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**FAMILY INVOLVEMENT IN DIET AND EXERCISE INTERVENTIONS AMONG CHILDREN  
IN NIGERIA**

**ORITSEWEYINMI ORIGHOYE**

A thesis submitted in partial fulfilment of the requirements of Leeds Beckett University for the  
degree of Doctor of Philosophy.

August 2022

## **ACKNOWLEDGEMENTS**

I would like to express my deepest appreciation to my Director of Studies Professor Maria Maynard and my Supervisor Dr Tanefa Apekey for their invaluable patience and feedback. I could not have undertaken this PhD journey without their support as they generously provided knowledge and expertise. Also, this endeavour would not have been possible without the generous support from the Royal Society of Tropical Medicine and Hygiene who through the National Institute for Health Research awarded me a small global health grant to fund a part of my research.

I am grateful to the colleagues, especially the PhDers WhatsApp Group, for their feedback sessions, and moral support. Thanks, will also go to the university librarians and Graduate School, the Universal Education Board in Lagos State, Ministry of Education, gatekeepers, and study participants who impacted and support my research journey.

Lastly, I express my gratitude to my nuclear and extended families – especially my parents, my in-laws, my husband, and my son. Their prayers, moral support physically and virtually has kept my spirits and motivation high during this process. I would like to thank God for the wisdom, strength and understanding to be able to complete this research journey.

## **ABSTRACT**

Childhood malnutrition is a major public health concern with serious implications. This thesis comprising of three studies (i) A mixed methods systematic-type review on studies in developing countries focused on parental influences on optimal diet, physical activity, and body mass index of children. (Study 1). (ii) Exploring views of children, parents, and other stakeholders on the influences on potential diet and physical activity interventions among children in Nigeria (Study 2). (iii) Evaluating potential intervention components and outcome measures for promoting a healthy diet, physical activity and improved water, sanitation, and hygiene practices (WASH) among children in Nigeria (Study 3).

Study 1 findings showed increasing parental associations of income, educational level, and socioeconomic status was associated with less favourable BMI status among children. Peer influence facilitated and parental perceptions of weight, household level, and a limited income were barriers to optimal diet, physical activity, and BMI in children. The review also indicated a lack of intervention and qualitative studies conducted in Nigeria, and a need to address this integrating a focus on undernutrition and WASH.

Studies 2 and 3 took place in a suburban multi-ethnic community in Lagos, Nigeria from 2018-2020. Study 2 involved parents, school children, teachers, school heads, community leaders, health workers, and civil servants in the health and education sector recruited using purposive and theoretical sampling strategies. Three phases of qualitative semi structured interviews and focus group discussions were conducted with 32 adults and 16 children. Participants voiced active partnership between communities and schools as essential to addressing barriers to diet and physical activity interventions. Activities for engaging families in interventions such as health literacy teaching for parents in local dialects were suggested.

Mixed methods were used in Study 3. Acceptability and feasibility of 12 school and community intervention sessions and the Global School-based Student Health Survey (diet, PA, hygiene knowledge/practices questionnaire and body mass index (BMI) measures) were evaluated. Participants included 130 children aged 8-15 yrs. Three children and their parents took part in qualitative interviews. All 12 planned intervention sessions were delivered with 100% participation, and approval by parents and children. Timing of sessions, integration of activities into school curriculum were potential barriers to sustainability. Researcher capacity and school timing impacted on the completion of the survey and measurements (n=59; 45% response rate); however, there were no missing questionnaire data.

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## **PRESENTATIONS EMERGING FROM THIS THESIS**

O.Orighoye\*; M. Maynard; T. Apekey. Exploring views on potential components of a diet and physical activity intervention with parental involvement among children in Nigeria. Society for Social Medicine & Population Health Virtual Annual Scientific Meeting 2021.

O.Orighoye\*; M. Maynard; T. Apekey; Haleemah Oyindamola Olanase; Olamide Ojo; Faiza Adekoya. Motivational drivers of sustained WASH practices among parents and children: an exploratory study on a WASH intervention in Lagos, Nigeria. 12th European Congress on Tropical Medicine and International Health 2021.

O.Orighoye\*; M. Maynard; T. Apekey. A pilot study on promoting a healthy diet and physical activity among children with parental involvement in Nigeria. European Public Health Conference Virtual Edition 2021.

## **1 INTRODUCTION**

This chapter provides an introduction to the thesis and describes the background and rationale for Nigeria as a case study for the research in the context of the researcher's positionality and current literature. The chapter concludes with the aims and objectives of the programme of research and the thesis structure.

### **1.1 CHILDHOOD NUTRITION AND PHYSICAL ACTIVITY IN THE GLOBAL CONTEXT**

Good nutrition is essential to the healthy physical growth and development of children. The demands for growth in children and adolescents make the nutritional and energy requirements high in relation to size (Angbratt et al., 2011). Childhood dietary patterns, especially in early years and late adolescence, set in motion future dietary patterns in adulthood (Emmett and Jones, 2015).

The World Health Organisation (WHO) definition of physical activity is “any bodily movement produced by skeletal muscles that requires energy expenditure” (WHO 2021, p. 2). It includes activities ranging from organised sport and exercise to active play (e.g. running around outside) or activities undertaken as a part of everyday living (e.g. walking or cycling to school, chores). The level of physical activity, its rate, duration, amount, type as well as the time spent being sedentary, have a major impact on health at all stages of life (González et al., 2017). There is also a growing concern that many children spend too much time undertaking sedentary activity (Hesketh et al., 2017).

Physical inactivity has been identified as the fourth leading risk factor for global mortality (estimated to account for 6% of deaths globally), and a significant risk factor for non-communicable diseases (NCDs) such as diabetes, stroke, obesity and some cancers (Mkuu et al., 2021). There is also evidence that the risk of NCDs in adulthood is associated with lack of physical activity, poor nutrition and obesity in childhood (Jacob et al., 2019). Childhood obesity is one of the most serious global public health challenges of the 21st century (Edward and Gopalakrishnan 2022; King et al., 2021; Sumińska et al., 2022).

### **1.2 OVERWEIGHT AND OBESITY**

Global estimates suggest that lack of progress means unacceptable levels of malnutrition persist. Globally, 149.2 million children under 5 years of age are stunted, 45.4 million are wasted and 38.9 million are overweight (Global Nutrition Report, 2021). Almost half of all overweight children under five years lived in Asia and one quarter lived in Africa (WHO, 2021). In Africa, the number of overweight children has nearly doubled from 5.4 million in 1990 to 10.3 million in 2014 (Lafia et al., 2022). One of the reasons for rising obesity rates worldwide

is the globalisation of increasingly obesogenic environments, which are mainly characterised by rapid urbanisation (Brouwer et al., 2021; Kirchengast and Hagmann, 2021). Although urbanisation can bring about positive improvements in children's diets, it can also bring several less favourable dietary changes, such as increased consumption of processed foods (Popkin and NG, 2022). This, coupled with more sedentary lifestyles, could have contributed to the dramatic rise in the prevalence of overweight and obesity (Davies and Garrett, 2018; Fox et al., 2019). Despite rising levels of obesity, malnutrition in the form of under nutrition remains common in low- and middle-income countries (LMIC) including sub-Saharan Africa (Barker et al., 2021; Victora, et al., 2021). The coexistence of undernutrition, overweight and obesity is referred to as the double burden of malnutrition (Fongar et al., 2019; Wariri et al., 2020).

### **1.3 THE DOUBLE BURDEN OF MALNUTRITION**

Sub-Saharan Africa remains the region with the highest prevalence of undernutrition, with moderate progress in recent years (Christian and Dake, 2021). Maternal undernutrition is also of concern in Africa given that, despite reported declines in the last two decades, the prevalence remains above 10% (Chadare et al., 2022). The global health community acknowledges the combined challenges of rising non-communicable diseases coupled with unresolved malnutrition (Burt, 2021; Heidkamp et al., 2021). Furthermore, undernutrition in childhood is linked with overnutrition in later life. Nationally representative surveys in Russia, Brazil, South Africa, and China have indicated a significant association between childhood stunting and increased risk of overweight in adulthood, with risk ratios ranging from 1.7 to 7.8 (Gupta et al., 2012; Kosaka and Umezaki, 2017).

The increasingly high prevalence of overweight and obesity with concurrent high levels of undernutrition in low-income countries including sub-Saharan Africa are thus present in Nigeria (Adeyeye et al., 2021; Ndisika and Omigie, 2022). Therefore, the rationale for Nigeria as a case study for research aiding the development of diet, PA and obesity prevention interventions from personal and evidence-based perspectives are outlined below.

### **1.4 NIGERIA AS A CASE STUDY FOR CHILDHOOD NUTRITION AND PA RESEARCH**

#### **1.4.1 Researcher positionality**

Positionality describes an individual's view and the position they have chosen to adopt in relation to a research task (Savin-Baden and Major 2013). These are often shaped by political allegiance, religious faith, gender, sexuality, geographical location, race, culture, ethnicity, social class, age, linguistic tradition, and so on (Sikes, 2004, p. 15-33). Positionality requires the researcher to acknowledge and locate their views, values, and beliefs in relation to the

research process. Reflexivity, in seeking to understand how one's own beliefs, judgments and practices influence the research process (Cohen et al. 2011), is in other words, reflecting on one's positionality. The researcher's positionality is outlined below. Reflexivity is a core element of the empirical qualitative research conducted as part of the current programme (see Chapters 4 and 5).

The researcher is a Nigerian woman, of Christian religion, a resident of a city in Southern Nigeria's Niger delta region and is from one of the minor and marginalised ethnic groups in Nigeria. Recognising her cultural heritage is an important influence on how she views public health issues within the social and cultural context of the population she is from. She holds no political office or allegiance to any of the political parties in Nigeria; however, she engages with grassroots politics by looking for ways to understand and influence local policies on maternal and child health. Her view on health impact is a bottom-up approach to change; this has also played a role in how she approached her research as she believes action at the individual and community level can lead to policy implementation and/ or improvement. There has also been a reciprocal influence between these views and her chosen career and work history.

After qualifying as a medical doctor in 2012, she then completed further training in paediatrics in 2014. During her residency, additional study led to the completion of an MRes on the assessment of microbial inflammatory processes in primary and secondary urinary tract infections in children and the metabolic role of intestinal microflora in the development of urinary crystals in children, followed by an MSc in Occupational Safety, Health, and Wellbeing in 2015. The dissertation focused on malaria transmission, chemoprevention, and drug efficacy and resistance in children in Nigeria, The Gambia, Senegal, Ghana, Burkina Faso, Ivory Coast, Liberia, Sierra Leone, and Mali, cementing her interest in child health in sub-Saharan countries.

After the above studies undertaken in European institutions, she returned to Nigeria to work for a number of third sector organisations and the addition of public health to her clinical skills. This included working as a Programs Director for a non-governmental organisation addressing societal issues in the coastal communities of the Niger Delta region in Nigeria. In addition, from 2016-2020, she co-managed '*The Community Girl*' which targeted girls and young women aged 10-22 years in marginalised communities where societal issues affected their wellbeing. Working with school staff, church leaders, community leaders and governmental officials, the many programmes delivered included a focus on nutrition and water, sanitation, and hygiene (WASH), education. Further WASH intervention experience was gained with the non-profit Foundation for Partnership Initiatives, working closely with UNICEF and other

partners across the nine Niger Delta states to implement collaborative, community owned programmes including WASH in Schools (WinS), with Canada-based Centre for Affordable Water, Sanitation and Technology supporting the installation and improvement of sanitary facilities in schools and communities in the coastal areas, and with Days for Girls delivering menstrual health management sessions and WASH clubs in schools across the nine Niger Delta States.

Returning to clinical practice she worked as a medical officer in the Paediatrics Unit of the Nigerian National Youth Service Corps in 2017, with roles including the treatment of malnutrition. During this time, she also worked on an *ad-hoc* basis at a private community clinic covering five communities in her region. She worked closely with nurses, community health workers, non-governmental organisations, local community and religious leaders, and school staff to raise awareness and promote prevention among children in public health issues including managing several cases of underweight, overweight and obesity among the under 5s, and primary and secondary school aged children. Through these consultations there was realisation that addressing malnutrition should not start in the hospital but in the community, as cases of malnutrition arose because of environmental factors such as polluted water, poverty levels, a gap in individual knowledge about health, shortage of health practitioners in hospitals and communities, poor infrastructure and delivery of public health interventions. This awareness contributed to the formation of ideas of the PhD research, with a focus on school aged children, the school setting, and a holistic approach to addressing malnutrition.

Her experience working in both community and health settings included different stakeholders - parents, teachers, politicians, health workers, school administrators and policymakers. She realised as she worked in the above-mentioned areas, family involvement appeared to be in the margins, rather than the centre of health promotion and interventions with families as decision makers in developing effective health programmes for their children.

Seeking to do a PhD on family involvement within health promoting schools, her original aim was to explore the effectiveness of the health promoting schools' ethos (see Chapter 2) or school-based health interventions in the UK, and how and to what extent, they address the involvement of families in the nutritional health and physical activity needs of school aged children. The hope was to learn from the UK context and see how it could be implemented in her home country. With her experience in both hospital and community, she saw the need to carry out exploratory research involving schools, nutrition, physical activity, and family, with the aim to find ways in which school nutritional and physical activity interventions could be done effectively in Nigeria.

Coupled with personal interest noted above, at the start of the PhD programme Nigeria did not (and still does not, at the time of writing) have a widespread health promoting school programme with or without family involvement. However, there have been a small number of locally tailored, health promoting school projects that focus on identifying common health challenges of adolescents in Nigerian northern states (Jigawa and Kano) and assess the effect of board game-based nutrition education on breakfast knowledge, attitude and habits of adolescents in schools in Ile-Ife, Nigeria (Ariyo et al., 2022; INASP, 2020). Rather than conduct research which may or may not translate to the Nigerian context, the plan was refocussed to be directly conducted in Nigeria, so that exploratory research that identified, developed, and tested potential components for a future intervention involving families to promote diet and physical activity among school Nigerian children could be carried out.

Recent research has been conducted in African countries such as Kenya and Uganda, focused on improving the diets of infants and school children (Alum, 2022; Knight et al., 2021, Wall et al., 2022). However, a recent rapid systematic and Delphi consultation study in sub-Saharan Africa have identified a lack of interventions to improve nutritional status of infant and young children (6-23 months) living in urban low-income informal settlements (Mutisya et al., 2020). Existing work addressing this evidence gap therefore focuses on underweight, stunting and micronutrient deficiencies among children aged 5 years and under (Kimani-Murage and Wright, 2020; Mutisya et al., 2020). However, to the researcher's knowledge (and at the time of writing), there are no completed nutritional and physical activity research focused on *school aged children over the age of 5 years* and with parental involvement, in schools and communities in Nigeria.

Systematic reviews of existing evidence have demonstrated that school-based interventions have positive results on children and adolescents' anthropometry, dietary intake, and physical activity (Jacob et al., 2021; Silveira et al., 2011; van de Kolk et al., 2019). None of the included studies were conducted in sub-Saharan Africa. In addition, the results show that school-based health interventions may also have positive impact on parents' health outcomes (Beal et al., 2016; Berniell, de la Mata, and Valdés, 2013). The impact of family involvement in nutrition interventions for children has not been explored in Nigeria. Given the potential benefit of these interventions on parents and children, the current research programme sought to explore whether school-based interventions for school children, with parental involvement, show the potential to have improve children's dietary intake, nutrition knowledge, and physical activity, and health outcomes among their parents. The argument for Nigeria as a case study for research contributing to addressing childhood malnutrition is further outlined below.

#### 1.4.2 Country characteristics

Nigeria, located on the western coast of Africa, is comprised of 36 states and one federal territory, the Federal Capital Territory, located in Abuja. However, as the former capital, Lagos still retains its standing as the country's leading commercial and industrial city. Within the states, Nigeria has 774 local government areas (LGAs), each with significant degrees of autonomy (Abe and Omotoso, 2021).

The population of Nigeria exceeds 203 million (National Population Commission, 2019). Children under the age of 15 years account for 44% of the population, those aged 15-65 years constitute 53%, with the remaining 3% of the nation's population aged 65 years and over (National Population Commission, 2019). The country is home to more than 250 distinct ethnic groups. The largest ethnic populations are the Hausa (27% of the population), the Yoruba (14%), the Igbo (14%), and the Fulani people (6%). Smaller ethnic groups include the Ijaw, Kanuri, Ibibio, and Tiv peoples, each about 2% of the population (White, 2019). The country's official language is English, however, in the Southern part of the country, Nigerian 'Pidgin' English (an English-based creole language), is used widely as an unofficial medium of communication (The World Fact Book, 2018). Nigeria accounts for nearly one-fourth of sub-Saharan Africa's population that live in poverty (Hotez et al., 2012; World Bank Group: Poverty and Equity, 2020).

Nigeria is also a multi-religious state. The major religions in this country are Christianity and Islam. About 52% of the population identifies as Muslim, 11% as Roman Catholic, and 36% as other Christian denominations (White, 2019). Islam dominates in the north-western and north-eastern parts of the country whilst Christianity is more prominent in the south-eastern and south-south geographical zones. Although often disregarded, traditional and other religions have a number of followers and therefore have an important influence on the determination of state-religious relations (Ezeanya et al., 2022).

Despite having the largest economy on the continent, it lags in development and is ranked 157th on the Human Development Index (Ejike, 2022; Onyekwelu, 2022). According to the United Nations Development Programme, Human Development Report (2020), the Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The health dimension is assessed by life expectancy at birth, and the education dimension is measured by the mean number of years of schooling for adults aged 25 years and over and expected years of schooling for children of school entering age. Standard of living is measured by gross national income per capita. The scores for the three HDI dimension indices are then aggregated into a composite index. The HDI can be used to



stimulate policy debate; however, it simplifies and captures only part of what human development entails. For example, it does not reflect on inequalities, poverty, human security, empowerment, etc. Other composite indices within the same report provide broader proxies for key issues of human development, inequality, gender disparity and poverty (Human Development Report, 2020). Overall, these data show marked inequality between the northern and southern regions of Nigeria in all important development parameters. Social conflict involving non-state armed groups have ravaged Nigeria for decades. These include the militancy in the Niger Delta, the Farmer-Herder clashes in the north-eastern and central regions of the country and, most prominently, the Boko Haram insurgency which now has much further reach than its origins in the north-eastern quadrant, of the country (Abdulazeez Malefakis, 2022; Tyndall et al., 2020).

Inequalities in relation to development mentioned above, include parameters pertaining to the health sector and this inequality has been growing in recent years (Abubakar et al., 2022, World Bank, 2020). Life expectancy in Nigeria is notably the lowest in West Africa. The average life expectancy is around 54.5 years of age according to the World Health Organisation, with men living an average of 53.7 years and women living an average of 55.4 years (UN, World Mortality Report, 2015). This can be ascribed to a number of health determinants including a host of socioeconomic, biological, cultural, and environmental factors such as unemployment, limited access to healthcare, infant and maternal mortality, non-communicable and infectious diseases (Kabir et al., 2019). Nigeria is listed as among the countries with high diet-related non-communicable diseases, with urbanisation implicated as a causative factor (USAID, 2021).

Due to the combination of its size and relatively poor health sector performance, Nigeria has the second highest under-fives and maternal mortality rates in the world, with over 800,000 deaths in children under the age of five each year (30% of which occur in new-borns) and nearly 20% of all global maternal deaths (WHO, 2019). In this context, the extent of malnutrition in Nigeria are discussed below.

#### 1.4.3 Malnutrition in Nigeria

Presently in Nigeria, 37% of children under five years are stunted. The prevalence of stunting increases with age, peaking at 47% among children aged 24–35 months. The national prevalence of stunting has improved since 2008, and wasting has also improved from 14% in 2008 to 7% in 2018 among children under five years, while 22% of children are underweight. However, stark regional variation means that some areas have very high stunting, wasting,

and underweight rates that have not improved (National Population Commission (NPC) and ICF International 2019; 2009; USAID 2021).

Malnutrition, in terms of stunting, wasting, and underweight, is more prevalent among children in rural areas than in urban areas (Ogechi et al., 2017; Senbanjo et al., 2013), and is concentrated among children living in the Northeast and Northwest. By comparison the Southeast region has the lowest percentage of undernourished children (Adesuyi, et al., 2021; Omobola, 2021). These regional disparities, underpinned by wider determinants such as lack of safe water supply, inadequate sanitation, healthcare, and community resources have led to a focus on child feeding interventions and one school-based initiative in progress in the North of the country (Abubakar et al., 2022; Musa, 2021).

The Nigeria Demographic and Health Survey (NDHS) is a national sample survey that provides information on demographic and health indicators (NPC and ICF 2019). The National Nutrition and Health Survey (NNHS) has been conducted three times with the latest in 2018, and with the aim of surveying the nutrition status of the population at state, zonal and national levels; and to monitor the progress towards the Saving One Million Lives (SOML) goals (National Bureau of Statistic (NBS) 2018). SOML is a Federal Government of Nigeria maternal and child health investment programme supported by the World Bank, which provided incentives, based on achievement of improvements in health outcomes. The NDHS, and the NNHS both include nationally representative data on nutritional status focussing on children aged under five years, and those 15 years and older (NPC and ICF 2019; NBS 2018). Due to the age ranges that are focused on in these surveys, there is limited nationally representative community-based data on the nutritional status of children aged 6 – 14 years in Nigeria. Nevertheless, the latest NDHS revealed high levels of stunted growth and micronutrient deficiencies, with children, women and the elderly severely affected (NPC and ICF 2019). Additionally, the NNHS revealed the north and south contrast in nutrition indices, but also the fact that there are more interventions in the north compared to the south (NBS 2018).

Internal migration studies indicate that there are more than 10 urban locations in Nigeria with populations of over 1 million (Ajero et al., 2013; Odimegwu and Adewoyin, 2020). Undernutrition remains a significant issue, as noted above, and the prevalence of overweight and obesity among children is much greater in urban areas vs. rural areas (10.7% and 4.2%, respectively). Overweight and obesity are attributed to a number of factors including urbanisation, high socioeconomic status of some families, poor dietary diversity among low-income households and greater exposure to convenience and fast foods (Obayelu and Osho 2020). With the United Nations (2014) predicting that by 2050, the urban population in Nigeria will increase by 226 million, there is much need to improve equitable access to health and

nutrition resources in urban areas. Aregbeshola and Khan (2018) discuss high out-of-pocket payments for health services in urban areas. This is further compounded by a proliferation of expensive private health facilities in Nigeria's urban centres (Adewoyin et al., 2018). It has been stated that the competition for health and nutrition resources in rapidly urbanising areas can be managed by effective and sustainable urban-focused policies and strategies (Tripathi and Mahey 2017; United Nations Habitat 2020).

#### 1.4.4 Nutrition policies

In 2016, Nigeria reviewed its 2002 National Policy on Food and Nutrition (NPFN) to address malnutrition, extreme hunger and achieve optimal nutritional status for Nigerians by 2025. The policy places emphasis on the nutritional levels of vulnerable groups such as the urban poor (Ministry of Budget and National Planning, 2016). It is also decentralised across the federal, state, and local government levels and coordinated by the Ministry of Budget and National Planning. Despite the NPFN, many child and adult nutrition indicators are worse than global rates, as noted above (Adesuyi et al., 2021; Obada et al., 2021; Onwujekwe et al, 2021). These statistics show that the NPFN has not been successful. Furthermore, the Nigeria Zero Hunger Strategic Plan (NZHSP) (2017–2030) whose goals are likened to those of the NPFN have also not been successful so far. A key element of the NZHSP relevant to the current research is that it emphasises the need for a school feeding programme for school pupils (International Institute of Tropical Agriculture, 2017).

In line with the school feeding programme, the use of locally grown foods by smallholder farmers to feed an estimated population of 5.5 million public school pupils commenced in 2016. The programme is designed to be a combination of efforts of the Federal and State governments. The Federal Government is to feed children from Primary 1–3, while the State governments will do the same from Primary 4–6. The nutritional level of the children who attend these schools (mostly found within urban centres), is the main target of the policy, among other targets not directly connected to nutrition (Igboji et al., 2022). State governments were asked to participate but do so of their own volition (Federal Government, 2017; Omoera et al., 2021). While hailed as a success by the Federal Government, other independent observers have been more sceptical (Onah and Onah 2021; Spaces for Change, 2018). Spaces for Change (2018) have conducted an evaluation study. Spaces for Change is a non-profit organisation working to increase the participation of youth, women, and communities in the development of social and economic policy and help authorities and corporate entities to put a human rights approach at the heart of their decision-making. The authors confirmed that the NHGSFP improved attendance rate of school pupils, acknowledged the strong connection

between education nutrition and hygiene, and that parents appreciated the programme (Spaces for Change, 2018). However, in the same study, the quantity and diversity of the meals were questioned (Spaces for Change, 2018). Additionally, Cummings and Kulutuye (2017) have advocated for the intensification of the supervision of the programme to facilitate achieving the programme's objectives. Inconsistencies in the delivery and effectiveness of the programme have in part been attributed to corruption such as diversion of funds by school personnel for their own families' use, programmes running costs in schools being artificially inflated, and lack of basic school infrastructure (Amake, 2019). In the 2021 Global Hunger Index, with a score of 28.3 Nigeria ranks 103<sup>rd</sup> out of the 116 included countries; a score which indicates a 'serious' level of hunger (Global Hunger Index 2021) and therefore also casts doubt on the efficacy of the policy.

Policies and strategies that will help make urban health and nutrition available and accessible amidst rising competing demands caused by the increase in urban population are needed (Aliyu and Amadu, 2017; Ojogiwa and Akinola, 2020; Onwujekwe et al., 2021). More research with which to inform policy is needed to explore approaches to improve diet and activity among children in Nigeria. Thus, the current research sought to address the research gaps relating to geographical location (lack of focus on the south) and malnutrition among children aged over 5 years. Having established a need to focus on Nigeria the following sections explore the Nigerian family with regard to food and physical activity.

## **1.5 THE NIGERIAN FAMILY: FOOD AND CULTURE**

The major characteristic of a traditional Nigerian household is that they are mostly patriarchal and hierarchical and open to kinship networks, with substantial importance attached to lineage continuation (Ekane, 2013). However, improvements in economic conditions, educational opportunities, and health (e.g. access to reproductive health services) for some means increased merging of traditional and contemporary norms, values, and practices (Nwoke, 2013; Owoaje et al., 2014). Modernity is marked by the shift from larger to smaller family size and households, and the gradual change in extended family relationships and community-based socialisation (Agbaje, 2013). Despite this modernisation process, the family remains a prominent focal point in the social life of Africans (Agbiji and Swart, 2015). There is still significant importance attached to the respect for elders and ancestors, and communities remain characterised by the prevalence of collectivism as opposed to individuality (Kakay, 2016). Family involvement could therefore play a key role in addressing the health needs of children, as previously mentioned, nutritional and physical activity research in countries like Nigeria focused on school children and their parents has had limited attention.

One of the ways through which the Nigerian family ideals are changing is through food. Dietary practices are influenced by food accessibility, including food availability, affordability and acceptability, and by the care and hygiene practices of families (UNICEF, 2020). These are in turn driven by parental knowledge and time, household dynamics and social norms, including gender norms and roles (Dickin et al., 2021; Doyle et al., 2018; UNICEF, 2020). Nigeria has complex and diverse cultures partially because of the diverse ethnic, social, and agricultural profile of the country (Adegboye, 2015). That said, the diet of most Nigerians is based on local staple foods accompanied by soup or made with tomatoes, pepper, ground melon seeds, and other vegetables, and varied amounts of meat (such as chicken, beef, goat, pork, snails), prawns, periwinkles, or fish, depending on family income and cultural recipes, and served with white rice or plantain (Olumati, 2017). Common fruits consumed are mangoes, pawpaw, pineapples, oranges, avocado, guava, cashew, and African star fruit (Adegboye, 2015). These fruits are seasonal and there is often no effective method of preservation (e.g. lack of regular electricity supply for chilling or freezing) and in transportation to different regions are easily spoiled (Omojola et al., 2022).

Despite the ongoing importance of traditional eating, fast food consumption has been on the increase in Nigeria, especially among young adults, 80% of whom were reported to consume fast foods at least once a week (Akanle, 2021). Other dietary changes in urban areas as a result of the nutrition transition include marked increases in consumption of animal products, and intakes of fat, sugar, and sodium, and a decline in consumption of vegetables, fruits, and fibre (Afolabi et al., 2013).

Positive views about childhood overweight also influences how body size is viewed in some families, such as the tendency to view overweight or obese children as normal weight and that the child's weight is appropriate for their age (Iguacel et al., 2021). Parental perceptions of the weight of their children can therefore play a crucial in the dietary habits that are encouraged within families (Inclán-López et al., 2021; Mahmood et al., 2021).

## **1.6 THE NIGERIAN FAMILY: PHYSICAL ACTIVITY**

Traditionally, farming in Nigeria has been a significant contributor to physical activity as people (including children) walked considerable distances to their farms and worked all day. Children would also enjoy the evenings with some form of physical activity such as dancing and acrobatics (Asakitikpi et al., 2018; Nnamani, 2019). Activities for young girls and women included domestic chores such as walking to fetch water and using a 'grinding stone' to blend food ingredients. Boys and older men's activities also involved going hunting for animals,

setting animal traps, and for those in the coastal areas, fishing, preparing fishing nets, and paddling canoes. However, with urbanisation, the level of physical activity has significantly declined (Oyeyemi et al., 2016). It has been noted that in Nigeria 50% of children were engaged in low levels of physical activity (Adeniyi et al., 2011). However, overall, there is little information on possible physical activity transition associated with economic development in sub-Saharan African countries, particularly among school-aged populations (Muthuri et al., 2014).

## **1.7 RATIONALE FOR THE CURRENT RESEARCH PROGRAMME**

Childhood and adolescent malnutrition (undernutrition, stunting, overweight and obesity) are a serious public health problem globally, and have adverse psychological, social and health consequences in childhood and later in life. Diets and lifestyles are changing rapidly in developing countries; this has led to food insecurity and undernutrition for some and the concurrence of the non-communicable disease such as obesity stroke, hypertension, diabetes and heart disease, formerly more common in high income countries. Healthy habits during childhood promote optimal health, growth, and cognitive development of the child, and may contribute to the prevention of chronic disease in later life. Childhood signifies an important life stage for the development of healthy nutritional behaviour because some evidence exists, that nutritional behaviour starts from the early stages of life into adulthood. Most nutrition research in Nigeria is focused on infants under 5 years old. Furthermore, national nutritional policies have been poorly implemented to date, there is limited research on nutrition and physical activity among school children and no interventions in the southern region of Nigeria to support schools or family involvement in promoting optimal diet and physical activity among school aged children. Family beliefs, attitudes, perceptions and behaviour in addition to and shaped by wider social determinants can have a significant impact on the development of under and over nutrition. Therefore the role of the family in school life and how family members can contribute to health initiatives in an empowered way is an issue that warrants further exploration in Nigeria. As such, support and guidance for families may aid improving nutrition and physical activity among children in the context of holistic wellbeing. To date, few studies have comprehensively examined how such initiatives address the family involvement in the health needs of children and none have been conducted in the southern regions of Nigeria.

## **1.8 RESEARCH AIMS AND OBJECTIVES**

The primary aim of this programme of research was to explore the potential to identify, develop, test and evaluate intervention components for improving diet and physical activity among school children in Lagos, Nigeria and the feasibility and acceptability of interventions

involving active family participation. The programme of research was conducted in three studies. The aims and objectives of the three studies are outlined below.

***Study 1. A systematic-type review of family involvement in diet and physical activity interventions among children in developing countries.***

The purpose of this study was to conduct a systematic-type review on qualitative and quantitative studies in low-income settings on optimal diet and exercise and BMI of children to identify evidence of the role of parental associations and the perspectives of children, parents and stakeholders.

The objectives of study 1 were to:

1. Investigate associations between parental factors and diet, exercise, and body mass index (BMI) in children.
2. Explore perspectives of children, parents and other stakeholders on the barriers and facilitators to optimal diet, exercise, and BMI among children.

***Study 2. Exploration of views on diet and physical activity interventions with family involvement and the settings likely to support the effective engagement in Nigeria.***

The aim of this study was to explore views of parents, children and other stakeholders on the social, cultural, and environmental factors that influence diet and physical activity; potential components or activities within childhood diet and physical activity (PA) interventions; and the potential for parental involvement in such interventions among children in Lagos, Nigeria.

The objectives of study 2 were to:

1. Explore views on social, cultural, and environmental factors and their role as barriers and facilitators in achieving favourable diet and PA;
2. Understand views on the potential solutions to the barriers identified that, in turn, could help inform culturally acceptable intervention approaches to prevent the risk factors for childhood and adolescent malnutrition;
3. Examine views on acceptable methods for involving families in diet and physical activity interventions for children;
4. Explore ways in which parental involvement could be further enhanced by active engagement of the school and the wider community in diet and physical activity intervention for children.

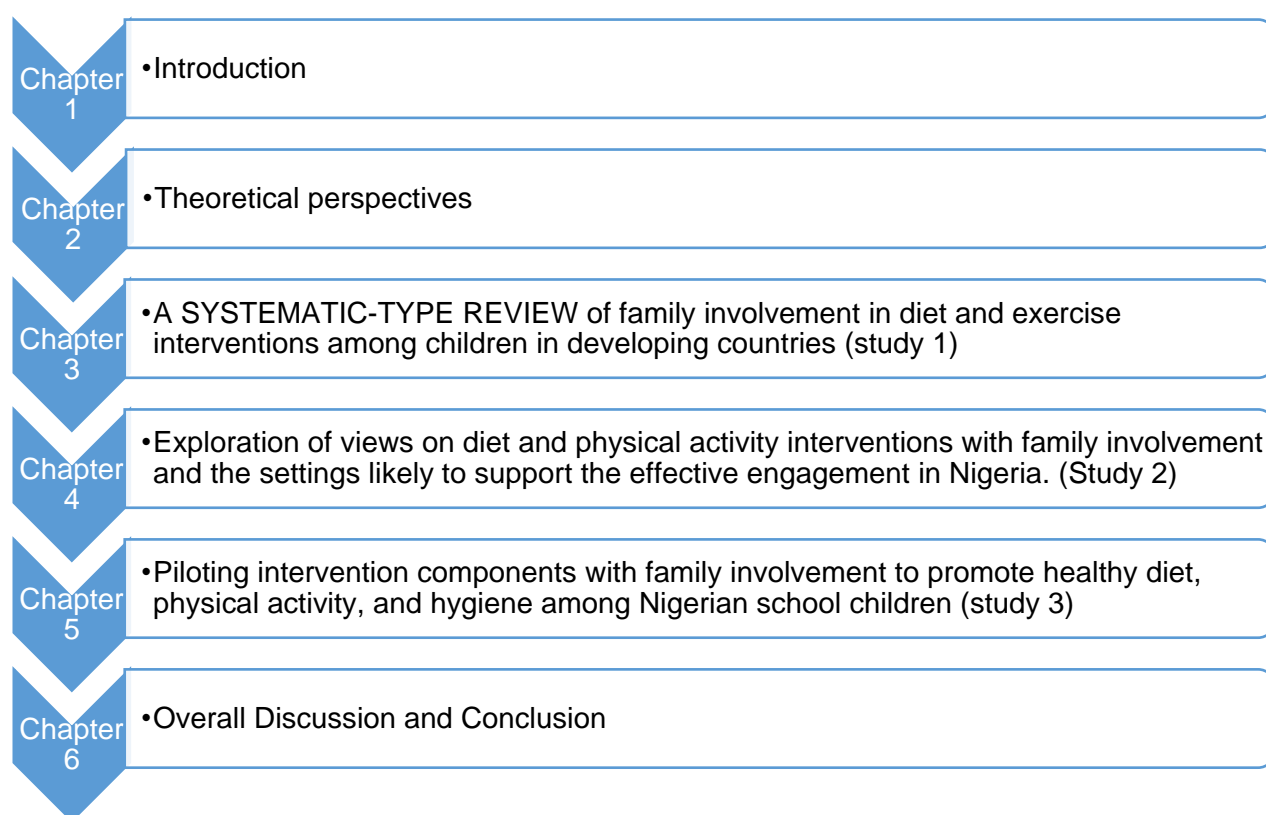
### ***Study 3. Piloting of intervention components plus family involvement to promote a healthy diet and physical activity among Nigerian School children.***

Based on the findings from the literature review (study 1) and the qualitative study (study2), the purpose of study 3 was to develop, pilot and evaluate potential intervention components that focus on promoting healthy diet and physical activity with school children (aged 8 to 10 years) in Lagos, Nigeria.

The objectives of study 3 were to:

1. Develop theoretically- and evidence-based intervention components that are culturally favourable, focusing on increasing healthy diet choices, physical activity, and hygiene practices, and reducing sedentary behaviours.
2. Deliver the intervention components in a school and the wider community.
3. Explore the acceptability and feasibility of the intervention among parents and children.

Prior to conducting study 1 the theoretical frameworks underpinning the programme of research are summarised (Chapter 2). A flow diagram depicting the structure of the thesis is in Figure 1.1.



*Figure 1.1: Flow diagram of the thesis structure*



## **2 2 THEORETICAL PERSPECTIVES**

### **2.1 INTRODUCTION**

This chapter examines the concept of health and health promotion, and the socioecological perspectives on health promotion approaches. This chapter also describes family involvement as one of the key pillars of health promotion among children and its potential role in the development of a successful health intervention, are described.

The concepts of health and health promotion have been viewed from various perspectives, and many people and organisations have made an attempt to define both (Cairney et al., 2019). The model of health promotion, unlike the public health perception of illness prevention, places emphasis on reaching out to people at individual, community, and organisational levels, to improve the holistic environment and thus improve the health of the entire community (Carroll and Hills, 2020; Van den Bosch and Bird, 2018).

The Ottawa Charter for Health Promotion (WHO, 1986) established the first step in defining a move towards a more holistic view of health and stated that *'Health is created and lived by people within the settings of their everyday life; where they learn, work, play and love'* (WHO, 1986, p.3). The charter, in encouraging a significant move towards this more holistic model of health from a health promotion perspective, identified and expanded on five levels at which health promotion can be practised; that is, *"building healthy public policy, creating supportive environments, strengthening community actions, developing personal skills and reorienting health services"* (WHO, 1986, p. 1-4).

This emphasis on a supportive environment that could encourage improvements in the health of individuals led to the development of the settings approach to health promotion (Barker et al., 2018; Fletcher et al., 2018). The settings approach to health promotion suggests that peoples' health can be affected by the settings in which they function and emphasised a move towards a socio-ecological perspective of health (Spencer et al., 2018; Velardo and Drummond, 2019).

### **2.2 HEALTH THEORIES AND MODELS**

Developing health promotion interventions that support healthy lifestyle behaviours requires a solid framework (Lood et al., 2015), and models and theories are used to guide this process (Coulson et al., 2016; Davis et al., 2014). There are many factors that can affect an individual's or a community's ability to effectively change diet and physical activity (PA) behaviours, including poverty, lack of access to safe places to exercise, inaccessibility of healthy food, and cultural and ethnic differences (Hagger and Weed, 2019; Fernandez et al., 2019). To be

effective, interventions must not only address the behaviour, but also the factors that surround the behaviours (Cislaghi and Heise, 2019; Scaglioni et al., 2018).

Health behaviour models and theories help to explain why individuals and communities behave the way they do and suggest ways of effecting change, providing frameworks for intervention design, development, implementation, increased effectiveness, and evaluation (Coulson et al., 2016; Davis et al., 2014). There is, however, no one size fits all approach; different models may be appropriate in different situations, as each individual or community requires an intervention that is tailored to meet their specific needs (Brown et al., 2019; Theobald et al., 2018).

Tailoring an intervention may require the consideration of multiple theories to support lifestyle behaviour change. It is said that a mix of approaches helps to provide the best support and guidance to help individuals and communities work towards developing healthy lifestyle behaviours (Lavallée et al., 2018; Oliwa et al., 2020). The health behaviour and behaviour change models, theories, or approaches considered of potential relevance to this programme of research included the health belief and transtheoretical models; social cognitive and socioecological theories; and settings, family involvement and community partnership approaches, and are discussed below.

### 2.2.1 The Health Belief Model

The Health Belief Model was first developed in the 1950s by social psychologists Godfrey Hochbaum, Irwin Rosenstock, and Stephen Kegels (Hochbaum et al., 1952). It is one of the oldest models of health behaviour, addressing the willingness to act upon a health behaviour based on several individual beliefs (Nagy-Pénzes et al., 2020).

The Health Belief Model is a framework for motivating people to take positive health actions that uses the desire to avoid a negative health consequence as the prime motivation (Sulat et al., 2018). Core constructs of this model include perceived susceptibility and perceived severity, perceived benefits and perceived barriers, cues to action and self-efficacy (Rosenstock, 1974). The assumptions underlying this health model are that an individual's beliefs and attitudes about health behaviours influences their actions and knowledge about the consequences of these behaviours (Dempsey et al., 2018).

The model explains why people might not engage in PA, for example, even if they are fully aware of the potential negative impacts of such behaviour (Green et al., 2020; Kelly and Barker, 2016). The rule of exceptionalism can play a role in such behaviours, as an individual might have a 'cognitive illusion' despite the statistics showing the negative effects e.g. of a lack of PA (Gopinath, 2011).

A key limitation of this model is that it does not consider the community, economic, environment, social factors that can influence health behaviours and outcomes (Almutari and Orji, 2021; Kamran et al., 2021). The Health Belief Model stresses personal responsibility, which may lead individuals blaming themselves if they cannot alter their behaviours (O'Connor et al., 2014). Health behaviours are often more complex and can be caused by various factors, as mentioned. The fact that behaviours may be performed based on social or cultural acceptability is also not considered (Simons-Morton et al., 2012). For example, it is a cultural practice for a Efik girl to enter a 'fattening room' (a centuries old rite-of-passage for young women, where they are secluded, eat, sleep, restrict activity, and therefore gain weight as a mark of good health and prosperity) (Enang, 2009). Thus, a health belief model would be inadequate as a stand-alone design or framework for the development of a health promotion intervention in this instance; there needs to be accommodation of various environmental, social, and cultural factors whilst focusing on the personal health behaviours.

#### 2.2.2 Transtheoretical Model (Stages of Change)

Developed by Prochaska and DiClemente in the late 1970s (Sarkin et al., 2001), the Transtheoretical Model, (also called the Stages of Change Model), focuses on the decision making of the individual and is a model of purposeful change. This model functions on the notion that people do not change behaviours quickly and decisively. Rather, change in behaviours, especially habitual behaviours, occurs continuously through a cyclical process (Prochaska et al., 2009).

This model suggests that the process individuals move through is in six stages of change: precontemplation, contemplation, preparation, action, maintenance, and termination; however, since the process is cyclical, the individual may spend time at one stage and might either go forwards or backwards (Prochaska and Velicer, 1997). As the lines of the stages of change are not specific, it is difficult to determine what stage of change an individual is in. This can have a negative impact on evaluating the health intervention as one cannot validate or standardise change in this model (Reed et al, 2021).

Factors such as the costs and benefits, the impact of desired change, support and confidence can affect individual's attempt to make a behavioural change (Michie et al., 2018). Whilst these factors are considered in this theory, the environmental, socioeconomic status and income of an individual needs to also be considered as these can also affect the stage of change an individual decides to be at. Implementation and evaluation can also be affected in the design

of such an intervention if there is no clear sense of how much time is needed for each stage or how long an individual might spend at a given stage (Fernandez et al., 2019).

The model also assumes that individuals make clear and logical plans in their decision-making process when this is not always true (Eyster et al., 2022). This model is individual-focused and therefore may not be relevant for specific populations, complex health interventions or community-based interventions except when used in combination with a theory or model that augments its missing factors (Jiménez-Zazo et al., 2020).

### 2.2.3 Social Cognitive Theory

Social cognitive theory (SCT), the cognitive formulation of social learning theory articulated by Bandura (1986), and widely applied (Beauchamp et al., 2019; Rhodes et al., 2019), explains human behaviour in terms of a three-way, dynamic, reciprocal model in which personal factors, environmental influences, and behaviour continually interact. Key constructs of social cognitive theory that are relevant to health behaviour change interventions include observational learning, reinforcement, self-control, and self-efficacy (Govindaraju, 2021).

However, one of the limitations of the social cognitive theory is that it focuses on individual behaviour change, and environmental influences are largely considered at the social environmental level and in relation to learning behaviour (Rhodes et al., 2019). The interventions based on this theory are often seen as relying heavily on the intention to teach, with little emphasis on the development of behavioural capacity.

