, Sanitation, and Hygiene Cluster-Randomized Trial in Laos. *International Journal of Enviromental Research and Public Health*, *15*(570), 1–17. https://doi.org/10.3390/ijerph15040570.

Charmarbagwala, R., Ranger, M., Waddington, H., & White, H. (2004). The Determinants of Child Health and Nutrition: A Meta-analysis. *World Bank*. 1–60 *https://openknowledge. worldbank.org/handle/10986/20224*.

Cheryl L. Perry, Elaine J. Stone, Guy S. Parcel, R. Curtis Ellison, Philip R. Nader, Larry S. Webber, R. V. L. (1990). School-based Cardiovascular Health Promotion: The Child and Adolescent Trial for Cardiovascular Health (CATCH). *Journal of School Health*, *60*(8), 1-8.

Chigozie Gloria Anene-okeke, Abdulmuminu Isah, Deborah Oyine Aluh, A. L. E. (2018). Knowledge and Practice of Malaria Prevention and Management among Non-Medical Students of University of Nigeria, Nsukka. *International Journal Of Community Medicine And Public Health*, *5*(2), 461. https://doi.org/10.18203/2394-6040.ijcmph20180220.

Christa L Fischer Walker, Igor Rudan, Li Liu, Harish Nair, Evropi Theodoratou, Zulfi qar A Bhutta, Katherine L O'Brien, Harry Campbell, R. E. B. (2013). Global Burden of Childhood Pneumonia and Diarrhoea. *Lancet*, *1405*(16), 1–13.

Christian Parul, & Smith R Emily. (2018). Adolescent Undernutrition: Global Burden, Physiology, and Nutritional Risks. *Ann Nutr Metab*, *72*(4), 316–328. https://doi.org/10.1159/000488865.

Denise Duijster, Bella Monse, Jed Dimaisip-Nabuab, Pantjawidi Djuharnoko, Roswitha Heinrich-Weltzien, Martin Hobdell, Katrin Kromeyer-Hauschild, Yung Kunthearith, Maria Carmela Mijares-Majini, Nicole Siegmund, Panith Soukhanouvong, H. B. (2017). Fit for School'– a School-based Water, Sanitation and Hygiene Programme to Improve Child Health: Results from a Longitudinal Study in Cambodia, Indonesia and Lao PDR. *BMC Public Health*, *17*(302), 1–15. https://doi.org/10.1186/s12889-017-4203-1.

Denise Duijster, Helen Buxton, Habib Benzian, Jed Dimaisip-Nabuab, Bella Monse, Catherine Volgenant, R. D. (2020). Impact of a School-based Water, Sanitation and Hygiene Programme on Children ' s Independent Handwashing and Toothbrushing Habits : A Cluster Randomised Trial. *International Journal of Public Health*, *65*(9), 1699–1709. https://doi.org/10.1007/s00038-020-01514-z.

Department for International Development (DFID). (2011). Annual Report and Accounts 2010-2011. *DFID, Abercrombie House, Eaglesham Road, East Kilbride, Glasgow G75 8EA.:* 1, *1-172*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/67477/Annual-report-2011-vol1.pdf.

Desiree Govender, & Saloshni Naidoo, M. T. (2019). Knowledge, Attitudes and Peer Influences related to Pregnancy, Sexual and Reproductive Health among Adolescents using Maternal Health Services in Ugu, KwaZulu-Natal, South Africa. *BMC Public Health*, *19*(1), 1–16. https://doi.org/10.1186/s12889-019-7242-y.

Emmanuel M. Abar. (2019). Islam , Christianity , Traditional Religions and Power Politics in Northern Nigeria Since Pre-Islamic Period. *Andrews University*. 1-234.

Esimai OA, O. E. (2015). Nutrition and Health Status of Adolescents in a Private Secondary School in Port Harcourt. *Health Science Journal*, *9*(5), 2–6. http://journals.imedpub.com.

Essien E, Emebu PK, Iseh KR, M. H. (2014). Assessment of Nutritional Status and Knowledge of Students From Selected Secondary Schools in Sokoto Metropolis, Sokoto State, Nigeria. *African Journal of Food, Agriculture, Nutrition & Development*, *14*(6), 9454–9468. http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=100116985& site=ehost-live.

Faith Agbozo, Prosper Atito, A. A. (2016). Malnutrition and Associated Factors in Children: A Comparative Study between Public and Private Schools in Hohoe Municipality, Ghana. *BMC Nutrition*, *2*(1), 1–10. https://doi.org/10.1186/s40795-016-0073-7.

FAO, IFAD, UNICEF, WFP and WHO. 2019. The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and

downturns. *Rome, FAO*. 1-239. https://www.wfp.org/publications/2019-state-food-security-and-nutrition-world-sofi-safeguarding-against-economic

FAO, I. and W. (2014). The State of Food Insecurity in the World: Strengthening the enabling environment for food security and nutrition. *Rome, FAO*. 1-57. http://www.fao.org/ publications/card/en/c/56efd1a2-0f6e-4185-8005-62170e9b27bb/.

FDI World Dental Federation. (2015). The Challenge of Oral Disease – A call for global action. *FDI World Dental Federation, Geneva*. 1-63. https://www.fdiworlddental.org/oral-health-atlas.

Federal Ministry of Health, N. (2005). National Plan of Action on Food and Nutrition in Nigeria. In *Federal Ministry of Health, Nigeria*. 1(MAY), 1-53. https://extranet.who.int/nutrition/gina/sites/default/filesstore/NGA%202005%20National%20Plan%20of%20Action%20on%20Food%20and%20Nutrition.pdf.

Federal Ministry of Health, N. (2014). Malaria ACSM Guidelines : Strategic Framework and Implementation Guidelines for Advocacy, Communication and Social Mobilisation Programmes. *Federal Ministry of Health Nigeria*. 1-118. https://www.thecompassforsbc. org/sites/default/files/project_examples/Nigeria%20Malaria%20ACSM%20Guide.pdf.

Federal Republic of Nigeria. (2012). Annual Abstract of Statistics 2012. National Bureau of Statistics, Federal Republic of Nigeria. In *National Bureau of Statistics at Plot 762, Independence Avenue, Central Business District, P.M.B 127, Garki, Abuja, Nigeria*. 1-619. https://doi.org/nigerianstat.gov.ng.

Fernandes, E. C. B., de Castro, T. G., & Sartorelli, D. S. (2017). Associated Factors of Malnutrition among African Children Under-five years old, Bom Jesus, Angola. *Revista de Nutricao* 30(1), pp. 33–44). https://doi.org/10.1590/1678-98652017000100004.

Fisher, J. D., Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS - Risk Behavior. *Psychological Bulletin*, *111*(3), 455–474.

Fisher, J. D., Fisher, W. A., Amico, K. R., & Harman, J. J. (2006). An information-motivation-behavioral skills model of adherence to antiretroviral therapy. *Health Psychology*, *25*(4), 462–473. https://doi.org/10.1037/0278-6133.25.4.462.

Fisher, J. D., Fisher, W. A., Bryan, A. D., & Misovich, S. J. (2002). Information-motivation-behavioral skills model-based HIV risk behavior change intervention for inner-city high school youth. *Health Psychology*, *21*(2), 177–186. https://doi.org/10.1037/0278-6133.21.2.177.

Fisher, W. A., Fisher, J. D., & Harman, J. (2003). The Information – Motivation – Behavioral Skills Model : A General Social Psychological Approach to

Understanding and Promoting Health Behavior. In *Social Psychological Foundations of Health and Illness* (pp. 1–25).

FMOH. (2013). Malnutrition : Nigeria's Silent Crisis Malnutrition. *Federal Ministry of Health Nigeria*. 1-4. https://www.prb.org/wp-content/uploads/2015/06/ nigeria-malnutrition-faqs.pdf.

Food and Agriculture Organization of the United Nations. (2008). An Introduction to the Basic Concepts of Food Security. *FAO Food Security Programme*. 1-3. https://doi.org/10.1007/s11524-010-9491-z.

Food and Agriculture Organization of the United Nations (FAO). (2007). FAO Guidelines for Measuring Household and Individual Dietary Diversity. *Food and Nutrition Technical Assistance (FANTA)* 3(August). 1-21. https://humboldt-reloaded.uni-hohenheim.de/ uploads/tx_uhohhrprojekte/FAO%20guidelines%20for%20measuring%20Dietary%20Diversity_v3_August%20f..pdf.

Food and Agriculture Organization of the United Nations (FAO). (2010). Guidelines for measuring household and individual dietary diversity. *Food and Agriculture Organization of the United Nations (FAO), Rome, Italy*. 1-60. http://www.fao.org/ publications/card/en/c/5aacbe39-068f-513b-b17d-1d92959654ea/.

Food and Agriculture Organization of the United Nations (FAO). (2019). Strengthening Sector Policies for Better Food Security and Nutrition Results. In *Food and Agriculture Organization of the United Nations*. 1-48. http://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1255711/.

Francesco Branca, Ellen Piwoz, Werner Schultink, L. M. S. (2015). Nutrition and Health in Women, Children, and Adolescent Girls. *BMJ (Clinical Research Ed.)*, *351*(1), 27–31. https://doi.org/10.1136/bmj.h4173.

Freeman, M. C., Clasen, T., Dreibelbis, R., & Saboori, S. (2014). The Impact of a School-based Water Supply and Treatment, Hygiene, and Sanitation Programme on Pupil Diarrhoea : A Cluster Randomized Trial. *Epidemiol. Infect*, *142*, 340–351. https://doi.org/10.1017/ S0950268813001118.

Fuad, R. A., Arip, M. A. S. M., & Saad, F. (2019). Validity and Reliability of the HM-Learning Module among High School Students in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, *9*(1), 1–15. https://doi.org/10.6007/ijarbss/v9-i1/5480.

Ghattas, H. (2014). Food Security and Nutrition in the context of the Global Nutrition Transition. Technical Paper. *Food and Agriculture Organization of the United Nations (FAO), Rome.* 1-21. *(available at http://www.fao.org/economic/ ess/ess-fs/voices/en/)*. http://www.fao.org/economic/ess/ess-fs/voices/en/.

Ghosh, A. (2011). Rural-urban Comparison in Prevalence of Overweight and Obesity among Children and Adolescents of Asian Indian origin. *Asia-Pacific Journal of Public Health*, *23*(6), 928–935. https://doi.org/10.1177/1010539511428697.