By contrast, a socioecological perspective prioritises understanding of various levels of influence relating to an individual's health and related behaviours, and how this understanding can provide guidance for effective interventions, as discussed below.

### 2.2.4 Socioecological Model

Ecological or socioecological models (SEM) address behaviour change at multiple levels and considers the inter-relationship between behaviours and the environment. The emphasis on interactions across individual, interpersonal, organisational, community and public policy levels, and the idea that behaviours both shape and are shaped by the social environment, suggests that creating environments conducive to change is important in making it easier for populations to adopt healthy behaviours (Veer et al., 2019). The main emphasis of social ecological models is therefore that they are a more holistic approach that may be more effective at driving change than interventions that focus only on individual level behaviour (Sallis et al 2008).

SEM have evolved within behavioural and public health research and practice with the most influential variant being Bronfenbrenner's approach which conceptualised the categories of

influences on behaviour as the *microsystem*, *mesosystem*, *exosystem*, and *macrosystem*, illustrated using nesting circles that placed the individual in the centre surrounded by the aforementioned systems (Bronfenbrenner, 1977). The microsystem, closest to the individual was viewed as containing the strongest influences and encompasses the interactions and relationships of the immediate surroundings. The mesosystem looks beyond immediate interactions and includes others that the individual has direct contact with such as at work, school, church, and neighbourhoods. The exosystem was purported to exert both negative and positive interactive forces on the individual via community contexts and social networks, while the macrosystem included societal, religious, and cultural values and influences (Bronfenbrenner, 1986). In revised models the additional *chronosystem* contained both internal and external elements of time and historical content, and included the influence of policy (Bronfenbrenner, 1989).

Sallis et al., (2008) proposed that behaviour-specific SEM should be developed and the most influential factors at each level identified. In health promotion and public health subsequent revisions of SEM have occurred, most commonly including five levels of influence namely intrapersonal, interpersonal, institutional, community, and policy, or other variations on the category number and labels (Sallis et al., 2008), and applied to a range of fields such as PA, mental health, maternal and child health, and cancer prevention (Lauwers et al., 2021; Johnson et al., 2020; Zimmerman et al., 2015; Mehtala et al., 2015; Alio et al., 2010). The principal concern of the current programme of research was the improvement of diet and physical activity in school aged children and the role of parental involvement. Models of behaviour change combining policy actions aimed at improving the social, cultural, economic and environmental factors with individually focused approaches are reflected in influential international guidance such as the WHO Global Action Plan on Physical Activity (<https://apps.who.int/iris/bitstream/handle/10665/272722/9789241514187-eng.pdf>).

However, despite this high level endorsement, examples of diet and PA interventions which address multiple levels of intervention remain relatively scarce. In a systematic review of physical activity interventions in childcare settings, applying a SEM lens, of the 23 studies eligible for inclusion 15 were conducted at two or three of the intrapersonal, interpersonal, and organisational levels and the remaining eight were conducted at the individual level (Mehtala et al., 2014). None of the studies were conducted at more than three levels of influence, or at the community or policy level. Of the studies that included a parental involvement component, PA was significantly increased in one high quality study. The lack of impact of parental involvement in the other studies was attributed to methodological weaknesses and lack of intensity (such as only providing parents with knowledge or materials); similarly, only one of the multilevel and theory-based interventions was deemed high quality. The authors

recommend that more well designed, intensive, multilevel and multicomponent interventions are needed (Mehtala et al., 2014).

Existing intervention studies promoting healthy diet and physical activity from a SEM perspective, relevant to urban African settings, are even more sparse. Two reviews mapping factors influencing PA and/ or dietary behaviours to a SEM found that, of the small total number of studies included (n=39 and n=23, respectively), the literature was dominated by studies examining individual level factors (Osei-Kwesi et al 2020; Yika et al 2020). Furthermore, although Osei-Kwesi et al., (2020) included studies on adolescents, Yika and colleagues' (2020) review focused on adult women, identifying a significant gap in relation to children in the current evidence.

As a framework for understanding the interaction between multifaceted influences on health, the growing interest in SEM has parallels with the increasing attention to, and content of, the social determinants of health model. This model centres on the conditions of daily life and the wider forces and systems that shape the conditions of daily life

([https://www.who.int/health-topics/social-determinants-of-health#tab=tab\\_1](https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1)). It is a global phenomenon that health outcomes and their causes vary strikingly by socio-economic circumstances, such that the least well off have the worst outcomes (Donkin et al., 2017). The cornerstone of a social determinants model is therefore the concern for health equity for all across social class gradients not just for the more affluent (Dahlgren and Whitehead 1991). The most well-known variant of the social determinants model is that proposed by Dahlgren and Whitehead (1991) (Figure 2.1), and this model was used to further explicate the SEM developed to underpin the current programme of research, as shown in Table 2.1. The interplay between four levels of factors relevant to promoting healthy diet and PA among children with parental involvement formed the SEM framework. **Individual** (or intrapersonal) factors, for example knowledge, attitudes and beliefs, aligned with the age, sex, 'constitutional', and individual lifestyle factors in the social determinants model. **Interpersonal** factors, including family role modelling, were akin to the social and community networks layer of the social determinants model, as were **community** level factors such as cultural norms and food accessibility. The fourth **societal** level, including school diet and PA programmes, government and local policies, mapped to living and working [school] conditions, general socio-economic/ environmental conditions, and policies and legislation layers of the social determinants model.

The SEM model is not without its limitations. For instance, it does not clearly address the importance of resilience (e.g., Luthar et al., 2000) – a major framework in developmental psychology and one which had become increasingly popular around the time of the start of

the research reported in this thesis (Henderson et al., 2016; Ma et al., 2017; Taylor and Distelberg, 2016). There is also a lack of specificity about the most important influencing factors; when compared with other models or theories, the broad concepts of this model can make it difficult for the researcher to focus on specific factors relating to health behaviours (Simons-Morton, et al. 2012). Similarly, there is also a lack of information on how broader levels of influence operate to achieve effective change in health behaviours (Henderson et al., 2016; Terhani et al., 2016).

It has been suggested that interventions with the SEM as its basis, informing change at several levels of influence including environmental, organisational, and personal, are most likely to be effective in favourable behaviour modification (Sallis et al., 2008). This view has been maintained over the years, including in research involving young people, and despite the inherent challenges (Wold and Mittelmarm, 2018). However, it has also been suggested that combining several theories or models might result in the strongest interventions (Glanz and Rimer 2008), and that the SEM in conjunction with its consideration of wider determinants such as environments and policy, provides a valuable framework for the inclusion of multiple theories (Sallis et al., 2008). The SEM is the conceptual underpinning of the settings approach (WHO 1986), and as schools and communities are central to the current research focus the overarching value of a settings approach is explored in Section 2.2.6, below. Furthermore, as family involvement is a core area of enquiry in this programme of research, alliance with families and the potential for community based participatory research to facilitate such partnership, also espoused as a value within the settings approach, is additionally highlighted in Section 2.2.7.

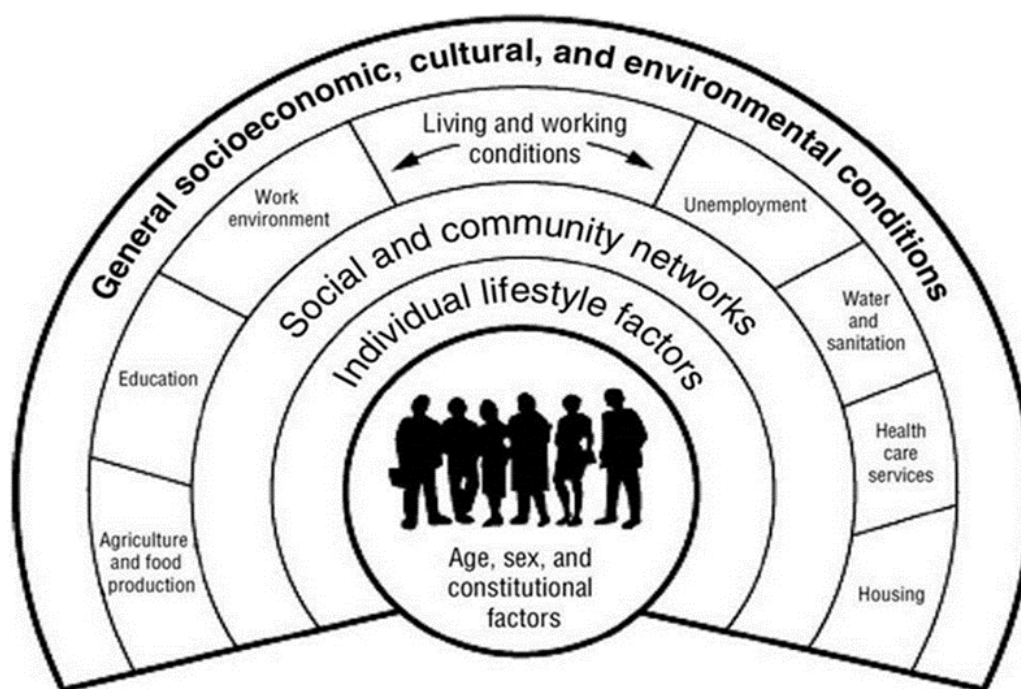


Figure 2.1: Social determinants of health model. From: Dahlgren and Whitehead 1991



**Table 2.1. Sociological model mapped to the social determinants of health**

Four levels of factors for the SEM framework for this programme of research	Social determinant of health (Dahlgren and Whitehead (1991))
<p>1. <i>Individual</i></p> <p>1. Knowledge, attitudes and beliefs;</p> <p>2. Motivation to engage in health diet and physical activity,</p> <p>3. Literacy and cognitive abilities,</p> <p>4. Socio-economic status, age, gender, ethnicity;</p> <p>5. Weight, dietary intake, physical activity, sedentary lifestyle, age</p>	<p>Age sex constitutional factors</p> <p>Individual lifestyle factors</p>
<p>6. <i>Interpersonal</i></p> <p>1. Family eating and physical activity attitudes, knowledge and behaviours;</p> <p>2. Family role modelling;</p> <p>3. Role of children in diet and physical activity;</p> <p>4. Peer influences on diet and physical activity, food preferences</p>	<p>Social and community networks</p>
<p>5. <i>Community</i></p> <p>1. Cultural norms and beliefs regarding diet and physical activity,</p> <p>2. Availability of appropriate, enjoyable physical activity options;</p> <p>3. Accessibility of food;</p> <p>4. Community organisational and other social networks</p>	<p>Social and community networks</p>

5. *Societal*

National and local government  
policies on diet and physical activity  
e.g. National School Health Policy



Living and working conditions

Work environment

Education

School environment

School programmes on diet and  
physical activity

General socio-economic/  
environmental conditions

Policies and legislation

### 2.2.5 The Settings Approach

The healthy settings approach has at its basis a holistic concept with the main goal of integrating health consciousness into the multifaceted fabric of settings, including the culture, structure, processes, and everyday life (Dooris et al., 2014). Settings such as schools, workplace, communities, and hospitals constitute key settings for health promotion (Hubley and Copeman, 2018). As such, the settings approach is different from conventional health education which may use settings as locations to reach people, and as places to conduct health promotion activities; rather it is a holistic approach to health promotion that signals the role of partnership between individuals, families, communities, researchers, and intervention providers (Hubley and Copeman, 2018; Kumar and Preetha, 2012). The settings approach has global recognition. Consequently, the Nigerian National Health Promotion Policy states that health promotion should be strengthened in key settings that reach large segments of the community, and that the settings to be mobilised include the community, higher education institutions, and notably, schools, as advocated by this policy (Federal Ministry of Health, 2019).

Schools have an important influence on young people's health and wellbeing as they are settings where they ostensibly spend a large proportion of their day, are linked to the students' families and are embedded within the wider community (Jourdan et al., 2021). Therefore, to maximise the likelihood that health interventions will improve children's health, a socio-ecologically informed settings approach is considered suitable for both practical and theoretical reasons; children can be engaged with in the physical, social, and cultural settings in which they live, learn, play, and work, i.e. the home, community, and school (Jourdan et al., 2021; Wold and Mittelman, 2018). Promoting children's health at school has been found having a positive ripple effect in engaging families and communities in healthy habits (Gold et al., 2020; Pulimeno et al., 2020). However, it is not only the setting that impacts on its actors (e.g. parents and children) but also the actors that shape the setting, known as reciprocal determinism (Kokko et al., 2014). To foster health promotion and deliver on their social commitments, schools need the support of wider community and societal actors, to overcome the obstacles that arise, and in order to build up a comprehensive preventive system (Singla et al., 2020). This holistic ethos with regard to enabling schools and communities to improve and maintain the health status of school aged children, advocated in the Ottawa Charter for Health Promotion (WHO 1986) as outlined in the introduction to this chapter, gave rise to the concept of the WHO's Health Promoting School.

Within the WHO's global school health initiative, a health promoting school is characterised as a school constantly strengthening its capacity as a healthy setting for living, learning, and

working ([https://www.who.int/health-topics/health-promoting-schools#tab=tab\\_1](https://www.who.int/health-topics/health-promoting-schools#tab=tab_1)). Providing health services including health education, health promotion, nutrition and food supply programmes; opportunities for physical education, recreation and mental health promotion; striving to improve the health of school personnel, families and community members through a home-school-community relationship; and implementing policies and practices that respect an individual's wellbeing and dignity are among the range of features which define a health promoting school.

In response to the global school health initiative, a number of countries including Nigeria developed a National School Health Policy (NSHP), as the cornerstone of a whole school approach and thus a health promoting school (Federal Ministry of Education 2006). School Health Programmes (SHP) are a core constituent of NSHP. The Nigeria SHP was defined in the NSHP as a series of harmonised projects and activities in the school environment for the promotion of health and development of the school community (Federal Ministry of Education, 2006). The policy has five components including a healthful school environment, school feeding services, skill-based health education, school health services, and school, home, and community relationships. The extent to which the policy impacts downstream on the influences on children's dietary and physical activity habits, how bottom-up approaches influence policy, and the involvement of policy actors in research in exploring these interactions within a settings approach, underpinned by a SEM, is therefore germane to the current programme of research. Fostering the partnerships with families and communities which are integral to the chosen approaches is discussed below.

## 2.2.6 Family involvement and community partnership

### *Family involvement*

With its core importance to the health and wellbeing of a child, the fundamental role of parental and family involvement in the developmental years of their children is well established (Viner et al., 2012), and evidence for the supportive role of families within schools is also accumulating (Lang et al., 2021).

The extent and quality of the interrelationships within the settings where children spend their time (community, families, and schools) can affect their growth and development (Immordino-Yang et al., 2018; Rhoes et al., 2020). Positive outcomes have been demonstrated when families actively participate in contributing to the promotion of the health and wellbeing of their children (Patel, 2014; Yarımkaaya and Esentürk, 2020). Parents and members of the community can also influence food policies in schools through involvement in school nutrition

groups, for example, which results in healthier dietary options being provided for the children (Day et al., 2019).

The potential influence of a positive relationship between the home and school on improving children's lives has been underlined (Masten and Barnes, 2018). In addition, it has been suggested that both the education and wellbeing of children is considerably linked to the relationship between the school and the home (Kerbaiv and Bernhardt, 2018; Moore et al., 2018). Although the participation of families in school life can sometimes be challenging (Gadsden, 2021), family participation in school life is generally viewed positively and it has been argued that school and home relationships should be supported (Gennetian et al., 2019; Soneson et al., 2018).

However, one outstanding issue is the question of how schools and families can make the connection to help children reach their potential (Aguirre Velasco et al., 2020; Jeynes, 2018). It has been reported that a friendly and welcoming physical and psychosocial environment in a school has the prospect of creating an atmosphere that encourages family participation (Darling-Hammond and Cook-Harvey, 2018; Vaux and Asay, 2019). There is a general lack of understanding regarding how such involvement can be encouraged and supported.

The environment surrounding the school can reflect the values being developed within the school environment and vice versa, and attention to positive relationships between the school and the community, particularly the families of the school children, is advocated (Clauss-Ehlers et al., 2019; Montoya-Ávila et al., 2018). Health promoting interventions within a school setting still requires supportive communities, and the concept of the health promoting school includes this idea of the school linked in partnership to its wider community and environment (Kolbe, 2019; Nutbeam, 2019; O'Reilly et al., 2018), as noted above. Partnership with the surrounding communities within the model of the health promoting school has been recognised as fundamental to the development of a successful school health promotion (Hubley and Copeman, 2018). Community based participatory research (CBPR) can be one way of fostering the necessary partnership (Marrone et al., 2022).

#### *Community based participatory research (CBPR)*

A CBPR approach, with an emphasis on partnering with the community, provides an alternative to traditional approaches (Jull, et al. 2017). CBPR aids recognition of the importance of involving a wide range of stakeholders, including the individuals and communities who are the intended beneficiaries, as active and equal partners in the phases of intervention development and implementation in order to facilitate change (Tremblay et al., 2018). Involving families and other community members in health promotion initiatives could

contribute considerable added value in providing their skills, expertise, and social capital to shape the planning, implementation, and sustainability of health promotion interventions (Darling-Hammond et al., 2019).

Collaborative partnerships throughout the research involving a power sharing process that addresses social inequalities, co-learning and capacity building among all partners aids knowledge generation which is beneficial to all parties involved (Israel et al., 2005). The cyclical and iterative process involved in systems development gives local relevance to public health problems and on ecological perspectives that attend to the multiple determinants of health (Silberberg and Martinez-Bianchi, 2019). There is opportunity for local and wider dissemination of result which brings together community partners, institutional partners, and researchers irrespective of ethnicity, education, and social class. There is also rigour and validity to ensure relevance of research (Afifi et al., 2020; Kelly et al., 2020).

Various CBPR studies have used the SEM as a framework for understanding the multiple factors that impact health at different levels, to identify and develop approaches for prevention and health promotion (Bammann et al., 2021; Fetherman et al., 2021), but more research involving children in low resource settings is needed.

## **2.3 THEORETICAL UNDERPINNING OF THE PROGRAMME OF RESEARCH**

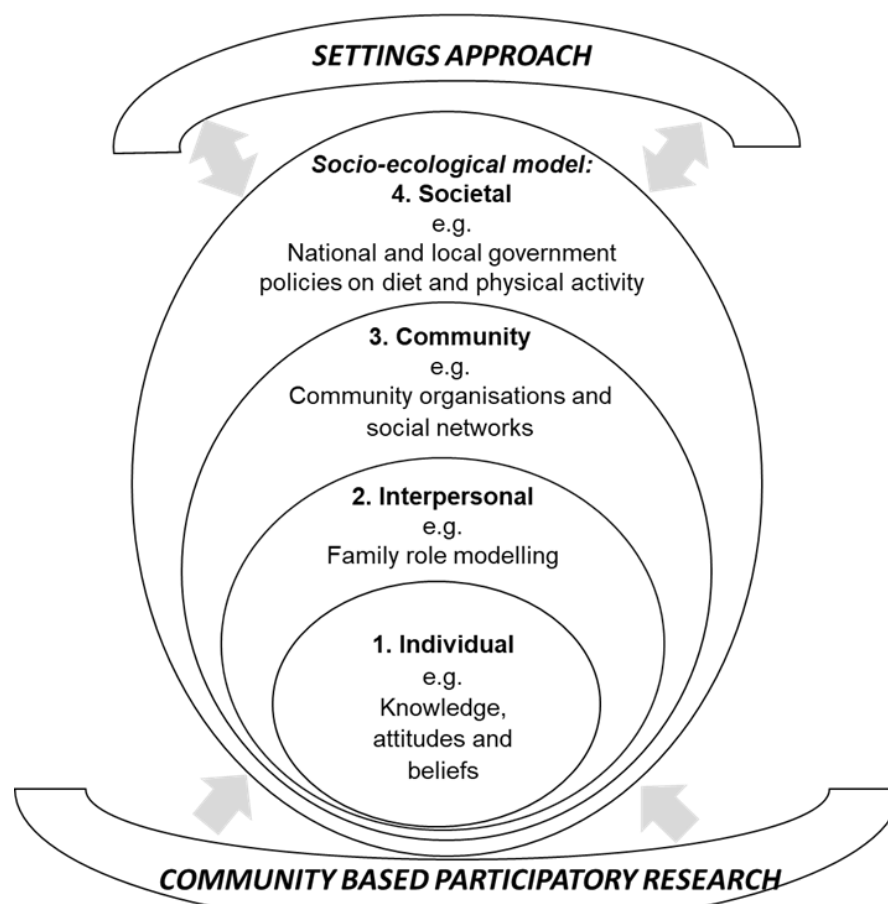
The application of a theoretical basis to an intervention contributes significantly to the success of a programme, as research indicates interventions based on theories are more effective than interventions that do not have a theoretical basis (Cassar et al., 2019; Skivington et al., 2021).

The composite of theory informing the research is depicted in Figure 2.2. A socio-ecological model (SEM) was chosen as the core theoretical approach due to its fundamental concept being the multiple levels of influence on children's dietary habits and physical activity. This facilitates an emphasis on the school, family, and other social environments, and their reciprocal, simultaneous, and dynamic influence on individual level factors (Sallis et al., 2008). The SEM is the conceptual basis of the settings approach and the health promoting school ethos. Inclusion of healthy settings thinking helped consideration of the context of the school as the setting for a holistic approach to behaviour change, and potentially aided exploration of the mechanisms which foster home-school-community partnership (Jourdan et al., 2021).

Family involvement in diet and exercise interventions in Nigeria is a central area of inquiry. The home environment is critically important to support behaviours that promote health and prevent malnutrition, yet remains understudied in Nigeria, especially with regard to children over 5 years old (Adebimpe, 2019; Oyeyemi et al., 2019). A theoretical foundation which draws

on CBPR formalises the engagement of a range of stakeholders across the SEM levels, cementing the principle of partnership, capacity building, shared ownership and commitment to health promotion initiatives (Israel 2005), key to the settings approach.

The ways in which the model informed and was integrated into the qualitative study of children's, parents' and other stakeholders' views (Study 2), and a mixed-methods piloting of potential components for a diet and physical activity intervention (Study 3), the empirical studies within this programme of research, are outlined in Chapters 4 and 5, respectively. The appropriateness of the model is further deliberated in the overall discussion in Chapter 6.



*Figure 2.2: Theoretical model for the programme of research*

The next stage in the programme of research, however, was to establish the existing evidence base for diet and physical activity interventions with parental involvement in developing countries including Nigeria, through a systematic-type review of the literature presented in Chapter 3.

### **3 A SYSTEMATIC-TYPE REVIEW OF FAMILY INVOLVEMENT IN DIET AND EXERCISE INTERVENTIONS AMONG CHILDREN IN DEVELOPING COUNTRIES (STUDY 1)**

#### **3.1 INTRODUCTION**

Low-income and middle-income countries carry the greatest burden of malnutrition. Malnutrition in all its forms- obesity, undernutrition, and other dietary risks for non-communicable diseases (NCDs), is already the leading cause of poor health globally (Swinburn et al., 2019). Historically, the most widespread form of malnutrition was undernutrition which includes micronutrient deficiencies, stunting and wasting; however, in the past few decades, the pandemic of obesity has shifted the patterns of malnutrition (Swinburn et al., 2019). There has also been extensive research on the development of health and disease which has shown childhood undernutrition are risk factors for obesity and its consequences through the course of life (Bhadoria et al., 2015; Martins et al., 2011).

In low-income and middle-income countries, the prevalence of overweight in children is on the rise on the background of an already highly prevalent status of stunting, wasting and underweight among children. Unhealthy nutrition in addition to its causative role in obesity and undernutrition costs lives, cost dignity and increasingly places an unsustainable economic burden on the individual and society (Harrison K et al., 2011; te Velde SJ et al., 2014).

The importance of parental involvement in school-based interventions is recognised as families and the wider community in which children live also have an enormous impact on children's health based on the health promoting school framework (Langford et al, 2014). It is known that environmental factors like the family and school environment play a major role in improving children's weight status, physical activity, and sedentary behaviours (Brug J et al., 2012). Parents are involved in influencing childhood diet by providing their child with the ability and opportunity to make healthy or unhealthy choices through the selective use of food parenting practices Hoerr et al., 2009).

Since food choices are related to energy balanced related behaviours, parent involvement in children dietary and/or physical activity interventions seems crucial to mitigating the risk of malnutrition (Rennie et al., 2006). A systematic-type review by Campbell and Hesketh (2007), aimed to impact children's weight status, physical activity, diet, or sedentary behaviours concluded parents have the capacity of making behavioural changes that may encourage healthy weight in their children, but due to the limited number of studies in this age group, the authors were unable to draw any conclusions as to the most effective strategies.

A more recent systematic-type review summarised studies on the effectiveness of primary school-based physical activity, sedentary behaviour, and nutrition interventions with direct



parental involvement on children's BMI or BMI z-score, physical activity, sedentary behaviour, and nutrition behaviour, categorised into those with intervention components targeting socio-cognitive determinants, or environmental determinants (Verjans-Janssen et al., 2018). The authors concluded that parental involvement in school-based interventions can improve physical activity and body mass index (BMI) and also decrease sedentary activity by directly engaging parents instead of using indirect strategies such as intervention related newsletters.

The original intention of this current review was to include the objective of exploring diet and exercise interventions with direct parental involvement conducted in developing countries, as previous reviews had not been conducted in these settings. However, the initial scoping search for this review identified relevant studies conducted only in high- and middle-income countries (Berggren et al., 2017; Evans et al., 2015; Hoppu et al., 2010 and Shi-Chang, 2004) according to the World Bank's classification of countries (see methodology). Thus, the objectives were revised, and the review was limited to exploring associations between parental factors and childhood diet, exercise, and adiposity, and perspectives on the barriers and facilitators to optimal diet, exercise, and BMI among children in developing countries settings, especially in Africa.

This review involved the use of multi methods, equally prioritising qualitative and quantitative studies. This has allowed addressing the research objectives which either a qualitative or qualitative approach alone could not achieve (Tashakkorie and Teddlie, 2003).

### **3.2 AIMS AND OBJECTIVES**

The purpose of this study was to conduct a systematic-type review on qualitative and quantitative studies on to identify evidence of the role of parental associations, and the perspectives of children, parents, and stakeholders. in low-income countries

The objectives were to:

1. Investigate associations between parental factors and diet, exercise, and body mass index (BMI) in children.
2. Explore perspectives of children, parents and other stakeholders on the barriers and facilitators to optimal diet, exercise, and BMI among children.

### **3.3 METHODOLOGY**

Two commonly used paradigms in public health research are positivism, based on quantitative assumption, and interpretivism, based on qualitative assumptions (Ulin et al., 2005). A pragmatic assumption can also be used, which combines key elements from each paradigm

in carefully designed studies. The following sections in this chapter describe the pragmatic approach, its different strengths, and limitations.

The study methodology comprised of the following discrete stages. Searching for potential eligible studies in a systematic form; screening of studies by applying a priori exclusion and inclusion criteria created from the research objectives to titles, abstract and full texts of citations; extracting data using a standardised format; quality assessment of the studies using recognised, validated tools; synthesis of the data and reporting of the review findings in tables and in a narrative review and critical evaluation of studies that have met the inclusion criteria; and (Khan et al., 2003).

In the World Development Indicators database, all 189 World Bank member countries, plus 28 other economies with populations of more than 30,000, are classified so that data users can aggregate, group, and compare statistical data of interest, and for the presentation of key statistics (World Bank, 2020). The main classifications provided are by geographic region, by income group, and by the operational lending categories of the World Bank Group.

Economies are currently divided into four income groupings: low, lower-middle, upper-middle, and high. Income is measured using gross national income (GNI) per capita, in U.S. dollars, converted from local currency using the World Bank Atlas method (World Bank 2019).

The conduct and reporting of this review adhere to the general principles using a predefined protocol recommended by Preferred Reporting Items for SYSTEMATIC-TYPE REVIEWS and Meta-Analysis (PRISMA) for the quantitative studies (Moher et al., 2015) and Enhancing Transparency in Reporting the synthesis of Qualitative research (ENTREQ) guidelines (Tong et al 2012) for the qualitative studies.

### **3.4 CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW**

The study objectives and criteria for inclusion in the review were originally defined using the PICOS guidelines (Higgins and Green, 2011). The PICOS components are population, intervention or exposure, comparator, outcome, setting, and study design. However, as noted in the introduction, the initial scoping search did not identify any randomised controlled trials for diet and exercise interventions with parental involvement in low-income countries,

The PICO(S) tool for systematic-type reviews of quantitative research, is not optimal for qualitative evidence synthesis (O'Connor et al., 2008). Qualitative reviews seek to understand the meaning of phenomena and their relationships; therefore, a different approach was required for synthesis that included qualitative research. The PICo mnemonic is commonly used for qualitative reviews and stands for the population, the phenomena of interest and the

context (Risenberg and Justice, 2014a; Stern et al., 2014). A revised framework to address the two objectives of this review was devised utilising PICO, but also integrating outcome, and settings from PICO(S) (Higgins and Thomas, 2021). The framework was applied to the two elements of the review as outlined below:

**Population:** The population of interest was children aged 5-20 years, as well as parents, school staff and health professionals (qualitative studies only) responsible for the dietary and exercise needs of children in this age group. It is well established that diet and lifestyle in childhood are predictors of health outcomes in adulthood (Jacob et al., 2019; Emmett and Jones 2015). Studies were restricted to those conducted in low-income countries. In addition to the evidence suggesting the long-term impact of childhood exposures on adult health, research suggests there are differences in how diet, exercise and BMI of children is associated with parental factors such as parental social class and adiposity in affluent vs less affluent countries (Shrewsbury et al., 2008; Barriuso et al., 2015).

**Outcomes (quantitative studies):** Relevant outcomes for the quantitative studies were those that elucidated associations between parental factors including sociodemographic information (e.g. gender, age, education, employment status/ occupation, income), parental dietary and activity behaviours, weight, weight status or BMI, and children's dietary and activity behaviours, weight, weight status or BMI.

**Setting (qualitative and quantitative studies):** The setting for both elements of the review was low-income countries. Initial scoping of the literature (see Chapter 1) indicated that school-based interventions have positive impact on child and adolescent anthropometry, dietary intake, and physical activity (Jacob et al., 2021; Silveira et al., 2011; van de Kolk et al., 2019). However, as noted above, none of the included studies were conducted in sub-Saharan Africa or other low-income countries, and it was necessary to pivot the focus of the review to studies examining parental influences on their children's diet, activity and weight. Nevertheless, the focus on low-income countries (as defined by the World Bank) was maintained in order to critically review the literature that had the closest contexts to Nigeria, given the importance of this in the associations of interest outlined above. Where possible similarities and differences in associations or views in urban vs rural settings were explored.

**Context (qualitative studies):** As for the quantitative studies, the included qualitative studies were those in low-income countries. Where possible, in addition to urban vs rural comparisons, similarities or differences in views between participants in school-based vs community-based studies were explored.

**Phenomena of interest (qualitative studies):** For qualitative studies, the phenomena of interest included participants own perspectives on diet, exercise, and BMI, and on the barriers to and facilitators of optimal diet, exercise and body weight.

The combined framework was used to develop the inclusion and exclusion criteria (Table 3.1).

**Table 3.1: Inclusion and exclusion criteria**

Parameters	Relevant to quantitative, qualitative or both	Inclusion	Exclusion
Population	Both	Children aged 5 to 20 years Parents  Other adults/ stakeholders responsible for children's diet and exercise needs (qualitative studies only)	Studies including children aged <5yrs
Settings	Both	Low-income countries; urban or rural locations	Studies conducted in middle- and high-income countries
Context	Qualitative	Low-income countries; Urban or rural locations, school or community-based	As above
Outcomes	Quantitative	Associations between parental factors and childhood diet, exercise, and BMI	Studies that did not examine associations between these factors (unless suitable for inclusion within the qualitative studies)
Phenomena of interest	Qualitative	Perspectives on diet, exercise, and body weight; and views on barriers and facilitators to optimal diet, exercise, and BMI	Qualitative studies which focused on other phenomena
Study designs	Both	All	No restriction on study design for studies otherwise meeting the inclusion criteria

### 3.5 SEARCH STRATEGY AND SOURCES OF PAPERS

The study objectives and inclusion and exclusion criteria informed the identification of the keywords and search terms related to family involvement, diet, physical activity, and developing countries from which the search strategy was developed. Free search terms and key words were combined using truncation and the Boolean operators in computer-based searches (e.g., famil\* AND involvement AND diet\* AND "physical activity" AND child\* AND ("developing countries" OR Nigeria). Further details about the search strategy are presented in the Appendix 1.

Searches were devised in collaboration with an academic librarian. CINAHL, Cochrane, FSTA, MEDLINE, Sage, and Scopus databases were searched for relevant literature using the Leeds Beckett University Portal Discover, published from July 2008 to July 2018. The search limitation was proposed as, at the time of writing, this last decade was a period when discussions about family involvement in diet and physical activity interventions were at their peak especially in low-income countries (Popkin et al., 2012).

The searches were restricted to studies of humans. Studies were restricted to low-income countries in line with the focus of this review, thus articles conducted in high and middle-income countries were excluded from the search. No methodological search filters were applied that would limit results to specific study designs; conference abstracts were also included. As there were no randomised controlled trials or other relevant interventions all studies were observational in nature.

Similarly, there were no language restrictions; papers found in languages other than English were translated with Google translate. Reference lists and citations of identified articles and relevant systematic reviews were also examined for additional relevant literature.

Table 3.2: Identification of key word and search terms

<b>Population</b>	<b>Setting/ context</b>	<b>Outcomes</b>	<b>Phenomenon of interest</b>	<b>Study design</b>
Child	Low-income countries	Parental factors	Family	-
Adolescent		Diet	Family involvement	
Child*	Nigeria	Diet*	famil* involvement*	
Adolescen*	Focus groups	Physical activity	Parental factors	
	Interviews			

Exercise

Obesity

BMI

### **3.6 STUDY SCREENING AND SELECTION**

The author firstly screened the titles of the articles. Where titles were deemed relevant, abstracts were assessed for relevance of each study according to the inclusion criteria stated in Table 1 and reasons for exclusion from the abstract screening stage onwards, were noted. Full text papers of any titles and abstracts considered relevant were obtained where possible and further screened. The author was not blinded to the details of the study author or journal.

### **3.7 QUALITY ASSESSMENT METHODS**

The quantitative studies were all cross-sectional in design. A quality assessment form adapted from the Appraisal tool for Cross-Sectional Studies (AXIS) (Downes et al., 2016) supplemented with the Centre for Evidence Based Management (CEBM) 'Critical appraisal of a survey form' (Olsen, 1990), was used. The checklist is shown in Appendix 2. The AXIS tool has explanatory text associated with what each question is asking. The form is designed to assess issues in cross-sectional studies covering methods, bias, and relevance to aid the reader to judge the study reliability. The adapted form consisted of ten questions with YES/NO responses.

Results of the quality assessment of studies are included in this review and informed the critique of the body of research, but studies were not excluded on the basis of quality. The AXIS tool has the benefit of providing the user the opportunity to assess each individual aspect of study design to give an overall assessment of the quality of the study. By providing this subjectivity, AXIS gives the user more flexibility in incorporating quality of reporting and risk of bias when making judgements on the quality of a paper (Downes et al., 2016 and Moskalewicz and Oremus, 2020).

The Critical Appraisal Skills Program (CASP) checklist for qualitative research was used as this checklist is a commonly used instrument for critical review of qualitative research studies (Gugiu and Ristei Gugiu, 2010). The CASP tool helps consider three overall quality concepts: rigor, credibility, and relevance (Duffy and Chenail, 2009). One of the shortcomings of the CASP is the ambiguity surrounding the grading with open ended questions which can create a false sense of trust or over-reliance on quality assessment of the studies.

Various approaches have been suggested with the two leading schools of thought being one which emphasises methodology (Dixon-Woods, 2004) and the other (Lincoln et al., 2011) which stresses the rigour of interpretation of results. By identifying commonalities of qualitative research, Dixon-Woods produced a checklist of questions for assessing clarity and appropriateness of the research question; the description and appropriateness for sampling, data collection and data analysis; levels of support and evidence for claims; coherence between data, interpretation, and conclusions, and finally level of contribution of the paper.

These criteria fostered the 10 questions for the CASP checklist for qualitative studies (CASP, 2013). However, these methodology-weighted criteria may not do justice to qualitative studies that differ in epistemological and philosophical paradigms (Tracy, 2010). Similarly, without a vigorous methodological layout, rigorous interpretation of results will not be good either (Lincoln et al., 2011).

It is recommended that all qualitative research should be seen as a two-way interactive process such that validity and quality have to be judged by the receiving end too and not by the researcher's end alone. Thus, the three gold criteria of validity, reliability and generalisability apply in principle to assess quality for both quantitative and qualitative research, what differs will be the nature and type of processes that ontologically and epistemologically distinguish between the two (Leung, 2015).

The CASP checklist (Appendix 3) is formed of three sections with 10 questions addressing research purpose, methodological quality, research design, recruitment strategy, data collection method, methods of communication between researchers and participants, ethical principles in research, rigor of the analysis, clear findings, and the value of the research of a qualitative study. Responses for each of the 10 questions can be "yes," "can't tell," or "no."

Using Dixon-Woods et al., (2007), the author further assigned each paper to one of four categories based on the results of the CASP checklist: 'key paper'; 'satisfactory paper'; 'irrelevant to the synthesis'; and 'fatally flawed'. Studies were not excluded based on quality alone; an evaluation of the overall quality of the literature reviewed also formed part of the review findings, in terms of any research gaps or weaknesses identified.

Details of the quality assessment of both qualitative and quantitative cross-sectional studies are in Appendix 4.

### **3.8 DATA EXTRACTION AND SYNTHESIS**

Standardised, predesigned data collection forms were used for data extraction using the Cochrane Collaboration data collection forms for the quantitative (Cumpston et al., 2019) and qualitative (Cargo et al., 2018) studies. The forms were tailored to capture information relating

specifically to the review. Where available, the following information was extracted from the studies: information on the study, research design and methods, such as the study authors; date of publication; date of study initiation; study duration; study location and setting; number of participants; participants' age, gender, and study findings; validity, bias, outcomes.

Following this, all relevant text was extracted from sections labelled as "results" in the included papers. Other sections of the papers were also checked for any additional data. Data were extracted independently from the twelve studies, were checked for consistency of data extraction, and entered in Microsoft Excel for analysis. Examples of the completed data extraction forms can be found in Appendix 5 and 6.

### **3.9 METHODS OF ANALYSIS FOR QUANTITATIVE AND QUALITATIVE STUDIES**

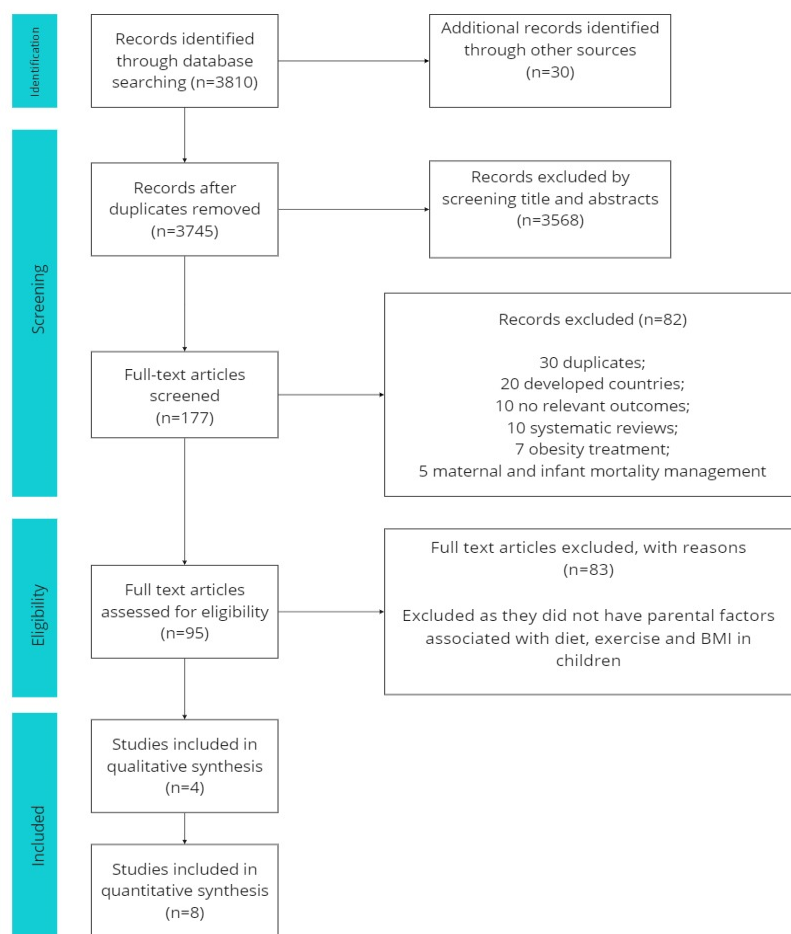
The quantitative studies were summarised in a descriptive narrative synthesis and a meta-analysis of these studies was not feasible due to study heterogeneity. Content thematic analysis was used to synthesise and report the findings of all included qualitative studies (Thomas and Harden, 2008). The extraction of the themes initially identified 17 categories which encompassed all the thematic content. Four broad organising themes emerged after further analysis by the author.

### **3.10 RESULTS**

#### **3.10.1 Screening and selection results**

The literature search resulted in a total of 3,840 studies and after removal of duplicates, a total of 3,745 studies remained. After screening on title and abstract, 95 records were assessed for eligibility by reading the full text. The main reason for exclusion was that most studies were done in developed countries (10) and duplicate studies of (30). No studies relevant to this review were identified from conference abstracts. None of the papers translated from other languages into English were relevant to this review.





*Figure 3.1: Flowchart showing the screening and selection process*

In total, 12 studies describing parental factors associated with diet, exercise, and body mass index (BMI) in children and views on barriers and facilitators of achieving optimal behaviours were identified. According to the Dixon-Woods categories, the qualitative papers were deemed 'satisfactory'. All the studies were cross-sectional. The screening and selection process is summarised in Figure 3.1.

### 3.10.2 Study Descriptions

#### *Quantitative Studies*

The eight quantitative studies were published from 2007-2016 (Table 3.3). The studies were conducted in various countries: one each in Cameroon, Ghana, and Kenya, Pakistan, and Mozambique and three studies in Nigeria. Four studies were carried out in an urban school setting (Kenya, Pakistan, and Nigeria); two studies were carried out in both urban and rural school settings (Cameroon and Ghana); one study was carried out in a rural community setting (Mozambique), and the rural or urban setting of one school-based Nigerian study was not mentioned.

The study participants included parents, schoolboys and girls. The sample size in each study ranged from 630 to 16,450. The age of children participating in the included studies ranged from 5 to 19 years. Five of the included studies had school-aged children/ adolescent and parents as participants, and three of the studies only school aged children/adolescents.

The aims of the studies were to investigate the factors associated with malnutrition (overweight, obesity and underweight) and physical activity among children. Direct anthropometric assessment of height and weight, with BMI calculated, and questionnaires related to diet, lifestyle, and school and neighbourhood environment were administered to children and parents. Dietary questionnaires were either self-administered or administered with the assistance of research assistants. They were structured or semi structured, mainly pretested but not validated. They contained modules on demographic information (gender, date of birth, residential address, and parental education); family-based characteristics (parental working status, income levels); number of siblings and number of persons in child's living room); dietary behaviours (breakfast, lunch); physical activity sedentary lifestyle.