Ghosh Smritikana. (2020). Factors responsible for Childhood Malnutrition: A Review of the Literature. *Current Research in Nutrition and Food Science*, *8*(2), 360–370. https://doi.org/10.12944/CRNFSJ.8.2.01.

Ginny Lane, Christine Nisbet, H. V. (2019). Food Insecurity and Nutritional Risk among Canadian Newcomer Children in Saskatchewan. *Nutrients*, *11*(8), 1–17. https://doi.org/10.3390/nu11081744.

Gobal Network Against Food Crisis. (2020). 2020 Global Report on Food Crises. F*ood Security Information Network*.1-240. https://www.wfp.org/publications/2020-global-report-food-crises.

Hadi Atassi. (2021). Protein-Energy Malnutrition. *Medscape*, *5*(29), 1–18. https://emedicine.medscape.com/article/1104623-images.

Hernan Brice Kenmogne-Domguia, Roger Ponka, E. F. (2015). Protein-Energy Intakes and Nutritional Status of in-School Adolescents in Baham, Cameroon. *Journal of Nutritional Disorders & Therapy*, *06*(02), 6–10. https://doi.org/10.4172/2161-0509.1000186.

Hiba A. Bawadi, Reema F. Tayyem, Amal N. Dwairy, N. A.-A. (2012). Prevalence of Food Insecurity among Women in Northern Jordan. *Journal of Health Population and Nutrition*, *30*(1), 49–55. https://doi.org/10.3329/jhpn.v30i1.11276.

Holliday, R. B. (2011). Development of a Theory-Driven Nutrition Education Measurement Instrument. In *ProQuest LLC 789 East Eisenhower Parkway P.O. Box 1346 Ann Arbor, Ml 48106-1346*. 1-207.

Hurst, C. S., Hagensee, M. E., Ahmed, S. A., & Smith, J. S. (2015). Validation of Educational Tools for Use in a Human Papillomavirus Intervention Study. *Cancer and Oncology Research*, *3*(3), 35–43. https://doi.org/10.13189/cor.2015.030302.

Huruy Assefa, Tefera Belachew, L. N. (2015). Socio-demographic Factors Associated with Underweight and Stunting among Adolescents in Ethiopia. *The Pan African Medical Journalournal*, *20*(252), 1–11. https://doi.org/10.11604/pamj.2015.20.252.3588.

Ijarotimi, O. S., & Erota, M. L. (2018). Assessing Household Food Security Status and Nutritional Outcome among Underprivileged Children (10-19 Years) from East Senatorial District of Lagos State , Nigeria. *Annals of Nutrition & Food Science*, *1*(2), 1–6.

International Food Policy Research Institute. (2015). Global Nutrition Report 2015: Actions and Accountability to Advance Nutrition and Sus- tainable Development. Washington, DC. 1-201.

International Food Policy Research Institute. 2016. Global Nutrition Report 2016: From Promise to Impact: Ending Malnutrition by 2030. Washington, DC. 1-182. https://www.ifpri.org/publication/global-nutrition-report-2016-promise-impact-ending-malnutrition-2030.

International Food Policy Research Institute (IFPRI). (2019). Nutrition Policy in Nigeria. *International Food Policy Research Institute*. 1-12. https://www.ifpri.org/publication/ .nutrition-policy-nigeria.

Ismail, A., Darling, A. M., Mosha, D., Fawzi, W., Sudfeld, C., Sando, M. M., Noor, R. A., Charles, J., & Vuai, S. (2020). Prevalence and risk factors associated with malnutrition among adolescents in rural Tanzania. *Tropical Medicine and International Health*, *25*(1), 89–100. https://doi.org/10.1111/tmi.13331.

J.A., A., & Alebiosu, O. B. A.-V. E. O. (2013). Differences in the Nutritional Status of Young School Children From Public and Private Owned Primary Schools in Ekiti State, Nigeria. *European Scientific Journal*, *9*(7), 1857–7881. https://doi.org/doi:10.1146/annurev .cellbio.17.1.677.

Jacob, I., & Ph, D. (2013). Food Insecurity in Nigeria : Way Forward. *An International Multidisciplinary Journal, Ethiopia*, *7*(4), 26–35.

Jafari, S., Fakhri, M., Naeeni, M., Omidi, R., Karami, P., Fouladgar, M., Farajzadegan, Z., & Heidari, K. (2014). Nutritional Knowledge, Practice, and Dietary Habits among School Children and Adolescents. In *International Journal of Preventive Medicine* 5(14), pp. 171–178). https://doi.org/10.4103/2008-7802.157687.

Jai K. Das, Zohra S. Lassi, Zahra Hoodbhoy, R. A. S. (2018). Nutrition for the Next Generation : Older Children and Adolescents. *Ann Nutr Metab*, *72*(3), 56–64. https://doi.org/10.1159/000487385.

Jalambo, M. O., Sharif, R., Naser, I. A., & Karim, N. A. (2017). Improvement in Knowledge, Attitude and Practice of Iron Deficiency Anaemia among Iron-Deficient Female Adolescents after Nutritional Educational Intervention. *Global Journal of Health Science*, *9*(7), 15. https://doi.org/10.5539/gjhs.v9n7p15.

James D. Dziuraa, Lori A. Posta, Qing Zhaob, Zhixuan Fu, P. P. (2013). Strategies for Dealing with Missing Data in Clinical Trials: From Design to Analysis. *Yale Journal of Biology and Medicine*, *86*(3), 343–358.

James L Harper, E. C. B. (2016). Iron Deficiency Anemia. *News & Perspective Drugs & Diseases CME & Education Academy*. 1-8. https://emedicine.medscape.com/article /202333-overview.

Jebena, M. G., Lindstrom, D., Lachat, C., Belachew, T., & Kolsteren, P. (2017). The Effect of Food Insecurity on Health Status of Adolescents in Ethiopia: Longitudinal Study. *BMC Public Health*, *17*(1), 1–12. https://doi.org/10.1186/s12889-017-4406-5.

Jikamo, B., & Samuel, M. (2019). Does Dietary Diversity Predict the Nutritional Status of Adolescents in Jimma Zone , Southwest Ethiopia ? *BMC Research Notes*, 10–15. https://doi.org/10.1186/s13104-019-4437-3.

Johan, G. (2017). Religiosity, Attitude, and the Demand for Socially Responsible Products. *Journal of Business Ethics*, *144*(1), 121–138. https://doi.org/10.1007/s10551-015-2796-9.

John B. Mason, Roger Shrimpton, Lisa S. Saldanha, Usha Ramakrishnan, Cesar G. Victora, Amy Webb Girard, Deborah A. McFarland, R. M. (2015). The First 500 Days of life: Policies to Support Maternal Nutrition. *Global Health Action*, *8*(1), 1–8. https://doi.org/10.3402/gha.v7.23623.

John B. Mason, Lisa S. Saldanha, Usha Ramakrishnan, Alyssa Lowe, Elizabeth A. Noznesky, Amy Webb Girard, Deborah A. McFarland, R. M. (2013). Opportunities for Improving Maternal Nutrition and Birth Outcomes : Synthesis of Country Experiences. Food and Nutrition Bulletin, 33(2), 104–138.

John C. Anyanwu. (2013). Marital Status, Household Size and Poverty in Nigeria: Evidence from the 2009/2010 Survey Data: Working Paper Series No 180 African. In *African Development Bank, Tunis, Tunisia*. https://doi.org/10.1111/1467-8268.12069.

Jonathon McPhetres, M. Z. (2018). Religiosity Predicts Negative Attitudes towards Science and lower levels of Science Literacy. *PLoS ONE*, *13*(11), 1–20.

Kankana De. (2017). Effect of Socio-Economic Status on Nutritional Status on Adolescent Girls of Paschim Medinipur, West Bengal, India. *Vitamins & Minerals*, *06*(01), 4–6. https://doi.org/10.4172/2376-1318.1000149.

Katona, P., & Katona-Apte, J. (2008). The Interaction between Nutrition and Infection. Clinical Infectious Diseases, 46(10), 1582-1588.

Kelly T. Alexander, Garazi Zulaika, Elizabeth Nyothach, Clifford Oduor, Linda Mason, David Obor, Alie Eleveld, Kayla F. Laserson, P. A. P.-H. (2018). Do Water, Sanitation and Hygiene Conditions in Primary Schools Consistently Support Schoolgirls' Menstrual Needs ? A Longitudinal Study in Rural Western Kenya. *International Journal of Enviromental Research and Public Health*, *5*(15), 1–15. https://doi.org/10.3390 /ijerph15081682.

Kelvin Akingbade Ayowale & Sanusi RA. (2016). Nutritional Status of in-school Adolescents in Ekiti State, Nigeria. *Global Journal of Medicine and Public Health*, 5(4), 1–11.

Ken Maleta. (2006). Undernutrition. *Malawi Medical Journal*, *18*(4), 189–205. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3345626/pdf/MMJ1804-0189.pdf.

Kigaru, D. M. D., Loechl, C., Moleah, T., Macharia-Mutie, C. W., & Ndungu, Z. W. (2015). Nutrition Knowledge, Attitude and Practices among Urban Primary School Children in Nairobi City, Kenya: A KAP Study. *BMC Nutrition*, *1*(1), 44. https://doi.org/10.1186/s40795-015-0040-8.

Kikomeko Kato Peterson & Ndahura Nicholas Bari. (2014). *Nutrition Training Manual Developed for Tea Communities in Uganda*. 1-51. https://www.researchgate.net/publication/273452337_Nutrition_Training_Manual_Developed_for_Tea_Communities_in_Uganda.

Kimberly Rinderknecht, C. S. (2004). Social Cognitive Theory in an After-School Nutrition Intervention for Urban Native American Youth. *Journal of Nutrition Education and Behavior Volume*, *36*(6), 298–304.

Kob, C. G. C., Rakib, M. K. Bin, Shah, A., & . A. (2018). Development and Validity of TIG Welding Training Modules Based on the Dick and Raiser Model Design in the Subject (DJJ3032) of Mechanical Workshop Practice 3 in Polytechnic Malaysia. *International Journal of Academic Research in Business and Social Sciences*, *8*(11), 463–474. https://doi.org/10.6007/ijarbss/v8-i11/4921.

Kola-Raji BA, Balogun MR, O. T. (2017). A Comparative Study of Nutritional Status of Adolescents from Selected Private and Public Boarding Secondary Schools in Ibadan, South Western Nigeria. *Journal of Medicine in the Tropics*, *19*(1), 49–55. https://doi.org/10.4103/jomt.jomt_43_16.

Krebs, N., Bagby, S., Bhutta, Z. A., Dewey, K., Fall, C., Gregory, F., Jr, W. H., Rhuman, L., & Caldwell, C. W. (2017). International Summit on the Nutrition of Adolescent Girls and Young Women : Consensus Statement. *Annals of the New York Academy of Sciences*, *1400*(2017), 3–7. https://doi.org/10.1111/nyas.13417.

Kupolati, M. D., Macintyre, U. E., Gericke, G. J., & Becker, P. (2019). A Contextual Nutrition Education Program Improves Nutrition Knowledge and Attitudes of South African Teachers and Learners. *Frontiers in Public Health*, *7*(September), 1–12. https://doi.org/10.3389/fpubh.2019.00258.

Latesh Veena Garg. (2015). A Study To Assess Prevalence of Malnutrition Among Adolescent Girls of Haryana. *Asia Pacific Journal of Research*, *1*(28), 47–51.

Laura M. Bogart, Burton O. Cowgill, Marc N. Elliott, David J. Klein, Jennifer Hawes-Dawson, Kimberly Uyeda, Jacinta Elijah, David G. Binkle, M. A. S. (2014). A Randomized Controlled Trial of Students for Nutrition and eXercise : A Community-Based Participatory Research Study. *Journal of Adolescent Health*, *55*(3), 415–422.

https://doi.org/10.1016/j.jadohealth.2014.03.003.

Lemeshow, S., Hosmer Jr, D. W., Klar, J., & Lwanga, S. K. (1990). Adequacy of Sample Size in Health Studies. In *Adequacy of Sample Size in Health Studies*. https://doi.org/10.1186/1472-6963-14-335.

Lillie, M., Lema, I., Kaaya, S., Steinberg, D., & Baumgartner, J. N. (2019). Nutritional status among young adolescents attending primary school in Tanzania : contributions of mid-upper arm circumference (MUAC) for adolescent assessment. *BMC Public Health*, *19*(1582), 1–12.

Lina Bandyopadhyay, Muktisadhan Maiti, Aparajita Dasgupta, B. P. (2017). Intervention for Improvement of Knowledge on Anemia Prevention : A School-based Study in a Rural area of West Bengal. *International Journal of Health & Allied Sciences*, *6*(2), 69–74. https://doi.org/10.4103/ijhas.IJHAS.

Lohman, B. J., Neppl, T. K., Lee, Y., Diggs, O. N., & Russell, D. (2018). The Association between Household Food Insecurity and Body Mass Index: A Prospective Growth Curve Analysis. *The Journal of Pediatrics*, *202*, 115-120.e1. https://doi.org/10.1016/j.jpeds .2018.05.052.

Luz Maria De-Regil. (2016). Nutritional Status of Adolescent Girls, Guidelines and Practices to address Malnutrition : Global Picture. *Micronutrient Iniative*. 1-18.
https://www.spring-nutrition.org/sites/default/files/events/2016_ adolescent_nutrition_ webinar_spring_de-regil.pdf.

Macías, Yvette Fautsch, G. P. (2014). Guidelines for Assessing Nutrition-related Knowledge, Attitudes and Practices Manual. *Food and Agriculture Organization of the United Nations, Rome*. 1-188.
http://www.fao.org/3/i3545e/i3545e00.htm.

Makama, G. A. (2013). Patriarchy and Gender Inequality in Nigeria : The Way Forward. *European Scientific Journal*, *9*(17), 115–144.

Mansourian, M., Shafieyan, Z., Qorbani, M., Rahimzadeh, B. H., Charkazi, R., Asayesh, H., ... & Rezapoor, A. (2013). Effect of Nutritional Education based on HBM Model on Anemia in Golestan Girl Guidance School Students. *Iran J Health Educ Health Promot*, 1(2), 51–56. http://journal.ihepsa.ir/article-1-88-en.html.

Marianne Sandsmark Morseth, Navnit Kaur Grewal, Ida Sophie Kaasa, Anne Hatloy, Ingrid Barikmo, S. H. (2017). Dietary Diversity is related to Socioeconomic Status among Adult Saharawi Refugees living in Algeria. *BMC Public Health*, *17*(1), 1–9. https://doi.org/10.1186/s12889-017-4527-x.

Marzieh Araban, Khadije Baharzadeh, M. K. (2017). Nutrition Modification aimed at Enhancing Dietary Iron and Folic Acid intake :An Application of Health Belief Model in Practice. *European Journal of Public Health*, *27*(2), 287–292.

https://doi.org/10.1093/eurpub/ckw238.

Mason, J. B., Saldanha, L. S., Ramakrishnan, U., Lowe, A., Elizabeth, A., Girard, A. W., Mcfarland, D. A., & Martorell, R. (2013). Opportunities for improving maternal nutrition and birth outcomes : Synthesis of country experiences. *Food and Nutrition Bulletin*, *33*(2), 104–138.

Matemilola, S., & Elegbede, I. (2017). The Challenges of Food Security in Nigeria. *Open Access Library Journal*, *04*(12), 1–22. https://doi.org/10.4236/oalib.1104185.

Mayomi, I., & Mohammed, & J. A. (2014). A Decade Assessments of Maiduguri Urban Expansion (2002 - 2012): Geospatial Approach. *Global Journal of Human-Social Science*, 1(2), 1–9.

McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia medica*, 22(3), 276-282. https://hrcak.srce.hr/89395.

Melaku Yohannes Adama, Alexander Zello Gordon, Gill K. Tiffany, Adams J. Robert, & Shi Zumin. (2015). Prevalence and Factors Associated with Stunting and Thinness among Adolescent Students in Northern Ethiopia: A Comparison to World Health Organization standards. *Archives of Public Health*, *73*(1), 1–11. https://doi.org/10.1186/s13690-015-0093-9.

Meuser, A. R., Zheng, S., Falciglia, G. A., & Couch, S. C. (2011). Constructs of the Social Cognitive Theory Mediate Change in Dietary Intake among Adolescents with Pre-Hypertension and Hypertension. *Journal of The American Dietetic Association*, *111*(9), A33. https://doi.org/10.1016/j.jada.2011.06.120.

Meyers MJ, Mount MK, and A. S. (2014). Positive Impact of a Brief Nutrition Education Intervention on Underserved Adolescents: A Pilot Study. *Journal of Child & Adolescent Behavior*, *2*(4), 1–4. https://doi.org/10.4172/2375-4494.1000161.

Micronutrient Initiative. (2009). Global Report: Investing in the Future: A United Call to Action on Vitamin and Mineral Deficiencies. In *Global report 2009. Ottawa: Micronutrient Initiative.* https://doi.org/http://www.unitedcalltoaction.org/documents/ Investing_in_the_future.pdf.

Ministry of Budget and National Planning. (2016). National Policy on Food and Nutrition in Nigeria. *Ministry of Budget and National Planning Plot 421 Constitution Avenue Central Business District Abuja.* 1-50. https://nigeria.savethechildren.net/sites/nigeria. savethechildren.net/files/library/NPFN%20manual%20design%20%20v13.pdf.

Ministry of Women and Child Development India. (2014). Understanding Malnutrition. In *Ministry of Women and Child Development India*.1-20.

https://motherchildnutrition.org/resources/pdf/mcn-understanding-malnutrition.pdf.

Mohammad Bagherniya, Manoj Sharma, Firoozeh Mostafavi Darani, Mohammad Reza Maracy, Mohammad Safarian, Ramesh Allipour Birgani, Vida Bitarafan, S. A. K. (2017). School-Based Nutrition Education Intervention Using Social Cognitive Theory for Overweight and Obese Iranian Adolescent Girls : A Cluster Randomized Controlled Trial. *International Quarterly of Community Health Education*, *38*(1), 37–45. https://doi.org/10.1177/0272684X17749566.

Mohammad Hossein Kaveh, Fatemeh Darabi, Farideh Khalajabadi-Farahani, Mehdi Yaseri, Mohammad Hossein Kaveh, Mohammad Javad Mohammadi, Hamid Reza Adeli Behrooz, Davoud Shojaeizadeh, A. R. (2018). The Impact of a TPB-Based Educational Intervention on Nutritional Behaviors in Iranian Adolescent Girls: A Randomized Controlled Trial. *Fresenius Environmental Bulletin*, *27*(6), 4349–4356.

Mokhtari, F., Kazemi, A., & Ehsanpour, S. (2017). Effect of educational intervention program for parents on adolescents ' nutritional behaviors in Isfahan in 2016. *Journal of Education and Health Promotion*, *6*(103), 1–6. https://doi.org/10.4103/jehp.jehp.

MOPH Afghanistan. (2009). National Health and Nutrition Communication Strategy 2008-2013. *Health and Nutrition, Bureau for Global Health, U.S. Agency for International Development, under the terms of Associate Cooperative Agreement No. 306- A- 00- 06- 00523 HSSP*.

Morley JE. (2017). Undernutrition - Disorders of Nutrition - MSD Manual Consumer Version. *Saint Louis University School of Medicine*. http://www.msdmanuals.com/en-au/home/disorders-of-nutrition/undernutrition/undernutrition.

Nabeel Al-Yateem, and Rachel Rossiter. (2017). Nutritional Knowledge and Habits of Adolescents aged 9 to 13 years in Sharjah, United Arab Emirates: A Cross Sectional Study. *Eastern Mediterranean Health Journal*, *06*(8), 95–105. https://doi.org/10.1016/j.drugalcdep.2013.10.004.

Nadia Akseer, Sara Al-Gashm, Seema Mehta, Ali Mokdad, Z. A. B. (2017). Global and Regional Trends in the Nutritional Status of Young People : A Critical and Neglected Age Group. *Annals of the New York Academy of Sciences*, *1393*(2017), 3–20. https://doi.org/10.1111/nyas.13336

Naghashpour Mahshid, Shakerinejad Ghodratollah, & Lourizadeh Mohammad Reza, Saeedeh Hajinajaf, F. J. (2014). Nutrition Education Based on Health Belief Model Improves Dietary Calcium Intake among Female Students of Junior High Schools. *Journal of Health Population and Nutrition*, *32*(3), 420–429.