Table 3.3: Quantitative Studies Characteristics

Author / date of publication	Country	Measures	Associations	Settings	Study population	Sample size
Doku et al. (2011)	Ghana	Questionnaire (substance use, sociodemographic factors, food habits, sleep, physical activity, sexual health, general health practices and future health behaviour)	prevalence and socio-economic differences in breakfast eating, fruit and vegetable consumption and physical activity	School (urban and rural)	Adolescents	1,566
Ene-Obong et al. (2012)	Nigeria	Weight, height, BMI, food habits, PA activity patterns and sedentary activity (questionnaire)	prevalence of overweight, obesity, and thinness	School (urban)	Children, parents	1,599
Kimani-Murage et al. (2011)	Mozambique	Anthropometric measurements (weight, height, BMI, pubertal stage, waist circumference)	associations between child-, maternal-, household- and community-level factors and weight status and central obesity	Community (rural)	Adolescents, parents	4,000
Mushtaq et al. (2011)	Pakistan	Anthropometric measures (weight, height, BMI), demographic information, family-based, characteristics,	dietary behaviours, physical activity and sedentary lifestyle associated with overweight and obesity.	School (urban)	Children, parents	1,860

Author / date of publication	Country	Measures	Associations	Settings	Study population	Sample size
		Dietary, physical activity and sedentary behaviours (questionnaire)				
Muthuri et al. (2014)	Kenya	Anthropometric measures (Mid upper arm circumference, weight, body fat percentage, waist circumference, height, bioelectrical impedance); accelerometer, questionnaire (diet and lifestyle)	Prevalence and factors associated with daily meeting PA guidelines, factors overweight/obesity	School (urban)	Children, parents	1,278
Navti et al. (2017)	Cameroon	Anthropometric measures, socioeconomic background, physical activity, and sedentary lifestyle (questionnaire)	school physical activity, sedentary lifestyle and socioeconomic status indicators with weight status and adiposity.	School (urban and rural)	Children, parents/guardians	720
Ojofeitimi et al. (2011)	Nigeria	Anthropometric measurements, and Questionnaire	Obesity status and knowledge about obesity and related matters, dietary practices, and lifestyles.	School	Students	16,450
Senbanjo et al. (2010)	Nigeria	Anthropometric measures (weight, height, BMI), PA questionnaire	frequency of PA, influence of age, gender and	School (urban)	Children	630

Author / date of publication	Country	Measures	Associations	Settings	Study population	Sample size
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socioeconomic factors on PA and  
the relationship between

PA and body mass index (BMI)

### Qualitative Studies

The four qualitative studies were published between 2009 and 2014. Two studies were carried out in Mozambique region (rural settings), one in Botswana (urban setting) and one in Malawi (semi-rural setting). The aims of the four included studies were to explore the perceptions of parents, school children, school staff and other stakeholders on the food and physical activity practices among children, their body size, obesity. The participants included parents, schoolgirls and boys, physical education teachers, school food vendors, and school administrators. The sample size in these included studies ranged from 18 to 58. The methods used were in-depth and semi structured interviews with direct anthropometric measurements of height and weight. The reliability of the results was increased by data saturation, and by comparing and contrasting views between participants. However, ultimately, no studies were excluded on the grounds of serious flaws in quality.

Table 3.4: Qualitative Studies Characteristics

Author (Date of Publication)	Country	Methods	Study Setting	Study Population	Sample size
Kinsman et al, 2015	Mozambique	Six focus group discussions and seven semi-structured interviews	School (rural)	Adolescent girls, aged 13 to 19 years; adult key informants	51 girls; 7 adults
Pulakka et al, 2014	Malawi	In-depth interviews and focus group discussion	Community (semi-rural)	Parents	22
Sedibe et al, 2014	Mozambique	“Duo interviews” in depth discussions	Community (rural)	Adolescent girls 16 to 19 years	11 pairs
Shaibu et al, (2015)	Botswana	Separate semi structured interviews	School (urban)	School administrators, PE teachers, and tuckshop (on-site food vendors) managers	18

### 3.10.3 Key Findings

#### Quantitative studies

All included quantitative studies reported the rising prevalence of all forms of malnutrition, indicating that over nutrition coexists with undernutrition. Five studies reported significant

association between increased moderate to vigorous physical activity and a lower prevalence of overweight and obesity among children (Iyanuoluwa Olugbenga-Bello et al., 2011; Mushtaq et al., 2011; Muthuri et al., 2014; Navti et al., 2017; Senbanjo and Oshikoya, 2010).

Three studies associated less physical activity, sedentary lifestyle, and high socioeconomic status with overweight and obesity (Mushtaq et al., 2011; Muthuri et al., 2014 and Navti et al., 2017). Six of the studies reported a positive association of increasing paternal education level, household income and attending a private school with overweight and obesity and a negative association with physical activity (Doku et al., 2011; Iyanuoluwa Olugbenga-Bello et al., 2011; Kimani-Murage et al., 2011; Mushtaq et al., 2011; Muthuri et al., 2014 and Navti et al., 2017).

### *Qualitative studies*

The emerging themes were considered as relating to knowledge and beliefs about diet and physical activity, external influences, parenting, environment, and resources. The most common theme relating to the perspectives of children, parents and other stakeholders on the barriers and facilitators to optimal diet, exercise and BMI among children is knowledge and beliefs towards diet and physical activity.

### *Knowledge and Beliefs*

A common cultural perception was that extra weight signifies affluence and the absence of sickness,

*“It’s culturally accepted here to be overweight because it is associated with affluence, so I would say there is far less judgment of overweight.” (Shaibu et al., (2011), p.223).*

There appeared to be a strong social and cultural pressure for girls to be overweight and it represents a clear disincentive to engage in physical activities. Many girls also ascribed to an ideal that appreciates ‘curves’ in a female body. Further to this, there was the suggestion that girls who do not conform to this ideal may be teased or bullied on the basis that their ‘thinness’ was assumed to be due to a serious illness (Kinsman et al., 2015; Shaibu et al., 2011).

Sporting activities were generally perceived as masculine activities so this could also be a disincentive for girls. It was suggested by some that adolescents should be separated by gender, either because of their religious customs (e.g., Muslim children in the schools) and to respect the sensitivity they may have about their changing bodies,

*“at this time they are becoming aware of their own body, I think it’ll be much better to separate them.” (Doku et al., 2011; Shaibu et al., 2011, p.225)*

However, it was also argued that exercise sessions should be primarily coeducational without any separation. Furthermore, many girls are held back from engaging in physical activities due to the cultural perception that girls are to stay at home and do house chores, or for the girls to focus on their education and thereby rise above poverty (Kinsman et al., 2015).

*“One other thing that makes the parents to be strict, you find that a parent grew up in a poverty family and she doesn’t want her kids to grow up like her, because she knows the poverty, she wants them to be educated. They don’t want their kids to suffer like they have, and that is why they are strict. [FGD 6, 16- to 19-year-olds].” (Kinsman et al., 2015).*

### *External Influences*

Peer perceptions among adolescents was a barrier to healthy eating. Adolescents were concerned about their peers’ reactions if they eat vegetables, since eating fast foods was seen as a sign of better economic status. Conversely, there appeared to be positive peer influence promoting physical activity, with active encouragement by friends (Pulakka et al., 2014; Sedibe et al., 2014 and Shaibu et al., 2011). Most schools provided a variety of physical activities during school breaks and after school such as dancing, football, basketball, and volleyball. Health education messages in clinics, magazines, and church youth gatherings were recognised as encouraging healthy eating practices among adolescent girls. Public health messages on the emphasis of nutrition and exercise have proven to be a key facilitator in promoting family involvement as breakfast, for example, was known to be the most important meal of the day, based on what they had heard and had been taught in school and at local clinics (Sedibe et al., 2014).

*“Everywhere, like when we are in a place that is crowded like the clinic, they teach people that we must eat healthy food in order to help our bodies.” (pair 5) (Sedibe MH et al, 2014).*

### *Parenting*

Administrators and school staff were of the perception that parents downplay or deny any childhood weight problems. As one PE teacher described,

*“it’s very difficult for a parent to really notice that their children are overweight. We tend to . . . cover [overlook] that, you know obesity, and maybe feel it’s not a problem.” (Shaibu et al., 2011, p. 223).*

This attitude is linked to parental influence and views on affluence in relation to obesity and overweight in children as the perception that the higher the weight of the child, the healthier



the child was common. However, with public health education, this perception is gradually changing (Shaibu et al., 2011).

Older adolescents agreed that parents influence what they eat at home. At the household level, a limited income and the increasing time and cost of food preparation for families could be important in the shifting of family dietary practices to less healthy choices. This is linked with parents in urban areas having to work long hours and having less time to prepare healthy meals (Sedibe et al., 2014).

#### *Environment and Resources*

Access to resources and environmental factors was a theme that revealed barriers and facilitators for health behaviours, both in terms of physical access and the monetary resources needed. Lack of local facilities was cited as a barrier to physical activity by participants in the studies.

*The amount [of money] that you had been allocated for the sport does not fit your budget, then we end up not doing our job in a good way. [Qualitative interview, Male Sports Teacher, 37 years] (John Kinsman et al, 2015).*

Table 3.5: Summary of Quantitative Study Findings

P: children aged 5 to 20, parents, health professionals, school staff responsible for the dietary needs of children in this age group

O: parental factors linked to optimal diet, exercise, and BMI in children

Settings: low-income countries

Study	Participants	Outcomes	Results	Quality of Evidence
Doku et al (2011)	Adolescents 498 boys; 659 girls, 38 without gender not indicated	Prevalence and socioeconomic differences in PA, FV intake and breakfast	More boys participated in PA than girls. Increased PA, FV intake and frequency of breakfast was more in affluent adolescents.	Validated methods with potential recall bias and reporting of results, important results but cause-and effect relationship cannot be emphasised due to study design. Applicable population and settings.
Ene Obong et al (2012)	School aged children and adolescents 1599	prevalence of overweight, obesity, and thinness among Nigerian school-aged children and adolescents.	Prevalence of overweight/obesity in children and adolescents of parents with higher income and socioeconomic status living in urban areas.	Validated methods with potential recall bias and incomplete data on income and single measurements, which may have introduced some measurement errors. Applicable population and settings.
Kimani-Murage et al (2011)	Adolescents 3511	Associations between child, maternal-, household- and community-level factors and weight status and central obesity	Adolescents of older mothers aged 50+years had higher odds of obesity. Adolescents from low socioeconomic status and education level had lower BMIs and lower odds of overweight/obesity.	Valid methods and sufficient sample size. Self-reported pubertal assessment increased recall bias. Appropriate measurements, Applicable population, and settings.

Mushtaq et al (2011)	School aged children, 1860	Dietary behaviours, physical activity and sedentary lifestyle associated with overweight and obesity, and their socio-demographic correlates	Dietary behaviours, physical activity, and sedentary lifestyle associated with the risk of being overweight and obese and having higher BMI were found in children from higher socioeconomic status, living in urban areas.	Validated methods with sufficient sample size. Variability in the measurements in the absence of digital tools may have introduced measurement error into the prevalence estimates. Self-recall and self-reporting of questionnaires could also have introduced bias. Applicable population and settings.
Muthuri et al., (2014)	Children, 563	prevalence and factors associated with overweight/obesity and physical activity	Higher parental education level, income, and attending a private school were associated positively with being overweight/obese and negatively with meeting physical activity guidelines.	Validated methods and sufficient sample size, applicable to population and settings. Self-recall could have introduced bias. Accelerometry measurement for PA could have provided measurement error.
Navti et al (2017)	Children, 522 children; 87 participants were dropped because of missing data on measures.	School physical activity, sedentary lifestyle, and socioeconomic status indicators with weight and adiposity	Children from higher social economic class with a high sedentary lifestyle were associated with overweight/obesity.	Validated methods with a risk of recall and reporting bias. Applicable population and settings. causal relationships cannot be established.

Ojofeitimi et al (2011)	Adolescent girls, 520	Obesity status and knowledge about obesity and related matters, dietary practices, and lifestyles.	Adolescents from higher socioeconomic class with higher parental level of education and attended private schools were more knowledgeable about obesity and related matters but were more likely to have poor dietary practices and be sedentary than adolescents who attended public schools from lower socioeconomic status and lesser parental level of education, less knowledge about obesity but have better dietary practices and less sedentary lifestyle.	Validated methods and measurement but self-recall could have produced bias. Applicable population and setting.
Sebanjo et al (2010)	570; 60 pupils were excluded because of refusal to participate and evidence of chronic diseases.	The frequency of PA, influence of age, gender and socioeconomic factors on PA and the relationship between PA and body mass index (BMI)	Children of mothers with post-secondary education had their weight and BMI higher and were more physically active than children of mothers with secondary school education or lower.	Validated methods, subjective assessment of PA could pose recall accuracy. Sufficient sample size, applicable to population and settings.

Table 3.6: Summary of Qualitative Study Findings

**P-** aged five years to twenty years as well as parents, school staff and health professionals responsible for the dietary and exercise needs of children in this age group.

**I (phenomenon of interest):** perspectives, barriers and facilitators to optimal diet, exercise, and BMI

**Context (qualitative studies):** in urban, rural, school, community settings

Author(s)	Research parameters (participants, sampling approach, framework)	Phenomenon of Interest	Emerging themes
Kinsman et al, 2015	Girls (51), adults (7). Focused group discussions and semi structured interviews. Cultural competence and social identity theory.	Identify and describe facilitating factors and barriers that are associated with physical activity among adolescent girls in a rural school setting	Knowledge and beliefs on cultural perceptions of body image and weight especially with the female gender. <i>“Sometimes you find that the other girl is having some curves and you don’t have it. If she saw you, she is going to call you by all names saying that you don’t have curves, you’re thin as if you’re HIV positive, you don’t have buttocks.”</i> <i>“[FGD 3, 13- to 15- year-olds]</i> Access to resources and environmental factors was a theme that revealed barriers and facilitators for health behaviours. <i>“The amount [of money] that you had been allocated for the sport does not fit your budget, then we end up not doing our job in a good way.” [Qualitative interview, Male Sports Teacher, 37 years].</i>
Pulakka et al, 2014	Parents (22), convenience sampling, no mentioned framework	Parental concepts about physical activity and child development.	External influence (positive peer pressure) helps in encouraging physical activity with encouragement from friends. <i>“They need to have toys that they can play with. Umm . . . for the toys it’s, either you can buy for them, or you can use these local things. Like this wire you can [make] something [for] them to play with or you can use these plastic [bags] and make a ball for a child so that she can be active.”</i> <i>(Mother, 27 years, IDI in English)</i>
Sedibe MH et al, 2014	Adolescent girls (22) Duo in-depth interviews, The Theory of Triadic Influence	Explore perceptions and attitudes of adolescent girls in	External influences as facilitators of optimal diet and PA via public health messages. <i>“Everywhere, like when we are in a place that is crowded like the clinic, they teach people that we must eat healthy food in order to help our bodies.” (Pair 5).</i>

		rural community setting	Parenting influence on adolescent choice of meals, limited income, time and cost of food, long working hours in urban areas. <i>"My family doesn't like miroho and vegetables from the garden, we just like meat and anything from the fridge. When we eat vegetables, we only eat salads, and it is not every day that we grow them. They are very scarce." (Pair 1).</i>
Shaibu et al. (2015)	School administrators, PE teachers, and tuckshop (on-site food vendors) managers (18), separate interviews. Purposive sampling,	Perceptions on diet, physical activity, body size, and obesity	<p>Knowledge and beliefs about extra weight signifying weight and the absence of sickness. <i>"It's culturally accepted here to be overweight because it is associated with affluence, so I would say there is far less. . . judgment of overweight." (p. 223).</i></p> <p>Sporting activities should be segregated. <i>"at this time, they are becoming aware of their own body, I think it'll be much better to separate them." (p.225).</i></p> <p>External influences such as positive peer pressure. <i>"obviously the team sports, you know they [create] the sense of community. For me, its' all about making things fun, making them (the students) enjoy it so that you realize that sport is much more than getting sweaty, it's teamwork, its communication ... ." (p.225).</i></p> <p>Parents downplaying overweight/obesity in their children. <i>"its very difficult for a parent to really notice that their children are overweight. We tend to ... cover [overlook] that, you know obesity, and maybe feel it's not a problem." (p.223).</i></p>

#### 3.10.4 Critique

The included quantitative studies demonstrated potential validity. The AXIS quality assessment indicated 'yes' responses for 8-10 of the 10 quality questions for the sample of studies overall. Areas where the response was 'no' related to lack of information around the selection of participants, and the potential for selection bias. This in turn impacted on study representativeness, and therefore raised some questions around the generalisability (external validity) of the studies.

The questionnaires used for reporting dietary intake and anthropometric methods were validated (Helmerhorst et al., 2012; Kaaks et al., 2002). However single measurements and self-reported questionnaires may have introduced some measurement errors and recall biases in the studies (Rosenman et al., 2011). The subjective assessment of physical exercise was noted as a limitation leading to recall accuracy in the included studies (Mindell et al., 2014). Measurement error reduces the strength of associations with the potential of false null findings where there is an association. (Mindell et al., 2014; Wilson et al., 2008).

The strength of evidence of a causal association is hampered in cross-sectional studies because parental factors and outcomes were measured at the same point in time, and there may be reverse causality e.g., a child may do more PA because they are not obese. However, for some of the associations from the study, reverse causality is not likely to be case e.g., a child's low PA is unlikely to cause parental higher social class (Biddle et al., 2017).

The appraisal of the qualitative studies with the CASP tool showed consistency of quality across the 10 categories, and as noted above all of the studies were deemed 'satisfactory'. The aims and objectives of the studies were adequately described and even where study rationales had been stated, there was commonly an outline of theoretical or conceptual frameworks. With adequate sample sizes, findings were broadly consistent across studies, therefore indicating the findings were transferable and generalisable to other similar settings.

However, despite the positive quality assessment, there were potential limitations to the studies which highlights the subjective nature of the assessment tool. For example, overall reporting of the study methodologies was variable and frequently incomplete in the qualitative studies. In addition, the role of the researchers was not adequately documented in the included studies and their impact was not acknowledged in the process of sampling.

Further, a non-transparent, lack of thick description of the sample and research process reduces replicability and reliability of the studies (Aguinis and Solarino, 2019). Although full details of the sample and research process were not always given, the researchers explored the views of various participants (parents, school personnel, school children) on malnutrition

among children, therefore the use of purposive sampling strategy was appropriate and resulted in the rich information collected.

The use of data saturation enabled the researchers to ensure the themes were established based on emerging evidence and this enhances the validity and reliability of the included studies (Booth, 2016; Johnson et al., 2019). Findings from these included studies are seen as credible even though they are tied to the time and context from which they were derived, but it can be representative of other low-income settings.

### **3.11 DISCUSSION**

#### **3.11.1 Summary of findings and interpretation**

The aim of this systematic-type review was to investigate associations between parental factors and diet, exercise, and body mass index (BMI) in children, and explore perspectives of children, parents and other stakeholders on the barriers and facilitators to optimal diet, exercise, and BMI among children. A total of 12 studies describing parental associations with children's diet and exercise, or perspectives of various stakeholders on the barriers and facilitators of optimal nutrition among children were identified.

The result of this systematic-type review shows that the influence of culture was acknowledged as potentially contributing to some of the less favourable lifestyles of adolescents, especially attitudes toward body size. There is the cultural perception that larger bodies are associated with affluence and thin bodies are associated with illnesses as reported also in a few other studies (Draper et al., 2015; Micklesfield et al., 2013; Okop et al., 2016).

There is also growing evidence on the barriers and facilitators affecting optimal diet and exercise in children such as balanced diet, access to sport facilities, peer pressure, limited income, and school activities (Melo et al., 2013; Seguin et al., 2014). However, there were no qualitative studies conducted in Nigeria, indicating a gap in the evidence on views and perceptions among Nigerian children and parents.

Wolff and Crockett (2011) state that decision making often happens within a social context where parents are present. Engaging in healthy lifestyle behaviours, becomes important, particularly with the increase in modern health risks which often is associated with the environment in which individuals find themselves (Middleton et al., 2013). Communities, schools, and parents need to work together to ensure consistency of messages in the home and school environments (Maynard et al., 2009; Rowe et al., 2010 and Maynard et al., 2017). There is a need for more research to explore views of parents, children and other stakeholders on diet and physical activity interventions and the potential for parental involvement in optimal diet, exercise, and BMI children in low-income settings.



### 3.11.2 Evaluation

The included studies have some limitations but are valuable due to a lack of evidence in this area of research. The small number of studies indicates that more research in this area is needed in low-income countries. The quantitative results in this review should be treated with caution as there were no interventions found in low-income settings that directly tested parental involvement in the diet and exercise habits of children. However together with the consistent themes around perceptions towards diet and physical activity among children, and potential barriers and facilitators, suggests that paying additional attention to the parental factors associated with diet, exercise and BMI may be important for designing and measuring the effectiveness of interventions designed to involve parents directly or indirectly in low-income settings.

### 3.11.3 Strengths and Limitations of the Review Process

The main strength of this review is having a design which makes it possible to identify through a multi method the associations of parental factors and perspectives of various stakeholders in diet, exercise, and BMI among children. Using a combination of qualitative and quantitative data can ensure that the limitations of one type of data are balanced by the strengths of another (Bryman, 2007 and O'Cathain et al., 2010).

The robust methodology and validated tolls applied in this study limited the bias in identifying and rejecting studies, as it is evident that explicit methods in SYSTEMATIC-TYPE REVIEWS reduces bias in selecting studies. Another strength of this review is that findings from the studies could be systematically compared to establish generalisability of findings in similar settings (Cook, 1997 and Greenhalgh, 1997).

However, there were limitations. Searching a number of bibliographic databases, for example, can lead to many irrelevant studies being found which then have to be checked manually one by one to find the few relevant studies. There is increasing use of specialised software to support and in some cases, automate the selection process. Text mining, for example, can assist in selecting studies for a review (Brunton et al. 2017b). Such automated support may result in some errors in selection, but this may be less than the human error in manual selection (O'Mara-Eves et al. 2015). Also, a lone reviewer can introduce bias through subjectivity in the selection and screening process, which could be reduced by independent reviewing by a team of researchers (Cumpston et al. 2019). However, careful checking at each stage of the review process will have minimised this bias.

#### 3.11.4 Chapter Summary and Implications for Study 2

This chapter summarised a systematic-type review that investigated the associations between parental factors and diet, exercise, and body mass index (BMI) in children, and explored the perspectives of children, parents and other stakeholders on the barriers and facilitators to optimal diet, exercise, and BMI among children. Twelve papers were suitable for inclusion in the systematic-type review and assessed for quality. Findings from the review suggest a negative impact of higher socioeconomic status on body composition and physical activity patterns in school aged children. Sedentary lifestyle and parental occupation/socioeconomic class was positively associated with overweight and obesity.

Findings from the review also show that stakeholders were aware of the unfavourable food environments in school, community and home settings influenced by cost, convenience, and availability of food. Facilitators of an optimal diet and exercise in children were identified as a balanced diet, good health, parental involvement and interest in healthy lifestyle, and barriers included a lack of parental concern about obesity, low finance, children's interests, lack of time community resources, and safety.

The review suggests a clear need for parents, communities, schools, government, and other stakeholders to work together to fulfil their responsibilities towards optimal nutrition and exercise and ensure that everyone is given consistent messages concerning the importance of healthy lifestyles.

Further studies are needed that contribute additional investigation seeking viewpoints on practical ways to overcome some of the established barriers that children and families face in preventing malnutrition. None of the included studies were conducted in Nigeria and potential solutions to the barriers identified that could inform culturally acceptable intervention approaches to preventing malnutrition. These findings therefore directly informed the design and conduct of Study 2 which aimed to identify views on social, cultural, and environmental factors and their role as barriers and facilitators in achieving favourable diet and PA, and what could be culturally acceptable approaches to diet and physical activity for children. The link between Studies 1 and 2 is depicted in Figure 3.1, and Study 2 is presented in the next chapter of the thesis.

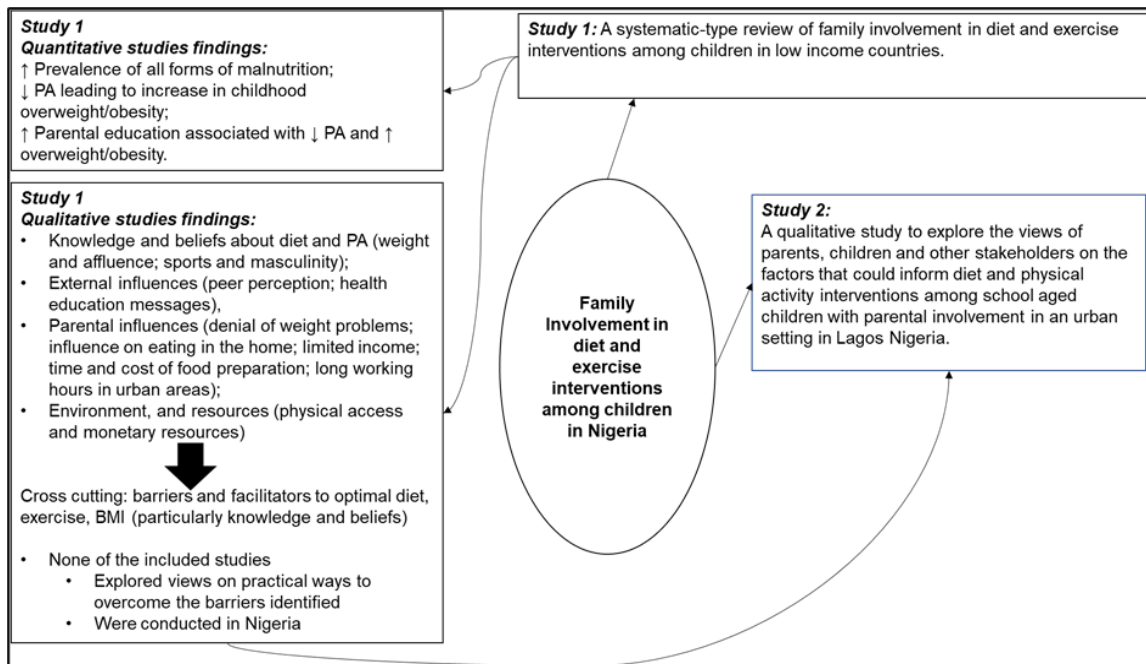


Figure 3.2: Links between the studies: how Studies 1 informed Study 2

## **4 EXPLORATION OF VIEWS ON DIET AND PHYSICAL ACTIVITY INTERVENTIONS WITH FAMILY INVOLVEMENT AND THE SETTINGS LIKELY TO SUPPORT THE EFFECTIVE ENGAGEMENT IN NIGERIA (STUDY 2)**

### **4.1 INTRODUCTION**

In the review carried out on qualitative and quantitative studies in low-income settings (see Chapter 3) indicated parental sedentary lifestyle, occupation and socioeconomic class were factors associated with diet, exercise and BMI in children and therefore associated with malnutrition among young people. The findings showed a negative association between higher socioeconomic status, body fat and physical activity patterns in school aged children.

Synthesis of the qualitative studies in the review suggested key barriers (such as limited access to resources, lack of concern about obesity) and facilitators (e.g., positive peer pressure, and public health messages) of optimal nutrition and physical activity. However, none of the qualitative studies were conducted in Nigeria, and it is necessary to explore similarities and differences in themes in comparison with other low-income countries. Further, the reviewed studies described barriers and facilitators, but not views on practical ways to overcome the established barriers. There is a need to explore views on how parents, communities, schools, government, and other stakeholders in Nigeria can work together towards optimal nutrition and physical activity in children, to understand the enablers, barriers, and potential solutions in preventing malnutrition.

### **4.2 RATIONALE, AIMS AND OBJECTIVES**

From the abovementioned, it is vital that intervention approaches to prevent malnutrition in Nigeria are designed with adequate understanding of the cultural and environmental and social contexts, prioritising the views of the target population. Thus, the aim of this study was to use qualitative methods to explore views of parents, children and other stakeholders on the factors that could inform diet and physical activity interventions among school aged children with parental involvement, in an urban setting in Lagos, Nigeria.

The objectives of study 2 were therefore to:

1. Explore views on social, cultural, and environmental factors and their role as barriers and facilitators in achieving favourable diet and PA;
2. Understand views on the potential solutions to the barriers identified that, in turn, could help inform culturally acceptable intervention approaches to prevent the risk factors for childhood and adolescent malnutrition;
3. Examine views on acceptable methods for involving families in diet and physical activity interventions for children;

4. Explore ways in which parental involvement could be further enhanced by active engagement of the school and the wider community in diet and physical activity intervention for children.

### **4.3 METHODOLOGY**

#### **4.3.1 Theoretical underpinning of the study**

The epistemological and ontological perspectives that underpinned the study informed the methodological framework and channelled how the research was shaped to gather and analyse data (Bryan, 2011). The ontological beliefs about existence, and the epistemic relationship between the knower and the known, are essential elements of how a phenomenon is approached by social researchers (Lincoln et al., 2011). Questioning the nature of reality is a vital feature of such inquiry, as the theoretical approaches underpinning social research call into question how reality is understood and how meaning is shared (Ritchie et al., 2013). It is important to understand theoretical discourses that surround a methodology in order to justify the research conclusions formed (Kivunja and Kuyini, 2017).

The researcher's position aligned with a relativist ontological paradigm which, unlike realist perspectives assume an objective and universal truth, a relativist perspective assumes that reality is produced through individual interpretation and is dependent on meaning derived from subjective perception (Blaikie, 2007). Only a small number of quantitative and qualitative studies in low-income settings have focused on the prevalence of malnutrition among children, its association with parental factors, and barriers to and facilitators of healthy nutrition and physical activity among children. Therefore, the question of how within these processes an understanding of cultural, environmental, and social context of the population could help with intervention approaches to childhood malnutrition in Nigeria needed to be studied and could best be done through using qualitative methodology. A qualitative approach allowed for a unique perspective on different views and experiences that have not been included in the literature thus far. This approach focused on respecting and valuing the expertise of diverse, low-income, and marginalised individuals by providing an inductive and emic account of their experiences. It was a key aim of this study that it would help inform possible solutions to the barriers associated with engaging families in diet and physical activity interventions, and ultimately optimal diet, physical activity and weight among children. A qualitative approach which fit with the philosophical stance adopted and grounded theory was chosen.

Grounded theory has developed and evolved over the years (Appendix 7), but a common thread is that in grounded theory the researcher's role is implicit in the co-production of meaning, and that the participants' views conveyed through the researcher's account were recognised (Bryant, 2009). Given the constructivist epistemology and therefore the relativist

ontological underpinning, an interpretive approach seeks to explicitly account for the researcher within the research processes, and, in so doing, enhancing methodological credibility by transparently delineating the process of meaning construction (Tobin and Begley, 2004).

Therefore, the grounded theory approach was deemed most appropriate to explore the cultural views and approaches to diet and exercise interventions among children in Nigeria addressing the overall questions of how and why a social process is happening. The focus on that process was through the experience or description and interpretation of phenomena and using a specific participant sample. Grounded theory facilitates the combination of data and literature into the development of theory to explain and understand a process features which are not the focal point of the other designs.

#### 4.3.2 Grounded theory approaches

Discussions around grounded theory methods are well documented (Bryant and Charmaz, 2007; Charmaz, 2007; Corbin and Strauss, 2014; and Morse et al., 2008). Grounded theory is an area of much contention, with different approaches addressing emergence of concepts, theoretical sensitivity, and the concept of the researcher's objectivity (Boychuk Duchscher and Morgan, 2004; Charmaz, 2008).

Subsequent generations of grounded theorists have positioned themselves along a philosophical continuum, from Strauss and Corbin's theoretical perspective of symbolic interactionism, through to Charmaz's constructivist perspective. Each variation is an extension and development of the original grounded theory by Glaser and Strauss (Charmaz, 2014, 2017; Corbin, 2009; Corbin and Strauss, 2008, 2015; Ghezeljeh and Emami, 2009; Mills et al., 2006).

The goal of "traditional grounded theory" (Glaser, 1978, pp. 22-27) is to generate a conceptual theory that accounts for a pattern of behaviour that is relevant and problematic for those involved. "Evolved grounded theory" (Strauss and Corbin, 2008, pp. 6-8), is founded on symbolic interactionism, a sociological standpoint that depends on the symbolic implication people ascribe to the processes of social interaction (Clarke, 2005). The methodological underpinning of "constructivist grounded theory" (Charmaz, 2006, pp. 9-10) is a focus on how participants' construct meaning in relation to the area of inquiry and a constructivist co-constructs experience and meanings with participants.

While there are commonalities across all three genres, there are factors that distinguish differences between the approaches including the philosophical position of the researcher; the

use of literature; and the approach to coding, analysis, and theory development. Critical engagement with the philosophies that shape grounded theory are important to understand the implications that arise from a researcher's relationship to data and analysis (Bryant, 2009). The grounded theory approach chosen for the current study was constructivist grounded theory.

#### 4.3.3 Constructivist approach for the grounded theory research design

Constructivist grounded theory most closely aligns with the adopted relativist perspective that assumes that reality is produced through individual interpretation and is dependent on meaning derived from subjective perception (Charmaz, 2014; Corbin and Strauss, 2008), as noted above. The main goal of this study was to understand and propose a theoretical explanation for this phenomenon (views on diet and physical activity interviews and strategic approaches to engage parents and children).

With subjectivism as its epistemological foundation, the impetus of a constructivist grounded theory approach is that the researcher is redefined as a co-creator of meaning, rather than as an objective reporter of observable facts (Mills and Francis, 2006). Hence, the researcher offers an interpretative portrayal of the studied phenomenon (Charmaz, 2014), the results are inherently collaborative, arrived at through interaction, and bound within temporal, cultural, and structural contexts (Charmaz, 2006; 2000).

Despite the different approaches to grounded theory there are common elements across the genre which integrate the grounded theory approach into the qualitative research process. These include iterative recruitment, purposive sampling, concurrent data collection and analysis, theoretical sampling and data saturation (Chun Tie 2019), all of which were employed in the current study. A range of data collection tools are suitable for a grounded theory approach and can be used singly or in combination to obtain rich data (Charmaz, 2014) and in-depth interviews and focus group discussions were used in this study. A critical description of the study methods used can be found in Sections 4.5 to 4.10.

Purposive sampling directed the early data collection and generated the initial data for this study (see Section 4.5.2) and is where participants that can address the research objectives are purposively selected (Chun Tie 2019). Concurrent data and data analysis was used to create an iterative process of data generation through various stages of coding and category development using with constant comparative analytical technique (Charmaz 2014) whereby codes and concepts were emergent and were put into dialogue with existing concepts and knowledge, as described in Section 4.10. More focused coding (4.10.2), supported by theoretical sampling (4.5.3) to collect additional data, led to theoretical coding (4.10.3), with the constant comparative process continued to inform the developing theory (Charmaz, 2014).

The selection of rich data extracts and memo writing were used to develop a substantive theory which explained the social phenomenon, within a particular social context, through the experiences of the people operating within the specific context of this study (Charmaz, 2016).

In keeping with a grounded theory approach, the researcher aimed to keep knowledge of the existing literature in the background during fieldwork and analysis, order not to force the data into *a priori* categories, and ensure the theory emerges from the data (Timonen, 2018). The use of a semi-interview guides comprised of open-ended questions (Section 4.8), allowed flexibility throughout the data collection, as questions could be adapted in light of observations and insights. The advice from traditional grounded theorists is to ignore previous literature. However, a more contemporary view is that this would contradict standard academic obligations, and that engaging with the literature at an early stage encourages flexibility and creativity in developing theory (Bryant and Charmaz, 2007). Therefore, although, this study is largely based on an inductive approach, there were elements of deductive thinking such as including areas of interests which stemmed from the systematic-type review conducted (see Chapter 3) which was also the basis of the specific objectives stated in Section 4.2.

In addition to early engagement with the literature, Charmaz (2014) advocates that constructivist grounded theory can work alongside the wider theory informing the study, adding deeper insight to the development of new theory. As described in Chapter 2, a socio-ecological model (SEM) was the core theoretical perspective for this programme of research and was the conceptual basis for an overarching settings approach (SA) (WHO 1997), further informed by community-based participatory research (CBPR). The constructivist grounded theory approach therefore complemented an emphasis on partnering with schools and the community. The study aims, objectives, and the generation of grounded theory were shaped by consideration of four levels of interacting factors that need to be understood with regard to promoting behaviour change among children with family involvement. For example, exploration of views at the individual level included knowledge, attitudes and motivation to engage of diet and physical activity; at the interpersonal level encompassed children's and families' roles in diet and physical activity, household norms and peer influences; accessibility to foods, availability of appropriate and enjoyable physical activity options, social networks and organisations at the community level; and societal factors including school and community environmental conditions, and local policies on diet and physical activity.

#### 4.3.4 Strengths and limitations of a grounded theory approach

The strength of grounded theory can be said to be its ability to provide insight into how meaning is navigated and combined within social settings, and how people situate themselves



within their social worlds (Charmaz, 2006). The ontological belief that meaning is both constructed and shared, thus influencing epistemic theories of knowledge as a social construct of human interaction, became influential in determining the appropriateness of the research methodology selected for the study. Grounded theory is particularly well suited for investigating social processes that have attracted little prior research attention, where the previous research is lacking in breadth and/ or depth, or where a new point of view on familiar topics appears promising (Charmaz, 2016). Previous research has not explored views and approaches to diet and exercise interventions among children with family involvement in Nigeria.

A criticism of grounded theory has been said to be its rigidity and focus on systematic procedures, as this is considered by some to interfere with the researchers' sensitivity to the data and promotes a power differential between researcher and participants (Hunter et al., 2011). However, this limitation may be more relevant to traditional grounded theory; there is more flexibility and inherent collaboration in a constructivist approach (Charmaz, 2006).

The main value of grounded theory is that making assumptions is avoided and instead a more neutral view of human action in a social context is adopted (Stillman, 2006). In accordance with this, *a priori* assumptions on what will be found, will not determine and what and how social phenomena should be viewed will not be determined. However, as noted above, deductive elements such as conducting a literature review, clarifying the research focus and justifying the objectives at the outset are consistent with a constructivist grounded theory approach.

#### **4.4 RESEARCH SETTING**

Lagos State is the smallest yet second most populated state in Nigeria. According to the 2006 National Census, Lagos State has a population of 9,013,534 in relation to the National population of 140,003,542 (National Population Commission Nigeria, 2019). However, based on the UN-Habitat and international development agencies' estimates, Lagos State was said to have about 24.6 million inhabitants in 2015 (Lagos State Government, 2020). Lagos is a well-recognised city for its diversity in terms of culture, tribal origins, food ways and activities (UNESCO, 2019).

This study was conducted in Eti-Osa and Ibeju local government areas (LGAs) of Lagos State. These local government areas were chosen because of the mixed population of people with low, middle, and high socioeconomic class as well as diversity in culture and people. According to the National Census in 2006 these two local government areas had a population of 1,083,055 inhabitants (Lagos Bureau of Statistics, 2016).

Engagement with stakeholders and potential participants commenced in November 2018 and the study was completed by April 2019.

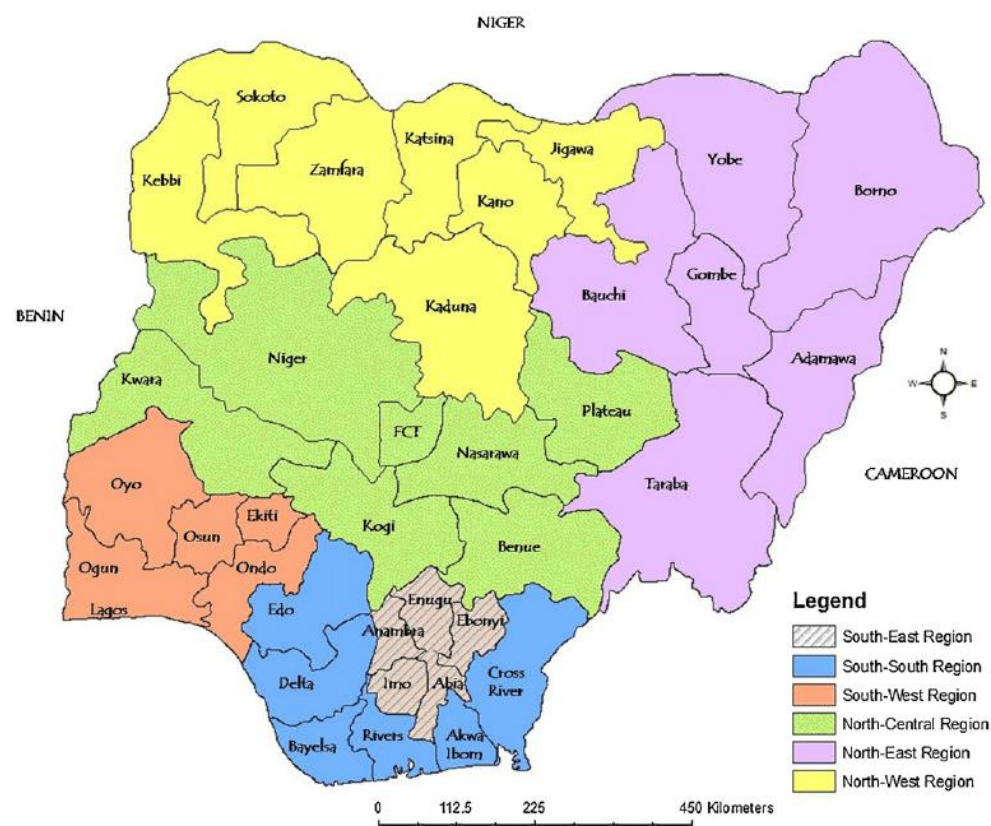


Figure 4.1: A map of Nigeria (Ekong et al., 2011)

## 4.5 SAMPLING

### 4.5.1 Study Population

The target population for this study were parents, school children, teachers and school heads, community leaders, health workers, and civil servants in the health and education sectors, residing in Eti Osa and Ibeju LGAs Lagos State. Other stakeholders included representatives of various organisations such as the Nutrition Society of Nigeria, and The Youth and Sport Organisation, Lagos, were selected to participate in this study because they were knowledgeable about diet and exercise relating to children in both schools and communities. The schools located in the local government areas which participated in this study were chosen based on the directive of the Ministry of Public Service, Lagos State Universal Education Board and Ministry of Education as schools that were registered as government approved for research purposes. This study was carried out from November 2018-April 2019.

#### 4.5.2 Purposive sampling

Purposive sampling, a form of non-probability sampling, was used in this study. Unlike various probability sampling techniques, the goal of purposive sampling is to focus on characteristics of a population that are of interest, which will best enable the researcher to answer the research questions. Therefore, the decisions concerning the potential participants (15 to 50) to be included in the sample were based on participant characteristics as determined by the researcher. Purposive sampling directed the collection and generation of the initial data that the researcher analysed.

The characteristics on which sampling was based were as follows: (i) be parents, children, or school teachers (approximately 10-15) (ii) adults with knowledge of nutrition, physical activity and school children (approximately 10-15); (iii) children aged of 8-17years (approximately 5-10) or adults aged 18-60 years (approximately 15-20), and (iv) resident within the community where the research was conducted (child participants only) (approximately 10-15), and (v) children who are able to participate in discussions relating to their food and the physical activities (approximately 15-30), (vi) socioeconomic class.

Table 4.1: Sampling characteristics

Group	Adults		Children	
Parents, children, or schoolteachers	1	1	1	1
Adults with knowledge of nutrition, physical activity, and school children	1	1	1	1
children aged of 8-17years	1	1	1	1
adults aged 18-60 years	1	1	1	1
resident within the community where the research was conducted (child participants only)	1	1	1	1
children who are able to participate in discussions relating to their food and the physical activities				
<b>Approximate total sample</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>

Defining African socio-economic class is difficult, and it is no different in Nigeria (Adesanya et al., 2017; Giesbert and Schotte, 2016). This study used the income classification of socio-economic status of the Nigerian Household sourced from the Research and Media Services,

Nigeria. (Jones and Vincent, 2014). Socioeconomic status was classified into four segments (A to E). A and B refers to the upper-upper, upper middle and lower upper class, C refers to the upper middle and middle lower class, and D refers to the lower class and E refers to the poor and those living below the poverty line. A detailed classification can be found in Appendix 8.

In keeping with qualitative research traditions, the study sample was not representative of the population; however, this is not considered to be a weakness. The principle of maximum variation sampling is relevant here, whereby to gain greater insights into a phenomenon it is looked at it from all angles (Palinkas et al., 2013). Therefore, using maximum variation purposive sampling in this study helped to capture a wide range of perspectives in relation to the research questions. Thus, the data obtained from the sample exhibits a wide range of attributes, behaviours, experiences, incidents, qualities, situations, and so forth. This initial data was collected, coded, and analysed before subsequent data collection was undertaken with a further sample identified through theoretical sampling.

#### 4.5.3 Theoretical sampling

Theoretical sampling commenced from the codes and categories developed from the first data set. Theoretical sampling was used to identify and follow clues from the analysis, fill gaps, clarify uncertainties, check hunches, and test interpretations as the study progressed (Charmaz, 2006; Chun Tie et al., 2019).

The purpose of theoretical sampling is to allow the researcher to follow leads in the data by sampling new participants that will provide relevant information in relation to the new leads with respect to the research questions (Corbin and Strauss, 2008). Also, theoretical sampling is central to grounded theory design, which aids the evolving theory and ensures the final developed theory is grounded in the data (Byrne, 2001; Priya, 2016). Theoretical sampling was used in this study for the development of theoretical categories, as opposed to sampling for population representation.