Nakitto Mariam, Kana Asano, Injoo Choi, & Yoon Jihyun. (2017). Dietary Intakes of Adolescents from Food Insecure Households: Analysis of data from the 6th(2013-2015) Korea National Health and Nutrition Examination Survey. *Nutrition Research and Practice*, *11*(6), 507–516. https://doi.org/10.4162/nrp.2017.11.6.507.

Naser Ihab Ali, Rohana Jalil, Wan Manan, Muda Wan, Suriati Wan, Nik Wan, Shariff Zalilah Mohd, & Abdullah Mohamed Rusli. (2014). Association between Household Food Insecurity and Nutritional Outcomes among Children in Northeastern of Peninsular Malaysia. *Nutrition Research and Practice*, *8*(3), 304–311. https://doi.org/10.4162/nrp.2014.8.3.304.

National Beareu of Statistics (NBS). (2018). National Nutrition and Health Survey. *National Bureau of Statistics*. 1-161. https://www.unicef.org/nigeria/media/2181/file/Nigeria-NNHS-2018.pdf.

National Bureau of Statistics. (2020). 2019 Poverty and Inequality in Nigeria: Executive Summary. In *National Bureau of Statistics Plot 762, Independence Avenue, Central Business District, FCT, Abuja Nigeria*. 1-27. https://www.proshareng.com/report/ Nigerian%20Economy/2019-Poverty-and-Inequality-in-Nigeria/13450.

National Population Commission (NPC) [Nigeria] and ICF International. (2014). *Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.* 1–565.

National Population Commission (NPC) [Nigeria], & ICF. (2019). Nigeria Demographic Health Survey 2018. In *The DHS Program ICF Rockville, Maryland, USA*. https://dhsprogram.com/publications/publication-fr359-dhs-final-reports.cfm.

Ndebele, M., Kasese-Hara, M., & Greyling, M. (2012). Application of the information, motivation and behavioural skills model for targeting HIV risk behaviour amongst adolescent learners in South Africa. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, *9*(1), 1–12. https://doi.org/10.1080/17290376.2012.744903.

Niclasen, B., Petzold, M., & Schnohr, C. W. (2013). Adverse health effects of experiencing food insecurity among Greenlandic school children. *International Journal of Circumpolar Health*, *72*(1), 20849. https://doi.org/10.3402/ijch.v72i0.20849.

Niemeier, J. (2018). Examining Food Insecurity Among High School Students: A Risks and Resources Model. Theses and Dissertations Retrieved from https://scholarworks.uark.edu/etd/2754.

Noronha, J. A., Bhaduri, A., Bhat, H. V., & Kamath, A. (2013). Interventional Study to Strengthen the Health Promoting Behaviours of Pregnant Women to Prevent Anaemia in Southern India. *Midwifery*, *29*(7), e35–e41.

https://doi.org/10.1016/j.midw.2012.07.014.

Nti, C. A., Brown, A., & Danquah, A. (2012). Adolescents ' Knowledge of Diet-Related Chronic Diseases and Dietary Practices in Ghana. *Food and Nutrition Sciences*, *3*(November), 1527–1532.

Nwozor, A., Olanrewaju, J. S., & Ake, M. B. (2019). National Insecurity and the Challenges of Food Security in Nigeria. *Academic Journal of Interdisciplinary Studies*, *8*(4), 9–20. https://doi.org/10.36941/ajis-2019-0032.

Oakley, A. R., Nelson, S. A., & Nickols-richardson, S. M. (2017). Peer-Led Culinary Skills Intervention for Adolescents : Pilot Study of the Impact on Knowledge , Attitude , and Self-efficacy. *Journal of Nutrition Education and Behavior*, *49*(10), 852-857.e1. https://doi.org/10.1016/j.jneb.2017.07.006.

Obayelu, O. A., & Osho, F. R. (2020). How diverse are the diets of low-income urban households in Nigeria? *Journal of Agriculture and Food Research*, *2*(December), 100018. https://doi.org/10.1016/j.jafr.2019.100018.

Office for the Coordination of Humanitarian Affairs (OCHA). (2019). Manual Kobo Toolbox. In *Office for the Coordination of Humanitarian Affairs (OCHA) in West and Central Africa* (September). 1-35. https://assessments.hpc.tools/attachments/7afade81-13d6-4b15-8c21-41b37d6c3209/Kobo%2520toolbox%2520v2.pdf.

Ogunniyi Adebayo, Kehinde Olagunju, Salman K. Kabir, O. A. (2016). Social Crisis, Terrorism and Food Poverty Dynamics: Evidence from Northern Nigeria. *International Journal of Economics and Financial Issues*, *6*(4), 1865–1872.

Ogunsile, S. E., & Ogundele, B. O. (2016). Effect of Game-enhanced Nutrition Education on Knowledge , Attitude and Practice of Healthy Eating among Adolescents in Ibadan , Nigeria. *International Journal of Health Promotion and Education*, *5240*(April), 1–11. https://doi.org/10.1080/14635240.2016.1157509.

Oldewage-Theron, W., Egal, A., & Moroka, T. (2015). Nutrition Knowledge and Dietary Intake of Adolescents in Cofimvaba, Eastern Cape, South Africa. *Ecology of Food and Nutrition*, *54*(2), 138–156. https://doi.org/10.1080/03670244.2014.959944.

Omobuwa, O., Alebiosu, C. O., Olajide, F. O., & Adebimpe, W. O. (2014a). Assessment of nutritional status of in-school adolescents in Ibadan, Nigeria. *South African Family Practice*, *56*(4), 246–250. https://doi.org/10.1080/20786190.2014.953891.

Omobuwa, O., Alebiosu, C. O., Olajide, F. O., & Adebimpe, W. O. (2014b). Assessment of nutritional status of in-school adolescents in Ibadan , Nigeria Assessment of nutritional status of in-school adolescents in Ibadan , Nigeria. *South African Family Practice*, *56*(4), 246–250.

https://doi.org/10.1080/20786190.2014.953891.

Orimoloye E.O.; Amadi C.O.A.; Amadi A.N.; Azuamah Y.C.; Nwoke E.A.; Zacchaeus, U., D. I. N. S. (2018). Assessment of Water Sanitation and Hygiene Practices in Ibadan, Nigeria. *International Journal of Research (IJR)*, *2*(2), 1–8.

Otilia Vanessa Cordero-Ahiman, Jorge Leonardo Vanegas, Christian Franco-Crespo, Pablo Beltrán-Romero, M. E. Q.-L. (2021). Factors that Determine the Dietary Diversity Score in Rural Households: The case of the paute river basin of azuay province, ecuador. *International Journal of Environmental Research and Public Health*, *18*(4), 1–16. https://doi.org/10.3390/ijerph18042059.

Owoo, N. S. (2020). Demographic Considerations and Food Security in Nigeria. *Journal of Social and Economic Development*, *23*(1), 128–167. https://doi.org/10.1007/s40847-020-00116-y.

Oxfam. (2019). Gender Inequalities and Food. In *Oxfam GB, Oxfam House, John Smith Drive, Cowley, Oxford, OX4 2JY, UK.* (Issue July). https://reliefweb.int/sites/reliefweb. int/files/resources/bp-gender-inequalities-food-insecurity-150719-en.pdf.

Pal, A., Pari, A. K., Sinha, A., & Dhara, P. C. (2017). Prevalence of Undernutrition and Associated Factors: A Cross-sectional Study among Rural Adolescents in West Bengal, India. *International Journal of Pediatrics and Adolescent Medicine*, *4*(1), 9–18. https://doi.org/10.1016/j.ijpam.2016.08.009.

Pal, J., & Pal, A. K. (2017). Impact of Health Educational Programme on Nutritional Status : A School Based Intervention Study among Adolescent Girls in an Urban Slum. *International Journal of Medical Science and Clinical Inventions*, *4*(8), 3163–3167. https://doi.org/10.18535/ijmsci/v4i8.08.

Pallavi Barooah. (2012). Adolescents' Nutrition, Attitudes and Practices. *Basic, Applied & Social Sciences*, *2*, 308–311.

Patimah, S., Royani, I., Mursaha, A., & Thaha, A. R. (2016). Knowledge, Attitude and Practice of Balanced Diet and Correlation with Hypochromic Microcytic Anemia among Adolescent School Girls in Maros District, South Sulawesi, Indonesia. *Biomedical Research (India)*, *27*(1), 165–171.

Paul, C. L., Redman, S., & Sanson-Fisher, R. W. (2003). Print Material Content and Design: Is it relevant to effectiveness? *Health Education Research*, *18*(2), 181–190. https://doi.org/10.1093/her/18.2.181.

Peyman, N., & Monireh Abdollahi. (2016). Using of Information–Motivation–Behavioral Skills Model on Nutritional Behaviors in Controlling Anemia among Girl Students. *Journal of Research & Health*, *12*(12), 1–9. https://doi.org/10.18869/acadpub.jrh.7.2.736.

Rajikan, R., & Esmail, S. (2020). Nutrition Education to Improve Nutrition Knowledge, Attitude and Practice among Yemeni School Children. *Trends in Applied Sciences Research*, *15*(3), 207–213. https://doi.org/10.3923/tasr.2020.207.213.

Ramakrishnan, U., Grant, F., Goldenberg, T., Zongrone, A., & Martorell, R. (2012). Effect of Women's Nutrition before and during early Pregnancy on Maternal and Infant Outcomes: A Systematic Review. *Paediatric and Perinatal Epidemiology*, *26*(SUPPL. 1), 285–301. https://doi.org/10.1111/j.1365-3016.2012.01281.x.

Raoudha Kebaili, Imed Harrabi, Jihene Maatoug, Rim Ghammam, S. S. and H. G. (2014). School-based Intervention to Promote Healthy Nutrition in Sousse, Tunisia. *Int J Adolesc Med Health*, *26*(2), 253–258. https://doi.org/10.1515/ijamh-2013-0306.

Razzak, A., Mohammad, A., Juliana, M. F., Sadia, U., Al Hasan, M. S., & Hossain, S. (2017). Nutrition Education Effects on Better Hand Hygiene Practice Among Adolescent Girls. *World Journal of Nutrition and Health*, *5*(2), 30–32. https://doi.org/10.12691/jnh-5-2-1.

Robert E Black, Cesar G Victora, Susan P Walker, Zulfi qar A Bhutta, Parul Christian, Mercedes de Onis, Majid Ezzati, Sally Grantham-McGregor, Joanne Katz, Reynaldo Martorell, Ricardo Uauy, and the M. and C. N. S. G. (2013). Maternal and Child Undernutrition and Overweight in Low-income and Middle-income Countries. *The Lancet*, *382*(9890), 427–451. https://doi.org/10.1016/S0140-6736(13)60937-X.

Robert E Black, Simon Cousens, Hope L Johnson, Joy E Lawn, Igor Rudan, Diego G Bassani, Prabhat Jha, Harry Campbell, Christa Fischer Walker, Richard Cibulskis, Thomas Eisele, Li Liu, C. M. (2010). Global, Regional, and National causes of Child Mortality in 2008: A Systematic Analysis. *The Lancet*, *375*(9730), 1969–1987. https://doi.org/10.1016/ S0140-6736(10)60549-1.

Robert G. LaChausse. (2017). A Clustered Randomized Controlled Trial to Determine Impacts of the Harvest of the Month program. *Health Education Research*, *32*, 375–383. https://doi.org/10.1093/her/cyx056.

Rode, S. (2015). Prevalence of Malnutrition among Adolescent : The Socio-Economic Issues and Challenges in Mumbai Metropolitan Region Prevalence of Malnutrition among Adolescent : The Socio-Economic Issues and Challenges in Mumbai Metropolitan Region PrevalenceofMalnutrit. *Global Journals*, *15*(8), 3.

Rosenstock, I. M. (1990). The Health Belief Model: Explaining Health Behavior through Expectancies. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), Health Behavior and Health Education: Theory, research, and practice (pp. 39–62). Jossey-Bass/Wiley.

Rufina N. B. Ayogu, Ifeoma C. Afiaenyi, Edith U. Madukwe, E. A. U. (2018). Prevalence and Predictors of Undernutrition among School Children in a Rural South-Eastern Nigerian Community. *BMC Public Health*, *18*(1), 1–9.

Russell, J. D. (1974). Modular Instruction. *Journal of Extension*, *July/August*, 31–32. https://archives.joe.org/joe/1975july/1975-4-brv1.pdf.

Sahar Saeed M. B., Luam Ghebrehiwot G, M. H. J. (2018). Factors Associated With Hand Washing Practices Among Adolescents Yemeni Students in Klang Valley, Malaysia. *International Journal of Public Health and Clinical Sciences*, *5*(6), 164–177.

Sakata, K., Matumura, Y., Yoshimura, N., Tamaki, J., Hashimoto, T., Oguri, S., Okayama, A., & Yanagawa, H. (2001). Relationship between Skipping Breakfast and Cardiovascular Disease Risk Factors in the National Nutrition Survey Data. *Nihon Koshu Eisei Zasshi* 48(10), pp. 837–841). http://www.ncbi.nlm.nih.gov/pubmed/11725527.

Salam, R. A., Hooda, M., Das, J. K., Arshad, A., Lassi, Z. S., Middleton, P. and, & Bhutta, A. (2016). Interventions to Improve Adolescent Nutrition : A Systematic Review and Meta-Analysis. *Journal of Adolescent Health*, *59*(4), S29–S39. https://doi.org/10.1016/ j.jadohealth.2016.06.022.

Salama, A., Elhawary, D., & El-Nmer, F. (2014). Nutritional Knowledge, Attitude, and Practice of Parents and its Impact on Growth of their Children. *Menoufia Medical Journal*, *27*(3), 612. https://doi.org/10.4103/1110-2098.145529.

Salem, G. M., & Said, R. M. (2018). Effect of Health Belief Model Based Nutrition Education on Dietary Habits of Secondary School Adolescent Girls in Sharkia Governorate. *The Egyptian Journal of Community Medicine*, *36*(3), 35-47.

Sally Grantham-McGregor, Yin Bun Cheung, Santiago Cueto, Paul Glewwe, Linda Richter, Barbara Strupp, and the I. C. D. S. G. (2007). Developmental Potential in the first 5 years for Children in Developing Countries. *Lancet*, *369*, 60–70.

Samuel Mersha Birru, Amare Tariku, A. K. B. (2018). Improved Dietary Diversity of School Adolescent Girls in the Context of Urban Northwest Ethiopia. *Italian Journal of Pediatrics*, *44*(48), 1–6. https://doi.org/https://doi.org/10.1186/s13052-018-0490-0.

Samuels Fiona, Maja Gavrilovic, Caroline Harper, M. N.-Z. (2011). Food, Finance and Fuel: The Impacts of the Triple F Crisis in Nigeria, with a particular focus on Women and Children Lagos State Focus. *Overseas Development Institute*. 1–16. https://odi.org/en/publications/ food-fuel-and-finance-the-impacts-of-the-triple-f-crisis-on-women-and-children-lagos-state-focus/.

Saraf, D. S., Gupta, S. K., & Pandav, C. S. (2014). Effectiveness of a School Based Intervention for Prevention of Non-communicable Diseases in Middle School Children of Rural North India : A Randomized Controlled Trial. *Indian J*

Pediatr, *82*(4), 354–362. https://doi.org/10.1007/s12098-014-1562-9.

Sarkar, M. (2013). Personal hygiene among primary school children living in a slum of Kolkata. India. *J Prev Med Hyg*, *54*, 153–158.

Save the children. (2016). Changing the story (of the Nigerian child). *Save the Children Nigeria*. 1-8. https://nigeria.savethechildren.net/sites/nigeria.savethechildren.net/files/library/Changing%20the%20story%20of%20the%20Nigerian%20Girl%20Child.pdf.

Save the Children. (2009). Changing Hygiene Behavior in Schools and Communities Successes and lessons learned from Nasirnagar, Bangladesh, March 2009. *Save the Children, 2000 L Street, NW, Suite 500, Washington, DC 20036*. 1-5. https://www. ircwash.org/sites/default/files/Uddin-2009-Changing.pdf.

Save the Children. (2015). Adolescent Nutrition: Policy and Programming in SUN+ Countries. 1-48. https://resourcecentre.savethechildren.net/library/adolescent-nutrition-policy-and-programming-sun-countries.

Save the Children. (2016). Scaling Up Nutrition Interventions For Children Left Behind In Nigeria. 1-8. https://nigeria.savethechildren.net/sites/nigeria.savethechildren.net/files/library/Nigeria%20briefing%204th%20pp(1).pdf.

Saw, S. M., & Ng, T. P. (2001). The Design and Assessment of Questionnaires in Clinical Research. *Singapore Medical Journal*, *42*(3), 131–135.

Schutter, O. De. (2010). Report submitted by the Special Rapporteur on the right to food. *United Nations*. 1-2. https://unctad.org/system/files/official-document/tdbex47mandate_ en.pdf.

Senbanjo, I. O., Oshikoya, K. A., Odusanya, O. O., & Njokanma, O. F. (2011). Prevalence of and Risk factors for Stunting among School Children and Adolescents in Abeokuta, Southwest Nigeria. *Journal of Health, Population & Nutrition.*, *29*(4), 364–370. https://doi.org/10.3329/jhpn.v29i4.8452.

Seth C. Kalichman, Demetria Cain, Andrea Fuhrel, Lisa Eaton, K. D. F. and T. E. (2005). Assessing Medication Adherence Self-efficacy among Low-literacy Patients: Development of a Pictographic Visual Analogue Scale. *Health Education Research*, *20*(1), 24–35. https://doi.org/10.1093/her/cyg106.

Sethi, V., Gupta, N., Pedgaonkar, S., Saraswat, A., Dinachandra Singh, K., Rahman, H. U., De Wagt, A., & Unisa, S. (2019). Mid-upper arm circumference cut-offs for screening thinness and severe thinness in Indian adolescent girls aged 10-19 years in field settings. *Public Health Nutrition*, *22*(12), 2189–2199. https://doi.org/10.1017/S13689800 19000594.

Severine Erismann, Serge Diagbouga, Christian Schindler, Peter Odermatt, Astrid M. Knoblauch, Jana Gerold, Andrea Leuenberger, Akina Shrestha, Grissoum

Tarnagda, Jurg Utzinger, G. C. (2017). School Children ' s Intestinal Parasite and Nutritional Status One Year after Complementary School Garden, Nutrition, Water, Sanitation, and Hygiene Interventions in Burkina Faso. *American Journal of Tropical Medicine and Hygiene*, *97*(2014), 904–913. https://doi.org/10.4269/ajtmh.16-0964.

Shaaban, S. Y., Nassar, M. F., Shatla, R. H., & Deifallah, S. M. (2014). Nutritional Knowledge, Attitude and Practice of Predominantly Female Preschool Teachers : Effect of Educational Intervention. *British Journal of Medicine & Medical Research*, *4*(8), 1739–1749.

Shaimaa B. Abdelaziz, Meray Rene Labib Youssef, Amal S. Sedrak, J. R. L. (2015). Nutritional Status and Dietary Habits of School Children in Beni-Suef Governorate, Egypt. *Food and Nutrition Sciences*, *06*(01), 54–63. https://doi.org/10.4236/fns.2015.61007.

Shapu, R. C., Ismail, S., Ahmad, N., Lim, P. Y., & Njodi, I. A. (2020). Food Security and Hygiene Practice among Adolescent Girls in Maiduguri Metropolitan Council, Borno State, Nigeria. *Foods*, *9*(9), 1–21.

Shapu, R. C., Ismail, S., Ahmad, N., Lim, P. Y., & Njodi, I. A. (2020). Systematic Review : Effect of Health Education Intervention on Improving Knowledge , Attitudes and Practices of Adolescents on Malnutrition. *Nutrients*, *12*(8), 1–19.

Shapu, R. C., Ismail, S., Ahmad, N., Ying, L. P., & Abubakar, I. (2020). Knowledge, Attitude, and Practice of Adolescent Girls Towards Reducing Malnutrition in Maiduguri Metropolitan Council, Borno State, Nigeria: Cross-Sectional Study. *Nutrients*, *12*(6), 1–21. https://doi.org/10.3390/nu12061681.