Based on initial codes and concepts theoretical sampling of key stakeholders in the education ministry who were involved in sports and nutrition, school heads, key members of the local community and people involved in the non-governmental organisations focused on community work was conducted to pursue the concepts further. Thus, theoretical sampling was used to focus and generate data to feed the iterative process of continual analysis of the data.

#### 4.5.4 Sample Size

There have been various suggestions for what is considered to be an appropriate sample size for grounded theory studies. Some experts in qualitative research methods (including grounded theory) argue that the sample size of the study is irrelevant and dependent on the research purpose and a number of further factors (such as budget, personnel, timetable), therefore precluded from being predetermined (Hennink et al., 2016).

Alternatively, a concept considered by some as important in determining group size is that of data saturation. A few researchers from the ground theory point of view defines saturation as the point in coding where there are mounting of the same codes without the emergences of new codes or themes emerging from the data ((Given, 2016, pp.135; Urquhart, 2012, pp.194). When and how saturation may be judged to have been reached depended on the ongoing process of the study and the nature of the study.

Research questions that refer to a focused area of practice in an applied field have been thought to justify a small number of data gathering interviews and groups (Charmaz, 2012). The sample size was selected by virtue of their capacity to provide rich information relevant to the study. The author considered factors such the quality of data putting into context the nature of participants been able to reflect and express themselves with regards to the nature of the topic. This helped the data to be more experiential and richer.

The scope of the research question helped limit the estimated sample size for the researcher to be able to reach saturation to help develop a better study. The nature of the topic studied was obvious and clear and information was obtained in the interviews without much difficulty among participants. Other factors included the amount of useful information obtained from each participant, the number of interviews per participant and the time frame of the study.

#### 4.6 ETHICAL CONSIDERATIONS

Ethical approval to carry out this study was obtained from the Research Ethics Committee, School of Clinical & Applied Science, Leeds Beckett University (Application Ref: 52680). Ethical approval was also obtained from the Lagos State Ministries of Education and Health to allow the data collection conducted in schools from October to November 2018 (Appendix 9).

As a starting point, a letter of intent to show that the researcher is a postgraduate research student at Leeds Beckett University, UK was sent to the Ministries of Health and Education in Lagos State to seek permission for the possibility of doing this study. Initial discussions were made with the key people at the Ministries of Health and Education, Lagos State, who recommended key stakeholders based on their specialism and expertise in health education

and schools and helped to identify the schools that could potentially be able to contribute to the study.

The researcher ensured detailed information about the nature of the research and the need to gain verbal and written consent was given to the participants. The consents more verbal than due to literacy issues, thus the researcher explained the nature of the study orally based on the participant's level of education. In the case of a distressed participant, the researcher would have stopped the interview to avoid further distress and used their counselling techniques; however, there were no recorded cases of distress during this study.

For anonymity and confidentiality, participants were not asked to disclose their surnames or home addresses. A unique reference number was assigned to each participant. Any aspects of the transcripts that could compromise the participants' confidentiality (such as names, date of births, addresses) were removed. Interviews and focus group discussions were audio recorded, with permission, for the purpose of transcription and analysis. All data from the study were kept in a safe storage of electronic and hard copy data.

The research was conducted in the communities and schools during or after work where required by participants. Interviews were not conducted at night or in underpopulated areas to ensure the safety of the researcher and the participants. A lone worker protocol was devised as part of the study risk assessment to ensure researcher safety.

#### **4.7 RECRUITMENT**

District Officers were assigned to send invitations and inform the schools selected by the Ministry of Education and Universal Basic Education Board. Invitations were also sent to stakeholders to participate in the study. All invitations and Information Sheets (Appendix 10) giving details about the research, purpose and impact were sent via emails and physically to parents and school children. The four purposively recruited schools were invited to participate in the study and school children and their parents who volunteered to participate using a sign-up sheet were provided with consent (opt-in, opt-out) and assent forms (Appendix 11) to be interviewed and participate in focus group discussions.

The Lagos state government has a list of the public and private schools in its city. During research, the Ministry of Education gives in details the schools available for research as not all schools are eligible either because they are commonly researched as in the cases most of private schools. Several public schools are not listed for research either due to poor infrastructure, poor environment, or limited numbers of students. This may serve as a limitation if such schools fell under the area the researcher was looking to conduct research. However, in this study, this was not seen as limitation as the public schools identified were eligible for

the study. The school selected for this study were aligned with the schools mapped by the research which was determined by logistics, population, and the type of schools (primary and secondary). The researcher, as part of the criteria was allowed options of schools to carry out this study because of the nature of the city. Lagos is divided as mainland and Island and so it was not feasible within the available resources to sample participants across the entire geographical area.

#### **4.8 DATA COLLECTION METHODS AND TOOLS**

Data were collected using semi-structured interviews and focus groups. These are methods of collecting data within qualitative research to enable meaningful discussions with participants, allowing them to share their experiences, thoughts, attitudes, and beliefs (Richards and Morse, 2007). Interview and focus group methods within grounded theory are particularly useful because meaning is constructed through participant-researcher interactions in order to generate new knowledge (Charmaz, 2006).

The main purpose of using the focus group method was to draw upon participants' attitudes, opinions, experiences, and reactions in a way in which would not be feasible using other methods, for example during observation, or questionnaire surveys (Austin and Sutton, 2014; Sim and Waterfield, 2019). These perspectives may be partially independent of a group or a cultural setting but are more likely to be revealed via the social gathering and the interaction which being in a focus group entails (Krueger and Casey, 2015; Sim and Waterfield, 2019).

The focus group gave the researcher the opportunity to gain a larger amount of information in a shorter period of time especially within the school settings. Given the power differences between the participants, for example the professionals in nutrition and exercise and the school children, focus group are particularly useful as the researcher had the ability to explore the degree of consensus on the given research area (Kitzinger, 1995).

Compared to focus groups that draw on the perspectives of a group in a cultural setting, individual interviews, for example the semi-structured interview is an effective method for data collection when the researcher wants to collect qualitative, open-ended data, to explore participants' thoughts, feelings, and beliefs about the research area, and to delve deeply into personal and sometimes sensitive issues (Jamshed, 2014).

An important goal of this study was to learn how culture may inform perspectives on parents' and children's experiences of diet and exercise interventions. Rather than simply describing differences between cultural groups, the goal is to show how cultural backgrounds and approaches may influence dietary and exercise practices among children to promote a healthy

diet and physical activity. To answer this question, we needed to allow the cultures to be interpreted in their own contexts.

For the focus group discussions and semi-structured interviews, a single interview schedule was developed based on the study objectives and the findings of the systematic-type review conducted which identified parental factors associated with optimal diet and exercise, and the barriers and facilitators of optimal diet and exercise in children in developing countries (Appendix 12). The interview schedule was used as a guide and, although many of the questions were asked to all participants, a flexible stance was maintained, and additional prompts and clarifications were used, or questions were skipped when it felt appropriate based on the participants' accounts. Interview questions were developed in this context.

Researcher reflexivity was key to the constructivist grounded theory approach in this study, which acknowledges that researcher cannot enter the field devoid of prior knowledge (Charmaz, 2014). As such, the process of inquiry and interpretation can be influenced by a researcher's social and cultural identities (Råheim et al., 2016). The researcher's experience and knowledge were shaped by her experience as a paediatrician and someone who has worked with different communities in a number of different projects (see Section 1.4.1) and considered their existing knowledge of the practical field an asset in facilitating their role as a researcher (Clarke, 2005). Awareness of how her professional status and previous experience might shape her views and assumptions with regard to child health, nutrition, and community engagement, and the potential social 'distance' between the researcher and the researched was also necessary for reflexive practice. In line with the chosen theoretical lens this included an awareness of the social setting, wider social and political context.

To enable the process of reflexivity, a research diary was kept in which the researcher wrote down thoughts and feelings about the research process. This included notes on observations, interactions, conversations, and responses, additional insights from repeated listening to the audio recordings of the interviews and focus groups and noting how these thoughts and feelings may have influenced the data collection process and how they may have shifted over time. These reflections were also discussed with supervisors aiding evaluation of the research process.

#### **4.9 DATA COLLECTION PROCEDURES**

Information sheets and consent forms were given to each participant (children for parental consent, parents, school heads, teachers, and other stakeholders) two to three weeks before the commencement of the interview or focus group discussion. Focus group discussions were



carried out in quiet classrooms separate from the main classrooms provided by the school staff. In-depth interviews with participants were held in either open plan government offices, homes of parents with their children and open sitting areas in schools for teachers. Due to the level of insecurity in Nigeria, schools take precautionary steps in safeguarding, thus, during the research, the usual security guard of the school is made to stay around the classroom while the focus groups and interviews took place. In the government offices, it is usually for security guards to be assigned to government officials, so in-depth interviews were carried out with security guard been present but with minimal interference and not participating in the study. During interviews and focus groups, other school children, teachers, and government staff members are not allowed to walk around the area where the study happened until it ended.

Before the start of each interview and focus group discussion, all participants provided written and oral informed consent and were reminded that they could stop taking part in the session at any point. Socio-demographic data were collected before each interview or discussion. In school the mood of the research sessions was friendly, engaging and light with laughter. Teachers established a positive attitude to the sessions with songs, announcements at the assembly, a brief description about the nature of the research and introduced the researcher. The discussions which took place in the community were equally friendly in tone, with parents keen to allow the researcher to discuss with their children as the study was of interest, were inclined to prompt further discussion after the interviews had been completed. Good engagement, a positive mood, appearing comfortable, and laughter were also features of the interviews with adult participants. All interviews and focus groups were conducted by the researcher with no other interviewers or facilitators. Discussions were principally carried out in English but also naturally lapsed into local dialects, pidgin English, Yoruba in which the researcher is also fluent.

Participants were assured that there were 'no right or wrong answers, and that their answers would be kept strictly confidential (within the safeguarding limits set out in the information sheet) and not associated with their names at any time. For children in school, a teacher stood around the classroom at the start of the interview with regular check-ins for safety reasons and also came in at the end of the interview to formally end the interviews. Sometimes they would ask how the interview went and would enquire about the nature of the discussions of the research. The researcher did not share confidential details but only responded to questions in general terms. For children interviewed in the community, a parent sat outside or stayed around the environment as the interviews were carried out, this did not interfere with the interview or influence the answers of the children. When necessary, the interviewer prompted participants to speak and probed for clarification or additional information. The interview

concluded when all topics were covered, and no new information emerged. Interviews and discussions were audio-recorded with permission using a recorder and a mobile phone.

A total of 48 individuals (32 adults; 16 children) took part in the study across three phases of data collection (Table 5). All participants met the determined criteria of willingness to participate, having provided informed consent. Initial data (Phase I) were gathered from 18 participants (three parents, five who had knowledge on nutrition and PA in health and education sector, and three children who each participated in semi structured interviews, and seven children who participated in one focus group discussion).

The interviews lasted from 45-60 minutes, and the focus group lasted 1 hour 45 minutes. Phase II of data collection involved a total of 14 participants (three parents, five stakeholders in the health and education sectors, six children) in semi-structured interviews lasting 45-60 minutes.

Phase III of data collection required the researcher to return to the field for specific interviews to answer questions that were impending from results of Phase II. It involved a total of 16 participants (five parents, one young adult and ten civil servants in the education and sports sector). Two focus group discussions were conducted with six participants in each of the groups. Four participants were involved in semi structured interviews. Interviews lasted 30-45 minutes, and the focus groups 45-60 minutes.

Table 4.2: Achieved sample

Data collection phase	Number of participants		Number of interviews		Number of focus groups ( <i>n</i> participants in each group)	
	Adults	Children	Adults	Children	Adults	Children
<b>Phase I</b>	8	10	8	3	0	1 (7)
<b>Phase II</b>	8	6	8	6	0	0
<b>Phase III</b>	16	0		0	2 (12)	0

<b>Total</b>	32	16	16	9	2 (12)	1 (7)
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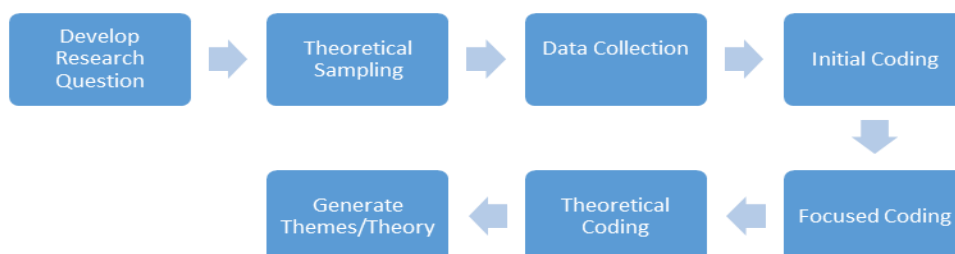
#### 4.10 DATA MANAGEMENT AND ANALYSIS

The grounded theory analytical approach involved coding or labelling i.e. the assignment of concepts to selected units within the data such as sentences taken from an interview transcript. The concepts are combined into related categories; links between categories are identified and verified against the data, and selective coding attempts to integrate the categories into a theory, which accounts for the phenomenon being investigated. Stages of analysis include transcription, memo writing, coding, constant comparison, generation of themes and theories (Charmaz, 2006; Gale et al., 2013; Bedford, 2013).

Transcripts of the interviews and focus groups, and memos (Phase II only) formed the analytical datasets. Data were all transcribed by manual typing and data management and analysis software was not used. Words and sounds in the recordings of the interviews and focus group discussions were captured verbatim (exactly the way they were delivered). Attention was also paid to pauses, non-verbal utterances and silence.

For the data collected at Phase I, initial and focused coding and comparison of concepts and categories based on the main research objectives was conducted. This analysis led to the creation of another set of refined, specific, and more probing questions for the second phase of data collection to uncover a deeper meaning at the heart of the research and asked in the second set of interviews (see Appendix 13).

For the data collected in Phases II and III, verbatim manual transcription was also carried out as in the first stage of data collection. Analysis for these two phases included initial and focused coding, and comparisons of concepts and categories. The analysis process is summarised in Figure 4.2 and the coding and comparison process is described in more detail below.



*Figure 4.2: The analytic process involved in this study*

#### 4.10.1 Initial Coding

The initial stage of open coding of the transcribed interviews started with the process of taking segments of data apart to compare words, to look for similarities and differences and the beginning of identifying patterns in the data. This involved line by line coding aided by the use of coloured sticky notes. In initial coding, the researcher inductively generated as many codes as possible from the first phase of data through theoretical sampling. Recurring words or groups of words were identified and labelled using the coloured notes. As recommended by Charmaz (2006) action-coding was prioritised over coding using topics. This involves the use of gerunds (words that suggest an idea, ending in *-ing*); “*Living communally*” and “*Identifying one’s heritage*” are examples of this within the initial coding for this study. The advantage of action-coding is that it is a heuristic (learning) stratagem that brings the researcher closer to the data, allows them to define meaning, make comparisons between data items, and identifying emerging links that warrant further examination (Charmaz 2006). Verbatim quotes from the participants were used as labels to capture the participant’s ideas where they represented a broader concept in the data.

During initial coding, Glaser (1978) suggested that the following questions were important to ask: What is this data about?; What does the data assume, and from whose point of view does this data come, whom does it represent or whose thoughts are they?; and What collectively might it represent?

This early coding process identified 71 general open codes (Appendix 14), with 31 concepts emerging from the data, and assisted in identifying the direction for further data gathering. After initial analysis, theoretical sampling was employed to direct collection of additional data that informed the developing theory.

#### 4.10.2 Focused Coding

The next step in the analysis was focused coding which built on the initial coding phase. Where initial coding fractured the data, focused coding began to transform basic data into more abstract concepts allowing the theory to emerge from the data. At this stage, a core category started to become evident as developed categories form around a core concept; relationships are identified between categories and the analysis is refined. The researcher interacted closely with the data during this phase, continually reassessing meaning to ascertain ‘what was really going on’ in the data.




Theoretical saturation was deemed to have occurred when new data analysis did not provide additional material to the existing theoretical categories from the preceding two phases of data collection, and the categories were sufficiently explained (Appendix 15).

#### 4.10.3 Theoretical coding to generate key themes

The goal of selective coding was to integrate the different categories that had been developed, elaborated, and mutually related during focused coding. To reach the goal of culminating all categories, the results from focused coding were further elaborated, integrated, and validated. Core categories were formed and further expanded on to be called key themes which provided the storyline for the research.

Memo writing (preliminary analytical notes) was used alongside this stage of advanced coding to ask questions of the data and identify gaps in the analysis (Charmaz 2006) Theoretical links became clearer and theoretical sampling was conducted to obtain data to address the evident gaps the analysis, develop the emerging theory and elaborate the main categories constituting it. The process of developing the analysis from code to core categories to themes is depicted in below. Table 4.3 summarises how the researcher looked for relationships between a concept such as 'Family participation in food preparation and exercise' and the wider data. Constant comparative processes were used to look closely at the data for possible connections between categories. Further data collection was conducted, so that the researcher could ask questions about ways in which parental involvement in active engagement of the school and the wider community in a diet and physical activity intervention for children could be further enhanced. Asking these questions elicited data that expanded on the characteristics and meaning of a further category labelled '*Teaching parents through activities in schools and communities*' which in turn contributed to the emerging '*Strategies to involve family in diet and exercise interventions*' theme. Additional examples for the remaining two overarching themes can be found in (Appendix 16).

Table 4.3 An example showing the development of one of the themes from codes to category to theme

Code	Family participation in meal preparation	Community nutrition and exercise advocates for parents and children
Supporting data extract	<p><i>“Then for the parents, we need to counsel them, like counselling them about food and nutrition and exercise as well as the children. Actually, giving them the general tips and stuffs like that. So parents need to know about good nutrition and encourage their children to eat nutritious meals, and this is where the schools can come in to help.” (URN 009, Adult, F, FT, PE Teacher, Lower Class D)</i></p>	<p><i>“A child may arrive home and tell the parents that ‘this is what was explained to us at school’. Some parents will ask the child to go and sit down, what did they do for you at school, your teacher that said so, did your teacher do so, and did your teacher do that? But if the parent is still educated within the community, if we can see some people that can sponsor some people to come and organise and talk to them and educate them. If the child hears, if the mother hears, if the child gets home and tell the mother, because the mother is aware, they will be able to make use of it.” (URN 036, Adult, M, Civil Servant, Lower Class D)</i></p>
		
Concept	Family participation in food preparation and exercise	Create family nutrition and exercise support for parents
		
Category	Teaching parents through activities in schools and communities	
		
Theme	Strategies to involve family in diet and exercise interventions	

Analysis of the focus group discussions and semi-structured interviews generated three major emergent themes: active communities; strategies to involve family in diet and exercise; and making the school a central point for diet and exercise; each with several sub-themes (Table 4.4). The solutions to the barriers of optimal diet and physical activity drawn from Study 1, participants' views on social, cultural, and environmental factors in achieving favourable diet and PA; culturally acceptable intervention approaches and acceptable methods for involving families in diet and physical activity interventions for children with parental engagement, schools and the wider community were elucidated within each of the themes.

Table 4.4. Emergent themes and subthemes

Key Themes	Theme description	Subthemes
<b><i>Active Communities</i></b>	Opportunities highlighted for links to community-based initiatives prompted by members of the communities including leaders. It points to the idea of partnership and shared responsibility for health promotion to reduce the burden on health services	1. <b>Taking ownership</b> 2. <b>Community agricultural interventions</b> 3. <b>Safe play environment</b> 4. <b>Language and religion</b> 5. <b>Health campaigns</b>
<b><i>Strategies to involve family in diet and exercise interventions</i></b>	A range of views on how people can be engaged to undertake health promotion, preventive measures, and action to promote healthy diet and PA in schools and communities. When responsibility is shared by communities and schools, approaches to these interventions are suggested that are more appropriate for the local context.	1. <b>Teaching food and PA skills/ food and health literacy</b> 2. <b>Using simple learning aids in the local context</b> 3. <b>School sports competitions/health campaigns</b> 4. <b>Professional support</b>
<b><i>Schools as key settings for diet and exercise interventions</i></b>	Schools were felt to have a universal reach, and that they are ideal settings to support children and young people's lifestyle choices.	5. <b>Setting up school gardens/farms</b> 6. <b>Train teachers on food and PA skills</b> 7. <b>School feeding and sports programme.</b>

Direct quotes were taken from in-depth interviews and focus group discussions transcriptions of the study to provide evidence for the analysis. Selected quotes support the reporting of the key themes in the results (Section 4.11.2), providing thick description of the findings. The

quotes were labelled using a unique reference number, adult or child, gender, socioeconomic classification, and for adult participants who were not parents of the child participants, their occupation.

#### 4.10.4 Respondent Validation

Respondent validation entails study participants checking early data, such as transcripts of interviews or observations of activities, for accuracy, or first drafts of interpretative reports for accuracy, as well as the interpretive claims being made (Mays and Pope, 2000; Kleven, 2008). Respondents' reactions to emerging findings can certainly help refine explanations as can key informants, although it is argued by some authors that it could be exploitative or distressing (Jaye, 2002).

However, respondent validation can be valuable in action research as is the case of this study, where the researcher aimed to work with participants on an ongoing basis to facilitate change (Barbour, 2001). This study looked at sharing transcripts of interviews and focus group discussions, drafts of interpretative data and reports with participants for them to strengthen the rigour of the research.

### 4.11 RESULTS

This section presents sample characteristics, and the key themes identified in the analysis.

#### 4.11.1 Sample Characteristics

Participant characteristics are summarised in Table 4.5, with more detailed individual level participant information in Appendix 17. The 18 participants who took part in Phase I included five boys and five girls, aged 8-10 years; seven women, and one man, aged 30-60 years. The participants' place of origin represented five geographical zones which excludes North West. The adult participants included parents, key personnel in health and education, and careers related to diet and exercise. Most of the participants' religious identity was Christianity.

The 14 participants in Phase II included six children with equal gender distribution, aged 10-11 years, from both primary and secondary schools. The adult participants included five women and three men, aged 26-59 years, represented various stakeholders in health and education as well as parents, and were from five geographical zones of the nation.

The 16 participants in Phase III were all adults including seven women and nine men, aged 19-52 years. They represented parents, sport officials and workers in the education sector, and two major geographical zones of the nation (the South West and South East).



**Table 4.5: Participants Characteristics**

Data collection phase		Phase I		Phase II		Phase III	
		Adults	Children	Adults	Children	Adults	Children
Gender	Female	7	5	5	3	7	0
	Male	1	5	3	3	9	0
Age	Years	30-60	08-10	26-59	10-11	19-52	0
Religious Identity	Christianity	8	7	7	3	13	0
	Islamic	0	3	1	3	3	0
Place of Origin	North Central (NC),	0	2	1	1	0	0
	North East (NE),	0	1	0	0	0	0
	North West (NW),	0	0	0	1	0	0
	South West (SW),	5	2	6	1	14	0
	South East (SE)	1	2	0	1	2	0
	South (SS)	2	3	1	2	0	0
Occupation	Students	0	10	0	6	1	
	Teacher	3		1		2	
	Business	2		0		5	
	Health sector	3		1		0	
	School heads	0		2		1	
	Voluntary sector	0		3		0	
	Civil servant	0		1		6	
	Sport Official	0		0		1	
Social Economic Class	A (highest)	0		0		0	
	B	0		0		0	
	C	1		1		2	
	D	7		7		14	
	E (lowest)	0		0		0	

#### 4.11.2 Key Themes

Analysis of the three overarching themes is presented below, supported by direct quotes from the data. Quotes are labelled with a unique reference number, adult or child, gender, and occupation and socioeconomic classification as described in the methods.

##### 4.11.2.1 Active Communities

Under this theme, five subthemes arose: taking ownership, community agricultural interventions, safe play environment, language and religion, health campaigns.

Taking ownership of schools and interventions that involves working to promote a healthy diet and exercise among children, requires everyone's collective participation and not only the federal or local government, as expressed by some participants,

*“However, we know how the government works and the situations happen, and we abandon the initiatives we have for the nation. All we can also do is support whatever the government is doing because if we leave everything for them, Nigeria will not work well. We have to take ownership as parents, communities and health professionals even the education people need to be involved.” (022, Adult, M, Medical Doctor, Lower Class D).*

There was also a suggestion from the participants that notable individuals in the communities with schools can take on schemes such as the school feeding programme and sports activities (a blend of both modern and local games carried out both indoors and outdoors) to promote healthy diet and physical activity among children. A number of participants mentioned that communities with schools should take on appropriate responsibilities by getting involved in the school sports competitions and other kinds of groups that pushes for community involvement which promoted sustainable agriculture. Also, there were opinions from participants that community agricultural interventions can be an avenue to promote healthy diet and physical activity among children with family involvement by encouraging communities to give room for agricultural infrastructure as in the case of providing farmlands for schools,

*“When the international donors pull out with our hands tied to the back, we will rely on community and social mobilization to see that the intervention project continues flying. Now the function of these mobilization teams is to work with a school support community board to see that the project works. Now this school support community board is made up of members of the community where the school is located. Its board members are mostly notable people in the community who have the means to support projects like a food project.” (FGD 034, Adult, M, Civil Servant, Lower Class D).*

*“We should drive more community driven outreaches that drives communal eating, and this can be sustained through sustainable agriculture.” (002, Adult, M, Nutritionist, Middle Lower Class C2).*

It was commonly felt that although notable individuals in communities can support school schemes like the yearly interhouse sports competition, there is a tendency that such individuals are not supportive either due to unwillingness or a lack of interest,

*“It is funny because we are told to ask the patrons of the houses to give us money, but then the patrons are not even willing to contribute. It is just one out of many that tends to give us money, that why each year the headmistress sorts of changes the patrons within the leaders or prominent people in the community, so that they can support the interhouse sports for their children.” (048, Adult, F, Sport Official, Lower Class D).*

It was discussed among some with similarities of views between professionals and parents that community responsibility could be used to mitigate against the issues of lack of physical safety as barriers to interventions, as well as driving the sustainability of interventions; those conveying fear also expressing potential solutions; with rhetorical complaints and not providing solutions vs. participants who see the problems and provides specific solutions; presenting self/organisation as part of the solution vs. hypothetical roles for others. It was suggested by some participants that communities working with schools can create safe play spaces for both parents and children. It is believed that safe play areas will encourage more physical activities organised both in schools and within the communities,

*“The fear of kidnapping is an issue in the community. You cannot even say you are safe let alone leave your child to go and play somewhere. No o. So I still think the school area is a safe place to start at least there are people always looking around and watching the children. Let them play there. But come to think of it, if communities work together and create a safe place for children and even adults to do different sport activities even if it is a place to play Ayo or other African games and add the modern games it will go a long way. Highest they pay for security. I bet it will work, no one will want to harm people just having fun.” (029, Adult, F, Community Development Worker, Lower Class D).*

*“For me, security is about the school field, the community is yet to look into the hoodlums and young boys who come into the field but misuse the school like smoking hemp there or drinking their concoctions with tramadol and all. Our children regularly go to play football in the evenings and during weekends even the youths, but it is unsafe for children to see these older men and women come into the school to practice all kinds of drug abuse, theft and dangerous activities even with their girlfriends. If the community can look into this aspect of security, it will be very helpful to the children and the school.” (FGD 041, Adult, F, Trader, Lower Class D).*

Access to clean water and menstrual hygiene were a part of the discourse around safety, but also intersected with gender in the engagement of children in physical activity. It was expressed among the female participants that their periods were a hindrance to engaging in physical activity as it relates with proper menstrual hygiene management. Participants suggested that a safe play environment will encourage young girls to participate in physical activity and by also diversifying physical activities will engage young girls,

*“I do skipping rope with my friends sha and it is nice. Sometimes we run but I don’t think there is much exercise or sports that girls can do here especially in school. So, we just do skipping rope, running and maybe play ten-ten. That is, it, it can be boring sometimes, so we just sit down as girls to talk about different things” (FGD 015, F, Pupil, Child).*

*"It is true Ma, if you are on your period, like we do not like to do sports you know how it can be especially if there is no water to clean up after sport. So, we just stay and not do any sport". (FGD, 012, F, Pupil, Child)*

*"I think we should have water to help us during our sport time and so that we can be able to do more sports like maybe running, long jump, maybe football for girls." (FGD 017, M, Pupil, Child).*

With discussions on how communities can support the school, a subtheme on creating safe play areas emerged. It was expressed that recycled or locally sourced materials can be used to create safe playgrounds for school children in both communities and schools. This was within the context that communities and schools should provide opportunities for green spaces which can encourage the active engagement of children and parents in physical activity,

*"...As for me, I think we can design a playground from the scratch. You don't need a lot of expensive equipment and being an environmentally friendly person, we can use recycled materials and create a safe playground for children in school and even extent to the communities." (029, Adult, F, Community Development Worker, Lower Class D).*

With suggestions for community responsibilities, another subtheme emerged that involved the use of language and religion. Discussions about language and religion was common among participants as it was suggested that local dialects and indigenous languages like Pidgin English should be used in health education. Use of these dialects and languages can serve as a means of increasing reach to parents and children with regard to nutrition- and physical activity-related health promotion, as English language is perceived as sometimes being a barrier to learning, especially about health,

*"All these doctors and health people speaking grammar that is too big, please tell them to teach parents in simple Oyinbo language. Use Ibo or Hausa or even Pidgin if the case is critical. Simple English about food and exercise for their children is what they need. Do town hall meetings in the communities. Take the gospel to them. You know all these parents do not like attending PTA meetings, so carry the message to them in their area." (029, Adult, F, Community Development Worker, Lower Class D).*

The role of language and religious settings were often interlinked. Religious gatherings in churches, mosques and town halls in various communities was proposed to be an effective way to promote healthy diet and physical activity through health literacy and will be altogether successful when conducted in local dialects. It was commonly felt that with parents coming together in groups or during an activity during a religious gathering, they can benefit from health literacy events and outreaches organised in their communities as it provides the

opportunity to learn about healthy diet and exercise and help in understanding the health needs of their children,

*“Parents need to be taught about nutrition in a language they understand, if you have to teach them in Yoruba and it is going to help then we have to do it. We also need to make use of religious organisations, they are a part of the community and it will help in further education about food and even sports.” (021, Adult, F, School Principal, Lower Class D).*

*“As for parents, I think they need to be taught more about nutrition and exercise. Some mothers do not know what to give their children and so sometimes the children are given just snacks or poorly prepared food as breakfast. It does not help and parents still need education in languages they can understand and also we can make use of the religious organisations, because they have a strong influence on people, they using those with knowledge about diet and exercise can take up programmes in their organisations to teach parents and the community as a whole.” (019, Adult, F, Civil Servant, Middle Upper Class C1).*

Disinterest in health promotion events among parents, even in religious settings, was a part of the discourse. It was expressed among participants that parents show less interest in health literacy and tend to have interest in other activities like parties, or they do not seem to financially to schemes that promote health education. Parents’ disinterest can also be linked to a child’s disinterest in engaging in sports activities, as expressed by some participants,

*“...Be sure that in your work Dr, you emphasise clearly the need for the parents to feed their children. Many are more concerned with parties and other forms of activities like business and clothes buying but forget they have to feed their children.” (FGD 036, Adult, M, Civil Servant, Lower Class D).*

*“...Then it is not every time we can play football as we think of books too because of our parents who say we play too much.” (URN 024, M, Student, Child).*

To support the potential of a healthy diet and physical activity intervention in religious and community setting, a subtheme on health campaigns emerged. With the influence of religious leaders and their religious settings, participants suggested that nutrition and physical activity related health promotion can be in the form of health campaigns supported in the local communities. It was commonly felt that these health campaigns will positively create an impact on parents and children,

*“Dr also when you want to talk about healthy food and exercise for children, do not forget to also emphasize in a community gathering the need for religious leaders to encourage*

*and supports people especially parents in the community to feed their children. Religious leaders also can provide the platform for campaigns on healthy eating and physical activity.” (FGD 038, Adult, M, Civil Servant, Lower Class D).*

Across the sample participants expressed that health campaigns should involve the health consultation, water, sanitation and hygiene facilities advocacy and improvement. Although funding from the government was indicated as a potential barrier, participants suggested that the public and private sector can work together to promote health campaigns in communities and schools,

*“We need health campaigns. I know organisations do these, but it should not stop in just the communities, the school also need these kinds of campaigns. A lot of health issues are in schools today. We have food issues, water and so on. We need to work together and see that the school is a safe environment for the children. Nothing stops us from having a sports competition to raise awareness for hypertension or diabetes.” (021, Adult, F, School Principal, Lower Class D).*

#### **4.11.2.2 Involving Family in Diet and Exercise Interventions**

Under this theme, four subthemes arose: teaching food and PA skills/ food and health literacy, using simple learning aids in the local context, school sports competitions/health campaigns, and professional support.

The idea of using teaching as a tool for promoting healthy diet and physical activity among children and parents was suggested among participants. Potential ideas revolved around meal planning, exploring healthy intercontinental foods, learning culinary skills and engaging in physical activity as parents. These ideas were discussed to address the barrier of knowledge on healthy diet and physical activity,

*“Teaching parents is like doing school for them because looking at nutrition and exercise, it is very necessary. It has to be simplified teaching nothing complex, the essential things, it just that you look at Nigeria and think are people ready to learn but public health education is very key to us. We have to use this means to teach the parents.” (030, Adult, M, Development Manager, Lower Class D).*

It was commonly felt that inadequate finance, fast paced work environment for parents led to poor dietary and physical activity choices especially from professional views. This brings about shifting the responsibilities to the children themselves or the school to provide healthy meals which sometimes are not able to serve the purpose of healthy choices as expressed by some participants,

*"At home, it is if there is money, sometimes we do not eat before we go to school and sometimes maybe rice in the morning, and rice in the evening. For school, I buy food in school but the food is not all that good o, let me not lie but it is okay. Sometimes we buy rice, sometimes spaghetti, sometimes too maybe we buy yam and stew but the water they use is not that good, the people selling sometimes use the toilet water and it is not good. If I am not all that hungry, I can buy egg roll, biscuits, meat pie, or sweets." (010, F, Child)*

*"Mothers should teach their children to cook, as we know busyness can eat into the time of work and parents can forget about their children, so teach children how to cook, instead of putting small money for roasted plantain and oil or groundnuts only. We should do better as families." (008, F, Home Economics Teacher, Lower Class D).*

It was discussed among some with similarities of views between professionals and parents that the decision on food choices resting solely on the child could hinder support for a healthy diet from parents and professionals. They expressed that the children should be enlightened on healthy nutrition and its benefits to their health both at home and in school,

*"Children who dictate what meals for parents they come from well to do houses and from well financial placed people but here, some of our students will not even bring money to buy food and they will not eat from home." (008, F, Home Economics Teacher, Lower Class D).*

*"Food is critical yes, but you see these children, they are very picky eaters. You will cook food for them in the morning, they will tell you that they are not interested. They will tell you they want you to cook this or that in the morning. Like me, I don't have time to start cooking in the morning, so I say okay. No problem, take money and eat in school. When you come back, we will give you something else to eat in the evening. So Dr, it is the children you have to talk to as well, they should stop being choosy." (FGD 044, F, Trader, Lower Class D).*

As discussions around teaching food and PA skills continued, a subtheme on the potential idea of using simple learning tools tailored to the families emerged. It was suggested among participants both parents and professionals that incorporating cultural activities like, dance and folklore; visual aids, board games and a mobile application can encourage parents to be involved in promoting a healthy diet and physical activity,

*"One thing I think is using visual aids, board games if possible. Or very simplified book in simple English or in languages that parents and even teachers can understand. We can also teach them using these aids and also talk about budget in relation to managing*

*healthy lifestyles for both parents and children. It is like you have book that encourages you and then sessions to tell you how to proper manage your funds to make food available for your children.” (030, Adult, M, Development Manager, Lower Class D).*

*“I think there should be like an App to help with fitness for families especially with mothers who are trying to lose weight and their children. All it should have excellent routines that will encourage the whole family to participate in. (003, Adult, F, Caterer, Lower Class D).*

Practical learning tools are essential in promoting healthy diet and physical activity as suggested by participants, the need for support was raised during the discourse bringing about a subtheme on schools’ sports and health campaigns. Participants suggested that improving school curriculum to include health promotion on nutrition and physical activity related activities was one of the ways to engage with children and parents,

*“Schools need to improve their curriculum for nutrition and exercise that uses culture again to help the children know the importance of culture with food and exercise. We need teachers who understand these concepts. Imagine teaching Yoruba and you are sitting in the classroom with no activity for the children to engage in, it loses the whole meaning of whatever topic you are teaching the children. The schools need to research and find ways to imbibe culture and food and exercise because that is how the children will learn more.” (003, Adult, F, Caterer, Lower Class D).*

*“A farm to grow food in school that sounds exciting I can even ask my parents to do small garden at home or even too I can do it myself.” (025, F, Pupil, Child).*

Having school activities that promote healthy diet and physical activity, a subtheme emerged as part of the discourse which was provision of professional support. Professionals suggested there was a need for professional support in achieving the goals for healthier diet and physical activity. Although parents had the suggestion of peer- to- peer support for equipping themselves better,

*“Health workers, teachers, parents are all going to be involved. For us, we run a mobile clinic for schools and using this opportunity we can all work together to address the issues of malnutrition. Consult with parents about their children’s nutritional needs, working with teachers and school heads to see that children participate in the school feeding programme that is if the government is working effectively but asides that we are non-governmental organisations and other donors can work together to see that there is a family centred kind of support.” (022, Adult, M, Medical Doctor, Lower Class D).*



*“For me, I think we mothers need to work on our stress level and also see that we know the meals to prepare before school the next day. We need to learn amongst ourselves on how to cope with work and ensuring our family eats good food.” (FGD 040, Adult, F, Teacher, Lower Class D).*

#### *4.11.2.3 Schools as Key Settings for Diet and Exercise Interventions*

In this theme, three subthemes arose: creating school gardens/farms and better sport areas, train teachers with adequate nutrition and PA skills, sustainable school feeding and sports programme.

It was suggested by participants that introducing gardens/farms and better sport areas in schools will benefit the school children as it will enhance learning and experience about healthy eating and physical activity,

*“For schools, I also think they need gardens as it will encourage children to participate in farming and it will increase their understanding of food produce especially when it comes to introducing children to vegetables. We must all work together to achieve this for the sake of the health and wellbeing of the children.” (022, Adult, M, Medical Doctor, Lower Class D).*

*“Can we have a small farm you know like when you can get fruits and vegetables and maybe it will be a good thing.” (028, F, Student, Child).*

*“...Me, I like playing but I want the field in the school to be like grass, not nails or stones that are in the sand.” (FGD 013, F, Pupil, Child).*

Adopting schools to promote school gardens and other initiatives by individuals or organisations due to insufficient funding from the government and as a part of corporate social responsibility was part of the discourse. This is linked to school settings and active communities working together to promote healthy nutrition and physical activity,

*“Like I know there is an organisation that currently adopted few schools in Lagos and they are developing school gardens and a school feeding programme, and I think this is working and should be adapted in various schools, we need people, organisations to do these things. I look forward to seeing an intervention that adopts a school in Lagos.” (019, Adult, F, Civil Servant, Middle Upper Class C1).*

*“Anyone who God has assisted, who can assist those children because in the school here, where some children will not eat from home but will be given garri in a container to drink on arrival at school very early in the morning for breakfast. Some of them here*

*at times do vomit. If we see one whom God has blessed and that can assist them, maybe has something, should tell government so that it will not be said that what the person gave the child has caused stomach ache for the child, but it should not be prepared food, if possible, the child can take it home to show the parents, and explain how some people came to share things for us at school, and this is how it was given to us when the child arrives home or invite parents in the community, they should invite them and they should be assisted..." (039, Adult, F, School Headmistress, Lower Class D).*

It was discussed among some with similarities of views between professionals regarding the issues of lack of farm safety as barriers to interventions as well as driving the sustainability of interventions; those conveying fear also expressed potential solutions,

*"I also tried having a farm in the school but the challenge there was that the teachers and secondary students were causing a lot of damages in a way and it result in a less bountiful harvest. We tried it but it didn't work well because of man-made activities it is something we might try again because I think it will be very beneficial and also it can encourage parents in the community to start a small farm. It will promotes activity and help with food especially vegetables." (020, Adult, F, School Headmistress, Lower Class D).*

With a creating school gardens/farms and sports area as potential components for healthy diet and PA intervention in schools, a subtheme on training teachers on with adequate nutrition and PA skills emerged. Participants both parents and professionals suggested that there is a need to train teachers with the right skills and equip them with tools to promote healthy diet and physical activity in schools. Professionals expressed that the challenges with temporary teaching staff makes it difficult to support teachers with tools to improve the quality of education, this is as a result of the teaching scheme proposed by the government,

*"We need teachers who understand these concepts. Imagine teaching Yoruba and you are sitting in the classroom with no activity for the children to engage in, it loses the whole meaning of whatever topic you are teaching the children." (003, Adult, F, Caterer, Lower Class D).*

*"...we need teachers that can work, not temporary teachers who cannot also afford to live within the schools. We also need teachers who will come regularly to teach without excuse." (020, Adult, F, School Headmistress, Lower Class D).*

In discussing the potential components for promoting a healthy diet and PA intervention with the school as a key setting, the subtheme of sustainable school feeding, and sport programme emerged. Although there is a current home-grown school feeding programme recently initiated

by the Nigerian government, it still has its successes and challenges as expressed by some participants. Some children participants expressed the need for a better sport area in school as there is inadequate resources to engage with during sports. It was suggested that schools should be adopted by individuals to set up school feeding programmes that will sustain the nutritional needs of the school, this brings the private and public sector together to achieve a common purpose.

*“So looking at the school’s scheme for our children, I will say the children are trying as well but the fact that we adopt the word with balanced diet it is not easy to achieve this, it is not easy at all. And for us to know those that are eating the balanced diet, it is not easy, although our food sellers are really trying, because when they give the children food, they put some fruits with the food. And you know many of the children their parents cannot afford it, so the sellers put fruits together with the foods, and this kind of helps the children and makes it easier to say at least the children are eating something balanced.” (009, Adult, F, FT, Physical Education Teacher, Lower Class D).*

*“When there is everything needed to participate in different sports apart from football.” (027, M, Pupil, Child).*

Whilst there was suggestion about the potential of a school feeding programme, quality of food and food hygiene practices was a part of the discourse. Children participants expressed the need for better practices and standards in order for them to have safer and healthier meals,

*“... for the school part, they should increase the food and also they should not use dirty water to cook the food and maybe they should not sell for that is almost sour for us.” (005, M, Child, Pupil).*

*“As for food, maybe in school they should make the food more and also make sure they use clean water to cook the food and they can add fruit like mango or orange for us.” (010, F, Child, Pupil).*

## 4.12 DISCUSSION

### 4.12.1 Summary of findings: integration with existing literature and underpinning theory

The aim of this qualitative study was to explore views of parents, children and other stakeholders on social and cultural factors at the individual, interpersonal, and community level, and factors at the wider environmental and societal level that influence diet and physical activity, including their role as barriers and facilitators; potential components or activities suitable for childhood diet and physical activity (PA) interventions; and the potential for parental involvement in such interventions among children in Lagos, Nigeria.

The study resulted in three overarching themes which were: 1. Active communities, which aligned with CBPR and the societal level of the SEM; 2. Strategies to involve families in diet and physical activity, with suggestions made that mapped across all of the SEM levels; and 3. Schools as key settings for interventions, aligning with the overarching settings approach. Comparison of cases by participant characteristics indicated that the themes appeared to be common across the sample regardless of religion or ethnicity. The interplay of themes and subthemes that emerged from the data generated the following theory:

*‘For active promotion of optimal health and wellbeing, there has to be a driven synergy between the community and the school to effectively carry out health promotion interventions that involve parents, children, community members, teachers and other key players in health and wellbeing. It is all about grassroots engagement to promote a healthy diet and physical activity for children’.*

The study findings can be further interpreted in light of the wider literature and the underpinning theory. Within the *active communities* theme, adult participants identified the need to tackle barriers to the development and uptake of diet and physical activity interventions, which stem from factors at the school environment and wider societal level. These included inconsistent funding and a lack of safe outdoor space for PA. The solutions they suggested included active collaboration between communities and schools. This type of partnership is also a necessary feature of CBPR (Israel 2005) and the health promoting school ethos which informs the settings approach in the current study (Jourdan et al., 2021). However, the discussions with adults also indicated that there was minimal existing relationship between the school and that the community and school did not work together as expected. Participants in this study attested to only a few community members getting involved in the promotion of school initiatives. such as interhouse sports competition and improvements to school meals because of the general lack of ownership, financial issues, or disinterest.

As described in Chapter 2, a number of countries have a National School Health Policy (NSHP), including Nigeria (Federal Ministry of Education 2006), as the foundation of a health

promoting whole school approach, of which School Health Programmes (SHP) are core constituents. According to a previous study in Nigeria involving interviews with head teachers and observations in schools (Ademokun et al., 2014), although teachers attempted to deliver SHP, there was limited awareness of the country's National School Health Policy (Federal Ministry of Education 2006) and SHP were poorly implemented and did not reach the standards set within the policy. Similarly, to the current study, participants cited lack of funds and inadequate facilities (Ademokun et al., 2014). One of the core elements of the policy is the promotion of community mobilisation. The lack of cordial relationship between the school and the community members could in part be attributed to the lack of infrastructure to enact the NSHP in the participating school. These findings are consistent with previous research that has shown limited family and community involvement in school health policies (Kehm et al., 2015; Michael et al., 2007; Winnail et al., 2002). School feeding is another key element of NSHP in Nigeria (see Section 1.4.4). Research conducted a decade ago showed that a school feeding programme in Osun State, Nigeria, significantly improved the nutritional quality of school meals and the nutritional status of 160 pupils in the participating primary school (Falade et al., 2012). More recent evaluations, as reviewed in Chapter 1, suggest inconsistencies in the delivery and effectiveness of school feeding programmes.

The concerns expressed by the child participants indicated an interaction between individual and school environment factors creating barriers to healthy eating and activity. Children shared worries about the quality of their school meals, as well as their lack of access to clean water and menstrual hygiene items, both of which had an impact on their PA engagement. Security for outside play areas, infrastructure improvements using recycled/ locally obtained materials, and health initiatives supported by local dignitaries were among the practical solutions suggested by adults to address these concerns. It was recommended that these solutions should be delivered through community collaborations, akin to a coalition model consistent with a community settings approach to health promotion (Hubley and Copeman 2018). Children's concerns about school food safety and quality are substantiated in other studies. Although there is an operational regulation concerning safety and minimum quality standards regarding food vendors in public schools, previous research has reported health hazards associated with food vendors in Nigeria which constitute significant sources of food contamination especially for school children (Okoroha, 2016; Idowu and Rowland, 2006). Many resource-poor communities struggle to access the resources they need for effective and sustained good hygiene practices given economic or infrastructure limitations. Studies have showed that access to soap was limited in schools, and water supplies and sanitation facilities were inadequate, particularly in remote schools, and therefore a lack of effective hygiene and sanitation practices despite good knowledge about hygiene among school children (Babalobi,

2013; Sibiya and Gumbo, 2013). A growing body of evidence indicates that access to safe drinking-water, sanitation, and hygiene (WASH) services has an important positive impact on nutrition, physical activity, and menstrual hygiene management (McGinnis et al., 2017; McMichael, 2019; Oduor et al., 2015; WHO, 2020). As suggested in this study, there is a need for clean water, sanitation facilities and WASH literacy which could be provided by active collaboration between schools, communities, the public and private sectors.

Views centred around individual and interpersonal factors within the *strategies for involving families* theme. Health literacy classes for parents, the use of learning aids adapted to literacy levels and local dialects, and the involvement of religious leaders were all suggested as ways to engage families in interventions. Previous research has shown that the success or failure of health promotion efforts rests on how well they are adapted to the local population (Lambert, 2006). The suggestions on training teachers in food and PA skills, and the involvement of religious leaders as key players in promoting a healthy diet and physical activity, align with this existing literature, as well as the capacity building of teachers and others that is a feature of the health promoting school model ([https://www.who.int/health-topics/health-promoting-schools#tab=tab\\_1](https://www.who.int/health-topics/health-promoting-schools#tab=tab_1)). In the past, health messages have been customarily delivered by professionals to ‘passive’ lay audiences, on the assumption that lay knowledge is inferior and incorrect (McMullin, 2005; Torsch and Ma, 2000). Whereas it has been argued in more recently that lay knowledge should be more widely incorporated into public health initiatives, with messages shaped by cultural and religious contexts (Levesque and Li, 2014), and aligning with the need to address individual and interpersonal level factors in health promotion according to the SEM (Sallis et al., 2008). Recommendations for using local dialects and simple English language for teaching health literacy and PA skills is supported in other research which suggests that in countries with many dialects, it is important that local language skills are considered in communication strategies (Burtscher and Burza, 2015). In addition to language, enhancing understanding of topics relating to nutrition, physical activity, health and disease using local concepts is also supported by previous research (Jilcott et al., 2007). Policy actors were included in the study sample; however, perhaps hampered by funding constraints, they provided suggestions that either focused on individual level responsibility, or with regard to the societal level suggested social responsibility schemes involving partnership between government and the corporate world to aid sustainability of health programmes.

In the *schools as settings for interventions* theme, adults and children supported school gardening/ farming and upgrades to sports facilities, arguing that schools are appropriate venues for health promotion initiatives. In the current study, participants were of the opinion

that gardening to contribute to school feeding could play an important role in healthy eating and also in encouraging parents, children, and the wider community to have their own gardens. However, adults raised concerns about viability and sustainability of such gardens. Research has shown that school gardens can promote and strengthen home gardening which could be a strategy to increase availability of fruit and vegetables and improve dietary patterns (Laurie et al., 2017; Wells et al., 2015; Phometsi et al., 2006). Despite the substantial uptake of school gardens to promote health, evidence of sustainability is limited (Laurie et al., 2017; Somerset and Bossard, 2009). Further development and use of suitable experimental designs will assist in developing a better evidence base for school gardens and other community-based health interventions (Davis et al., 2015).

#### 4.12.2 Strengths and limitations

The strength of this study was that it helped to address some of the gaps identified during the systematic-type review (Study 1). None of the qualitative studies from the systematic-type review were based in Nigeria, thus there was a need to explore any similarities or differences in barriers and facilitators of optimal diet, physical activity, and healthy weight among children that were identified in the review. This study has provided the opportunity to explore the views of parents, children, and other key stakeholders on how the identified barriers from the systematic-type review could be addressed. Common across the qualitative studies in the review and the themes in the current study were the role of knowledge and beliefs, and environment and resources as barriers and facilitators of optimum diet and physical activity.

The study illustrated that children have the capacity to take part in research that is related to them. Creating a balance of the voices amplified in this study could ensure genuine participation of children in school and increase the potential to enhance their own wellbeing (Claverling and McLaughlin, 2010; Kellett, 2005). Documenting the voice of children on what participation means to them has been used as a tool for improving the planning of child participation in programmes. It is hypothesised that children feel happy and involved when their opinions are counted as worthy and expressed in an interactive and liberal environment (Simovska and Jensen, 2009). However, in this study, a potential limitation was that the voices of children were somewhat silenced either due to social or environmental factors (Powell and Smith, 2009). It also helped to identify the situated nature of knowledge about diet and physical activity in schools and communities in Nigeria. As an exploratory method, grounded theory has been particularly suitable for investigating the social processes relevant to diet and physical activity with parental involvement among children in both schools and communities, which have attracted little prior research attention.

Data were gathered by different data collection methods including in-depth interviews, focus group discussions and field notes. Also, gathering data at different times of the year from child participants and adults in a range of roles i.e. teachers, parents, and civil servants provided a range of voices and experiences.

An audit trail to enhance reliability by reflecting on and outlining in a transparent way the processes that led to the study findings is suggested during qualitative studies (Lewis and Ritchie, 2003). Rigorous reviews of study design, sampling, ethics, data collection processes, consistency in carrying out fieldwork, verification of transcribed data and supporting the analysis with direct quotes ensured the trustworthiness of the data, thick description of sample, methods and findings provided a balanced perspective which resonated with other studies (Freeman, 2014).

As described in the methods, obtaining feedback from participants to enable comment of the interpretation of the data and challenge anything they perceived to be misinterpretations was planned (Birt et al., 2016; Leung, 2015). A limitation of the study was that although materials were provided to participants, no feedback was not received and therefore the intended respondent validation was not achieved.

In qualitative research, statistical generalisability to a wider population is not the objective. Generalisability, or more appropriately in this context theoretical generalisability or transferability, is concerned with how applicable theories which are generated in one setting are to other settings (Yin, 2003). This study included a wide range of relevant voices and has given insights into views of parents, children on diet and physical activity, solutions to address barriers intervention activities that exist in low-income settings, how communities and families can be actively engaged, and how school can be an ideal setting for diet and physical activity interventions. Transferability to other settings depends on the context in which the research will be conducted, and the contexts to which the research findings are to be applied (Koch, 2006). The audit trail provided in the current study means that detailed descriptions of context and phenomena are available to enable others to assess the findings' applicability to their own location.

A constructivist grounded theory approach, and qualitative research more widely, requires reflexivity throughout the research process as a key element of research rigour. Previous researchers have described a shared culture between participants and researcher as providing productive ground for obtaining access to target populations, asking meaningful questions, nurturing rapport and gaining understanding (Ochieng 2010). As a Nigerian, from a southern region, conversant in Yoruba and pidgin-English, and a person of faith, this



positionality resulted in a similar positive experience with regard to access to child, parent, and wider community participants, fostering trust, and openness in the discussions.

Experience in clinical practice and community health led to assumptions about the poor state of school health promotion in Nigeria; however, these assumptions and what may hinder and facilitate optimal diet and physical activity were confirmed as engaged with the recordings. The fluidity between an 'insider' position as a Nigerian with deep understanding of the role of religion and cultural norms in people's views, and an 'outsider' researcher-clinician was also reflected on, as has been reported by others (Adu-Ampong and Adams 2020). This ensured correcting any thinking that leaned towards the researcher considering herself an objective observer (Ochieng 2010), but also practicing 'fair dealing' (Mays and Pope 2000; p.51) with regard to garnering a range of views across the study sample, and not just those that aligned with her own cultural norms or assumptions based on previous experience.

Reflexivity took time and self-discipline, and maintaining the reflexive diary was challenging especially during fieldwork where there was pressure to move at a rapid pace and be flexible in terms of participants time and other commitments. This meant that adapting to conditions was not always possible. For example, although policy actors took part in the study they tended to be those in junior roles, and as noted above tended to direct the conversation to individual, community and private sector responsibilities. More time and space to reflect may have identified ways to achieve effective and accountable engagement with senior level policymakers at the top level, and the potential that this may have had to draw out understanding of how policies is not known.

#### 4.12.3 Chapter summary and implications for Study 3

Together with the findings of the systematic-type review (Study 1) the findings for this current grounded theory qualitative study provided the basis for Study 3. The suggested importance of collaboration between school and community provided the impetus for partnership and family orientated principles at the core of the next stage of research, in keeping with participatory and health promoting school approaches.

Adult and child participants in the current study identified similar barriers to healthy diet and PA as were found in the review, and their suggested solutions included increased security, infrastructure improvements such as safe play environments, and health initiatives supported by local dignitaries, school, community, and private sector collaboration. Further, suggestions were made for intervention content that could be culturally tailored and acceptable such as teaching food and PA skills, and school gardening as a means of working towards a

sustainable school feeding programme. These views all contributed to the development and testing of intervention components that might potentially be included in a future intervention promoting healthy diet and physical activity, including how wider social determinants were considered. Studies 1 and 2 therefore provided the evidence base for Study 3 and Figure 4.3 below summarises how this evidence informed the next phase of research.

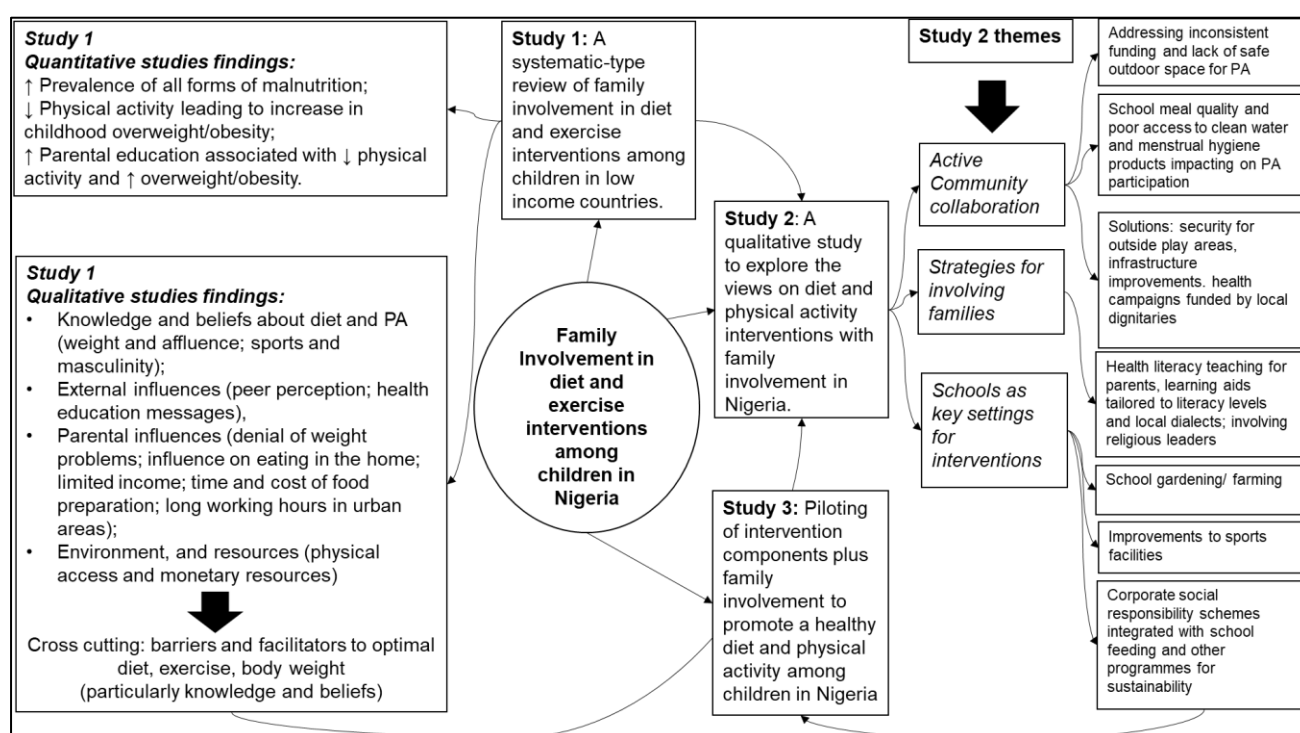


Figure 4.3: Links between the studies: how Studies 1 and 2 informed Study 3

Exploring the feasibility and acceptability of potential components and outcome measures, and the plausibility of outcome data, for a future healthy diet and physical activity intervention for children with parental involvement is therefore the subject of Study 3 and is presented in Chapter 5.

## 5 PILOTING OF INTERVENTION COMPONENTS PLUS FAMILY INVOLVEMENT TO PROMOTE A HEALTHY DIET AND PHYSICAL ACTIVITY AMONG NIGERIAN SCHOOL CHILDREN (STUDY 3)

The preceding qualitative Study 2 (Chapter 4) carried out in Lagos, Nigeria helped inform culturally acceptable approaches to promote a healthy diet and physical activity (PA) among Nigerian children. Coupled with the findings from the systematic-type review (Study 1) reported in Chapter 3, Study 2 suggested active community collaboration to address barriers such as lack of local facilities, involving families through teaching children and adults' food, PA, and hygiene management skills, and maximising the potential of schools as key settings for interventions through school gardening as approaches and intervention components to be tested in this current study. It should be noted that this study is not an intervention but potential intervention components to promote a healthy diet and physical activity among Nigerian children with family involvement. It, however, follows the principles of the MRC guidance for complex interventions.

Study 3 is presented in this chapter which explores the ***feasibility and acceptability of components which may potentially be included in interventions targeting healthy diet and PA behaviours among children with family involvement in Nigeria***. As such it will contribute to the exploratory stages which are required *prior to future feasibility and pilot trial testing of a fully defined intervention*. This is in line with the MRC guidelines for the development of complex interventions (Craig et al., 2008), and expanded on in more detail by O'Cathain et al (2019) which states that repeated development and refinement phases are often needed both prior to and overlapping with formal testing of a new intervention.

Globally, there are several school-based studies targeting families with young children that focused on modifying nutrition and physical activity behaviours to combat the obesity problem in developed countries, but few have been conducted in the low- and middle-income countries (LMICs) (Barkin et al., 2012; Slusser et al., 2012). To the knowledge of this author, there are no culturally tailored diet and exercise interventions with family involvement designed to promote healthy diet and physical activity among school children in Nigeria. The purpose of this study 3 was to develop, test and evaluate ***potential intervention components*** to address this gap among school children (aged 8-13 years) in Lagos, Nigeria. The current study, as with the preceding review and qualitative study, constitutes a novel contribution to the evidence base.

Specific objectives were to:

1. Develop theoretically- and evidence-based intervention components that are culturally favourable, focusing on increasing healthy diet choices, physical activity, and hygiene practices, and reducing sedentary behaviours.
2. Deliver the intervention components in a school and the wider community.
3. Explore the acceptability and feasibility of the intervention components among parents and children.
4. Explore the acceptability and feasibility of potential outcome measures and plausibility of outcome data.

## **5.1 THEORETICAL FRAMEWORK**

This exploratory study was informed by the guidance for the iterative development of complex interventions (Craig et al., 2008). Complexity can occur within the range of possible outcomes, the potential for variability in the target population and setting, as well as in the interaction between a number of components (Craig et al., 2008). Therefore, methods for the development (including feasibility/ piloting phases) and evaluation of complex interventions should be participatory and in multiple stage as recommended in the MRC guidance (Craig et al., 2008).

Detailed suggestions for conducting the iterative cycles of intervention development include obtaining feedback from stakeholders to identify problems, implementing potential solutions, assessing component acceptability, and starting the cycle again until assessment of later iterations of the intervention produces few changes (O’Cathain et al., 2019). These cycles will involve using quantitative and qualitative research methods to measure processes and intermediate outcomes, and assess the acceptability, feasibility, desirability, and potential unintended harms of the intervention (O’Cathain et al., 2019).

Before a substantial intervention evaluation can take place, it is proposed that the intervention must be developed “to the point where it can reasonably be expected to have a worthwhile effect” (Craig et al., 2008; p.2). There may be overlap between the development phase and the subsequent phase of feasibility and piloting because some exploration of feasibility is often part of the intervention development process (Hoddinott, 2015). The recommended assessment of the evidence base, including reviewing the effectiveness of existing interventions, and/ or qualitative research with stakeholders to inform the intervention development (O’Cathain et al., 2019), was adopted in the current programme as seen in Studies 1 and 2 and summarised in the introduction of this chapter.

The intervention component development, testing of components and potential outcome measures, and integration with theoretical perspectives are summarised in a development logic model (adapted from O’Cathain et al 2019; Figure 5.1). As outlined in Chapters 2 and 4, a socio-ecological model (SEM) was a core theoretical perspective applied to this programme of research, suggesting four levels of interacting factors that need to be understood in promoting behaviour change within an intervention. These levels were **individual** (including factors such as knowledge, behaviours, beliefs), **interpersonal** (family or household norms, roles; peer influences); **community** (social and community networks and organisations); and the wider **society** (living and school conditions; policy). The SEM model was the conceptual basis for an overarching settings approach (SA) which also recognises the impact on health of the interaction between individuals and the environment (WHO 1997). As such the approach to the development of the intervention looked towards a future aim of strengthening the target school’s capacity as a healthy setting for learning and working, working closely with the wider community (WHO 1997). The work was further underpinned by community-based participatory research (CBPR) with emphasis on partnering with the community, providing an alternative to traditional approaches (Jull et al., 2017), and allowing for innovative adaptation of local existing resources, the opportunity to explore the local knowledge about diet and physical activity, empowering participants to discuss their situations and suggest solutions (May and Law, 2008). The mapping of intended principles, actions and outputs from this exploratory study with the theoretical approach can be seen in Figure 5.1. For example, the participatory focus as one of the key principles of the development approach, operationalised through collaborative working between the researcher, Education Board and faith organisations, maps to the CBPR and SA approaches and the community and society levels of the SEM. Among the project actions, developing and delivering intervention components, and evaluating them and testing potential outcome measures, links with SA, individual and interpersonal SEM levels, while improvements to the school water supply and sanitation address a wider health determinant (i.e. SEM society level). The range of dissemination activities were designed to have impact across the SEM levels. The strengths and limitations of the theoretical model developed for the programme of research, including its appropriateness and degree of success in applying it to the current study, are discussed in section 5.4.

The current study sought to explore participants’ personal experiences of the intervention, and centres on the belief that all individuals view the world individually and subjectively (Kaushik and Walsh, 2019). This study utilised self-report measures as a means of gaining an insight into personal experience, however, conversely acknowledges the challenges and possible limitations inherent of using self-report to measure the internal processes

attributable to change (Bell et al., 2018). The research therefore adopts a pragmatic perspective, as a fitting epistemological position for this research as it is not tied to a particular ontology, rather it advocates for a methodological approach that works best for the research problem focused on an outcome-orientated method of inquiry (Dures et al., 2010). Pragmatism allows the researcher to choose between qualitative and quantitative methods, according to the study objectives, and therefore to alternate between inductive and deductive reasoning, using deductive quantitative analysis to serve as indicators of the potential to effect change, and inductive qualitative data analysis to seek to further understand the possible mechanisms by which change is fostered within a future, fully developed intervention (Teddle and Tashakkori, 2009).

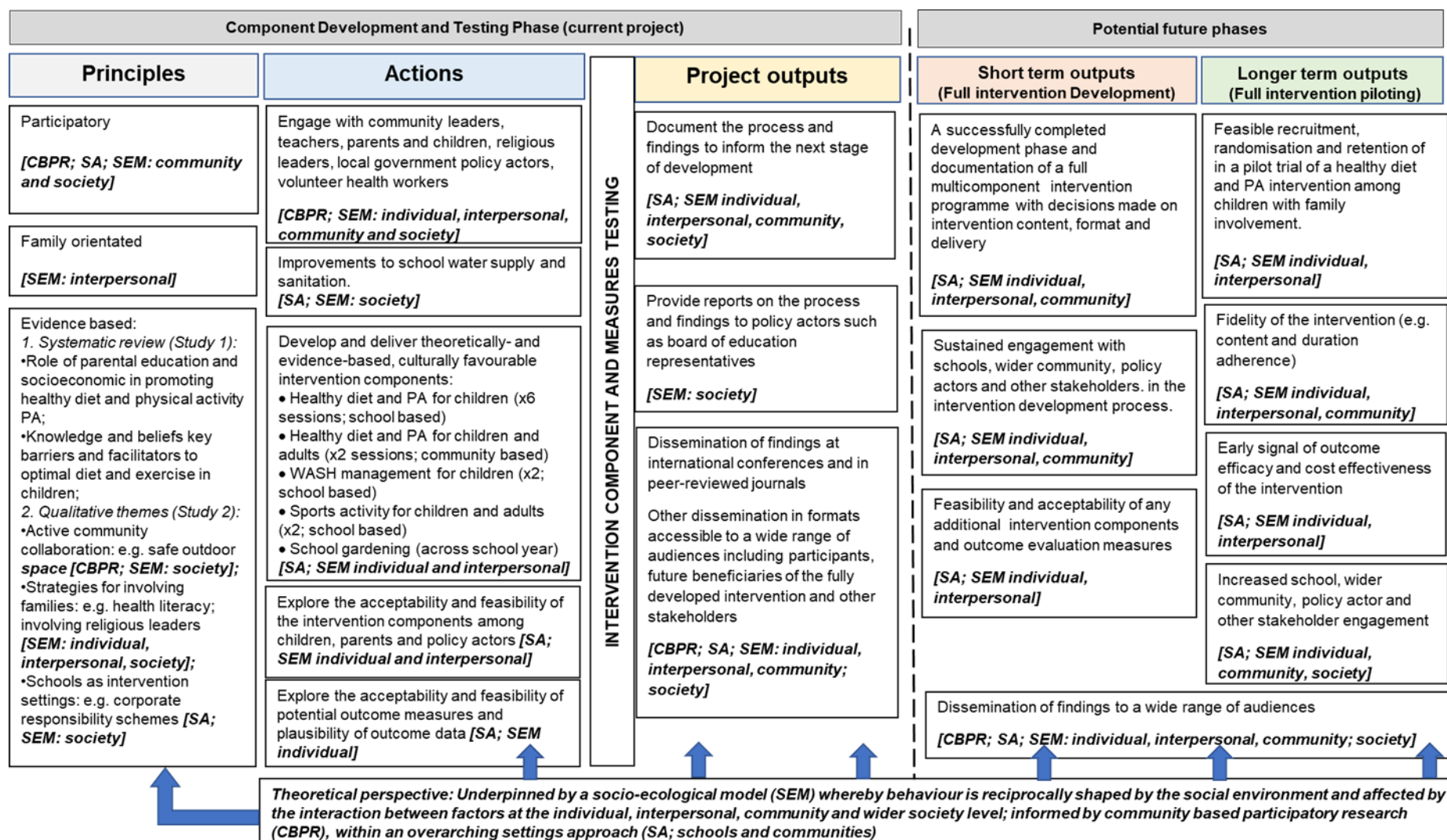


Figure 5.1: Logic model for the intervention development (adapted from O’Cathain et al 2019)

## 5.2 METHODS

A mixed methods approach was adopted to establish feasibility and acceptability of the potential intervention components and of the questionnaire and physical measures conducted as potential intervention outcome measures (see sections 5.24 and 5.26 below). In keeping with the theoretical approach, small scale fieldwork using qualitative and quantitative methods took place in Lagos, Nigeria, from July 2019 to December 2019.

### 5.2.1 Sample and setting

#### *Recruitment of organisations*

Ibeju Local Government Area, Lagos State, a suburban multi-ethnic community, was selected for this study. This ensured the involvement of participants from the six geopolitical zones in Nigeria and was also a logistical choice based on the proximity of the researcher during the time of the research. Recruitment of organisations and individuals was conducted from July to October 2019.

A local community primary school was identified for invitation to the study based on the directive of the Lagos State Universal Education Board (the school was registered as government approved for research purposes as noted in Chapter 4); gatekeepers of the school and community involved in the study raised awareness of the study, after they were briefed during a meeting with the researcher prior to recruitment and data collection.

The researcher several mobile phone calls and exchange of letters with key contacts and had eight initial face to face meetings. Two meetings each with the community high chief, the state education board, and the school's district officer; one meeting each with the community at large, the school's administrative team of seven members, five chiefs, a local member of parliament, the youth, men and women leaders of the community, and local religious leaders (two Imams and three pastors), building on previous meetings held for Study 2, and existing links with the Universal Basic Education Board officials contributed to the recruitment phase. With the support of the local education board, the identified school agreed to participate in the study. Expressions of interest in the study were received from one of the two Imams and one of the pastors (representing three places of worship).

#### *Recruitment of participants*

The target population for this study were parents of the child participants and school children residing in Ibeju Local Government Area, Lagos State. To recruit individuals within the community and school settings, a combination of recruitment strategies was employed which included three personal referrals from key community leaders to the youth and women leaders, three site visits, use of town criers on three occasions to invite the community members for



the meeting held before the study and during the start of intervention sessions held in the community to encourage parents and children, three door to door visits, visits to interfaith meetings and community meetings.

Purposive sampling for the intervention sessions and the measurements, as described in chapter 4 (section 4.5.2) was again used here. As the study was exploratory in nature, by design it did not include a control group or a waiting list control group. The characteristics on which sampling was based were as follows: Participants had to: (i) be parents or children (ii) be within the age requirements of 8yrs to 60yrs, (iii) if school children and parents, reside within the community of the research, and (v) children and parents able to participate in the intervention component sessions.

### 5.2.2 The intervention components and session content

The intervention components and content of the sessions in which the components were delivered was informed by suggestions of activities reported by participants and emergent gaps from Study 2. Originally, a school gardening scheme was designed as one of the potential intervention components, the aim of which was to improve knowledge about the origin of various foods and serving as a form of physical activity for the children and parents. Space was secured for planting, mapping out the parameters, preparation of the soil and deciding which seeds to plant based on the seasonal suitability. However, after evaluating the school environment and the soil quality, the gardening activity was put on hold due to the possibility of flooding during the rainy season and the limited timeframe within the study period to mitigate against such a challenge.

The four components and session content are summarised in Table 5.2. Twelve group sessions in total were planned for delivery of the intervention components – 10 in the school and two in the community. The components included 1. *Healthy Diet and Physical Activity* for children (6 sessions delivered in schools), 2. *Healthy Diet and Physical Activity* for adults and children delivered in the community (x2); 3. *Effective WASH Management* for children (x2) and 4. *Sports Activity* for adults and children (x2) delivered in the school. Session content for components 1, 2, and 4 focused on increasing physical activity among children and parents, health education to promote healthy diet and exercise, healthy recipes and food swaps, healthy habit formation, and addressing other knowledge gaps in nutrition and physical activity. The WASH component included literacy sessions that informed school children about the transmission and prevention of infectious disease related to WASH, and the importance and benefits of good handwashing skills and hygiene. The content was complemented by the wider school curriculum through classroom discussions, reinforcement of key messages by

incorporating them into local songs, an essay writing competition, and integrating the *Sports Activity* component into the pupils' interhouse sports competition; and by additional practical sessions such as hand washing demonstrations and soap making workshops. Goal setting was incorporated into the sessions to aid behavioural change.

Sessions were practically oriented and interactive. School-based sessions were delivered in classrooms with whole class participation. Physical activity sessions were delivered in the school field, together with community participation. One of the community-based sessions was held in a church for its congregation and other invited guests, but as the community had no other suitable venue for session delivery, the second community-based session was held in the school's playground. In both settings, sessions were led by the researcher with volunteers such as doctors, school officials, and members of the community supporting the delivery of the sessions, largely by coordinating the participants.

Table 5.1: Diet, physical activity, and WASH intervention sessions

Location and Target participants	Component (Number of sessions)	N child participants	N adult participants	Awareness raising			Skill development		Delivery	
Primary School										
Classrooms Children	Healthy Diet and Physical Activity for children (6)	60	-	1.	Balanced diet, fruit, and vegetables	4.	Creating menus for a balanced diet	6.	Interactive session	
				2.	Alternatives to highly processed foods and sugary drinks	5.		Healthy eating goals for the remaining school term	7.	Food and fruit display
				3.	Good hygiene practices, understanding physical activity and the benefits.			8.	Group work	
School Field Parents and children	Healthy Diet and Physical Activity for children and adults (1)	25	30	1.	Non-communicable diseases awareness (hypertension, diabetes, stroke)	1.	Group discussion	8.	Interactive session	
						2.	Dancing with popular local music.	9.	Small group work	
				2.	PA requirements for health.	3.	Goal setting on physical activity, hygiene practices.			
				3.	Body weight and care, Balanced diet	4.	Making simple local snacks			
				4.	Alternatives to highly processed food and sugary drinks.	5.	Tasting sessions			
						6.	Hand washing Demonstration			
				5.	Using popular activity like local music to reinforce PA messages.	7.	Vital signs check (BMI and Blood pressure).			
				6.	WASH education.					

Location and Target participants	Component (Number of sessions)	N child participants	N adult participants	Awareness raising			Skill development		Delivery	
School field Children	Effective WASH Management (2)	100	-	1.	General hygiene practices.	5.	Soap making for hand washing and sanitary facilities.	Whole group activity		
				2.	Menstrual hygiene management	6.	Discussions and reflections of own habits.			
				3.	Handwashing skills					
				4.	Common illness in children due to poor hygiene practices.	7.	Handwashing skills with soap and water using handwashing stations.			
School field Parents and children	Sports Activity (2)	100	15	1.	Importance and benefits of sports for parents and children	2.	Showcasing physical activity skills	Small group and individual activities		
<b>Community</b>										
Church Hall Parents and children	Healthy Diet and Physical Activity for children and adults (1)	10	30	1.	Non-communicable diseases awareness (hypertension, diabetes, stroke)	1. 2.	Group discussion Dancing with popular local gospel music.	1. 2.	Interactive session Small group work	
				2.	PA requirements for health,	3.	Goal setting on physical activity, hygiene practices.			
				3.	Body weight and care, Balanced diet	4.	Making simple local snacks			
				4.	Alternatives to highly processed food and sugary drinks.	5.	Tasting sessions			
				5.	Using popular activity like local music to reinforce PA messages					
				6.	WASH education					

### ***Other inputs***

There were potential barriers suggested in Study 2 that constitute wider determinants of diet and PA behaviours. These included inconsistent funding, and lack of safe outdoor space and potential solutions such as improvement to PA infrastructure. Through the partnership approach and consultation process with community leaders, skilled workers from the community provided labour for infrastructure improvements which supported the ability to deliver some of the intervention components. The school staff also contributed funds for acquiring locally sourced materials for sports equipment to support the *Sports Activity* component, and materials for local soap making to support the WASH components.

To boost community participation in the *Sports Activity* component, the school staff sought avenues to engage the community members by writing letters to local dignitaries to fund the inter-house competitions and aid the support of providing food for children. To address security for outside play areas, the community provided a security guard who was assigned to the play areas and the school, and community members offered to continuously assess the school environment and outdoor play spaces for any breaches like broken fences or evidence of unsafe activities.

#### **5.2.3 Study outcomes**

The primary study outcome was the feasibility and acceptability of the intervention components through process evaluation (see section 5.2.5 below) involving both quantitative (recruitment and retention rates of the participants, time required to recruit to target populations and the rate of completion of the intervention sessions) and qualitative (participants' views and experiences of the intervention) data collection, including what they perceived to be the barriers and facilitators of participation.

Process evaluation involved the evaluation of intervention reach, dose, and fidelity among both children and adults. Assessment of 'reach' provides evidence on whether and how the intended audience participates in the specific intervention components. Typically, reach is reported as the proportion of participants who attend sessions or have exposure to various intervention elements (Young et al., 2007). Assessment of the 'dose' is designed to capture the quantity of intervention provided by examining what was delivered to and received by the participants (Cissell, 2004), and 'fidelity' helps in determining the extent to which the delivered intervention is consistent with its design (Carroll et al., 2007; Proctor et al., 2010).

The secondary outcome was the feasibility of the measures used to provide plausible outcome information and identify any limitation in the analysis process for diet, physical activity, BMI and WASH knowledge, attitudes, and practices. The study was not powered or designed to

detect clinically significant changes in BMI, dietary and physical activity outcome measures in response to the intervention sessions; these data were collected on each outcome respectively to determine whether the measures would be feasible to use in a larger evaluation of a fully developed intervention.

Furthermore, the plausibility of the data generated by the dietary (frequency of consumption of fruits and vegetables), physical activity (frequency of vigorous, moderate, and sedentary activities), and WASH (frequency of hand washing before eating, use of soap, knowledge on handwashing data) were also assessed (see feasibility testing of measures below).

An exception where change effected by the intervention was tested was in relation to the handwashing element of the WASH component. Improvements in how participants cleansed their hands after a critical event (after defecation, before and after eating) after the WASH sessions compared to prior to the sessions was assessed by structured observation based on the World Health Organisation's visual guidelines to handwashing and recorded in a study log. To explore the potential for long-term change in behaviours, hygiene practices within the school were observed for a 6-week period after delivery of the WASH sessions.

#### 5.2.4 School environment – Water, Sanitation and Hygiene (WASH)

There was awareness of the potential for limited school water supply and sanitary facilities, as it was raised in the qualitative study. Children voiced concern about the poor access to clean water, poor sanitary facilities, and menstrual hygiene products, which for the girls was a limitation to participating in sports activities. However, the changes which were expected to have been made were not, due to inconsistent funding from the appropriate authorities. This also linked with findings from the systematic-type review indicating environment (access to infrastructure) as a barrier to achieving optimal diet, physical activity, and BMI in children. Thus, to be able to continue with the components of the intervention an assessment of the school water supply and sanitary facilities and improvement of infrastructure was necessary. This was carried out by the researcher using an adapted observation checklist from the UNHCR WASH in Schools (WinS) template (<https://wash.unhcr.org/download/wash-in-schools-checklist/>) (Appendix 18).

The WinS indicators and criteria defined for each output go beyond the absence or presence of infrastructure, as often defined in WASH and in evaluations, but also encompass functionality and condition of the infrastructure over time, as well as adequate use (water supply, individual and group handwashing stations must be accompanied with water and soap; toilets must be kept unlocked, clean and with water available for flushing).

### 5.2.5 Process Evaluation

Responsiveness to the components (compliance, enjoyment, appropriateness, and relevance of activities) and acceptability of the measures was evaluated using qualitative interviews with fidelity assessed through by taking videos and photos of the intervention sessions.

#### *Responsiveness to the components*

Face-to-face semi-structured interviews were carried out at the end of the programme in both the school and community. The interviews aimed to explore the diet, physical activity and WASH components delivered at the school and community, the roles within intervention, support, perceived effectiveness, challenges, and barriers to success. Questions also addressed key learning from implementation, sustainability and general recommendations for healthy eating and physical activity school-based interventions.

The topic guides are included in Appendix 19. Interviews lasting approximately 20–30 min, were conducted within school time and after sessions were held in the community. Informed consent for the children for the pilot was sought from both the participants and their parents before the interview took place. The adults interview schedule was focused on feasibility and effectiveness of the intervention in promoting healthy diet and physical activity alongside WASH practices among children with parental involvement.

#### *Fidelity of the intervention sessions*

The researcher took photos and videos of the intervention session, to assess and informally evaluate ongoing fidelity and observe intervention sessions. The education board in the state required that the researcher provided a formal report to measure whether the identified components of the intervention protocol were implemented. As directed by the state education board, the school's district officer, the community high chief, a representative of the local council observed parts of the intervention sessions and were assigned to provide information regarding adherence and competence of the researcher.

### 5.2.6 Feasibility testing of measures

The piloting of instruments which measured the potential dietary intake, physical activity and handwashing behavioural change in parents and children was conducted over six weeks.

Data collection tools were informed by the Global School-based Student Health Survey (GSHS) for children (<https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/global-school-based-student-health-survey/questionnaire>) and the World Health Organization Stepwise approach to Surveillance (STEPS) for adults (<https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps>).

The STEPS framework is based on the concept that surveillance systems require standardised data collection, but also sufficient flexibility to be appropriate in a variety of country situations and settings (Odutayo and Hirji, 2013). The key element of this framework is the different levels of risk-factor assessment that allow greater or lesser detail, depending on the resources available, without compromising the comparability of the data (Riley et al., 2016).

The GSHS is a questionnaire-only survey initiated by WHO and is an international and standardised surveillance programme aimed at measuring behavioural risk and protective factors in school children. As with STEPs, GSHS provides within-country flexibility for tailoring to the research setting and offers the opportunity for comparison to be made within and between countries (WHO 2020). In addition to GSHS components BMI was also measured.

A range of alternative measures of diet and physical activity are available (such as 24 hr recalls, food diaries, food frequency questionnaires (FFQs) Child and Youth Physical Activity questionnaires (CPAQ; YPAQ), PA diaries and logs). However, STEPS and GSHS methods were chosen over these alternatives due to the benefit of collecting data on various non-communicable diseases risks which helps to reflect a large part of the future risk of NCDs in the population. More detailed discussion of the strengths and limitations of the methods chosen in relation to alternative choices is provided in the discussion section (see section 5.4.2)

### *Adults*

Methods within the STEPs framework, which reflect the different levels of risk-factor assessment possible, include a questionnaire, physical measures, and blood samples; the first two levels were utilised in this study; however, blood samples were not feasible due to their cost and the exploratory nature of this study. Each level has core, expanded and optional modules; the core modules were used in the current study, in addition to some elements of the expanded module for demographic information (see below).

## **(i) Modified Questionnaire data (demographic information, dietary intake, and physical activity)**

### ***Demographic information***

The STEPs questionnaire core module questions include sex, date of birth, age, and number of years at school and in full-time study. Date of birth was not included as it was considered sensitive and identifiable personal information in the ethical approval process. Ethnic group, marital status and occupation were used from the expanded module, in addition to highest



level of educational achievement which was included in place of total number years education. The four categories of educational achievement were: (1) no schooling or not graduated from primary school; (2) graduated from primary school; (3) graduated from secondary school; and (4) graduated from university or any other higher education.

### ***Dietary intake***

The core module on diet intake included information on the number of times salt, salt sauces, seasonings, spices, processed foods (high in salt, fat, fast foods) were consumed. A list of processed foods was compiled and read to the participants to aid their responses. Participants were shown different measures of salt, salt sauces, seasonings and spices and were asked to quantify their intake.

The core module on fruit and vegetable consumption included information on the number of days fruits and vegetables were consumed in a typical week in the last year, as well as the number of servings of fruit and vegetables consumed in one of those days. Participants were shown different local fruit and vegetables and were also asked to quantify their servings.

Fruit included raw fruit, fruit used in juices, or any other preparations. Vegetables included both raw and cooked. The servings were calibrated based on how the fruit and vegetable vendors sold them. Those who ate less than five servings of fruit and/ or vegetables on average per day were defined as those who did not meet fruit and vegetable consumption recommendation.

### ***Physical activity***

Physical activity was assessed in three different domains (work, transport, and leisure time); as well as sedentary time. The researcher read introductory statements to the participants, which explained what vigorous and moderate activity meant. The participants were asked to detail time spent in a typical week on: (1) vigorous and moderate activity at work; (2) vigorous and moderate activity during recreation; and (3) activity related to travel.

Vigorous activity was defined as those that required hard physical effort and caused increased breathing. Participants were asked to only consider activities which lasted for 10 minutes or more. Information on the number of days in a week spent and time spent in a typical day for each activity were recorded. Time spent sitting or reclining, either at work, at home, or on travel, excluding time sleeping, on a typical day was gathered.

## **(ii) Physical measures – body mass index (BMI) and blood pressure (BP)**

### **Body mass index (BMI)**

To calculate BMI weight and height were measured according to WHO protocols (de Onis, 2007) with the participants encouraged to wear lightweight clothing and standing barefoot on instruments placed on a flat surface. Weight was measured to the nearest 10g using a mechanical scale. Height was measured to the nearest 0.1 cm using a portable stadiometer. Body mass index (BMI) was calculated as weight in kilograms divided by height in metres squared. Participants were classified as living with overweight if their BMI was  $\geq 25$  kg/m<sup>2</sup>; further, those with a BMI of  $>30$  kg/m<sup>2</sup> were defined as living with obesity.

### **Blood pressure**

Blood pressure was measured using digital blood pressure measurement device. Blood pressure was measured at the right arm at heart level after a period of 10 minutes of rest following the STEPS methods. Three measurements were taken and the average of the last two readings were used in the analysis. Raised blood pressure was defined as those with systolic blood pressure  $>140$  mmHg and/ or diastolic pressure  $>90$  mmHg, or taking any anti-hypertensive medication (Muntner et al., 2019).

## *Children*

### **(i) Modified Questionnaire data (demographic information, dietary intake, physical activity, and WASH knowledge)**

#### ***Demographic information***

The GSHS questionnaire demographics core module questions on age, sex, and class at school were used.

#### ***Dietary intake***

The module on dietary intake for children included information on the consumption of breakfast, lunch, milk, and other dairy products. A list of processed foods and sweetened drinks and juices was compiled and read to the participants to aid their responses on their intake. Participants were shown different fruit and vegetables (as for adults, above) and were asked to quantify their intake in the last 30 days at the time of the interviews. Participants were also asked information on knowledge about the benefits of healthy eating, fruits, and vegetable intake during a school term.

### ***Physical activity***

The module on physical activity for school children gathered information on participants playing in a sports team in the past 12 months, exercising (strengthening muscles or stretching the body) in the past 7 days, knowledge on physical activity plans, benefits of physical activity, preventing physical activity injuries and opportunities for physical activity in the community. Sedentary time (time spent playing games, chatting with friends, sitting, or watching TV) was also recorded. Various local physical activities were read to the participants during the interviews.

### ***WASH knowledge***

Each participating student was administered the GSHS core-expanded hygiene module on knowledge, attitudes, and practices. The questions gathered information on the source of drinking water in the school, frequency of handwashing before eating, generally and in school, after the use of the toilet in school, and use of soap for handwashing after the use of the toilet. Information was also gathered on the place to wash hands before eating and after the use of toilet; the safety, privacy, and accessibility of the toilets in school; and on knowledge about the importance of handwashing, worm infestation treatment and prevention during the school year.