Shapu, R. C., Ismail, S., Lim, P. Y., Ahmad, N., & Njodi, I. A. (2021). Effectiveness of health education intervention on water sanitation and hygiene practice among adolescent girls in maiduguri metropolitan council, borno state, nigeria: A cluster randomised control trial. Water, 13(7), 1–14. https://doi.org/10.3390/w13070987.

Shariff, Z. M., Bukhari, S. S., Othman, N., Hashim, N., Ismail, M., Kasim, S. M., Paim, L., Samah, B. A., Azhar, Z., & Hussein, M. (2008). Nutrition Education Intervention Improves Nutrition Knowledge , Attitude and Practices of Primary School Children : A Pilot Study. *International Electronic Journal of Health Education*, *11*, 119–132.

Sharma, M., Mehan, M. B., & Surabhi, S. (2009). Using Social Cognitive Theory to Predict Obesity Prevention Behaviors among Preadolescents in India. *International Quarterly of Community Health Education*, *29*(4), 351–361. https://doi.org/10.2190/iq.29.4.e.

Shesha, T., Chaluvaraj, I., & Satyanarayana, P. T. (2018). Change in Knowledge, Attitude and Practice Regarding Anaemia among High School Girls in Rural Bangalore: An Health Educational Interventional Study. *National Journal of Community Medicine*, *9*(5), 358–362.

Shin, A., Surkan, P. J., Coutinho, A. J., Suratkar, S. R., Campbell, R. K., Rowan, M., Sharma, S., Dennisuk, L. A., Karlsen, M., Gass, A., & Gittelsohn, J. (2015). Impact of Baltimore Healthy Eating Zones : An Environmental Intervention to Improve Diet Among African American Youth. *Health Education & Behavior*, *42*(1S), 97S –105S. https://doi.org/10.1177/1090198115571362.

Sireesha, G., & Bindu, V. (2017). Teenage girls' Knowledge Attitude and Practices on Nutrition. *International Journal of Home Science*, *3*(2), 491–494. http://www.fags.org/nutrition/A-Ap/adolescent.

Sivagurunathan C., R. Umadevi, R. Rama, S. G. (2015). Adolescent Health: Present Status and Its Related Programmes in India. Are We in the Right Direction. *Journal of Clinical and Diagnostic Research*, *9*(3), 1–6. https://doi.org/10.7860/JCDR/2015/11199.5649.

Spendlove, J. K., Heaney, S. E., Gifford, J. A., Prvan, T., Denyer, G. S., & Connor, H. T. O. (2012). Evaluation of general nutrition knowledge in elite Australian athletes. *British Journal of Nutrition*, *107*(2012), 1871–1880. https://doi.org/10.1017/S000711451100 5125.

Srivastava, R., Murali, R., Shamala, A., Yalamalli, M., & Kumar, Av. (2016). Effectiveness of two oral health education intervention strategies among 12-year-old school children in North Bengaluru: A field trial. *Journal of Indian Association of Public Health Dentistry*, *14*(2), 126. https://doi.org/10.4103/2319-5932.181895.

Stephanie Kelly, Bernadette Mazurek Melnyk, M. B. (2012). Predicting Physical Activity and Fruit and Vegetable intake in Adolescents: A test of the Information, Motivation, Behavioral Skills Model. *Research in Nursing and Health*, *35*(2), 146–163. https://doi.org/10.1002/nur.21462.

Stephanie L. Jackson, William F. Vann Jr, Jonathan B. Kotch, Bhavna T. Pahel, and J. Y. L. (2011). Impact of Poor Oral Health on Children ' s School Attendance and Performance. *American Journal of Public Health*, *101*(10), 1900–1906. https://doi.org/10.2105/AJPH. 2010.200915.

Stretcher, V., & Rosenstock, I. M. (1997). The Health Belief Model. *Health Behavior and Health Education: Theory, Research and Practice*, 31–36. https://doi.org/10.1111/j.1365-2648.2010.05450.x..

Sun, X., Guo, Y., Wang, S., & Sun, J. (2006). Predicting Iron-Fortified Soy Sauce Consumption Intention: Application of the Theory of Planned Behavior and Health Belief Model. *Journal of Nutrition Education and Behavior*, *38*(5), 276–285. https://doi.org/10.1016/j.jneb.2006.04.14.

Susan Paul N., S., Mathew, P., Johns, F., & Abraham, J. (2018). The Feasibility of Using Remote Data Collection Tools in Field Surveys. *International Journal Of Community Medicine And Public Health*, *5*(1), 81. https://doi.org/10.18203/2394-6040.ijcmph20175514.

Susanna Lehtimaki, Nina Schwalbe, L. S. (2019). Adolescent Health. The missing population in Universal Health Coverage. WHO: Geneva, Switzerland. 1-32. https://www.who.int/ pmnch/media/news/2018/Adolescent-Health-Missing-Population-in-UHC.pdf.

Syahrul, S., Kimura, R., Tsuda, A., Susanto, T., Saito, R., & Ahmad, F. (2016). Prevalence of Underweight and Overweight among School-aged Children and it's Association with Children's Sociodemographic and Lifestyle in Indonesia. *International Journal of Nursing Sciences*, *3*(2), 169–177. https://doi.org/10.1016/j.ijnss.2016.04.004.

Syeda Saima Alam, Md Nahian Rahman, Lobaba Sultana Lima, Md Monoarul Haque, K. I. (2018). Food Security Status of Adolescent Girls in Selected Urban Slum. *MOJ Public Health*, *7*(5), 247–250. https://doi.org/10.15406/mojph.2018.07.00238.

Syeda Saima Alam, Md Nahian Rahman, Md Ahad Mia, Md Monoarul Haque, K. I. (2018). Dietary Diversity and Nutritional Status of Adolescent Girls in Selected Urban Slum of Dhaka City in Bangladesh. *International Journal of Nutrition and Food Science*, *7*(3), 1–5. https://doi.org/10.19080/NFSIJ.2018.07.555711.

Tamara E. Baer, Emily A. Scherer, Eric W. Fleegler, A. H. (2015). Food Insecurity and the Burden of Health-Related Social Problems in an Urban Youth Population. *Journal of Adolescent Health*, *57*(6), 601–607. https://doi.org/10.1016/j.jadohealth.2015.08.013.

Tamiru, D., Argaw, A., Gerbaba, M., Ayana, G., Nigussie, A., & Belachew, T. (2016). Effect of Integrated School-Based Nutrition Education on Optimal Dietary Practices and Nutritional Status of School Adolescents in Southwest of Ethiopia : A Quasi-experimental Study. *Int J Adolesc Med Health*, 1–12. https://doi.org/10.1515/ijamh-2016-0015.

Tanu Anand, G. K. Ingle, Gajendra Singh Meena, Jugal Kishore, S. Y. (2015). Effect of Life Skills Training on Dietary Behavior of School Adolescents in Delhi : A Nonrandomized Interventional Study. *Asia-Pacific Journal of Public Health*, *27*(2), 1616–1626. https://doi.org/10.1177/1010539513486922.

Tariku, A., Gonete, K. A., Bikes, G. A., & Alemu, K. (2019). Household Food Insecurity Predisposes to Undiversified Diet in Northwest Ethiopia : finding from the baseline survey of nutrition project , 2016. *BMC Research Notes*, 1–7. https://doi.org/10.1186/s13104-019-4083-9.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education* 2, 53–55. DOI: 10.5116/ijme.4dfb.8dfd.

Teng, C. Y., Chin, Y. S., Taib, M. N. M., & Chan, Y. M. (2018). Evaluation of the Effectiveness of a 3-Year, Teacher-Led Healthy Lifestyle Program on Eating Behaviors Among Adolescents Living in Day School Hostels in Malaysia.

Food and Nutrition Bulletin, *39*(4), 595–607. https://doi.org/10.1177/0379572118795358.

The Federal Republic of Nigeria. (2016). The Federal Republic of Nigeria Agricultural Sector Food Security and Nutrition Strategy 2016 – 2025. *The Federal Republic of Nigeria*. 1-107. https://www.nesgroup.org/storage/app/public/policies/Agriculture-FSN-Strategy-2016-25_Printed-Version_1562696265.pdf.

The International Women's Health Coalition (IWHC). (2015). Integrating Sexual and Reproductive Health in Wash. 1-4. https://iwhc.org/wp-content/uploads/2018/07/SRHR-WASH-Fact-Sheet_WebFinal.pdf.

Thomas Clasen, Sophie Boisson, Parimita Routray, Belen Torondel, Melissa Bell, Oliver Cumming, Jeroen Ensink, Matthew Freeman, Marion Jenkins, Mitsunori Odagiri, Subhajyoti Ray, Antara Sinha, Mrutyunjay Suar, W.-P. S. (2014). Effectiveness of a Rural Sanitation Programme on diarrhoea, Soil-Transmitted Helminth Infection, and Child Malnutrition in Odisha, India: A cluster-randomised trial. *Lancet Global Health*, *2*(11), e645–e653. https://doi.org/10.1016/S2214-109X(14)70307-9.

Thornton, T. N., Craft, C. A., Dahlberg, L. L., Lynch, B. S., & Baer, K. (2002). Best Practices of Youth Violence Prevention: A Sourcebook for Community Action. June 2002 (Revision). 1-226. https://stacks.cdc.gov/view/cdc/7540.

Tofail, F., Fernald, L. C. H., Das, K. K., Rahman, M., Ahmed, T., Jannat, K. K., Unicomb, L., Arnold, B. F., Ashraf, S., Winch, P. J., Kariger, P., Stewart, C. P., Jr, J. M. C., & Luby, S. P. (2018). Effect of Water Quality, Sanitation, Hand Washing, and Nutritional Interventions on Child Development in Rural Bangladesh (WASH Benefits Bangladesh): A Cluster Randomised Controlled Trial. *The Lancet Child and Adolescent Health*, *2*(4), 255–268. https://doi.org/10.1016/S2352-4642(18)30031-2.

Tom Baranowski, Karen W. Cullen, Theresa Nicklas, Deborah Thompson, J. B. (2008). Are Current Health Behavioral Change Models Helpful in Guiding Prevention of Weight Gain Efforts? *Obesity Research*, *11*(S10), 23S-43S. https://doi.org/10.1038/oby.2003.222.

Turner, K. G., Nielsen, M. K., & Madsen, E. L. (2009). Causes Of Undernutrition in Children Under-five in the Case of Sierra Leone. 1-38.

Turner LW, Hunt SB, Dibrezzo RO, J. C. (2004). Design and Implementation of an Osteoporosis Prevention Program using the Health Belief Model. *American Journal of Health Studies*, *19*(2), 1–115.

Udonwa, N. E., Gyuse, A. N., & Etokidem, A. J. (2010). Malaria: Knowledge and Prevention Practices among School Adolescents in a Coastal Community in Calabar, Nigeria. *African Journal of Primary Health Care and Family Medicine*, *2*(1), 2–5. https://doi.org/10.4102/phcfm.v2i1.103.

Ukegbu, P., Nwofia, B., Ndudiri, U., & Uwakwe, N. (2019). Food Insecurity and Associated Factors Among University Students. *Food and Nutrition Bulletin*, *40*(2), 271–281. https://doi.org/10.1177/0379572119826464.

UNICEF. (2005). Vitamin and mineral deficiency: A Global Damage Assessment Report. *The Micronutrient Initiative*, PO Box 56127, 250 Albert Street, Ottawa, Canada. 1-43. https://www.unicef.org/media/files/vmd.pdf.

UNICEF. (2009). The State of World's Children 2009: Maternal and Newborn Health. United Nations Children's Fund, 3 United Nations Plaza New York, NY 10017, USA. 1-168. https://www.unicef.org/media/84866/file/SOWC-2009.pdf.

UNICEF. (2012). Water , Sanitation and Hygiene (WASH) in Schools. 1-6. https://www.unicef.cn/media/10381/file/water,%20sanitation%20and%20hygiene%20in%20schools.pdf.

UNICEF. (2013). Improving child nutrition: The achievable imperative for global progress. *Division of Communication, UNICEF*. 1-132. https://doi.org/978-92-806-4686-3. https://www.eldis.org/document/A66131.

UNICEF. (2017). UNICEF Nigeria - Media centre - Uniting in the Battle to end Child Malnutrition in Nigeria. 1-6. https://www.unicef.org/nigeria/press-releases/uniting-battle-end-child-malnutrition-nigeria.

United Nation State Agency for International Development (USAID). (2019). President 's Malaria Initiative: Malaria Operational Plan FY 2019. *United Nation State Agency for International Development (USAID)*. 1-79. https://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy19/fy-2019-nigeria-malaria-operational-plan.pdf?sfvrsn=3.

United Nations. (2010). The Millennium Development Goals Report 2010. United Nations Department of Economic and Social Affairs. 1-80. https://www.un.org/millenniumgoals/pdf/MDG%20Report%202010%20En%20r15%20-low%20res%2020100615%20-.pdf.

United Nations. (2016). Transforming our World: The 2030 Agenda for Sustainable Development. *United Nations*. 1-41. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf.

United Nations Children's Fund. (1990). Strategy for improved nutrition of children and women in developing countries. *UNICEF*. 1-36. https://digitallibrary.un.org/record/ 132779?ln=en.

United Nations Children's Fund (UNICEF). (1998). The State of the World's Children 1998: Focus on Children. *United Nations Children's Fund*. 1-36. http://119.82.251.165 8080/xmlui/bitstream/handle/123456789/468/The%20state%20of%20the%20 world%E2%80%99s%20children%201999.pdf?sequence=1.

United Nations Children's Fund (UNICEF). (2011). The State of the world's Children 2011: Adolescence An Age of Opportunity. *United Nations Children's Fund*. United Nations Children's Fund, 3 United Nations Plaza New York, NY 10017, USA. 1-148. https://www.unicef.org/reports/state-worlds-children-2011

United Nations Children's Fund (UNICEF). (2012). Progress for Children: A report card on adolescents. Number 10. ERIC Clearinghouse. 1-56. https://www.unicef.org/media/ files/PFC2012_A_report_card_on_adolescents.pdf.

United Nations Children's Fund (UNICEF). (2018). Food Systems for Children and Adolescents: Working together to secure nutritious diets. Proceedings of the UNICEF Office Research Innocenti, Florence, Italy, 5-7, 1-12. https://www.unicef.org/media/ 94086/file/Food-systems-brochure.pdf.

United Nations Children's Fund (UNICEF). (2019). The State of the World's Children 2019: Children, Food and Nutrition. Growing Well in a Changing World. *UNICEF. 1-258. https://www.unicef.org/media/60806/file/SOWC-2019.pdf.*

United Nations Development Programm. (2017). Business case assessment for Accelerating Development Investments in Famine Response and Prevention: North-East Nigeria. *United Nations Development Programm*.1-32.

United Nations Research Institute for Social Development (UNRISD). (2017). Challenges and Opportunities in the Implementation of the Sustainable Development Goals. *UNDP. 1-101. https://www.undp.org/publications/global-trends-challenges-and-opportunities-implementation-sdgs.*

United States Agency for International Development (USAID). (2016). Nutrition and Hygiene for Orphans and Vulnerable Children in Nigeria : A Training Guide for Community-Based Organisations. *Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING), Research & Training Institute, Inc. 1616 Fort Myer Drive, 16th Floor Arlington, VA 22209 USA.*, 1–78.

Viera, A. J., & Garrett, J. M. (2005). Understanding interobserver agreement: the kappa statistic. Fam med, 37(5), 360-363.

Wafaa Y. Abdel Wahed, Safaa K. Hassan, and R. E. (2017). Malnutrition and Its Associated Factors among Rural School Children in Fayoum Governorate,

Egypt. *Journal of Environmental and Public Health*, *2017*(9), 1–10. https://doi.org/10.1155/2017/4783791.

Wang, D., Shi, Y., Chang, C., Stewart, D., Ji, Y., Wang, Y., & Harris, N. (2014). Knowledge, attitudes and behaviour regarding nutrition and dietary intake of seventh-grade students in rural areas of Mi Yun County, Beijing, China. *Environmental Health and Preventive Medicine*, *19*(3), 179–186. https://doi.org/10.1007/s12199-013-0372-4.

Wang, D., Stewart, D., Chang, C., & Shi, Y. (2015). Effect of a school-based nutrition education program on adolescents ' nutrition-related knowledge , attitudes and behaviour in rural areas of China. *Environmental Health and Preventive Medicine*, *20*, 271–278. https://doi.org/10.1007/s12199-015-0456-4.

Wassie, M. M., Gete, A. A., Yesuf, M. E., Alene, G. D., Belay, A., & Moges, T. (2015). Predictors of nutritional status of Ethiopian adolescent girls: a community based cross sectional study. *BMC Nutrition*, *1*(1), 20. https://doi.org/10.1186/s40795-015-0015-9.

Webb, M. C., & Beckford, S. E. (2014). Nutritional Knowledge and Attitudes of Adolescent Swimmers in Trinidad and Tobago. *Journal of Nutrition and Metabolism*, *2014*, 1–7. https://doi.org/10.1155/2014/506434.

Weerasekara, P. C., Withanachchi, C. R., Ginigaddara, G. A. S., & Ploeger, A. (2020). Food and Nutrition-Related Knowledge , Attitudes , and Practices among Reproductive-age Women in Marginalized Areas in Sri Lanka. *Int. J. Environ. Res. Public Health*, *17*(3985), 1–21.

West, K. P. (2003). Vitamin A deficiency disorders in children and women. *Food &# 38; Nutrition Bulletin*, *24*(Supplement 2), 78–90.

WFP. (2018). Global Report on Food Crisis 2018. *Food Security Information Network*. 1-202. https://www.wfp.org/publications/global-report-food-crises-2018#:~:text=Conflict%20and%20insecurity%20continued%20to,or%20worse%20across%2048%20countries.

WFP -United Nations World Food Programme. (2017). Emergency Food Security Assessment in Three North East of Nigeria. World Food Programme. 1–38.

Whatnall, M. C., Hutchesson, M. J., & Patterson, A. J. (2020). Predictors of food insecurity among Australian university students: A cross-sectional study. *International Journal of Environmental Research and Public Health*, *17*(1). https://doi.org/10.3390/ijerph17010060

World Health Organization. (2006). Progress report 2004-2005: Child and Adolescent Health and Development. 1-98. https://apps.who.int/iris/bitstream/handle/10665/43458/9789 241594226_eng

.pdf.

WHO. (2018). Evaluating implementation of the WHO set of recommendations on the marketing of foods and non-alcoholic beverages to children: Progress, challenges and guidance for next steps in the WHO European Region. 1-60. https://www.euro.who.int/__data/assets/pdf_file/0003/384015/food-marketing-kids-eng.pdf.

WHO. (2018). *Malnutrition*. World Health Organization. 1-13. https://www.who.int/health-topics/malnutrition.

WHO Report. (2017). World Malaria Report 2017. *World Health Organization*. 1-196. https://apps.who.int/iris/bitstream/10665/259492/1/9789241565523-eng.pdf%3Fua%3D 1.

WFP, W., & UNICEF. (2007). Preventing and controlling micronutrient deficiencies in populations affected by an emergency. Geneva: World Health Organization. 5-6. https://www.who.int/docs/default-source/nutritionlibrary/preventing-and-controlling-micronutrient-deficiencies-in-populations-affected-by-an-emergency.pdf?sfvrsn=e17f6 dff_2.

William C. Shiel Jr., MD, FACP, F. (2018). Which Vitamins are Water Soluble and Fat Soluble?.1-3. https://www.medicinenet.com/water_soluble_vitamins_vs_fat_soluble_ vitamins/ask.htm.

Williamson, N. (2013). State of the world population 2013. motherhood in childhood: Facing the challenge of adolescent pregnancy. *United Nations Population Fund*, 1-132. *Retrieved September, 18, 2019*.

Wingood, G. M., & DiClemente, R. J. (1999). The use of psychosocial models for guiding the design and implementation of HIV prevention interventions: Translating theory into practice. Preventing HIV in developing countries*: Biomedical and behavioral approaches.* (pp. 187–204). http://search.ebscohost.com/login.aspx?direct=true&db= psyh&AN=1999-02970-008&site=ehost-live.

Winter, Rebecca, Akinlo, Ambrose, and L. F. (2016). Trends in Child Health in Nigeria, 2003-2013. *DHS Further Analysis Reports No. 103. Rockville, Maryland, USA: ICF International* (Issue 103).

Wolde, T., & Belachew, T. (2019). Predictors of thinness and improved dietary diversity among School Aged Children in Southern Ethiopia. *Nutrition and Dietary Supplements*, *11*, 49–58.