### **(ii) Physical measures – BMI**

Children's weight and height were also measured according to WHO protocols (de Onis, 2007). Malnutrition (underweight, overweight/obesity) was defined according to the sex and age specific BMI cut-offs from the WHO growth references for school-aged children and adolescents (WHO 2007) as follows: underweight (<15th percentile); normal weight (15th to <85th percentile); overweight (85th to <97th percentile); and obese ( $\geq$ 97th percentile).

#### **5.2.7 Measurement process**

Information and data collection sessions were held at the school and community study sites for six weeks, prior to the intervention sessions. Questionnaires and interviews were completed in the presence of the researcher to establish how much assistance was required to support participants. The diet and physical activity recall, and height and weight measurements were carried out by the researcher, assisted by volunteer doctors, and school officials after they received 1-week training, delivered by the researcher.

#### **5.2.8 Data analysis**

##### ***Quantitative data***

The statistical analyses were conducted by using The Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistics were used to summarise demographic characteristics, recruitment, retention, completion rates of the measures, and missing data. Continuous variables were summarised by exploring frequencies using means and standard deviations, medians with interquartile ranges. Skewness test of normality was used to assess the normality of continuous variables. A value of skewness within the range of  $\pm 2.0$  was considered as normally distributed. Categorical data were displayed as counts and percentages.

Inferential statistical tests were chosen according to the nature of the variables (continuous or categorical) and the distribution of continuous variables (normal or not normal). T-tests (normally distributed data), Chi-squared and Mann Whitney U tests (proportions/ skewed data) were used to identify statistically significant patterns between schools and community settings and by gender where data permitted ( $p \geq 0.05$ ).

#### *Qualitative data*

All recordings of interviews were listened to for familiarisation and transcribed verbatim. In addition to the spoken word, attention was paid to pauses, non-verbal utterances and silences. Transcripts were not returned, and participants were not asked to provide feedback on the findings, due to limited time for participation in the study.

A thematic analysis of data was carried out using both an inductive and deductive approach (i.e. using a process of coding that involved a balance coding derived from the theoretical underpinning of the study and from themes emerging from participants' discussions). Through this process, it was possible to identify clearly how themes were generated. Transcripts were read and re-read for familiarisation. Manual coding using highlighters to identified potential patterns was used and an initial set of codes was developed and applied to the data. Coded data was then entered into Atlas.ti version 9, categorised and collated into themes, using tables with all the relevant extracts collated within identified overarching themes. The themes generated were reviewed and refined and discussed between the researcher and supervisors for consensus validation.

#### 5.2.9 Reflexivity

In order maintain the reflexive process documented in Study 2, the researcher continued to consider her positionality such as her gender, social and cultural identity and profession, and relationship with the gatekeepers and participants, to gain a critical understanding on how this may have influenced the research process (Zhao & Haga 2013). As in Study 2 this was aided by keeping a research diary, again noting down thoughts and feelings about the research

process alongside observations about the research and wider interactions, conversations with the participants and the emergent data and findings. Reflexive evaluation also continued through discussion of the process with supervisors.

#### 5.2.10 Ethical approval and consent

Approval for the study was obtained from the School of Clinical and Applied Sciences Ethics Committee, Leeds Beckett University (Application Refs: 52680 and 65492), the Lagos State Universal Basic Education Board (EDIII/SCH.ADM/C.U/VOL.18/174), and relevant community leaders.

Participants received written (Appendix 22) and oral information and provided informed consent either orally (because of limited literacy) or in writing (Appendix 23). Parents consented to their own participation and/ or that of their child if aged under 16 years. All children also gave their written or verbal assent prior to data collection. These measures minimised the risk of participants being coerced into taking part in the research and to ensure participants had knowledge of the opportunity to withdraw at any time during data collection.

The information sheets and consent forms were provided in English and translated by the researcher into Pidgin English and Yoruba languages for ease of delivery. Completed consent forms were kept separate from data in encrypted, password protected University laptop computer. All hard copy data were kept in a safe box owned by and only accessed by the researcher. Participants could inform the researcher either orally or in written if they wished to withdraw from the study, with no obligation to provide their reason. In the event any data provided was destroyed through shredding of papers and deleting from folders in the researcher's University laptop. Instructions were be given on who to contact if there were any questions or concerns that arose after completing the study.

Interview recordings, interview transcriptions, raw and analysed questionnaire data and qualitative analyses were stored in an encrypted, password protected University laptop computer. Hard copies of data were kept in a safe box owned by and only accessed by the researcher. Health and safety precautions were applied by both the researcher and the participants during the sessions in both school and community settings. All interviews were carried out in the mornings and afternoons to ensure the safety of the participants and researcher.

Food safety and hygiene measures were applied by both the researcher and the participants during the interventions as raw and prepared foods were used during the study. Participants were asked to raise concerns regarding any possible allergies, whereby avoidance of such foods were put into place and first aid was on standby in the case of an emergency.

The sessions involved preparation of usable products such as soaps which were given to the participants after the sessions carried out in the study. Equipment used for the sports sessions were given to the school as part of the benefits of participating in the study.

## **5.3 RESULTS**

### **5.3.1 Recruitment**

Figure 5.2 shows the process of community organisation and participant level recruitment for this study. Engaging organisations and raising awareness of the study required several mobile phone calls, exchange of letters, and eight initial face to face meetings with key contacts as noted in the methods. In turn, this led to regular meetings with the school headmistress, district officer, and community representatives to engage the key members of the community and parents in the school and raise awareness among potential participants. Fifteen telephone calls, text messages, letters from school, assembly announcements, and the use of a town crier using the local language further facilitated active recruitment of participants. Alongside the participating community school, a church and a mosque also registered interest; however, the mosque could not offer a suitable session day in their venue, and the church took part in the study, but the testing of measures was not feasible in this setting due to time constraint.

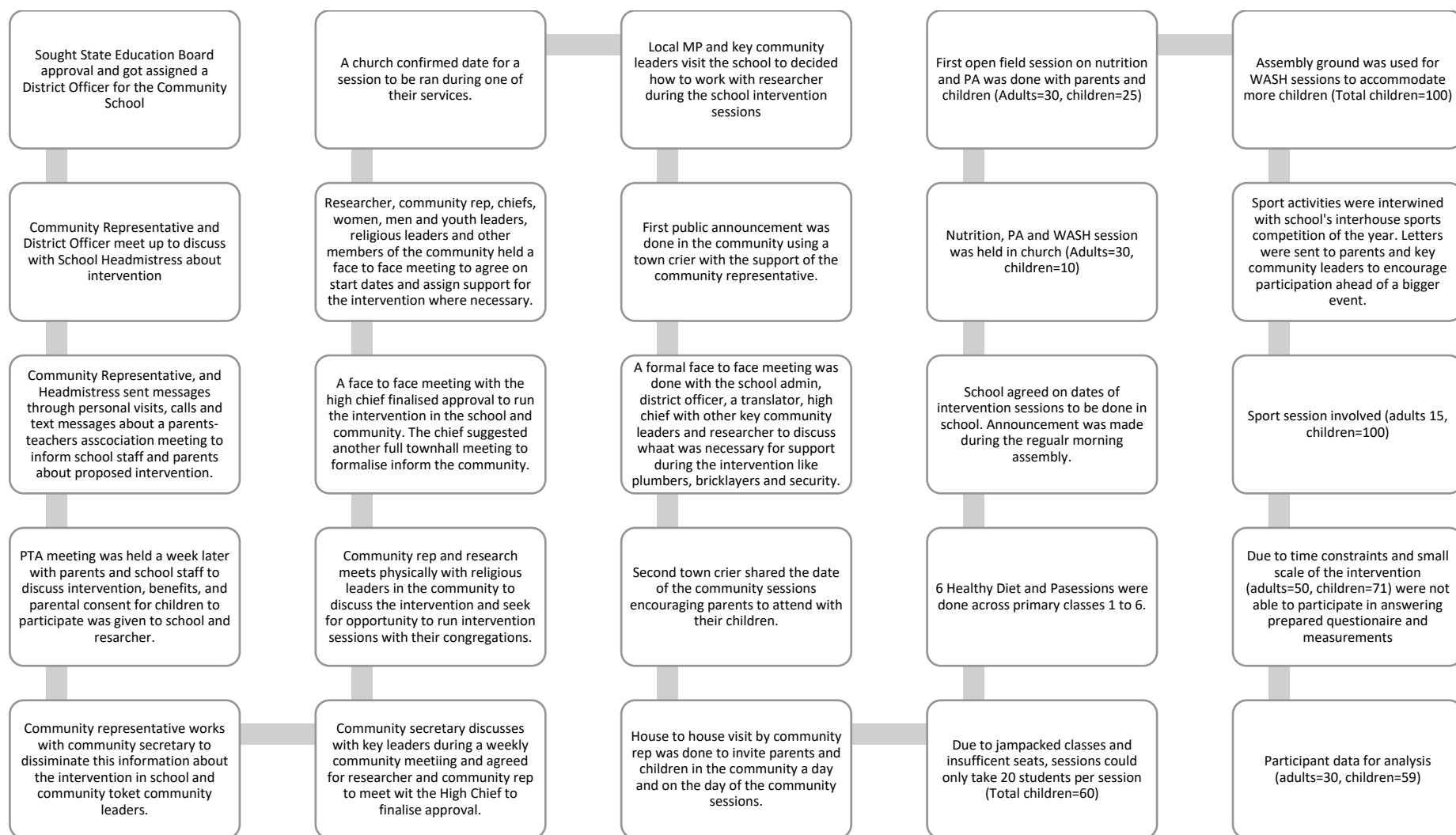


Figure 5.2: Community, organisation, and participant recruitment



### 5.3.2 School environment – Water, Sanitation and Hygiene (WASH)

Findings from the UNHCR WASH in Schools observation checklist covering the absence or presence of WASH infrastructure, the functionality and condition of facilities over time, and adequacy of use are outlined below.

#### *Water source*

The school's source of water was a borehole with piped water into the school building to supply the toilets. At the pre-intervention stage, the borehole water supply was not functioning. There was not enough water in the school, the water was not treated before drinking and water facilities were not accessible to children with disabilities.

#### *Toilet facilities, access, and cleanliness*

The toilet facilities were flush/pour-flush (water closet toilet) to sewer. There was a total of 12 toilets in the school. Four were for use by both girls and boys, with no differentiation of toilets for either gender. Two toilets were available for teachers and other non-academic staff, marked 'private' so that the school children would not access them. All six, though in use, were without adequate water supply as the pipes in the school building were faulty and the lighting in the toilets was not functional as the school lacked power supply. The toilets were located within the school building and accessible only at specific time of the day due to the limited water supply.

The younger primary school children were observed to practice open defecation with little access to any water, as the water supply to the functioning toilet that they had access to was faulty. There were not enough materials for cleaning after the use of the toilets which relied on the availability of water obtained from outside the school premises, such as the nearby mosque. The toilets were not designed to be accessed by children with disabilities. The remaining six toilets were not functional at the time of study.

#### *Handwashing and menstrual hygiene*

There were no functional handwashing stations present in the school. Water was available only when the children went across the road from the school premises for ten minutes to get water; however, soap was not available to wash hands. Therefore, there were no handwashing facilities accessible to the smallest children at the school and children with disabilities. Younger children used leaves to clean themselves or a small amount of toilet paper provided on rare occasions by a teacher or used their uniforms to clean their hands after urinating.

There were also no hygiene learning activities conducted for all students in the school. Water and soap were not available in a private space for girls to manage menstrual hygiene. There were no covered bins for disposal of menstrual hygiene materials in the toilets for girls or

female teachers. The solid garbage from the school was collected irregularly by the municipal waste system.

### *Drinking water*

In many cases, drinking water from the main source was not available at the school throughout each school day. Drinking water was therefore not accessible to children with disabilities or younger children during the school term. There were no drinking water points available in the school. The school did not have water treatment and were not aware of the possible contaminants in the borehole water supply.

During the break periods, food and drink vendors were allowed into the school premises, but the cost of sachet water, popularly called pure water, sometimes deterred the children from purchasing any. A sachet of water at the time of this intervention cost 10 Naira (£0.017) which contains about 50-60ml of water most often shared between friends.

Due to the lack of infrastructure at the school, including lack of a functional water source which would hamper conduct of the intervention testing, the researcher instigated some changes to the facilities at her own expense. The borehole was replaced, the water supply reinstated, and the faulty pipes that supplied the toilets in the school building were repaired. Two handwashing stations with five taps each were installed in the school premises and containers for soap were provided during the intervention period.

Table 5.2: Results from the WASH in schools checklist

Checklist element	Observation
<b>CORE QUESTIONS</b> 1. Main source of drinking water provided by the school 2. Current availability of drinking water from the main source 3. Most common type of toilets/latrines 4. Total number of toilets: Number that are currently usable 5. Handwashing facilities at the school 6. Soap and water <u>currently</u> available at the handwashing facilities	Borehole None Flush/Pour-flush to sewer (water closet) 12 6 None None
<b>EXPANDED QUESTIONS</b> <b>Drinking water</b> 7. Availability of drinking water from the main source available at the school throughout each school day in the previous two weeks 8. Typical availability of drinking water from the main source typically available throughout the school year 9. Accessibility of drinking water to those with limited mobility or vision 10. Accessibility of drinking water to the smallest children at the school 11. Number of drinking water points (e.g., taps) at the school? 12. Treatment of the water from the main source to make it safe to drink	None None ( <i>unavailable &gt;30 days</i> ) None None N/A None
<b>Menstrual hygiene</b> 13. Availability of water and soap in a private space for girls to manage menstrual hygiene 14. Availability of covered bins for disposal of menstrual hygiene materials in girls' toilets 15. Availability of disposal mechanisms for menstrual hygiene waste at the school	None None None
<b>Toilets</b>	

Checklist element	Observation
16. Number of times per week student toilets are cleaned 17. General cleanliness of the student toilets 18. Accessibility of at least one usable toilet/latrine to the smallest children at the school 19. Accessibility of at least one usable toilet/latrine to those with limited mobility or vision 20. Location of the student toilets 21. When students are permitted to use the school toilets/latrines 22. Availability of culturally appropriate anal cleansing materials to all students 23. Functional lighting in the student toilets 24. Latrines or septic tanks emptied (or latrines safely covered) when they fill up	2-4 times Not clean None None School building Specific times in school day None None Yes
<b>Handwashing</b> 25. Accessibility of handwashing facilities to those with limited mobility or vision? 26. Accessibility of handwashing facilities to the smallest children at the school 27. Location of handwashing facilities with water and soap 28. Number of handwashing facilities with water and soap ( <i>number of taps</i> ) 29. Number of times per week group handwashing activities conducted for all students 30. Method of school solid waste (garbage) disposal	None None Toilets (but non-functioning) N/A Less than once Openly dumped

### 5.3.3 Intervention sessions

Intervention session participants included 130 children and 30 adults. Sample characteristics were available for those who subsequently took part in the measurement sessions (see section 5.3.5).

All 12 of the planned intervention sessions were delivered with 100% attendance. Sessions were stand-alone but attracted repeat attendance with children and parents attending 1 (25%), 2(42%) or 3 (77%) sessions. Table 5.2 shows the location of each session, child and or adult participants, number of participants, sessions content, the aspects of awareness raising, and skill development targeted, and the delivery mode.

School sessions were delivered in classrooms or the school field. The classrooms were good sizes but could accommodate all students in a class because of the lack of chairs and desks. Available seats and desks were either broken, or students had to sit four to a desk designed for two. The school field was a wide-open playground made partly of sand and grass. There was no shade from the sun. Sessions were held without the use of megaphones at the beginning, but megaphones were later made available to ensure everyone was engaged during the sessions which took place in the open field.

One education session was held in a church hall attended by its congregation and other invited guests. Despite a high level of community interest there was no other community venue suitable for delivering a session; thus, community participation was incorporated into PA and education sessions held on the school field for the other community-based session as noted in the methods. Sessions were led by the researcher with active engagement of volunteers such as doctors, school officials, and members of the community that supported the delivery of the sessions by coordinating the participants as planned.

Participants of both school and community sessions were required to either mark attendance using an attendance sheet with guidance from the researcher due to different literacy levels or were marked using the school's register with assistance from teachers and shared with the researcher for record purposes. Sessions lasted between 60 to 90 minutes depending on the activities held.

Ten adult participants of the 30 parents who attended the sessions in the community were the only ones who received the interactive materials to take home such as factsheets (aimed at reinforced messages on nutrition and physical activity). This was due to limited tailored made existing resources available in Nigeria and the prohibitive of cost for providing novel resources for this study.

The intervention sessions were delivered as originally intended, within consideration of external constraints such as environment and cost as indicated. Visual records of the sessions

such as capturing them on video and photos were not formally analysed, but both the child and adult participants were seen to have enjoyed the intervention activities. Session evaluation (see Section 5.3.4 below) involved formal observation of the impact of the WASH management session on handwashing behaviours, and qualitative interviews among a subsample of the intervention participants to identify the activities considered most appealing and views to take account of when planning appropriately for future modifications.

As required by the education board, a formal report was written and delivered via the district officer to the education board, however there was no feedback received about the report. The district officer, the community chief representative made some visits to the intervention sessions as observers to note adherence and competency of the researcher. Detailed reports were not shared with the researcher as it was deemed only for official purposes. The representative of the local council did not participate in the assigned observation due to political reasons but was fully aware of the intervention study.

#### 5.3.4 Evaluation of intervention sessions

##### *Observation of handwashing before and after the WASH management sessions*

Prior to the intervention sessions and the installation of facilities in response to the WASH environment survey, lack of access to handwashing stations meant the children were accustomed to not washing their hands prior to critical events (before eating a snack; after defecation). After provision of soap and water, children's handwashing was observed pre- and post- the WASH intervention sessions, the checklist based on the World Health Organisation's visual guidelines to handwashing was completed for 22 participants (5 women and 17 boys and girls; Table 5.3).

The checklist results indicate an improvement in adequately wetting hands and applying soap with all participants doing so after the WASH sessions. Rubbing hands for 20 seconds was not done by any participants prior to the demonstration with 14 of the 22 participants doing this afterwards. Rinsing hands with running water was conducted by all the women and the boys prior to the sessions and maintained afterwards; two of the girls continued not to rinse their hands adequately. There was improvement among the women and some of the boys in drying their hands with a clean towel or single use paper-towel, but no improvement in the numbers doing this among the girls.

Over the six weeks post-intervention it was observed that the children had a conscious behavioural change towards greater use of the handwashing stations with the soap provided. To curb wastage, the soap was kept in the Head teacher's office, which children had to go to refill the soap cans. The younger primary school children could access the toilets and wash their hands; however, it was still a challenge for a few as it was a new change compared to

openly defecating on the school field. Older children were able to practice handwashing frequently compared to the initial stages of the study. In three school assemblies during this period, it was observed that the teachers voluntarily emphasised the need for effective handwashing, using cues such as songs in a local dialect commonly spoken in the community.

Table 5.3: Hand washing pre- and post- WASH management intervention session, n=22

	Prior to Handwashing Demonstration			After a Handwashing Demonstration		
Variable	Adults (women)	Boys	Girls	Adults (women)	Boys	Girls
<b>Total, n</b>	<b>22</b>			<b>22</b>		
Sample size, per subgroup, <i>n</i>	5	8	9	5	8	9
<b>Hand washing variable, <i>n</i> (%):</b>						
Wet hands with running water or from a bowl	3 (60)	6 (75)	7 (78)	5 (100)	8 (100)	9 (100)
Apply enough soap to cover wet hands	3 (60)	6 (75)	7 (78)	5 (100)	8 (100)	9 (100)
Rub all surfaces of the hands including back of hands, between fingers and under nails for at least 20 seconds				3 (60)	4 (50)	7 (78)
Rinse thoroughly with running water	5 (100)	8 (100)	3 (33)	5 (100)	8 (100)	7 (78)
Dry hands with a clean cloth or single-use towel	4 (80)	2 (25)	5 (56)	5 (100)	6 (75)	5 (56)



### *Qualitative interview sample*

Two primary school children and four adults involved in the intervention sessions took part in post session qualitative interviews (Table 5.4). Participants were a boy and girl, aged 10 and 11 years; three women, and one man, aged 30-60 years, including parents, a member of the school, and a community stakeholder. Participants represented four different places of origin from two geographical zones and identified as either Christian or Muslim.

Table 5.4: Qualitative interview sample

ID number	Age	Gender	State of Origin (geographical zone)	Grade/ Occupation	Religion
<b>Child participants</b>					
001	10	Boy	Borno (North East)	Primary 5	Islam
002	11	Girl	Lagos (South West)	Primary 6	Christianity
<b>Adult participants</b>					
003	55	Man	Lagos (South West)	Civil Servant	Islam
004	39	Woman	Abia (South East)	Teacher	Christianity
005	30	Woman	Lagos (South West)	Trader	Islam
006	32	Woman	Delta (South South)	Trader	Christianity

### *Qualitative interview findings*

Analysis of the semi-structured interviews generated four themes: Community and school participation, acceptability of the intervention, improved health and wellbeing, and ongoing social and logistical challenges. The themes are presented below, supported by direct quotes from the data labelled with a unique reference number (URN), gender, and parent or student (child) status, or occupation as described in the methods.

Table 5.5: Categories and themes

Themes	Categories
Community and school participation	Community and school involved in the implementation of the intervention.  Community members and school staff involved in the monitoring of the intervention
Acceptability of the intervention	Community and school wide appreciation  Fairness of the intervention
Improved health and wellbeing	Physical health  School performance  Community and school awareness to the nutritional and PA needs of both parents and children.  Empowered beneficiaries of the intervention  Sense of cohesion
Ongoing social and logistical challenges	Barriers to intervention success

### ***Theme 1: Community and school participation***

The intervention, through its involvement with both the school and the community was seen as beneficial. This is consistent with the intrinsic recognition of having to involve the community members and school staff members in the programme implementation was generally appreciated.

*“I think this initiative has been a good step in our school and I am glad to be a part of it. I have enjoyed seeing how things have worked in terms of delivering activities in the school to promote healthy diet, exercise, and handwashing. It is a community primary school with less attention from the community and government, so really seeing that things were working to promote is a plus for us...” (URN 003, Female, School Staff).*

Participants spoke about the importance of using local knowledge and insight to identify, target and work with families and children. The notion of ‘local’ also encompassed the proximity of the intervention, making them better at monitoring and responding to problems in a timely and apt manner.

*“It helped these parents and children because I was near them and I was familiar with their needs since we live in the same community. If they had questions about the activities in the intervention, it was easy to address it because they had someone.” (URN 006, Female, community member).*

The transparency of the regular, short community and school meetings and calls to leaders and school heads about the intervention enabled these stakeholders to take an informal role in the intervention. As a result, they were passively involved in study’s intervention activities and seeing to its completion.

*“When we wait for only government, many times such projects just end up dying. It has to do with ownership and everyone getting involved. It is interesting that the community and the school are currently involved in this intervention, but one must keep the momentum by looking out for where help is necessary. If it is in supporting with healthy food or keeping up with the sport activities, we need it to keep going irrespective of the challenges.” (URN 003, Female, School Staff).*

## **Theme 2: Acceptability of the intervention**

Achieving fairness was mentioned by the participants as important, it was generally agreed that the intervention was fair. One feature in particular – involving everyone in the community irrespective of gender, religion, or socio-economic status – was highlighted as contributing to the participants’ judgement of the fairness of the intervention.

*“I was actually happy to see people from my community and the school children getting organised. It showed that people need such interventions. Nobody took it personally, even if their names were called out specifically, it was from the top to the bottom. It was a choice one had to make to participate, there was nothing like it is for only Muslims or just for Christians. They brought their children and allowed things to work smoothly in the school too. We all even enjoyed the activities.” (URN 006, Female, Community Leader).*

Another factor which contributed to acceptability of the intervention as voiced by adults and children was a community and school-wide appreciation for the intervention intentions to promote healthy eating and physical activity.

*“Yes, they found all activities interesting, the soap making, the hand washing demonstration and participation of parents in their sports competition was thrilling for them. When you hear conversations among the children, you will know that activities were going on in their school and their parents are also happy to be a part of it” (URN 006, Female, Community Leader).*

*“The whole school was happy about the handwashing activity and the soap making class. Aunty, I also like the school sports part as we got to play every other day and then the lessons about food when Aunty displayed various types of foods for us to learn about (URN 004, Male, Student).”*

### **Theme 3: Improved health and wellbeing**

The dietary and physical activity sessions were believed to foster change in the health-related behaviours of children and their parents. This suggests that parents and children were empowered through knowledge and practical demonstrations on how to improve their food intake and participate in physical activity.

*“Some parents have started eating healthier foods, because they could understand the health impact of the types of food they eat and give their children. Some are already relying on their small farms and the need to appreciate more local foods when they started using resources from the intervention. Sometimes we talk about our new weights and how exercise truly can help someone stay healthy. I think something has been achieved and more parents will work to see that their children become healthier too” (URN 002, Male, Parent).*

The health benefits for the children also included reduction in anxiety levels because of having handwashing stations, clean drinking water and the opportunity to learn the skill of soap making. One child extended this observation further by arguing that this is also a relief as it reduces the risk of having frequent diarrhoea due to a lack of clean water.

*“Last year I used to suffer from frequent diarrhoeas because there was no access to clean water or a place to wash hands. I was always thinking of how I do not want to go to school especially if I would have to use the toilets. I could not focus on my studies properly. Sometimes I would miss school but right now, with clean water for toilets and even drinking I am comfortable attending school. I now have access to clean soap and water” (URN 005, Female, Student).*

The intervention helped to build relationships between community and school as reported in theme one and sensitised everyone to the needs and challenges of healthy eating and participating in physical activity for both parents and children. The intervention was believed to be a ‘conversation starter’ and was said to spark a sense of action, possibly an enhanced

social solidarity in the community. One participant argued that the community had become more unified, with everyone interacting well.

*“I think it gave people an opportunity to look at every household in the community and opened our eyes to some issues that were not given much attention, like the issue of this malnutrition, diabetes, hypertension and so on. It has brought togetherness as you saw with the mothers during one of the sessions asking how they could support themselves moving forward because some people used to suffer on their own. They did not socialise with other mothers before, so this thing we have done has brought a kind of change.” (URN 001, Female, Parent).*

#### **Theme 4: Ongoing social and logistical challenges**

Whilst participants generally spoke well about the intervention, there were continuing social and logistical challenges. A frequently mentioned problem expressed by participants was the timing of the activities. A few participants expressed that six weeks was considered a short duration to expect major behavioural changes.

*“If I would suggest, more of these kinds of sessions regularly. Something that is for a long period and with people in the community getting involved more because I think it is too short to know how well this programme has helped our health and that of our children.” (URN 001, Female, Parent).*

It was agreed that integrating the intervention sessions into the curriculum was best for the success of future scaling up into a programme, putting less burden on the schedule, although support would be needed from senior educational authorities. The challenge of involvement/ownership by all key stakeholders such as community, parents and the government were argued among some participants.

*“It is important for programmes like this that government, policymakers, and other key players to ensure that they integrate practicable policies that can be implemented at the bottom level of the community engagement. We still struggle with ownership across all levels, so we need to all meet at a common ground where everyone including parents and children can have their say.” (URN 003, Female, School Staff).*

### 5.3.5 Feasibility of the outcome measures

#### *Measurement completion and sample characteristics*

Sample characteristics and data were available for those in the intervention sample who also took part in the feasibility testing of the GSHS questionnaire for children and STEPS questionnaire and measurements for adults (Table 5.6). Participants included all 30 parents (100% response) and 59 of the children (45%). Characteristics of the measurements sample, by setting (school, community) are shown in (Table 5.6). Participants originated from across the northern and southern geopolitical zones in Nigeria with about 80% from the southern zones. Children were aged 8-13 years, however none of the children in the community sample attended school on the data collection days but participated in the intervention sessions. Men and women were aged 19-66yrs, over 60% had completed primary and secondary school, and around two-thirds were traders by occupation.

Table 5.6: Measurement completion rates and sample characteristics

Variables	Adults		Children	
	All (Community)	All	Community	School
<i>N (response rate, %)</i>				
<i>GSHS</i>	N/A	59 (45)	24 (31)	35 (69)
<i>STEPS questionnaire</i>	30 (100)	N/A	N/A	N/A
<i>STEPS BP measurement</i>	30 (100)	N/A	N/A	N/A
<i>STEPS height and weight measures</i>	30 (100)	N/A	N/A	N/A
Within the measurement sample:				
Age, Median (range), yrs.	<b>36.5 (19-66)</b>	<b>13(8-16)</b>	<b>13 (8-16)</b>	<b>13(8-16)</b>
<i>N (%)</i>				
Female	25 (83)	18 (30)	9 (38)	9 (26)
Geographical zone of origin				
Northern Zones	6 (20)	5 (9)	1 (4)	4 (11)
Southern Zones	24 (80)	54 (92)	23 (96)	31 (89)
State of origin				

Lagos	14 (47)	20 (34)	7 (29)	13 (37)
Other <sup>1</sup>	16 (53)	39 (66)	17 (71)	22 (63)
Highest level of education (adults)			-	-
No/less than primary	6 (20)			
Primary or secondary	19 (63)			
UG university degree	5 (17)			
Occupation			-	-
trader	20 (67)			
businessman	2 (7)			
student	3 (10)			
religious leader	1 (3)			

<sup>1</sup>Other states in the country: Abia, Anambra, Akwa Ibom, Bayelsa, Benue, Borno, Cross River, Delta, Ekiti, Imo, Kano, Kogi, Kwara, Ondo, Ogun, Osun, Oyo, Rivers.

#### *Data quality*

Completion rates and quality indicators for the dietary and PA measures are shown in Table 10. High completion rates were achieved for the global school-based student health survey (GSHS) and WHO stepwise approach to non-communicable disease risk factor surveillance (STEPS) questionnaires.

The questionnaires were comprehensible to the adults and children (except for fruit and vegetable serving which needed to be explained) and had a lengthy completion time (approximately 30-45 minutes) due to the number of questions and the need for researcher assistance.

Table 5.7: Questionnaire data quality

	Adults	Children
<b>Mean % (SD) missing items</b>		
Global school-based student health survey (GSHS) questionnaire	N/A	0 (0)
WHO Stepwise approach to non-communicable disease risk factor surveillance (STEPS) questionnaire	6 (1.45)	N/A
<b>Extent of missing data for affected items in the STEPS questionnaire, N (%) of sample</b>		
Question:		
[Q 23] “How much time do you spend doing vigorous activities at work on a typical day? (hours and minutes)”	28 (93)	N/A
[Q25] “How much time do you spend doing vigorous sports on a typical day? (Hours and minutes)”	23 (77)	N/A



## *Outcomes*

Diet, PA, WASH, and weight status outcomes for children from the GSHS; and diet, PA, weight status, and BP outcomes for adults from the STEPS questionnaire and measures are detailed in Tables 5.9 and 5.10, respectively.

### *Diet, physical activity, WASH, and weight status outcomes in children*

#### *School vs community*

In both school and community settings, around 90% of children who completed the questionnaire reported consuming fruit on only one day per week or less, 50% reported consuming vegetables on one or two days per week, and around 75% in the community and 90% in schools had knowledge about healthy eating. There were no statistically significant differences between community and school settings in the reported amounts of fruit and vegetable intake, or knowledge about healthy eating. Knowledge about handwashing was poor across the sample. About 12% in the community compared to 9% in the school settings reported washing their hands in a dish used by others, with the remainder (88% vs 91%) reported never washing their hands at school before eating ( $p=0.006$ ). Physical activity levels were similar between settings; however, a higher proportion of the community sample reported three or more hours of sedentary activity per day, although this was not statistically significant ( $p=0.089$ ). Weight status outcomes based on BMI showed approximately 90% of children had healthy weight in community and school settings.

#### *Boys vs girls*

There were no significant gender differences in the reported frequency of fruit or vegetable intake, knowledge about healthy eating, knowledge of handwashing or handwashing before eating, and hours spent in sedentary activities. A significantly greater proportion of girls (94%) compared to boys (44%) reported not spending any days in a typical week participating in vigorous physical activity for 60 minutes ( $p=0.001$ ). However, 77% of girls compared to none of the boys reported spending at least one day a week doing moderate intensity physical activity ( $p=0.002$ ). Weight status by gender based on BMI showed 100% of the girls were of healthy weight which was a slightly greater proportion in comparison to the boys, but not significantly ( $p=0.064$ ). Around 10% of the boys were underweight.

Table 5.8: Diet, physical activity and WASH outcomes, children (n=59)

	Community, n=24	School, n=35	p-value for difference	Boys, n=41	Girls, n=18	p-value for difference
<b>Diet</b>						
Number of days fruit is consumed in a typical week, N (%)						
None consumed	3 (13)	3 (9)		4 (10)	2 (11)	
1 day or less	21 (88)	32 (91)	0.624	37 (90)	16 (89)	0.874
Number of days vegetables are consumed in a typical week, N (%)						
None consumed/less than 1 day	10 (42)	18 (51)		17 (42)	11 (61)	
1 or 2 days	14 (59)	17 (49)	0.461	24 (59)	7 (39)	0.164
Knowledge about healthy eating, N (%),						
Yes	18 (75)	31 (89)		35 (85)	14 (78)	
No	6 (25)	4 (11)	0.172	6 (15)	4 (22)	0.474
<b>Water, Sanitation and Hygiene</b>						
Method of handwashing before eating at school, N (%)						
Did not wash hands	21 (88)	32 (91)	0.006	13 (32)	7 (39)	0.874
In a dish of water used by others	3 (12)	3 (9)		28 (68)	11 (61)	
Knowledge about handwashing, N (%),						
Yes	3 (13)	8 (23)	0.17	5 (12)	6 (33)	0.15
<b>Physical Activity</b>						
Number of sports team played in the last 12 months, N (%)						
0 or 1 team	24 (100)	34 (97)	0.404	40 (98)	18 (100)	0.504
Number of days vigorous intensity activities for at least 60 mins in a typical week, N (%)						

	Community, n=24	School, n=35	p-value for difference	Boys, n=41	Girls, n=18	p-value for difference
No vigorous activity 1 or more days	15 (63) 9 (37)	20 (57) 15 (43)	0.681	18(44) 23 (56)	17 (94) 1 (6)	0.001
Number of days moderate intensity activities for at least 60 mins in a typical week, N (%)						
No moderate intensity activity 1 or more days	2 (9) 22 (91)	2 (6) 33 (94)	0.694	41 (100) -	4 (22) 14 (78)	0.002
Sedentary hours in a typical day, N (%)						
1 to 2 hours	7 (29)	18 (51)	0.089	17 (42)	8 (44)	0.831
3 or more hours	17 (71)	17 (49)		24 (58)	10 (56)	
<b>Weight status based on percentiles of Body Mass Index (BMI; kg/m<sup>2</sup>)</b>						-
Weight status, N (%)						
Underweight: <5 <sup>th</sup> percentile	2 (8)	2 (6)		4 (10)		-
Healthy weight: 5 <sup>th</sup> to <85 <sup>th</sup> percentile	22 (92)	30 (86)	0.059	34 (83)	18 (100)	0.064
Overweight/obese: 85 <sup>th</sup> to ≥95 <sup>th</sup> percentile	0	3 (9)		3 (7)		

### *Dietary, PA, BMI, and BP outcomes in adults*

Around two thirds of the adult participants (67%) reported consuming fruit on only one day per week or less, with an average of one serving per week. Vegetable consumption was also low, with only seven of the men and women (23%) reporting consuming vegetables on three or four days in a typical week and, as for fruit, an average of one serving per week. All participants reported always cooking with salt (100%), and no participant avoided processed foods to control salt intake. Almost half of the sample was categorised as overweight with one individual as obese. Systolic blood pressure that reflected possible hypertension was found in 17% of adult participants, while diastolic blood pressure reflecting possible hypertension was found in 4% of adult participants.

Table 5.9: Diet, physical activity, BMI, and blood pressure outcomes, adults (n=30)

<b>Outcome</b>	<b>Frequency</b>
<b>Diet</b>	
Number of days fruit is consumed in a typical week, N (%)	
1 day or less	20 (67)
2 or 3 days	10 (33)
Servings of fruit consumed per week, median (range)	1 (0-1)
Number of days vegetables are consumed in a typical week, N (%)	
1 day or less	12 (40)
2 days	11 (37)
3 or 4 days	7 (23)
Servings of vegetables consumed per week, median (range)	1 (0-3)
Cooking with salt, N (%)	
Always	30 (100)
Avoided processed food to control salt intake, N (%)	
Yes	0
<b>Physical Activity</b>	
Number of days moderate intensity sports, fitness or recreational activities are done in a typical week, median (range)	1 (1-2)
Sedentary hours in a typical day, median (range)	7.5 (5-10)
<b>Weight status classification based on Body Mass Index (BMI; kg/m<sup>2</sup>),</b>	
Weight status, N (%)	
Underweight: <18.50	5 (17)
Normal weight: 18.50-24.99	11 (38)
Overweight/obese: ≥25.00	14 (47)

Outcome	Frequency
<b>Blood Pressure</b>	
Systolic Blood Pressure (mmHg), N (%)	
Normal (lower than 140)	25 (83)
Possible hypertension (between 140 and 180)	5 (17)
Diastolic Blood Pressure (mmHg), N (%)	
Normal (lower than 90)	26 (87)
Possible hypertension (between 90 and 110)	4 (13)

## 5.4 DISCUSSION

### 5.4.1 Summary and interpretation of the findings

This mixed methods study took place in a suburban multi-ethnic school and community in Lagos, Nigeria. The choice and development of the healthy diet and PA, sports and WASH session components were all informed by the theoretical model (see below) and suggestions made on potentially acceptable activities and the barriers to adoption of such activities identified in Study 2 and the qualitative studies in the review (Study 1). Twelve intervention sessions were delivered with 100% participation. Parents and children approved of the session components and delivery; however, parents highlighted the timing of the sessions and concerns about potential lack of government support for integrating an intervention into the school curriculum as potential barriers to sustainability.

It was not possible to design and deliver all of the intervention components that the qualitative evidence suggested would be appropriate. For example, addressing the lack of provision of menstrual hygiene products which impacts on PA participation among girls was a component suggested by Study 2 data, but it was not possible due to cost and the need for support from other parties. Addressing poor school meal quality was also suggested in Study 2, but after consulting with key school officials in the district and Ministry of Education, it was decided it could not be addressed due to the safety concerns about the use of gas cookers, and the political sensitivity around the quality and accessibility of school meals in the country (see Section 1.4.4). School gardening was initiated but due to flooding, did not succeed as an intervention component. Exploring the potential of corporate social responsibility schemes integrated into existing school feeding and other programmes, as suggested by participants in Study 2 was beyond the scope of the current study.

## *Potential outcome measures*

### *Children*

Researcher capacity and school timing impacted on the completion of the outcome measurements among the children, however among those taking part, there were no missing questionnaire data. Children reported low frequency of fruit and vegetable consumption, but good knowledge of healthy eating. These data were consistent with studies in other African countries reporting low consumption ( $\leq 3$  days/week) of fruits and vegetables (Peltzer and Pengpid, 2010; Raaijmakers et al., 2018). Boys were more likely to do vigorous PA and the girls more likely to do moderate intensity PA. With a decline in PA behaviour among adolescents across the globe (Hallal et al., 2012), despite the paucity of data on children, studies in Nigeria have also revealed that adolescents are not participating enough in physical activity (Adeniyi, et al., 2011; Oluwasanu and Oladepo, 2017) which is reflected in the PA behaviours of children in this study.

The suggestion of gender differences in the impact of the WASH sessions would need to be confirmed in a larger study. A study in Kenya revealed that hand drying practices were sub-optimal in both genders with women drying their hands on their clothes after rinsing hands in water with little apparent concern about the level of cleanliness of the fabric, and the men drying their hands with handkerchiefs or their trousers and children using their clothes (Person et al., 2013).

Although underpowered by design, the indication that plausible data were collected suggests significant attention to diet quality in this setting is also required. Although in LMIC countries like Nigeria, a lot of attention has been paid to nutrition and assessment of nutritional status in children under the age of five; however, nutrition in school-aged children has received less attention although there are studies underway and anticipation that more studies will focus on them (Abubakar et al., 2022; Ahinkorah et al., 2021; Musa, 2021), as discussed in Chapter 1.

### *Adults*

All of the adults in the sample participated in the measurement sessions. However, there were issues with missing data for questions on PA. Men and women participating in the study also reported low fruit and vegetable consumption, limited PA and high levels of sedentary behaviour. Confirming the influence of parental habits on children's, national and regional studies reporting that among Nigerians and in Africa generally, consumption of fruits and vegetable is below the recommended intake despite its benefits (Bvenura and Sivakumar, 2017; Landais et al., 2014).

There is a lack of national data, but studies among university students, and people living with diabetes, indicate that adults in Nigeria do not meet WHO recommended physical activity levels (Adegoke and Oyeyemi, 2011; Adeniyi et al., 2013; Oyewole, et al., 2014). In contrast to the children, almost half of the parent sample were overweight suggesting a need to emphasise prevention among children, and with 10% of the boys being underweight, continued attention on all forms of malnutrition.

Adults in the study always add salt during cooking and do not limit processed foods to control salt intake, thus leading to possible high blood pressure. There is an established causal link between salt intake and high blood pressure globally, and evidence that salt intake in much of sub-Saharan Africa is above WHO's recommended maximum intake and may be set to increase as the continent continues considerable urbanisation (Appel et al., 2012; Oyebode et al., 2016). The main aim of the parental measures was to engage parents in the process, but the feasibility and acceptability and possible plausibility of the results suggest the intervention may also benefit parental outcomes.

#### 5.4.2 Study strengths and limitations

##### ***Theoretical model***

The study was underpinned by a socio-ecological model, and further informed by CBPR, within an overarching settings approach. The study principles, intended actions, and project outputs were planned to assess the capacity of the school to be health promoting fostered by links between the school and community. They were also mapped to interacting factors at the individual, interpersonal, community and wider society level to address diet and PA behaviour change.

The bonds created between the school and the wider community evidenced the settings approach and the associated health promoting school model (Senior, 2012). In contrast to the lack of relationship that was identified in the qualitative study (Study 2 Chapter 4), parents and other community members responded positively with the engagement between the school and community, actively engaged with the intervention and measurement sessions, and advocated the continuity of the positive relationships between the school and the community as a core element of intervention implementation and sustainability.

Barriers to adoption of health promoting activities identified in Study 2 and the review included wider societal factors such as inconsistent funding, poor infrastructure, and lack of safety. The delivery of the sessions could only be achieved through the efforts that were engendered by the partnership between community leaders, which led to skilled workers providing their labour for infrastructure improvements, and security, contribution of funds and locally sourced

materials for sport equipment and WASH facilities. Considerable school and community social capital was drawn on in line with the settings approach and addressing wider environmental factors in order to deliver the intervention components at the individual level. The extent to which those efforts could continue long-term could call into question the sustainability of a future intervention and the appropriateness of the theoretical model. Sustainability of intervention programmes is acknowledged as a significant translational research problem, and that changes in funding, policy maker attention, population demographics, and public interest as a result of dynamic socio-political context can all impact on sustainability (Shelton et al., 2018). The noted partnerships between the researcher and stakeholders, in keeping with CBPR, is likely to have contributed to the high levels of participation in the study. Co-learning and capacity building associated with CBPR have previously been associated with high recruitment into intervention programmes (Greiner et al., 2014), and to achieving significant intervention effects (De Las Nueces et al., 2012). Working with communities is clearly enhanced CBPR approaches. However, the time and other resources that are needed to fully implement the approach creates challenges in a low resource setting (Holkup et al., 2004). This was further compounded by being a lone researcher within a PhD programme of independent research, whereby coproduction at all stages of the project is constrained. As such it can only be claimed that elements of CBPR were utilised in the current study.

Corporate social responsibility schemes integrated into existing school feeding and other programmes, was suggested by participants in Study 2 as a way to support the intervention at the societal level, particularly in improving school meal quality, but it was beyond the scope of the current study to explore putting this into practice. As noted in Study 2 policy actors were inclined not to acknowledge the role of government due to funding constraints, and in the current study government and local council representatives did not respond to the reports submitted and only the education board district officer participated in the session observations. The other suggested components that could not be tested in this exploratory phase (provision of menstrual products; school gardening) could potentially also provide impact in future intervention at the wider school environment level.

Overall, although cognisant of the different levels of intersecting factors within the study design and interpretation of the findings, and early signally of the potential for a health promoting school, much of the success of the project was at the individual level with regard to the underpinning theory.