World Atlas. (2018). *Where is Maiduguri, Nigeria. Borno Map, Global 1000 Atlas Map of*

Maiduguri, Nigeria. 1-4. https://www.europa.uk.com/global-1000-atlas/map/?pid=115253.

World Food Programme(WFP). (2018). Hunger Map 2018. *World Food Programme(WFP)*. 1-1. https://www.wfp.org/publications/2018-hunger-map.

World Health Organization(WHO). (2005). WHO Estimates of the Causes of Death in Children. *Lancet*, *65*(9465), 1147–1152.

World Health Organization. (2014). Global status report on noncommunicable diseases 2014 (No. WHO/NMH/NVI/15.1). World Health Organization. 1-302.

WHO/UNICEF/WFP. (2014). Global Nutrition Targets 2025: Wasting Policy Brief (WHO/NMH/NHD/14.8). Geneva: World Health Organization. 1-8.

World Health Organization. (2002). The World Health Report 2002: Reducing Risks, Promoting Healthy Life. World Health Organization. 1-236.

World Health Organization. (2003). Adherence to Long-term Therapies: Evidence for Action. World Health Organization. 1-209.

World Health Organization. (2012). Preventing Early Pregnancy and Poor Reproductive Outcomes among Adolescents in Developing Countries: What the evidence says (No. WHO/FWC/MCA/12/02). World Health Organization. 1-9.

World Health Organization. (2015). Improving Nutrition Outcomes with better Water, Sanitation and Hygiene: Practical Solutions for Policies and Programmes.1-76.

World Health Organization. (2017). Gobal Nutrition Report: Nourishing the SDGs. *World Health Organization*. 1-115.

World Health Organization. (2018). Guideline: implementing effective actions for improving adolescent nutrition. World Health Organization. 1-68. https://apps.who.int/iris/handle/ 10665/260297. License: CC BY-NC-SA 3.0 IGO.

World Health Organization (WHO). (2002). Personal , Domestic and Community Hygiene. In *Chapter 8* (pp. 65–73). http://www.who.int/water_sanitation_health/hygiene/settings/hv chap8.pdf.

WorldBank. (2018). *Combined Project Information Documents, Integrated Safeguards Datasheet (PID / ISDS) Electricity Access and Renewable Energy Expansion Project*. 1–23.

Yabsira Melaku, Anteneh Dirar, Garumma Tolu Feyissa, D. T. (2017). Optimal Dietary Practices and Nutritional Knowledge of School Adolescent Girls in Jimma Town, South West Ethiopia. *International Journal of Adolescence and Youth*, *3843*, 1–9. https://doi.org/10.1080/02673843.2017.1369889.

Yahaya, Suriani, Saliluddin, & J. (2018). Factors Associated with Food Hygiene Practices among Street Food Vendors in Selected Food Vending Locations of Bauchi Metropolis, Nigeria. *International Journal of Public Health and Clinical Sciences*, *5*(2), 196–208.

Yasin Mohammed, A. (2015). Nutritional Status and Associated Risk Factors Among Adolescents Girls in Agarfa High School, Bale Zone, Oromia Region, South East Ethiopia. *International Journal of Nutrition and Food Sciences*, *4*(4), 445. https://doi.org/10.11648/j.ijnfs.20150404.15.

Yeshalem Mulugeta Demilew & Amanu Aragaw Emiru. (2018). Under-nutrition and Associated Factors among School Adolescents in Dangila Town, Northwest Ethiopia: A Cross Sectional Study. African Health Sciences, 18(3), 756–766. https://doi.org/10.4314/ahs.v18i3.34.

Yisak, H., Tadege, M., Ambaw, B., & Ewunetei, A. (2021). Prevalence and Determinants of Stunting, Wasting, and Underweight Among School-Age Children Aged 6–12 Years in South Gondar Zone, Ethiopia. *Pediatric Health, Medicine and Therapeutics*, *12*, 23–33. https://doi.org/10.2147/phmt.s287815.

You, T., Yang, R., Lyles, M. F., Gong, D., Nicklas, B. J., Wells, J. C. K., Weise, A. S., Warner, M. J., Ozanne, S. E., Visser, M., Bouter, L. M., McQuillan, G. M., Wener, M. H., Harris, T. B., Tzioumis, E., Adair, L. S., Snell-Bergeon, J. K., West, N. A., Mayer-Davis, E. J., … Wien, M. (2014). WHA Global Nutrition Target 2025: Stunting Policy Brief. *European Journal of Clinical Nutrition*, *92*(1), 819–825. https://doi.org/10.1152/ajpendo.00419 .2004.

Yu, S. H., Mason, J., Crum, J., Cappa, C., & Hotchkiss, D. R. (2016). Differential effects of young maternal age on child growth. *Global Health Action*, *9*(1), 31171. https://doi.org/10.3402/gha.v9.31171.

Yunhee Kang, Sungtae Kim, Sisay Sinamo, P. C. (2017). Effectiveness of a Community-based Nutrition Programme to Improve Child Growth in Rural Ethiopia : A Cluster Randomized Trial. *Maternal & Child Nutrition*, *13*(e12349), 1–15. https://doi.org/10.1111/mcn.12349.

Zahra Moaadeli, ; Aazam Hossainnejad Neyrizi ; Iman Sharifikia, Khadijeh, A. ;, & Marandi. (2015). The Study of Knowledge, Attitude and Nutritional Practice of Secondary School Students in Darab City, Fars Province, Iran in 2011-2012. *Int J School Health*, *2*(2), 3. https://doi.org/10.17795/intjsh-25702.

Zhou, W., Xu, X., Li, G., Sharma, M., Qie, Y., & Zhao, Y. (2016). Effectiveness of a school-based nutrition and food safety education program among primary and junior high school students in Chongqing , China. *Global Health Promotion*, *23*(1), 37–49. https://doi.org/10.1177/1757975914552914.

Zoë Shtasel-Gottlieb, Deepak Palakshappa, Fanyu Yang, and E. G. (2016). The Relationship Between Developmental Assets and Food Security In Adolescents From A Low-Income Community. *J Adolesc Health*, *56*(2), 215–

222. https://doi.org/10.1016/j.jadohealth.2014. 10.001.The.

Zulfiqar A Bhutta, Jai K Das, Arjumand Rizvi, Michelle F Gaff ey, Neff Walker, Susan Horton, Patrick Webb, Anna Lartey, R. E. B. (2013). Evidence-based Interventions for Improvement of Maternal and Child Nutrition: What can be done and at what cost. *The Lancet*, *382*(9890), 452–477. https://doi.org/10.1016/S0140-6736(13)60996-4.

BIODATA OF STUDENT

Ruth Charles Shapu was born in Maiduguri Metropolitan Council, Borno State, Nigeria. She attended University of Maiduguri in Borno State, Nigeria and graduated with a Bachelor of Science in Human Anatomy in 2006 and Masters of Health Planning and Management (MHPM) in 2012. She joined Universiti Putra Malaysia in 2018 to pursue PhD in Public Health, Faculty of Medicine and Health Sciences. She is presently a lecturer at college of nursing and midwifery, Maiduguri, Borno State.

LIST OF PUBLICATIONS

Shapu, R. C., Ismail, S., Ahmad, N., Lim, P. Y., & Njodi, I. A. (2020). Food Security and Hygiene Practice among Adolescent Girls in Maiduguri Metropolitan Council, Borno State, Nigeria. *Foods*, 9(9), 1–21.

Shapu, R. C., Ismail, S., Ahmad, N., Lim, P. Y., & Njodi, I. A. (2020). Systematic Review: Effect of Health Education Intervention on Improving Knowledge, Attitudes and Practices of Adolescents on Malnutrition. *Nutrients*, 12(8), 1–19.

Shapu, R. C., Ismail, S., Ahmad, N., Ying, L. P., & Abubakar, I. (2020). Knowledge, Attitude, and Practice of Adolescent Girls Towards Reducing Malnutrition in Maiduguri Metropolitan Council, Borno State, Nigeria: Cross-Sectional Study. *Nutrients*, 12(6), 1–21. https://doi.org/10.3390/nu12061681

Shapu, R. C., Ismail, S., Lim, P. Y., Ahmad, N., & Njodi, I. A. (2021). Effectiveness of Health Education Intervention on Water Sanitation and Hygiene Practice among Adolescent Girls in Maiduguri Metropolitan Council, Borno State, Nigeria: A Cluster Randomised Control Trial. *Water*, 13(7), 1–14. https://doi.org/10.3390/w13070987

Submitted for Publication

Nutritional Status and Dietary Diversity Among Adolescent Girls in Maiduguri Metropolitan Council, Borno State Nigeria: Cross-sectional Study.

Effectiveness of Health Education Intervention on Dietary Practice and Nutritional Status Among Adolescent Girls in Government Secondary Schools Maiduguri: A Cluster Randomised Control Trial.

UNIVERSITI PUTRA MALAYSIA

STATUS CONFIRMATION FOR THESIS / PROJECT REPORT AND COPYRIGHT

ACADEMIC SESSION : _____

TITLE OF THESIS / PROJECT REPORT :

_____

_____

_____

NAME OF STUDENT : _____

I acknowledge that the copyright and other intellectual property in the thesis/project report belonged to Universiti Putra Malaysia and I agree to allow this thesis/project report to be placed at the library under the following terms:

1. This thesis/project report is the property of Universiti Putra Malaysia.
2. The library of Universiti Putra Malaysia has the right to make copies for educational purposes only.
3. The library of Universiti Putra Malaysia is allowed to make copies of this thesis for academic exchange.

I declare that this thesis is classified as :

*Please tick (√)

☐	**CONFIDENTIAL**	(Contain confidential information under Official Secret Act 1972).
☐	**RESTRICTED**	(Contains restricted information as specified by the organization/institution where research was done).
☐	**OPEN ACCESS**	I agree that my thesis/project report to be published as hard copy or online open access.

This thesis is submitted for :

☐	**PATENT**	Embargo from_____ until _____ (date) (date)

Approved by:

_____	_____
(Signature of Student)	(Signature of Chairman of Supervisory Committee)
New IC No/ Passport No.:	Name:
Date :	Date :

[Note : If the thesis is CONFIDENTIAL or RESTRICTED, please attach with the letter from the organization/institution with period and reasons for confidentially or restricted.]