## ***Reflexivity***



As noted in the methods here and in Chapter 4, reflexive practice was an important element of study rigour. Documenting reflexivity in qualitative research is expected (Charmaz 2016) but it is less common in mixed methods research (Cayir et al 2022). Mixed methods research combines the strengths of qualitative and quantitative methods to more rigorously explore a research question (Creswell and Clark 2017). Whether or not reflexivity should be applied to the qualitative element only has been debated; however, there is support for reporting of reflexivity by mixed-methods researchers (Cayir et al 2022; Walker et al 2013).

Reflecting on the field work at this stage of the process the researcher's 'insider' position as a Nigerian resulted in there being no difficulty in establishing good rapport and being accepted by the key stakeholders and participants, as described in Study 2 and by other authors with regard to their own positionality (Ochieng 2010). In addition, shared language including non-verbal expressions, and being a person of faith, which facilitated the use of parables to explain new concepts, elicited as an important way to engage families in Study 2, aided the openness of discussion and the ability to engage with the school and community populations.

It was necessary to step out of the insider's shoes and be mindful of drawing out explicit views to ensure that analysis and interpretation were data driven rather than formed by the researcher's assumptions. As such there was constant flux between an insider and outsider position (Adu-Ampong and Adams 2020), and the influence of the researcher's 'outsider' position as a 'foreign trained' paediatrician was also nuanced and not unidirectional (i.e. not all positive or all negative). For example, comments from the key government workers and head teachers indicate a positive influence such as them stating they were happy to see "*our own foreign trained researchers*" showing interest in school health and how it affects families; or ascribing "*a better understanding of the situation*" due to the researcher being a medical doctor. Such statements helped illuminate how the researcher's positionality influenced the narrative. By contrast, this outsider position proved to be a limiting factor for some who required more reassurance regarding what would be done with the information obtained, and around their scepticism about the researcher's motivation for trying to "*change the way things are being done*". However, the opportunities that the participatory and community based approaches created for wider dialogue beyond data collection helped to mitigate against these issues by building trust and authenticating her credibility, as others working in a LMIC setting have described (Adu-Ampong and Adams 2020).

### ***Methodological quality***

By design, the study sample was not representative of the population; however, using maximum variation purposive sampling in this study helped to capture a wide range of perspectives in relation to the research questions. Thus, the data obtained from the sample

exhibits a wide range of attributes, behaviours, experiences, incidents, qualities, situations (Palinkas et al., 2013).

The questionnaires and measures used needed to be relatively simple in such a challenging setting. This meant that only indicators of diet quality were collected. Methods to obtain more in-depth dietary assessment commonly include the use of 24-hour recalls (Desai, 2013; Shim et al., 2014). A limitation to this tool is that the reliability and validity of the recall depends on the interviewer's ability to probe appropriately while conducting an interview and the respondent's ability to recall intake from the preceding 24 hours (Burrows et al., 2019). Consequently, there is a potential for erroneous data from inaccurate recall resulting in over- or underreporting of intake. In addition, multiple days of collection is required to estimate usual intake. Food frequency questionnaires (FFQs) are also used because they are quicker than open question/ reporting methods such as recalls and inexpensive if self-administered. However, a significant weakness of the FFQ is the limited information related to types and quantity of food intake; also, self-completion of the questionnaire requires literacy.

Similarly for PA, a range of self-complete questionnaires are available (e.g. youth physical activity questionnaire (YPAQ); previous day physical activity recall (PDPAR)) that validate well against objective measures (Kowalski, Crocker, & Faulkner, 1996). However, the subjectivity inherent in all self-reported behaviour leads to recall errors, deliberate misrepresentations, social desirability, and other biases which are particularly important with child participants (Sirard and Pate, 2001).

In some studies, it is argued that the GSHS might not capture school children who are unable to attend school or have dropped out (Darfour-Oduro et al., 2018; Xu et al., 2020). However, in this study, children who were in the community and did not attend school during the school intervention sessions were captured. For adults, the STEPS approach supports the collection of data on several different risk factors, it has the benefit over single risk factor surveys in that it allows an understanding how an intervention can address clusters of risk factors within a population (Bonita et al., 2001). However, Step-3 of the augmented process includes biochemical assessments for blood glucose, blood lipids, and urinary sodium usually taking place at a local clinic was not captured in this study due to cost. It would have also been an opportunity to use the biomarkers to assess the micronutrient levels of parents and children to identify possible micronutrient deficiencies in participants.

Evidence shows that health and education are linked with the more educated enjoying better health and wellbeing, and healthy school children having better academic attainment (Belot and James, 2011). Therefore, consistent with the health promoting school model, those seeking to improve the health of school children need to work closely with teachers to ensure

that interventions are understood to be addressing educational and health goals, so that the time spent on health improvement interventions is not perceived as doing so at the expense of educational attainment (Pallan et al., 2013).

This study did not train teachers as part of the co-production of intervention components, but this should be regarded as an essential requirement of trials of any future health improvement interventions in schools. Co-production of interventions with teachers, within a wider CBPR approach is likely to result in a greater implementation fidelity. While challenging, it is worthwhile to evaluate how co-production would help in designing and implementing such interventions in low-income settings, as noted above (Campbell et al., 2015).

An overall limitation, which may affect the generalisability of the findings to other countries, is that it was based only in local population in an area within Lagos state. Additional work should be conducted in rural and wider geographical areas in Nigeria to consider variations in context. However, the study provides important information on how to develop a culturally appropriate and effective diet and physical activity intervention.

#### 5.4.3 Chapter summary

Interventions addressing diet, PA and hygiene may be acceptable and feasible in low resource school and community settings in Nigeria. Jointly with education, WASH can contribute to healthy diet and physical activity promotion by supporting access to safe drinking water in schools and communities, thus reducing the risk of malnutrition and the risk of water-borne diseases among children and their families.

Outcomes measures may have to be adapted for non-school attending children in the community. The implications of the study and the next stages of intervention development which could include wider piloting and evaluation of cost effectiveness, are presented in the next chapter which provides an overall discussion of the programme of research.

## **6 OVERALL DISCUSSION AND CONCLUSION**

The aim of this programme of research was to explore the potential to identify, develop, test, and evaluate intervention components for improving diet and physical activity among school children in Lagos, Nigeria and the feasibility and acceptability of interventions involving active family participation. The research was delivered in three interlinked studies including a mixed methods systematic-type review on studies in low-income countries, focused on parental influences on optimal diet, physical activity, and body mass index of children and (Study 1). This was followed by Study 2 which explored the views of children, parents, and stakeholders on the sociocultural and environmental influences on diet, physical activity, and possible interventions among children in Nigeria. The final study aimed to evaluate potential intervention components and outcome measures for promoting a healthy diet, physical activity and improved water, sanitation, and hygiene practices (WASH) among children in Nigeria (Study 3). The key findings of the studies and their contribution to knowledge are outlined below.

### **6.1 PRINCIPAL FINDINGS**

#### **6.1.1 Integration of findings with the research and policy evidence base**

The interplay between the three studies is depicted in Figure 6.1, below. The novel multi method systematic-type review importantly highlighted the absence of existing interventions to improve diet and PA among children with family involvement in low-income countries including Nigeria. The review showed that in contrast to high- and middle-income countries, overweight and obesity was most prevalent among parents and children from higher than from lower socioeconomic circumstances, but that all forms of malnutrition are notable public health issues in these settings (Levine, 2011; Templin et al., 2019). Parental income and education and socioeconomic status play crucial roles in promoting healthy diet and physical activity among parents and children, as supported by previous studies (Mutz & Albrecht, 2017; Tandon et al., 2012). Whilst in developed countries there is a focus more on overweight/obesity, and low-income countries are inclined towards focusing on undernutrition, this thesis supports the need for an emphasis on the double burden (now more commonly conceived as a 'triple' burden) of malnutrition as a global concern (Christian & Dake, 2021; Ford et al., 2017; Tzioumis & Adair, 2014). Synthesis of the qualitative studies in the review generated themes around knowledge and beliefs, external influences, the role of parenting and environment and resources. Cross cutting those themes, the analysis contributed understanding of the key barriers and facilitators to optimal diet, exercise, and BMI in children, particularly around knowledge and beliefs. Two clear gaps in the evidence were apparent; none of the qualitative studies had been conducted in Nigeria, and views on potential solutions to barriers had not been elicited. These gaps and the clear links between parent circumstances, their knowledge

and beliefs about nutrition and physical activity (Allender et al., 2006; Phillips et al., 2016), informed Study 2 which generated new knowledge on the barriers and facilitators of favourable diet, PA and weight prioritising the perspectives of parents, children, and other key stakeholders in an urban area of Lagos Nigeria using qualitative methods. Significantly, the study provided insight into participants views on how the barriers could be addressed.

Study 2 contributes three overarching themes to the evidence base. Active community collaboration was one of the approaches suggested to address barriers to diet and PA interventions. Suggested strategies for involving families included teaching health literacy and providing learning aids. Participants advocated for schools as key settings for intervention and supported school gardening/ farming and improvements to sports facilities. Themes from study 2 together with the learning from the systematic-type review informed the approach to and conduct of study 3.

Diet and physical activity intervention studies with parental involvement in high- and middle-income countries tend to conclude parents as receptive to such interventions, but due to the limited number of studies in low-income countries and among school children, authors have not been able to draw any conclusions as to the most effective strategies (Hingle et al., 2010; van de Kolk et al., 2019). Study 3 was therefore an opportunity to contribute unique understanding of the suggested activities as potential components for a diet and PA intervention among children with parental involvement. Diet and PA health literacy teaching, WASH management and sports activities were feasible acceptable and engaging for parents and children showing acceptability of strategies for involving families with the school as a key setting. Working with key stakeholders (parents, children, health and education boards, school, community, religious leaders) using a socioecological approach is beneficial for active engagement in designing diet and physical activity interventions (Caperon et al., 2019; Golden & Earp, 2012; Mehtälä et al., 2014). Integrating the socioecological framework with some key aspects of the community based participatory research shows great promise in moving closer to attaining the goal of improving dietary and exercise behaviours and the nutritional status of Africans and be useful in community and school settings interventions (Ngwenya et al., 2020; Tremblay et al., 2018). Such partnership helps to address known barriers in promoting behavioural changes and gives room for interventions to be tailored to the needs of the people, putting into consideration cultural, religious, and socioeconomic factors especially in settings where resources are limited (Coupe et al., 2018; Pantoja et al., 2017). School and community-based interventions could yield more behavioural change impact than the stand-alone interventions done in schools (French & Stables, 2003; Shediac-Rizkallah & Bone, 1998).

***Study 1. A systematic-type review of family involvement in diet and physical activity interventions among children in low-income countries.***

The purpose of this study was to conduct a systematic-type review on qualitative and quantitative studies in low-income settings on optimal diet and exercise and BMI of children to identify evidence of the role of parental associations and the perspectives of children, parents and stakeholders.

The objectives of study 1 were to:

3. Investigate associations between parental factors and diet, exercise, and body mass index (BMI) in children.
4. Explore perspectives of children, parents and other stakeholders on the barriers and facilitators to optimal diet, exercise, and BMI among children.

***Study 2. Exploration of views on diet and physical activity interventions with family involvement and the settings likely to support the effective engagement in Nigeria.***

The aim of this study was to explore views of parents, children and other stakeholders on the social, cultural, and environmental factors that influence diet and physical activity; potential components or activities within childhood diet and physical activity (PA) interventions; and the potential for parental involvement in such interventions among children in Lagos, Nigeria.

The objectives of study 2 were to:

5. Explore views on social, cultural, and environmental factors and their role as barriers and facilitators in achieving favourable diet and PA;
6. Understand views on the potential solutions to the barriers identified that, in turn, could help inform culturally acceptable intervention approaches to prevent the risk factors for childhood and adolescent malnutrition;
7. Examine views on acceptable methods for involving families in diet and physical activity interventions for children;
8. Explore ways in which parental involvement could be further enhanced by active engagement of the school and the wider community in diet and physical activity intervention for children.

***Study 3. Piloting of intervention components plus family involvement to promote a healthy diet and physical activity among Nigerian School children.***

Based on the findings from the literature review (study 1) and the qualitative study (study2), the purpose of study 3 was to develop, pilot and evaluate potential intervention components

that focus on promoting healthy diet and physical activity with school children (aged 8 to 10 years) in Lagos, Nigeria.

The objectives of study 3 were to:

1. Develop theoretically- and evidence-based intervention components that are culturally favourable, focusing on increasing healthy diet choices, physical activity, and hygiene practices, and reducing sedentary behaviours.
2. Deliver the intervention components in a school and the wider community.
3. Explore the acceptability and feasibility of the intervention components among parents and children.

Childhood undernutrition increases the risk of childhood mortality and poor cognitive development, and overweight/obesity is associated with increased risk of various non-communicable diseases such as high blood glucose levels, raised blood pressure, abdominal obesity, and high lipid profiles (Lancet Series, 2008; pp 404). Study 3, although not designed to measure effectiveness, appeared to demonstrate that plausible data could be collected with the measures used. Demographic and Health Survey and National Health and Nutrition surveys from different low and middle-income countries have reported that overweight/obesity in mothers was found to coexist with stunting, wasting and underweight among children from the same households (Doak et al., 2004; Jehn & Brewis, 2009). This is thought to be due to an interaction of changes related to socioeconomic status, dietary habits, physical activity, and sedentary lifestyle (Wong et al., 2015). Although, it was not possible to measure NCD outcomes in study 3, interest in the measures engaged parents in the wider activities, and it is anticipated that such interventions will benefit parental outcomes as well as children in the long term. Micronutrient intakes were not measured; however, indicators of poor diet quality suggest that some deficiency was likely. Micronutrient deficiencies are a significant problem in Nigeria. Available data show that 71% of children 6–59 months of age, 47% of nonpregnant women 15–49 years of age, and 58% of pregnant women 15–49 years of age in Nigeria had anaemia in 2011; with at least a third of the anaemias attributable to iron deficiency (Hawkes et al., 2015). Less is known about nutritional status of school aged children and improved surveillance data may indicate the need to complement diet and PA sessions with supplementation or fortification of foods (Anjorin et al., 2019).

Nigeria has a federal political system, with 36 states, 774 local government areas, and the Federal Capital Territory. Federal policies are ratified by individual states; as such, they may not be implemented across the whole country. Nineteen nutrition-relevant federal policies are

currently in use or in the advanced drafting stage (Table 6.1). They are in the areas of health (n=7), nutrition (n=4), agriculture (n=3), education/ research (n=2), WASH (n=1), environment (n=1), and social (n=1) (National Bureau of Statistics National Nutrition and Health Survey, 2018). Across the policy areas, the major focus is on undernutrition. Seven policies, from the areas of nutrition, health, and agriculture, present the context on micronutrient deficiencies, namely vitamin A, iodine, and iron deficiencies. Nine, from the same three policy areas, present information on noncommunicable diseases (NCDs), including nutrition related NCDs such as diabetes and high blood pressure and their risk factors. Overweight/ obesity are featured as NCDs in six of these nine policies. The role of nutrition in contributing to certain NCDs is emphasized in several of the policies. Nutrition, health, and agriculture policies present a more holistic nutrition picture of nutrition problems than the other policy areas. Half of the policies highlighted causes of nutritional problems such as poor diet and infant and young child feeding practices, social norms, inadequate health/nutrition services, limited physical and financial access to care, and insurgencies in parts of the country. The influences on healthy diet and active living reported in thesis can be disseminated as consistent with policy priorities.

The data informing these policies are predominantly quantitative rather than qualitative. Cited data sources for evidence on nutrition context in policies include Nigerian Demographic and Health Survey (NDHS), Multiple Indicator Cluster Survey (MICS), and National Nutrition and Health Survey (NNHS). Evidence that is cited mainly relates to prevalence levels of nutrition problems and not on identified solutions. This thesis has been able to highlight the role of mixed methods research in identifying barriers and facilitators to optimal diet, exploring views, methods, and approaches to address nutritional problems and a pilot intervention to test out potential components that may with further development (see section 6.2) suit the regional and country context. The community partnership approach is consistent with the UN's sustainable development goals of active partnership to achieve promotion of healthy diet and physical activity among parents and children (Kumar et al., 2016; United Nations, 2021).

#### 6.1.2 Research strengths and limitations

The strengths and limitations of each study are discussed in the related chapters and an overview is provided here. Key strengths are that the programme of research was theoretically underpinned throughout, and transparent, robust, and reproducible methods were used (e.g., CASP and AXIS quality assessment tools for the SYSTEMATIC-TYPE REVIEW; thick description and reflexivity in the qualitative study; WHO recommended outcome measures in the intervention component testing). Enjoyment, feasibility and acceptability of diet, PA, and WASH sessions, and of outcome measures was demonstrated, and plausible outcome data achieved. Participants felt that timing of sessions and integration into the school curriculum



were potential barriers to sustainability and warrants further exploration. There were practical (e.g., flooding preventing the gardening component) and bureaucratic issues (political sensitivity around the quality of school meals) which hampered development of some of the sessions participants had suggested. Intervention outcome measures needed to be quick and simple to use, and there were some issues with length of questionnaires and the impact on researcher time to reduce respondent burden. Self-reported measures were susceptible to recall and social desirability bias (Mindell et al. 2014). Further development and testing of the intervention as well as the wider scale piloting recommended in the next section should build on study strengths and address the weaknesses.

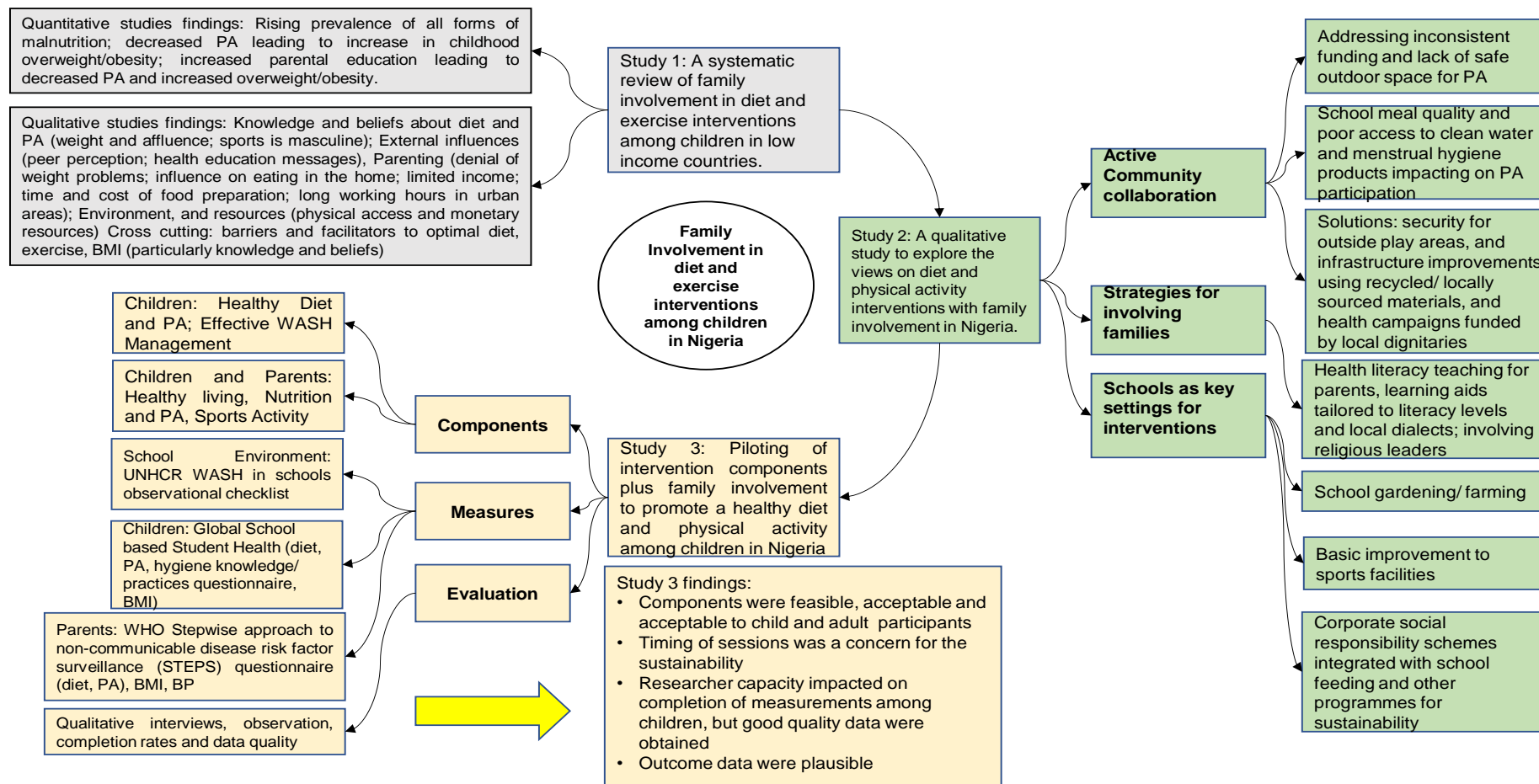


Figure 6.1: Links between the three research studies

Table 6.1: List of nutrition-relevant national policies

Area	Policy Name	Acronym	Start Date	End Date
Nutrition	National Policy on Infant and Young Child Feeding in Nigeria	NPIYCF	2000	Not applicable
	National Strategic Plan of Action for Nutrition – Health Sector Component	NSPAN	2014	2019
	National Policy on Food and Nutrition	NPFN	2016	2025
	National Social and Behavioural Change Communication Strategy for Infant and Young Child Feeding in Nigeria	NSBCCS	2017	2020
Health	National Health Promotion Policy	NHPP	2006	Not applicable
	Integrated Maternal, New-born and Child Health Strategy	IMNCHS	2007	2015 still in use
	Task-shifting and task-sharing policy for essential health care services in Nigeria	TSTS	2014	Not applicable
	National Health Policy	NHP	2016	Not applicable
	National Strategic Plan of Action on Prevention and Control of Noncommunicable Diseases	NSPANCD	2016	2020
	National Child Health Policy	NCHP	2017	Not applicable
	Second National Strategic Health Development Plan	NSHDP II	2018	2022
Agriculture	National Agricultural Investment Plan	NAIP	2011	2014
	Agriculture Promotion Policy	APP	2016	2020
	Agricultural Sector Food Security and Nutrition Strategy	ASFSNS	2016	2025
Water, Sanitation and Hygiene	Partnership for Expanded Water Supply, Sanitation & Hygiene Strategy	PEWASH	2016	2030
Environment	National Forest Policy	NFP	2006	Not applicable
Education/Research	National School Health Policy	NSHP	2006	Not applicable
	Science, Technology, and Innovation Policy	STIP	2011	Not applicable

Social	National Social Protection Policy	NSPP	2017	Not applicable
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## **6.2 DISSEMINATION, RESEARCH AND PRACTICE RECOMMENDATIONS**

The detailed exploratory work of this programme of research is a crucial first step in designing effective programmes in Nigeria for improving diet and PA among children with family involvement. The findings will be of value for others developing new interventions in such settings. The research has been presented at three international conferences (see page 8). The next stage will be to publish the three studies in peer-reviewed journals (e.g., Transactions of the Royal Society of Tropical Medicine & Hygiene <https://rstmh.org/journals>), and conduct other dissemination in formats that are accessible to a wide range of audiences including intervention beneficiaries and other stakeholders. O'Cathain et al (2019) recommend at the end of the development phase that the production of a document describing the intervention and how it should be delivered is valued (O'Cathain et al., 2019). To return to the MRC framework that underpins the intervention development, further assessment of the evidence base, including reviewing the effectiveness of existing interventions, and/or qualitative research with stakeholders may be required. This includes the need for greater understanding of the challenges children face in genuine participation in research (Larsson et al., 2018). Continued development and validation of outcome assessment tools suitable for use in low-income settings is required (<http://www.fao.org/documents/card/en/c/I9940EN/>).

Once a definitive package can be documented the next stage is to do larger scale piloting, and process, intermediate outcome, and economic evaluation, ideally in a randomised controlled trial (Craig et al 2019). This programme of research indicates the need to use multi-level strategies (i.e., intrapersonal, interpersonal, organisation, community) that seek to affect the most salient factors that influence healthy diet and physical activity promotion among parents and children, to achieve a more sustainable behavioural change. Identify and invite key community members (e.g., school principals, food vendors, religious leaders, community leaders) and institutions (e.g., non-governmental organisations) that may directly or indirectly influence behavioural health of parents and children to collaborate and be part of the intervention. Political support and community partnerships have been identified as some of the core domains that affects an intervention's capacity for sustainability (Alhassan et al., 2021; Horton & Brown, 2018). A logic model of the potential programme theory to guide the piloting and evaluation of the diet and PA programme is outlined in Figure 6.1 below. The author intends to prepare funding bids to support the proposed further development and pilot phases. There is evidence in low income countries and in local contexts in agriculture, social protection, early childhood development, education and water, sanitation, and hygiene (WASH) which give some support to the potential success of scale-up of the diet, PA, and parental involvement intervention (Ruel & Alderman, 2013).

In terms of wider implementation and sustainability, practitioners should consider the need teachers have for educational resources when developing the interventions. Educational resources (e.g., classroom activities) should help them meet the objectives set by the local school curriculums. Researchers should take advantage of the effectiveness of peers in influencing behaviour change and involve children and parents as agents of change during the intervention (Mayfield & Hill, 2007). For example, give children and parents the responsibility to organise fun activities (e.g., games, role plays) that promote healthy behaviours in other children and parents. Practitioners can work with civil societies, governments, and other local influencers to create demand for healthy diet and physical activity promotion among parents and children; using information and communication technologies to increase knowledge about healthy lifestyles (e.g., healthy eating choices; physical activity); and develop contextually appropriate. messaging to promote healthy lifestyles, beating NCDs, delivered through various multimedia strategies (Wakefield et al., 2010).

Diet related noncommunicable diseases such as obesity, diabetes mellitus, and cardiovascular diseases are increasing in public health importance in Nigeria. About 5 million Nigerians may die of noncommunicable diseases by the year 2015, and diabetes alone is projected to cause about 52% of the 30 mortality by 2015 (Ekpenyong et al., 2012). Researchers have empirically identified the link between noncommunicable diseases and globalisation, urbanisation, demographics, lifestyle transition, socio-cultural factors, poverty, poor maternal, foetal, and infant nutrition (Gouda et al., 2019). Thus, to better understand the scope of the problem of malnutrition throughout the country and to measure progress in addressing it, the nutritional status of the population must be monitored on a regular basis. This requires the routine collection of nutritional data, its analysis, and management (Bonita et al., 2013).

There needs to be prioritisation and investment in coordination mechanisms by adequately implementing actions across all policy areas ensuring all necessary targets are achieved. Nigeria is currently not on-track to meet most of the WHO targets, so it is necessary for coordination mechanisms to explicitly address the duplication of activities and achieve synergy (Head, 2010). Vertical (sectoral federal to community level) coordination structures, which are important given the decentralisation of all issues related to nutrition in Nigeria, need to ensure that implemented nutrition actions achieve adequate coverage among the populations that have the greatest potential to benefit. Horizontal (multisectoral) coordination structures (state and local level) are necessary to ensure that populations with the potential to benefit receive interventions across all relevant policy areas (Alhassan et al., 2021).

It is necessary for the nutrition community to engage required stakeholders to achieve alignment and better coordination among policy areas. There is also a need for engagement to ensure that additional relevant policy areas that currently do not integrate nutrition, such as economic and gender policies also mainstream nutrition (Baker et al., 2018; Sachs et al., 2019). They should also invest in rigorous evaluation of different types of interventions, sharing lessons learnt, and scaling-up the successful ones (Cairney & Oliver, 2017; Ramponi et al., 2020).

Governments should initiate and support research activities relevant to nutrition in collaboration with training and research institutions, NGOs, and professional associations. The private sector can support policy implementation through, for example, the development of low cost, nutritious complementary foods, fortification of staple foods, awareness creation, fund mobilisation, and research (Fanzo, 2011; Schönfeldt et al., 2018).

### **6.3 CONCLUSION**

The primary aim of this thesis was to explore the potential to identify, develop, test, and evaluate intervention components for improving diet and physical activity among school children in Lagos, Nigeria and the feasibility and acceptability of interventions involving active family participation. The systematic-type review indicated prevalence of all forms of malnutrition in low-income countries, and associations between parental factors and less favourable diet and PA habits, and overweight and obesity among parents of high socioeconomic status. The review also highlighted barriers and facilitators to optimal diet, exercise, and BMI. An exploratory qualitative study revealed views on how to address identified barriers, strategies to involve families in diet and exercise intervention and ways in which schools could work with the wider community for interventions. The delivery of potential components on diet and PA sessions to promote healthy diet and physical activity with parental involvement among school children, and outcome measures were found to be feasible and acceptable. The implication of this programme of research is that diet, PA, and WASH interventions with parental and community involvement may be acceptable and feasible in low resource school and community settings in Nigeria. Further development, piloting and evaluation of such interventions is recommended, with the long-term aim of wider implementation, scaling up, sustainability and transferability in the future.

Inputs	Outputs		Outcomes-Impact		
	Activities	Participants	Short	Medium	Long
Financial and Human Resources Planning Processes Materials People	Healthy Diet and Physical Activity. Effective WASH Management, Sports Activity for parents and children. Soap making.	School-aged children, parents, School Teachers	Gain knowledge and skills about malnutrition, healthy diet and PA. Set goals for diet and PA. Get active and gradual changes in diets.	Increase consumption of healthy meals and participation in PA. More activities to promote diet and PA. Behavioural changes in handwashing	Social, Environmental and Economic system supports healthy diet and physical activity among school children.
	Collaboration and Partnership: Support active community through interhouse sports, health campaigns, corporate social responsibility schemes.	Universal education board members, local councillor, local dignitaries, community, and religious leaders (Eputu).	Gain knowledge and skills of WASH practices and MHM. Ability to make soaps and make local eco-pads using cloths.	Increase practices of effective WASH and MHM Peer to peer learning on soap and cloth pads.	
	Healthy Built Environment School farming/gardens (preparation for gardens and planting); liaising with local farmers, training workshop on gardening skills. Work with school on play areas, WASH facilities. Liaise with the government and local environmentalist to build a biogas for kitchen.	Children, parents, community, ministries of health, education and environment, universal education board, ministry of sports, local farmers, environmentalists, workmen	Access to clean water and sanitary facilities, basic skills of gardening/farming, area for garden prepared. Play areas secured and ready for use.	Gardens/farms in operation, continuous workshops of success/failure, support, biogas ready for kitchen.	
	Public Policy: Support the development of healthy diet and PA policies by working with local councillors, local government chairman. Hold and participate in stakeholders' engagement meetings.	Policy makers: local councillors, state house of assembly reps of the constituency.	Avoiding duplication of policies, working with existing policies.	Working to scale up advocacy and high scale implementation projects, establishing existing collaboration to support diet and PA interventions.	
	Monitoring and Evaluation: Develop a monitoring and evaluation framework and reporting schedule with the district officers, hire a local external auditor.	Universal education board directors, local councillors, state house of assembly reps, community leaders, school admin.	Workshops training on engagement different partners at multistage to promote intervention.	Develop plans and work to adopt plans as CSR schemes in schools. Establish health campaigns on quarterly basis.	
			Increase understanding of how to integrate M & E data into practice	Monitoring and Evaluation data to inform practice. Revise logic model	

Figure 6.2: Nutrition and Physical Activity Logic Model



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## APPENDICES

## APPENDIX 1: SEARCH STRATEGY

### Database search result

Title: systematic-type review on Family Involvement in Diet and Exercise Interventions in Children Among Developing countries (Nigeria as a focus).

Databases searched Discover, CINAHL, Cochrane, FSTA, Medline, Sage, Scopus

Date search	of Database used	Search keywords/ synonyms	Limits	Results	Relevant results	Notes
09/07/2018	Discover	1. famil* AND involvement AND diet* AND "physical activity" AND child* AND ("developing countries" OR nigeria)	10 years	1292	16	Articles discarded as not relevant to the study, based in developed countries.
09/07/2018	CINAHL	1. famil* involvement diet* "physical activity" child* ("developing countries" OR nigeria)	10 years	1	0	Article discarded as it was related to pets
		2. famil* involvement diet* "physical activity" (child* OR adolescen* ) ("developing countries" OR nigeria)	10 years	5	0	Articles discarded as they were related to diabetes, vaccinations, mental health.

Date search	of Database used	Search keywords/ synonyms	Limits	Results	Relevant results	Notes
09/07/2018	Cochrane	1. famil* involvement diet* "physical activity" 10 years child* ("developing countries" OR nigeria)		0		
		2. famil* involvement diet* "physical activity" 10 years child* "developing countries"		0		
10/07/2018	FSTA	1. famil* involvement diet* "physical activity" 10 years child* ("developing countries" OR nigeria)		1476	10	Articles discarded as they were agriculture related.
10/07/2018	Medline	1. famil* involvement diet* "physical activity" 10 years (child* OR adolescen*) ("developing countries" OR nigeria)		7	0	Articles discarded as they were related to diabetes, vaccinations, mental health.
10/07/2018	Sage	1. famil* involvement diet* "physical activity" 10 years (child* OR adolescen*) ("developing countries" OR nigeria)		190	7	
		2. child* obesity AND nigeria	10 years	367	5	

Date search	of Database used	Search keywords/ synonyms	Limits	Results	Relevant results	Notes
10/07/2018	Scopus	1. "child" "obesity" AND developing countries	10 years	360	25	
		2. "child" "obesity" AND Nigeria	10 years	114	32	

## APPENDIX 2: CRITICAL APPRAISAL TOOL

Centre for Evidence Based Management (July, 2014), Critical Appraisal Checklist for Cross-Sectional Study.

### Critical Appraisal of a Cross-Sectional Study (Survey)

Appraisal questions	Yes	Can't tell	No
1. Did the study address a clearly focused question / issue?			
2. Is the research method (study design) appropriate for answering the research question?			
3. Is the method of selection of the subjects (employees, teams, divisions, organizations) clearly described?			
4. Could the way the sample was obtained introduce (selection) bias?			
5. Was the sample of subjects representative with regard to the population to which the findings will be referred?			
6. Was the sample size based on pre-study considerations of statistical power?			
7. Was a satisfactory response rate achieved?			
8. Are the measurements (questionnaires) likely to be valid and reliable?			
9. Was the statistical significance assessed?			
10. Are confidence intervals given for the main results?			
11. Could there be confounding factors that haven't been accounted for?			
12. Can the results be applied to your organization?			

Adapted from Crombie, *The Pocket Guide to Critical Appraisal*; the critical appraisal approach used by the Oxford Centre for Evidence Medicine, checklists of the Dutch Cochrane Centre, BMJ editor's checklists and the checklists of the EPPI Centre.

Cite as: Center for Evidence Based Management (July, 2014), Critical Appraisal Checklist for Cross-Sectional Study. Retrieved (month, day, year) from <https://www.cebma.org>

## APPENDIX 3: CASP CHECKLIST

Critical Appraisal Skills Programme (2018). CASP (Qualitative) Checklist.

CASP Checklist: 10 questions to help you make sense of a Qualitative research

How to use this appraisal tool: Three broad issues need to be considered when appraising a qualitative study:

Are the results of the study valid? (Section A)

What are the results? (Section B)

Will the results help locally? (Section C)

The 10 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is “yes”, it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a “yes”, “no” or “can’t tell” to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & SYSTEMATIC-TYPE REVIEW) were based on JAMA 'Users' guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Qualitative) Checklist. [online] Available at: URL. Accessed: Date Accessed.*





#### APPENDIX 4: QUALITY ASSESSMENT OF BOTH QUANTITATIVE AND QUALITATIVE STUDIES.

Y: yes; N: no. U: unclear

##### Quality Assessment summary of included Quantitative Studies

Study	Clear aims	Study design appropriate	Participant characteristics / selection clearly described	Selection bias avoided	Sample representa tive	Response rate satisfactory	Questionnaire validated	Ethical issues considered	Clear statement of findings	Research valuable
Doku et al. (2011)	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Ene-Obong et al. (2012)	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Kimani- Murage et al. (2011)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mushtaq et al. (2011)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Muthuri et al. (2014)	Y	Y	Y	Y	N	N	Y	Y	Y	Y
Navti et al. (2017)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y

Ojofeitimi et. al (2011)	Y	Y	Y	Y	N	Y	Y	N	Y	Y
Senbanjo et al. (2010)	Y	Y	Y	Y	N	Y	Y	Y	Y	Y

### Quality Assessment of Qualitative Studies

Study	Clear aims	Method appropriate	Research design appropriate	Recruitment strategy appropriate	Data collection appropriate	Relationship adequately considered	Ethical issues considered	Data analysis rigorous	Clear findings	Research valuable
Kinsman et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pulakka et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sedibe et al. (2014) rural	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Shaibu et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

## APPENDIX 5: DATA EXTRACTION FORM

A sample of a completed data extraction form



Data collection form

<b>Review title or ID</b>
A systematic-type review of family involvement in diet and exercise interventions among children in developing countries (Study 1)
<b>Study ID</b> <i>(surname of first author and year first full report of study was published e.g., Smith 2001)</i>
Kinsman, 2015
<b>Report IDs of other reports of this study</b> <i>(e.g., duplicate publications, follow-up studies)</i>
<b>Notes:</b>

## General Information

Date form completed <i>(dd/mm/yyyy)</i>	24/07/2018
Name/ID of person extracting data	Oritseweyinmi Orighoye
Report title <i>(title of paper/ abstract/ report that data are extracted from)</i>	A model for promoting physical activity among rural South African adolescent girls
Report ID <i>(if there are multiple reports of this study)</i>	
Reference details	<a href="https://doi.org/10.3402/gha.v8.28790">https://doi.org/10.3402/gha.v8.28790</a>
Report author contact details	John Kinsman, Epidemiology and Global Health Unit, Department of Public Health and Clinical Medicine, Umea° University, SE-901 87 Umea° , Sweden, Email: <a href="mailto:john.kinsman@umu.se">john.kinsman@umu.se</a>
Publication type <i>(e.g., full report, abstract, letter)</i>	Article
Study funding source <i>(including role of funders)</i>	MRC/DfID African Leadership Scheme, grant number 97008; the South African National Research Foundation Institutional Research Development Programme, grant number 62496; and the Swedish Council for Working Life and Social Research, grant number 20061512.

<b>Possible conflicts of interest</b> <i>(for study authors)</i>	The authors declare that they have received no funding from industry and that they have no conflicts of interest in relation to this study.
Notes: The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.	

## Eligibility

Study Characteristics	Review Inclusion Criteria		Location in text <i>(pg &amp; ¶/fig/table)</i>
	Adolescent girls (13-19 years), sport leaders, youth leaders Physical Activity Rural South Africa, community based, school settings Parental engagement, behavioural changes Qualitative cross-sectional study	<b>Yes/ No / Unclear</b>	
Type of study	Randomised trial	No	
	Non-randomised trial	Yes	Pg. 2
	Controlled before-after study 1. Contemporaneous data collection 2. At least 2 intervention and 2 control clusters	N/A	

Study Characteristics	Review Inclusion Criteria		Location in text
	<p>Adolescent girls (13-19 years), sport leaders, youth leaders</p> <p>Physical Activity</p> <p>Rural South Africa, community based, school settings</p> <p>Parental engagement, behavioural changes</p> <p>Qualitative cross-sectional study</p>	Yes/ No / Unclear	(pg & ¶/fig/table)
	<p>Interrupted time series OR</p> <p>Repeated measures study</p> <p>1. At least 3 timepoints before and 3 after the intervention</p> <p>2. Clearly defined intervention point</p>		
	Other design (specify):		
Participants	Adolescent girls (13-19 years), sport leaders, youth leaders	Yes	Pg. 3
Types of intervention	Physical Activity	Yes	Pg. 3
Types of outcome measures	Perceptions	Yes	Pg. 1
Decision: Included			

Study Characteristics	Review Inclusion Criteria		Location in text
	Adolescent girls (13-19 years), sport leaders, youth leaders		(pg & ¶/fig/table)
	Physical Activity		
	Rural South Africa, community based, school settings		
	Parental engagement, behavioural changes		
	Qualitative cross-sectional study	Yes/ No / Unclear	
Reason for exclusion			
Notes:			

**DO NOT PROCEED IF STUDY EXCLUDED FROM REVIEW**



## Population and setting

	<b>Description</b> <i>Include comparative information for each group (i.e. intervention and controls) if available</i>	<b>Location in text</b> <i>(pg &amp; ¶/fig/table)</i>
Population description <i>(from which study participants are drawn)</i>	adolescent girls, aged 13- 19 years  Sports teachers and youth leaders with knowledge and experience of sports and other activities of adolescent girls in the area.	Pg. 3
Setting <i>(including location and social context)</i>	Agincourt subdistrict of rural South Africa; the Agincourt area is broadly representative of the most marginalised rural communities in South Africa.	Pg. 3
Inclusion criteria	The schools were selected to represent the geographical diversity of the community.  Adolescent girls, aged 13-19 years.  Adult key informants, comprising sports teachers and youth leaders with knowledge and experience of sports and other activities of adolescent girls in the area.	Pg. 3
Exclusion criteria		

	<b>Description</b> <i>Include comparative information for each group (i.e. intervention and controls) if available</i>	<b>Location in text</b> <i>(pg &amp; ¶/fig/table)</i>
Method/s of recruitment of participants	The participants were stratified by age, with one FGD in each school comprising 13- to 15-year-olds, and the other comprising 16- to 19-year-olds. An announcement about the study was made in each school by the respective head teacher, and girls who wished to participate were invited to write their name on a piece of paper and deposit it into a sealed 'post box'. There were too many applicants at one school, so a random sampling approach was used in this case	Pg. 3
Notes:		

## Methods

	<b>Descriptions as stated in report/paper</b>	<b>Location in text</b> <i>(pg &amp; ¶/fig/table)</i>
Aim of study	The aim of this qualitative study was to identify and describe facilitating factors and barriers that are associated with physical activity among adolescent girls in a rural area of South Africa; and, based on these, to develop a model for promoting leisure-time physical activity within this population.	Pg. 2

Design <i>(e.g., parallel, crossover, non-RCT)</i>	Cross-sectional	
Unit of allocation <i>(by individuals, cluster/ groups or body parts)</i>	Focus group discussions Individual Interviews	Pg. 3
Start date	June 2011	Pg. 4
End date	July 2011	Pg. 4
Duration of participation <i>(from recruitment to last follow-up)</i>	The qualitative interviews took approximately 45 min each, and the FGDs lasted between 60 and 90 min	Pg. 4
Notes:		

## Risk of Bias assessment

See Chapter 8 of the Cochrane Handbook. Additional domains may be required for non-randomised studies.

Domain	Risk of bias <i>Low/ High/Unclear</i>	Support for judgement	Location in text <i>(pg &amp; ¶/fig/table)</i>
Random sequence generation <i>(selection bias)</i>	<b>High</b>	There were too many applicants at one school, so a random sampling approach. Sampling framework was purposive rather than systematically representative, and through this approach only one female adult key informant for the seven qualitative interviews. Therefore might have obtained data with a male bias.	Pg. 3 and 13
Other bias			
Notes:			

## Participants

Provide overall data and, if available, comparative data for each intervention or comparison group.

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Total no. randomised <i>(or total pop. at start of study for NRCTs)</i>	51 adolescent girls; 7 adults (6 males, 1 female)	Pg. 3
Clusters <i>(if applicable, no., type, no. people per cluster)</i>		
Age	13-19 years adolescent girls; 21-44 years adults	Pg. 3
Sex	Girls, 6 males, 1 female	Pg. 3
Race/Ethnicity	Africans, Mozambique roots	Pg. 3
Severity of illness	N/A	
Other relevant sociodemographics	Rural, marginalised communities	Pg. 3
Notes:		

## Applicability

<p>Have important populations been excluded from the study?</p> <p><i>(consider disadvantaged populations, and possible differences in the intervention effect)</i></p>	<p>Yes</p> <p><i>Yes/No/Unclear</i></p>	<p>The views of the women population (pg. 13)</p> <p>The views of adolescent boys</p>
<p>Is the intervention likely to be aimed at disadvantaged groups?</p> <p><i>(e.g., lower socioeconomic groups)</i></p>	<p>Yes</p> <p><i>Yes/No/Unclear</i></p>	<p>Pg. 13</p>
<p>Does the study directly address the review question?</p> <p><i>(any issues of partial or indirect applicability)</i></p>	<p>Yes</p> <p><i>Yes/No/Unclear</i></p>	<p>The barriers and facilitators of family involvement in diet and exercise activities in children were addressed:</p> <p>Poverty, gender, parental control, body image ideals, demographic factors, human infrastructure and health effects are both facilitators and barriers for teenage girls to take part in physical activities.</p>
<p>Notes:</p>		

## Other information

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Key conclusions of study authors	There is an urgent need to develop effective physical activity interventions in South Africa as one of several means to counter the rapidly expanding epidemic of NCDs in the country. The broad congruence of our findings with those from a range of studies in other settings suggests that the model may be applicable elsewhere in South Africa, as well as in other African and resource-poor countries that are undergoing health and social transitions alongside an upsurge in NCDs	Pg. 13

## APPENDIX 6: SAMPLE DATA EXTRACTION TEMPLATE

### A sample of the data collection form



Data collection form

<b>Review title or ID</b>
A systematic-type review of family involvement in diet and exercise interventions among children in developing countries (Study 1)
<b>Study ID</b> <i>(surname of first author and year first full report of study was published e.g., Smith 2001)</i>
Kinsman, 2015
<b>Report IDs of other reports of this study</b> <i>(e.g., duplicate publications, follow-up studies)</i>
<b>Notes:</b>



## General Information

Date form completed ( <i>dd/mm/yyyy</i> )	24/07/2018
Name/ID of person extracting data	Oritseweyinmi Orighoye
Report title <i>(title of paper/ abstract/ report that data are extracted from)</i>	A model for promoting physical activity among rural South African adolescent girls
Report ID <i>(if there are multiple reports of this study)</i>	
Reference details	<a href="https://doi.org/10.3402/gha.v8.28790">https://doi.org/10.3402/gha.v8.28790</a>
Report author contact details	John Kinsman, Epidemiology and Global Health Unit, Department of Public Health and Clinical Medicine, Umea° University, SE-901 87 Umea° , Sweden, Email: john.kinsman@umu.se
Publication type <i>(e.g., full report, abstract, letter)</i>	Article
Study funding source <i>(including role of funders)</i>	MRC/DfID African Leadership Scheme, grant number 97008; the South African National Research Foundation Institutional Research Development Programme, grant number 62496; and the Swedish Council for Working Life and Social Research, grant number 20061512.

<b>Possible conflicts of interest</b>  <i>(for study authors)</i>	The authors declare that they have received no funding from industry and that they have no conflicts of interest in relation to this study.
Notes:           The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.	

## Eligibility

Study Characteristics	Review Inclusion Criteria		Location in text
	<p>Adolescent girls (13-19 years), sport leaders, youth leaders</p> <p>Physical Activity</p> <p>Rural South Africa, community based, school settings</p> <p>Parental engagement, behavioural changes</p> <p>Qualitative cross-sectional study</p>	<p><b>Yes/ No / Unclear</b></p>	<p>(pg &amp; ¶/fig/table)</p>
Type of study	Randomised trial	No	
	Non-randomised trial	Yes	Pg. 2
	<p>Controlled before-after study</p> <p>Contemporaneous data collection</p> <p>At least 2 intervention and 2 control clusters</p>	N/A	
	<p>Interrupted time series OR</p> <p>Repeated measures study</p> <p>At least 3 timepoints before and 3 after the intervention</p> <p>Clearly defined intervention point</p>		

Study Characteristics	Review Inclusion Criteria		Location in text
	Adolescent girls (13-19 years), sport leaders, youth leaders  Physical Activity  Rural South Africa, community based, school settings  Parental engagement, behavioural changes  Qualitative cross-sectional study	<b>Yes/ No / Unclear</b>	<i>(pg &amp; ¶/fig/table)</i>
	Other design (specify):		
Participants	Adolescent girls (13-19 years), sport leaders, youth leaders	Yes	Pg. 3
Types of intervention	Physical Activity	Yes	Pg. 3
Types of outcome measures	Perceptions	Yes	Pg. 1
Decision:	Included		
Reason for exclusion			
Notes:			

**DO NOT PROCEED IF STUDY EXCLUDED FROM REVIEW**

## Population and setting

	<b>Description</b>  <i>Include comparative information for each group (i.e. intervention and controls) if available</i>	<b>Location in text</b>  <i>(pg &amp; ¶/fig/table)</i>
Population description  <i>(from which study participants are drawn)</i>	adolescent girls, aged 13- 19 years  Sports teachers and youth leaders with knowledge and experience of sports and other activities of adolescent girls in the area.	Pg. 3
Setting  <i>(including location and social context)</i>	Agincourt subdistrict of rural South Africa; the Agincourt area is broadly representative of the most marginalised rural communities in South Africa.	Pg. 3
Inclusion criteria	The schools were selected to represent the geographical diversity of the community.  Adolescent girls, aged 13-19 years.  Adult key informants, comprising sports teachers and youth leaders with knowledge and experience of sports and other activities of adolescent girls in the area.	Pg. 3
Exclusion criteria		

	<b>Description</b>  <i>Include comparative information for each group (i.e. intervention and controls) if available</i>	<b>Location in text</b>  <i>(pg &amp; ¶/fig/table)</i>
Method/s of recruitment of participants	The participants were stratified by age, with one FGD in each school comprising 13- to 15-year-olds, and the other comprising 16- to 19-year-olds. An announcement about the study was made in each school by the respective head teacher, and girls who wished to participate were invited to write their name on a piece of paper and deposit it into a sealed 'post box'. There were too many applicants at one school, so a random sampling approach was used in this case	Pg. 3
Notes:		

## Methods

	<b>Descriptions as stated in report/paper</b>	<b>Location in text</b> <i>(pg &amp; ¶/fig/table)</i>
Aim of study	The aim of this qualitative study was to identify and describe facilitating factors and barriers that are associated with physical activity among adolescent girls in a rural area of South Africa; and, based on these, to develop a model for promoting leisure-time physical activity within this population.	Pg. 2
Design <i>(e.g., parallel, crossover, non-RCT)</i>	Cross-sectional	
Unit of allocation <i>(by individuals, cluster/ groups or body parts)</i>	Focus group discussions  Individual Interviews	Pg. 3
Start date	June 2011	Pg. 4
End date	July 2011	Pg. 4

Duration of participation <i>(from recruitment to last follow-up)</i>	The qualitative interviews took approximately 45 min each, and the FGDs lasted between 60 and 90 min	Pg. 4
Notes:		

#### Risk of Bias assessment

See Chapter 8 of the Cochrane Handbook. Additional domains may be required for non-randomised studies.

Domain	Risk of bias <i>Low/ High/Unclear</i>	Support for judgement	Location in text <i>(pg &amp; ¶/fig/table)</i>
Random sequence generation <i>(selection bias)</i>	<b>High</b>	There were too many applicants at one school, so a random sampling approach. Sampling framework was purposive rather than systematically representative, and through this approach, only one female adult key informant for the seven qualitative interviews. Therefore might have obtained data with a male bias.	Pg. 3 and 13
Other bias			
Notes:			



## Participants

*Provide overall data and, if available, comparative data for each intervention or comparison group.*

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Total no. randomised <i>(or total pop. at start of study for NRCTs)</i>	51 adolescent girls; 7 adults (6 males, 1 female)	Pg. 3
Clusters <i>(if applicable, no., type, no. people per cluster)</i>		
Age	13-19 years adolescent girls; 21-44 years adults	Pg. 3
Sex	Girls, 6 males, 1 female	Pg. 3
Race/Ethnicity	Africans, Mozambique roots	Pg. 3
Severity of illness	N/A	
Other relevant sociodemographics	Rural, marginalised communities	Pg. 3
Notes:		

## Intervention groups

*Copy and paste table for each intervention and comparison group*

### Intervention Group 1

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Group name		
No. randomised to group <i>(specify whether no. people or clusters)</i>		
Description <i>(include sufficient detail for replication, e.g., content, dose, components; if it is a natural experiment, describe the pre-intervention)</i>		
Duration of treatment period		
Timing <i>(e.g., frequency, duration of each episode)</i>		
Delivery <i>(e.g., mechanism, medium, intensity, fidelity)</i>		

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Providers  (e.g., no., profession, training, ethnicity etc. if relevant)		
Co-interventions		
Economic variables  (i.e. intervention cost, changes in other costs as result of intervention)		
Resource requirements to replicate intervention  (e.g., staff numbers, cold chain, equipment)		
Notes:		

## Outcomes

*Copy and paste table for each outcome.*

### Outcome 1

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Outcome name		
Time points measured <i>(specify whether from start or end of intervention)</i>		
Time points reported		
Outcome definition <i>(with diagnostic criteria if relevant and note whether the outcome is desirable or undesirable if this is not obvious)</i>		
Person measuring/ reporting		
Unit of measurement <i>(if relevant)</i>		
Scales: upper and lower limits <i>(indicate whether high or low score is good)</i>		

	Description as stated in report/paper	Location in text (pg & ¶/fig/table)
Is outcome/tool validated?  <i>Yes/No/Unclear</i>		
Imputation of missing data  <i>(e.g., assumptions made for ITT analysis)</i>		
Assumed risk estimate  <i>(e.g., baseline or population risk noted in Background)</i>		
Notes:		

## Results

*Copy and paste the appropriate table for each outcome, including additional tables for each time point and subgroup as required.*

For randomised or non-randomised trial - Dichotomous outcome

	Description as stated in report/paper				Location in text (pg & ¶/fig/table)
Comparison					
Outcome					
Subgroup					
Time point <i>(specify whether from start or end of intervention)</i>					
<b>Results</b>  <i>Note whether:</i>  <i>... post-intervention OR</i>  <i>... change from baseline</i>  <i>And whether</i>  <i>... Adjusted OR</i>  <i>... Unadjusted</i>	<b>Intervention</b>		<b>Comparison</b>		
	No. events	No. participants	No. events	No. participants	

	Description as stated in report/paper				Location in text (pg & ¶/fig/table)
Baseline data	Intervention		Comparison		
	No. events	No. participants	No. events	No. participants	
No. missing participants and reasons					
No. participants moved from other group and reasons					
Any other results reported					
Unit of analysis <i>(e.g., by individuals, health professional, practice, hospital, community)</i>					
Statistical methods used and appropriateness of these methods <i>(e.g., adjustment for correlation)</i>					
Reanalysis required? <i>(if yes, specify why, e.g., correlation adjustment)</i>	... Yes/No/Unclear				

	Description as stated in report/paper		Location in text <i>(pg &amp; ¶/fig/table)</i>
Reanalysis possible?	... <i>Yes/No/Unclear</i>		
Reanalysed results			
Notes:			



## Applicability

Have important populations been excluded from the study? <i>(consider disadvantaged populations, and possible differences in the intervention effect)</i>	... Yes/No/Unclear	
Is the intervention likely to be aimed at disadvantaged groups? <i>(e.g., lower socioeconomic groups)</i>	... Yes/No/Unclear	
Does the study directly address the review question? <i>(any issues of partial or indirect applicability)</i>	... Yes/No/Unclear	
Notes:		

Other information

	Description as stated in report/paper	Location in text  <i>(pg &amp; ¶/fig/table)</i>
Key conclusions of study authors		
References to other relevant studies		
Correspondence required for further study information  <i>(what and from whom)</i>		
Further study information requested  <i>(from whom, what and when)</i>		
Correspondence received  <i>(from whom, what and when)</i>		
Notes:		

## **APPENDIX 7: THE EVOLUTION OF GROUNDED THEORY**

The pivotal work “The Discovery of Grounded Theory: Strategies for Qualitative Research.” (Glaser and Strauss 1967) explained how theory could be generated from data inductively and challenged the belief that qualitative research lacked rigour.

Glaser and Strauss (1967) detailed the method of comparative analysis that enables the generation of theory. However, philosophical standpoints have changed since Glaser’s positivist version and Strauss and Corbin’s post-positivism stance of grounded theory.

The original grounded theory labelled as positivist (relates to Glaser’s background) and having a reputation for naïve inductivism which involves theories fitting the data and not the vice-versa. It also means that the categories developed should close correlate to and express the meanings of data, however the researcher’s interpretations are not adapted to the predefined categories (Glaser, 1978).

Parallel developments in social science have social constructivism/symbolic interactionism foundations of the philosophical perspective of the Straussian grounded theory which is also ambiguous and has evolved over time. This interpretive theoretical perspective is derived from pragmatism where reality is not denied but it asserts that it is socially interpreted, and understanding these constructs is important to comprehend human behaviour (Clarke, 2016; Griffin et al., 2015).

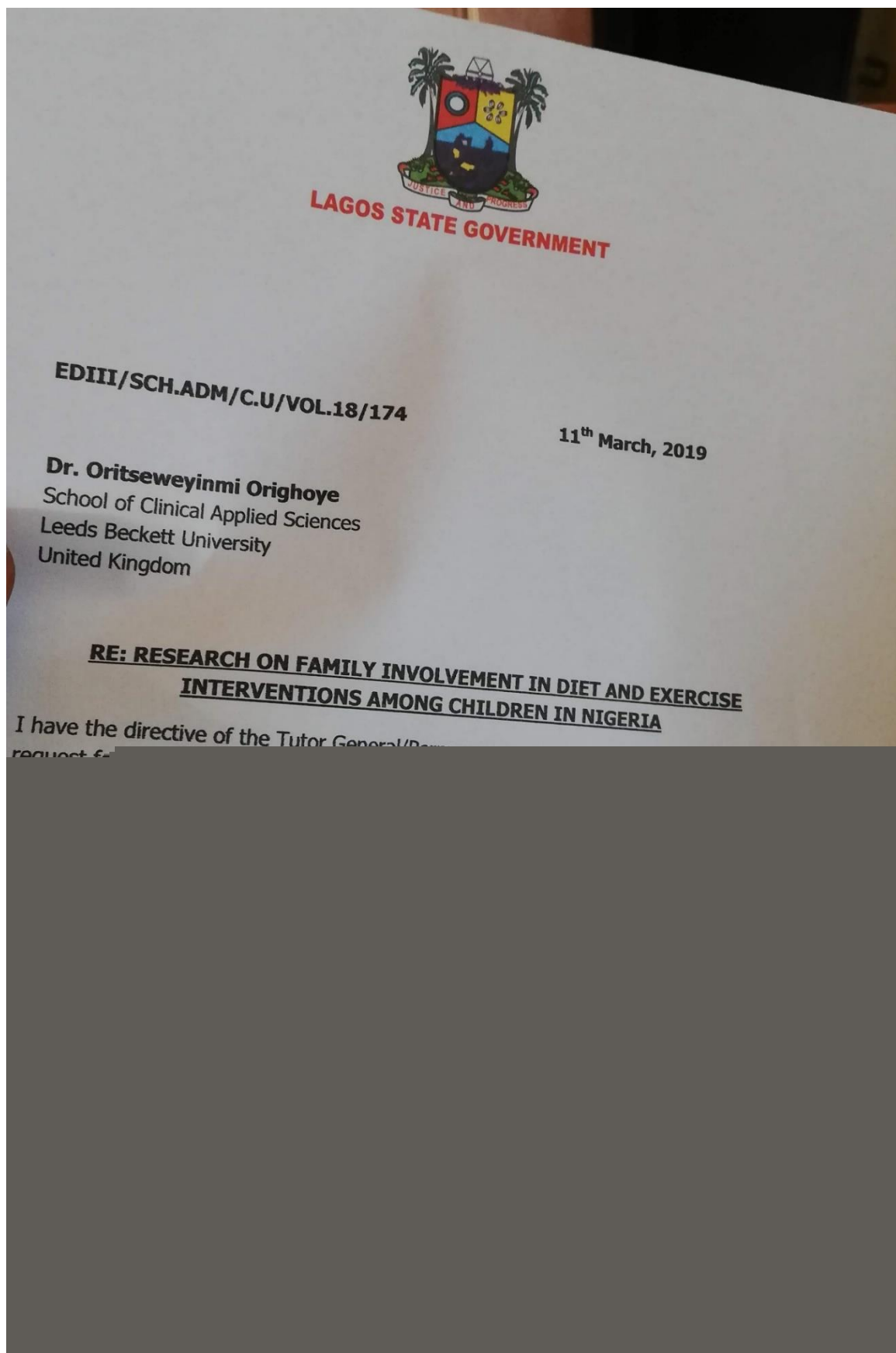
A variety of ideas and developments in grounded theory address these problems (moved further into constructivist/ interpretive concepts and away from positivism/ objectivism). Constructivists acknowledge reality as a social construction, and do not deny the existence of objectively true world, but they are more concerned with the world made real through actions, words, and the minds of those in it. It has a subjective epistemology and a relativist ontology that assumes the researcher are not separate from the research, but knowledge is co-created (Chamberlain-Salaun et al., 2013; Charmaz, 2007).

Variation in use is now more important than the differences between the two founders, thus amid continually evolving methodologies, it is important for researchers to be cognizant of the similarities and differences between the grounded theory approaches as they have significant implications for research.

## APPENDIX 8: SOCIOECONOMIC CLASSIFICATION

Socio-Economic Classification of Nigerian Household Based on Income -Source: Research and Media Services, Nigeria 2010					
Segment	Description	Size	Class	Variable	Monthly Income (\$US)
AB	Upper Class, Fulfilled, Actualizers, Retired Public Officers	5%	Upper Upper	Wealth Inheritors (A1 Segment)	>32, 000
			Upper Middle	Wealth Creators (A2 Segment)	>32, 000
			Lower Upper	Wealth Managers and Politicians (B1 Segment)	12,800-32, 000
				High Networth Individuals (B2 Segment)	9,600-16, 000
C	The Middle Class, Achievers and Experiencers	24%	Upper Middle	Professional and Businessmen and Women (C1 Segment)	2, 500- 6, 500
			Lower Middle	Junior-Middle Level Managers, Business Executives, Artisans (C2 Segment)	650- 1,300
D	Societally Conscious Strivers	31%	Lower Class	Skilled or semi-skilled workers, clerical staff, artisans	190-510
E	Survivors and Sustainers	40%	Poor	Unemployed, living below poverty line	38-64

**APPENDIX 9: APPROVED LETTER FROM THE MINISTRY OF EDUCATION AND  
UNIVERSAL BASIC EDUCATION, LAGOS STATE, NIGERIA**



## **APPENDIX 10: SAMPLES OF INFORMATION SHEETS AND A LETTER OF INVITATION TO PARTICIPATE IN THE STUDY 2**

### **Participant Information Sheet**

#### **Exploring cultural views and approaches to family involvement in diet and exercise interventions**

My name is Oritseweyinmi Orighoye. I am a student at Leeds Beckett University and I am conducting a research study as part of my PhD degree in Nutrition and Dietetics. I am looking for parents and children living in Lagos State, Nigeria to talk about their views and their approaches to a diet and exercise intervention among children.

#### **What will be involved?**

The study will involve ten participants. You will be asked to attend a one-to-one interview at a designated place. You will be informed of the time and date of your interview by phone a week beforehand. In the interview, we will discuss your views on dietary practices, exercise in children, approaches to maintain a healthy lifestyle in children. The interview will last about 30 to 60 minutes. For your child, there will be a child only session with supervision by a school teacher. Your child will be with other children within the same age range and maximum is 10 participants/session. They will be interviewed and involved in activities relating to their views on diet and exercise. This session will last about 30 to 60 minutes. With your permission, your interview and that of your child will be recorded to gain an accurate record of what is being said.

#### **What are the possible benefits of taking part?**

There are no direct benefits, however your information will help in understanding of the way culture can influence diet and exercise in children and how an intervention can be adapted to our setting.

#### **What are the possible risks of taking part?**

There are no identified risks for your participation.

#### **Do I have to take part in the study?**

Your participation in this project is voluntary which means you do not have to take part. If you do decide to take part in this project, I will ask you to complete and sign a consent form indicating that you agree to participate. At any point throughout the interview, you have the

right to stop the interview without giving a reason. You can withdraw any information you do provide at any point up to the July 31<sup>st</sup>, 2019; the analysis and summarising of the information will have begun by then and it will not be possible to identify the information which came from you.

### **Confidentiality**

All information which is provided to the study by you will be kept strictly confidential. No names will be used in this study. All data will be stored in a secure manner on an encrypted computer that is password protected. All information provided within the interview will remain confidential.

**However, please note:** any information shared within the interview relating to anything that may be considered harmful to you or others will be disclosed to the appropriate authorities.

### **What will happen to my information?**

With your consent, the information you and the other participants provide within the interviews will be transcribed (typed out word for word) and analysed to establish the main ideas that have been shared. Only my supervisor, and I will have access to these data. The results will be summarised and written up in a report (a thesis) and a presentation, including quotes from the interviews, as part of my degree, and might also be suitable for publication in a research paper. No names or other identifying material will be used in the report to protect your anonymity. The data will be kept for six months, and will be destroyed after this period. If you would like to have a copy of the findings, please let me know during the study.

### **Ethical approval**

The study has been given ethical approval by the Local Research Ethics Coordinator, School of Clinical and Applied Sciences, Leeds Beckett University, the Lagos State Ministry of Health and The Lagos State Ministry of Education.

**Thank you for reading this information sheet. Please contact me or my supervisor if you have any further queries**

### **Researcher details:**

Oritseweyinmi Orighoye

Email: o.orphoye8274@student.leedsbeckett.ac.uk

**Supervisor details:**

Tanefa Apekey

Email: [t.a.apekey@leedsbeckett.ac.uk](mailto:t.a.apekey@leedsbeckett.ac.uk)

**If you wish to contact someone about the study who is not directly involved in the study then please get in touch with Angela Hill (School Research Administrator)**

**Independent contact details**

Angela Hill

Email: [A.Hill@leedsbeckett.ac.uk](mailto:A.Hill@leedsbeckett.ac.uk)

**Participant Information Sheet**

**Exploring cultural views and approaches to family involvement in diet and exercise interventions**

My name is Oritseweyinmi Orighoye. I am a student at Leeds Beckett University and I am conducting a research study as part of my PhD degree in Nutrition and Dietetics. I am looking for school staff and people who work in the health and education sector living in Nigeria to talk about their views and their approaches to a diet and exercise intervention among children.

**What will be involved?**

The study will involve ten participants. You will be asked to attend a one-to-one interview at a designated place. You will be informed of the time and date of your interview by phone a week beforehand. In the interview we will discuss your views on dietary practices, exercise in children, approaches to maintain a healthy lifestyle in children. You do not have to have children to take part in the study. The interview will last about 30 to 60 minutes. With your permission, your interview will be recorded to gain an accurate record of what is being said.



**What are the possible benefits of taking part?**

There are no direct benefits, however your information will help in understanding of the way culture can influence diet and exercise in children and how an intervention can be adapted to our setting.

**What are the possible risks of taking part?**

There are no identified risks for your participation.

**Do I have to take part in the study?**

Your participation in this project is voluntary which means you do not have to take part. If you do decide to take part in this project, I will ask you to complete and sign a consent form indicating that you agree to participate. At any point throughout the interview you have the right to stop the interview without giving a reason. You can withdraw any information you do provide at any point up to the July 31<sup>st</sup>, 2019; the analysis and summarising of the information will have begun by then and it will not be possible to identify the information which came from you.

**Confidentiality**

All information which is provided to the study by you will be kept strictly confidential. No names will be used in this study. All data will be stored in a secure manner on an encrypted computer that is password protected. All information provided within the interview will remain confidential.

**However, please note:** any information shared within the interview relating to anything that may be considered harmful to you or others will be disclosed to the appropriate authorities.

**What will happen to my information?**

With your consent, the information you and the other participants provide within the interviews will be transcribed (typed out word for word) and analysed to establish the main ideas that have been shared. Only my supervisor, and I will have access to these data. The results will be summarised and written up in a report (a thesis) and a presentation, including quotes from the interviews, as part of my degree, and might also be suitable for publication in a research paper. No names or other identifying material will be used in the report to protect your anonymity. The data will be kept for six months, and will be destroyed after this period. If you would like to have a copy of the findings, please let me know during the study.

**Ethical approval**

The study has been given ethical approval by the Local Research Ethics Coordinator, School of Clinical and Applied Sciences, Leeds Beckett University, the Lagos State Ministry of Health and The Lagos State Ministry of Education.

**Thank you for reading this information sheet. Please contact me or my supervisor if you have any further queries**

**Researcher details:**

Oritseweyinmi Orighoye

Email: o.orphoye8274@student.leedsbeckett.ac.uk

**Supervisor details:**

Tanefa Apekey

Email: t.a.apekey@leedsbeckett.ac.uk

**If you wish to contact someone about the study who is not directly involved in the study then please get in touch with Angela Hill (School Research Administrator)**

**Independent contact details**

Angela Hill

Email: [A.Hill@leedsbeckett.ac.uk](mailto:A.Hill@leedsbeckett.ac.uk)

**Invitation Sample**

Good day Dr Akanno,

I hope this email meets you well.

My name is Oritseweyinmi Orighoye. I am a 2nd year doctoral student at the Leeds Beckett University, Leeds, United Kingdom. I am kindly requesting your participation for an interview in a doctoral research studying that I am conducting. This research study is a part of my academic requirement in the fulfilment of a Doctor of Philosophy Nutrition and Dietetics (PhD) at the Leeds Beckett University, UK.

The Research Title: Family Involvement in Diet and Exercise Interventions among Children in Nigeria.

Research aims and objectives: The role of this research is to explore the views on diet and physical activity interventions with family involvement and the settings likely to support the effective engagement in Nigeria.

The objectives of study are to:

1. Identify views on what could help inform culturally acceptable approaches to diet and physical activity interventions that may reduce risk factors for childhood and adolescent obesity.
2. Identify acceptable methods for involving families in diet and physical activity interventions for children.
3. Identify ways in which the school environment and the wider community can be actively involved in diet and physical activity intervention for children.

Data Required: Data collection will be done using semi-structured interviews. An important goal of this study is to learn how culture may inform perspectives on parents' and children's experiences of diet and exercise interventions. Rather than simply describing differences between cultural groups, the goal is to show how cultural backgrounds and approaches may influence dietary and exercise practices among children to curb overweight and obesity. To answer this question, we need to allow the cultures to speak for themselves.

Participation is completely voluntary and you may withdraw from the study at any time. The study is completely anonymous; therefore, it does not require you to provide your name or any other identifying information.

If you would like to participate in the study, please read the Information Sheet and Consent form enclosed with this email.

Your participation in the research will be of great importance to assist in creating nutritional and exercise interventions that will help school children curb the double burden of malnutrition and childhood obesity.

I have enclosed contact details of my Director of Studies and Supervisor.

I await your response.

Thank you.

Yours faithfully,

Dr Oritseweyinmi Orighoye



## APPENDIX 11: CONSENT AND ASSENT FORMS OF PARTICIPANTS IN STUDY 2

### Participant Consent Form

Exploring cultural views and approaches to family involvement  
in diet and exercise interventions



LEEDS  
BECKETT  
UNIVERSITY

Please initial the boxes  
below if you agree with the  
statements

1. I confirm that I have read and understood the information sheet (V1 1/10/18) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason<sup>1</sup>. ☐
3. I understand that all information given is confidential and only for the study and that all data will be anonymised. ☐
4. I agree to take part in the study and to complete a questionnaire and be interviewed. ☐
5. I agree to my interview being digitally recorded ☐
6. I agree that the research results can be included in a report, presentation and research paper and that all personal identifying details will be removed. ☐

If you wish to take part, please write and sign your name below

### **Data Protection Act**

I understand that data collected about me during my participation in this study will be stored on computer and that any files containing information about me will be made anonymous. I agree to a student from Leeds Beckett University recording and analysing this information. I

understand that information will be used only for the purpose of this study and my consent is conditional upon the University complying with its duties and obligations under the Data Protection Act.



**Name of participant**

**Signature**

**Date**

**Participant Consent Form**

**Exploring cultural views and approaches to family involvement in diet and exercise interventions**

**Please initial the boxes below  
if you agree with the  
statements**

7. I confirm that I have read and understood the information sheet (V1 1/10/18) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

8. I understand that I and my child's participation is voluntary and that I am free to withdraw myself and my child at any time, without giving any reason<sup>1</sup>.

☐

9. I understand that all information given is confidential and only for the study and that all data will be anonymised. ☐
10. I agree to take part in the study and be interviewed. ☐
11. I agree that my child(ren) can take part in the study and be interviewed ☐
12. I agree to my interview being digitally recorded ☐
13. I agree that the research results can be included in a report, presentation and research paper and that all personal identifying details will be removed. ☐

If you wish to take part, please write and sign your name below:

If you wish for your child (ren) to take part in the study, please write their name(s), class and school name below:

### **Data Protection Act**

I understand that data collected about me during my participation in this study will be stored on computer and that any files containing information about me will be made anonymous. I agree to a student from Leeds Beckett University recording and analysing this information. I understand that information will be used only for the purpose of this study and my consent is conditional upon the University complying with its duties and obligations under the Data Protection Act.

**Name of participant**

**Signature**

**Date**

### **Informed Assent Form (8-10 years old)**

**Exploring cultural views and approaches to family involvement  
in diet and exercise interventions**



Researcher: Oritseweyinmi Orighoye

I want to tell you about a research study I am doing. A research study is a way to learn more about something. I would like to find out more about what you think about the food you eat and the exercise you do; and if how you do these things can help me create a plan for children to help them stay healthy. You are being asked to join the study because you are healthy without any serious illness and fall with the age of 8 to 10 years.

If you agree to join this study, you will be asked to pair with your friends and other classmates to do some activities involving food and exercise. I will visit you about two times so I can make all this work out well.

During these activities you may feel a bit tired of talking or just uncomfortable.



I expect that the study will help you by understand the different types of food and kinds of exercise that will help children stay healthy.

You do not have to join this study. It is up to you. You can say okay now. You can also say no. If you say okay and then you change your mind later. If you want to stop, then all you have to do is tell me you want to stop. No one will be mad at you if you don't want to be in the study or if you join the study and then change your mind later and stop.

Before you say yes or no to being in this study, we will answer any questions you have. If you join the study, you can ask questions at any time. Just tell the researcher that you have a question.

We will also talk to your parents about this study. You can talk this over with them before you decide. If you have any questions about this study please feel free to your Head of School

Would you like to be in this research study?

☐

\_\_\_\_\_ Yes, I will be in this research study.

☐

\_\_\_\_\_ No, I don't want to do this.

\_\_\_\_\_  
Child's name

\_\_\_\_\_  
Signature of the child

\_\_\_\_\_  
Date

---

Person who received assent

---

Signature

---

Date

## FOR COMPLETION BY THE RESEARCHER

I Oritseweyinmi Orighoye, confirm that I have informed the above named about this research project. I have given them the Information Sheet. To the best of my knowledge, they have understood and have given free and informed consent to become a participant in the research project.

Signed ..... Date

.....

<sup>1</sup>Participants can withdraw from the study at any point without giving a reason. However to maintain anonymity and confidentiality we will not ask you for your name or any other information which will identify you. For this reason, if you do complete an interview or focus group discussion but afterwards you wish to withdraw from the study, you can do this up to the July 31<sup>st</sup>, 2019; the analysis and summarising of the information will have begun by then and it will not be possible to identify the information which came from you.

## **APPENDIX 12: INTERVIEW SCHEDULES FOR THE STUDY 2**



### **Interview Schedule for Diet and Exercise Interventions among Children in Nigeria (Children)**

#### **Family Involvement in Diet and Exercise**

##### **Introduction to the research**

Hello, my name is Oritseweyinmi Orighoye and I am a student at Leeds Beckett University, UK. I am studying for my PhD in Nutrition and Dietetics.

The aim of my PhD is aims to explore social, cultural and environmental views of parents, children and other stakeholders on diet and physical activity interventions and the potential for family involvement among children in Lagos, Nigeria. The purpose of the research is to gain important information which will be used to design an intervention for children in schools with the intention of improving health and curbing childhood obesity and undernutrition.

Please be assured that you will not be named in my research and nothing will be linked back to you. Everything you tell me will be treated as confidential. However, should you mention something that leads me to believe that you and/or someone else is at risk of serious physical and/or emotional harm, I will have to pass this information into my Director of Studies.

If you wish to receive further support you may contact either myself, my Director of studies or supervisor please find the contact details provided below.

The interview should take around 30-60 minutes.

Are you happy to take part in the interview today? You are free to withdraw from the interview at any point if you wish to.

Do you have any questions before we start?

Are you happy for me to record our conversation? As this will help with my project.

##### **Questions**

##### ***Initial Questions***

1. Tell me what part of Nigeria you are from
2. What class are you in?
3. How old are you?

### ***Diet and Exercise Needs***

1. What do you know about a balanced diet?
2. What kind of foods do you eat?
3. What do you think affect the type of food you eat at home and in school?
4. What do you know about exercise?
5. What kind of exercise do you participate in?
6. When last did you participate in any exercise? What was it?
7. Why do you need to exercise?
8. Does anyone encourage you to do exercise?
9. Are there things that stop you from exercising?

### **Behavioural change**

1. Can you think of ways we can make sure we eat a balanced diet and exercise?
2. Do you have any questions or would you like to add anything else?

Thank you very much for participating in this research.



## **Interview Schedule for Diet and Exercise Interventions among Children in Nigeria (Parents, Stakeholders)**

### **Introduction to the research**

Hello, my name is Oritseweyinmi Orighoye and I am a student at Leeds Beckett University, UK. I am studying for my PhD in Nutrition and Dietetics.

The aim of my PhD is aims to explore social, cultural and environmental views of parents, children and other stakeholders on diet and physical activity interventions and the potential for family involvement among children in Lagos, Nigeria. The purpose of the research is to gain important information which will be used to design an intervention for children in schools with the intention of improving health and curbing childhood obesity and undernutrition.

Please be assured that you will not be named in my research and nothing will be linked back to you. Everything you tell me will be treated as confidential. However, should you mention something that leads me to believe that you and/or someone else is at risk of serious physical and/or emotional harm, I will have to pass this information into my Director of Studies.

If you wish to receive further support you may contact either myself, my Director of studies or supervisor please find the contact details provided below.

The interview should take around 30-60 minutes.

Are you happy to take part in the interview today? You are free to withdraw from the interview at any point if you wish to.

Do you have any questions before we start?

Are you happy for me to record our conversation? As this will help with my project.

## **Questions**

### ***Initial Questions***

1. Tell me about where you originally come from in Nigeria.
2. What do you love most about your culture?
3. How would you describe your childhood?
4. How would you describe food and exercise growing up?
5. Who or what influenced your actions. Tell me how you were influenced

### ***Intermediate Questions***

1. Tell me your views about children adopting a healthy lifestyle (food and exercise)?
2. How do you go about food and exercise with children?
3. How do you think families should approach food and exercise?

4. Can you identify ways in our settings that culture can influence these diet and/or exercise among children?
5. What, if anything, do you think is needed in any diet and/or exercise practices among children in our setting?
6. What do you think are the important ways to encourage healthy meals and exercise among children?

***Ending Questions***

1. How do you think schools and communities can help children adopt a healthy lifestyle
2. Do you have any questions or would you like to add anything else to your responses?

Thank you very much for participating in this research.

## **APPENDIX 13: NEW QUESTIONS FOR PHASE II INTERVIEW**

### **New Probing Questions**

1. In what ways can we provide support for parents with nutritional needs?
2. How can we run up a small scale agricultural programme in schools?
3. Do you think the government's policies can change the way parents manage food for their children?
4. What should be entailed in a family centred education and support for nutrition and exercise?
5. What should a school feeding programme comprise of?
6. What comprises the present school curriculum for nutrition and physical activity?
7. How does the school feeding programme currently operate? Is there a place for exercise?
8. Is school work overload preventing school children from doing exercise?
9. What is the source of the water used in school cooking?
10. Is there a monitoring team for the quality and quantity of food provided in the schools?



## **APPENDIX 14: GENERAL OPEN CODES AND CONCEPTS**

### **General Open Codes and Concepts**

1. Eating is part of our culture
2. Living communally
3. Doing different physical exercise in school
4. Eating fresh and local foods
5. Identifying one's heritage
6. Encouraging children to eat healthy meals
7. Relating younger age to present day
8. Restructuring school choices
9. Explaining the difference in food choices as a people
10. Advocate for nutrition and exercise of parents and children
11. Use cultural activities to promote exercise
12. Communities getting involved in school sports
13. Passing traditions from one generation to the next
14. Thriving as a child
15. Being curious about food
16. No regime exercise for children
17. Preparing sweet healthy meals and snacks for family
18. Making nutrition inclusive
19. Sustaining agriculture
20. Prepare meals according to nutritional requirements
21. Family participation in meal preparation
22. Design food/brain games/activities for families
23. Change the school curriculum
24. Create a school food programme

25. Develop an agricultural school and community intervention
26. Encourage farming as an activity for families
27. Associating lifestyle with activities
28. Using school as an opportunity to play
29. Patient with children about eating vegetables
30. Being inconsistent with exercise as a family
31. Activities should be practical
32. Teach parental practical nutrition and exercise
33. Create safe play environments for exercise in the communities
34. Explore new recipes as families
35. Incorporate cultural activities into food and exercise lessons
36. Redesign the school fields
37. Equating balanced diet to classes of food
38. Eating more carbohydrate based meals
39. Emphasis of parental influence on food choices
40. Linking sports to health
41. Talking about a gap in school and sports
42. Parents encouraging exercise
43. School work discourages exercise
44. Increase food quantity in schools
45. Use clean water for school food
46. Design friendship sports
47. Use local meals and food to influence exercise and nutrition
48. Make farming an activity
49. Reluctance to explain food choices in school
50. Raises the issue of affordability of food

51. Linking balanced diet to growth and energy
52. Create family nutritional support for parents
53. Take advantage of seasonal fruits
54. Support for funds to adopt a healthy living in families
55. Make school food affordable
56. Categorising food and family class
57. Linking maternal knowledge and nutrition
58. Emphasising the role of maternal influence on food and exercise in children
59. Talking about malnutrition
60. Linking culture to fast foods
61. Speaking on school and community ownership
62. Use religion and language to teach parents about nutrition
63. Look into the role of food and fruits sellers- hygiene
64. Create a sports place for girls
65. Suggesting exercise at weekends
66. Family relationship and food
67. Acknowledge food as medicine
68. Discourage carbohydrate intake
69. See play as exercise for children
70. Use visual aids to promote meal engagement
71. Incorporate more sports activities in schools

## APPENDIX 15: FOCUSED CONCEPTS AND KEY THEMES

Open codes	Concepts	Key themes
Eating is part of our culture	Advocate for nutrition and exercise of parents and children	Communities and schools collaborating through different approaches
Living communally	Use cultural activities to promote exercise	
Doing different physical exercise in school	Communities getting involved in school sports	How: taking ownership of schools (safe access to water and school environment),
Eating fresh and local foods	Prepare meals according to nutritional requirements	community agricultural interventions like allotments to promote farms, creating safe playing environment, using town hall meetings and social gatherings through local religious organisations with the help of health professionals and the effective use of language, taking advantage of health campaigns in the communities, local sport competitions for both adults and children.
Identifying one's heritage	Family participation in meal preparation	
Encouraging children to eat healthy meals	Design food/brain games/activities for families	
Relating younger age to present day	Change the school curriculum	
Restructuring school choices	Create a school food programme	
Explaining the difference in food choices as a people	Develop an agricultural school and community intervention	
Advocate for nutrition and exercise of parents and children	Encourage farming as an activity for families	
Use cultural activities to promote exercise	Teach parental practical nutrition and exercise	
Communities getting involved in school sports	Create safe play environments for exercise in the communities	
Passing traditions from one generation to the next	Explore new recipes as families	
Thriving as a child	Incorporate cultural activities into food and exercise lessons	
Being curious about food	Redesign the school fields	Involving family in diet and exercise
	Increase food quantity in schools	
	Use clean water for school food	How: teaching parents through PTAs about nutrition and exercise, using simplified visual aids for parents to learn about nutrition and exercise in
	Design friendship sports	
	Use local meals and food to influence exercise and nutrition	
	Make farming an activity	

No regime exercise for children	Create family nutritional supportthe local context, teaching for parents parents through activities in
Preparing sweet healthy meals and snacks for family	Take advantage of seasonal schools and communities on fruits how to prepare affordable
Making nutrition inclusive	Support for funds to adopt ameals based on healthy living in families socioeconomic status, get
Sustaining agriculture	Make school food affordable parents involved in school
Prepare meals according to nutritional requirements	Use religion and language to sports competitions, involve teach parents about nutrition and parents in school health exercise campaigns, health
Family participation in meal preparation	Look into the role of food and professionals should provide fruits sellers- hygiene nutritional support- a Create a sports place for girls nutritional diary.
Design food/brain games/activities for families	Discussing water issues and periods in schools
Change the school curriculum	See play as exercise for children
Create a school food programme	Use visual aids to promote meal engagement Making The School a central point of diet and exercise
Develop an agricultural school and community intervention	Incorporate more sports activities in schools How:
Encourage farming as an activity for families	Introducing gardens as a form of knowledge and activity, train PE teachers to incorporate cultural activities in school PE activities such as dancing, wrestling, tailoring school playgrounds to the PE needs of the children, school competitions that involves other schools, a school feeding programme that is affordable and sustainable.
Associating lifestyle with activities	
Using school as an opportunity to play	
Patient with children about eating vegetables	
Being inconsistent with exercise as a family	
Activities should be practical	

Teach parental practical  
nutrition and exercise

Create safe play  
environments for exercise in  
the communities

Explore new recipes as  
families

Incorporate cultural  
activities into food and  
exercise lessons

Redesign the school fields

Equating balanced diet to  
classes of food

Eating more carbohydrate  
based meals

Emphasis of parental  
influence on food choices

Linking sports to health

Talking about a gap in  
school and sports

Parents encouraging  
exercise

School work discourages  
exercise

Increase food quantity in  
schools

Use clean water for school  
food

Design friendship sports

Use local meals and food to influence exercise and nutrition

Make farming an activity

Reluctance to explain food choices in school

Raises the issue of affordability of food

Linking balanced diet to growth and energy

Create family nutritional support for parents

Take advantage of seasonal fruits

Support for funds to adopt a healthy living in families

Make school food affordable

Categorising food and family class

Linking maternal knowledge and nutrition

Emphasising the role of maternal influence on food and exercise in children

Talking about malnutrition

Linking culture to fast foods

Speaking on school and community ownership

Use religion and language  
to teach parents about  
nutrition

Look into the role of food  
and fruits sellers- hygiene

Create a sports place for  
girls

Suggesting exercise at  
weekends

Family relationship and food

Acknowledge food as  
medicine

Discourage carbohydrate  
intake

See play as exercise for  
children

Use visual aids to promote  
meal engagement

Incorporate more sports  
activities in schools



## APPENDIX 16: GROUNDED THEORY ANALYTIC PROCESS

**Analysis Interview 009, Adult, F, FT,  
Lower Class (D),  
PE, Teacher/Parent**

**Focus Group FGD 036, Adult, M,  
FT, Lower Class (D),  
SUBEB official**

<b>Quote</b>	<p>“Then for the parents, we need to counsel them, like counselling them about food and nutrition and exercise as well as the explained to us at school’. Some children. Actually, giving them the general tips and stuffs like that. So parents need to sit down, what did they do for you at know about good nutrition and encourage school, your teacher that said so, did their children to eat nutritious meals, and your teacher do so, and did your this is where the schools can come in to teacher do that? But if the parent is help.”</p> <p>still educated within the community, if we can see some people that can sponsor some people to come and organise and talk to them and educate them. If the child hears, if the mother hears, if the child gets home and tell the mother, because the mother is aware, they will be able to make use of it.”</p>
<b>Code</b>	<p>Family participation in meal preparation</p> <p>Advocate for nutrition and exercise of parents and children</p>
<b>Concept</b>	<p>Family participation in food preparation and exercise</p> <p>Create family nutritional support for parents</p>
<b>Category</b>	teaching parents through activities in schools and communities
<b>Theme</b>	Involving parents in diet and physical activity interventions

**Interview 039, Adult, F, FT, Lower Class  
(D), School Headmistress**

**Focus Group FGD 035, Adult, M, FT, Lower Class (D), SUBEB official**

**Quote** “Likewise we should be educated” For instance, there is notable man in regularly, just as we are talking to them, Eputu, who takes his time to feed the community too should also organise primary school children once a year. sports events for both parents and the Those are the kind of people we work children. There is no much time spent with to see the projects are sustainable. in the school, just 6 hours they have, if We also try to encourage non- they enter by 8am they leave by governmental organisations, faith 2.00pm, those that are late will come at organisations and other bodies that can 1:00pm or 2:00pm, so within that time, support projects that the government if community can organise events to established in the school community. encourage parents and not only in Like in this your project, if the donors schools but within the community.” pull out, we will have to work with the school support community board to help the school. That’s the role of our social and community mobilization teams in SUBEB.”

**Code** Communities getting involved in school Living communally sports

**Concept** Communities getting involved in school Use local activities and food to sports influence exercise and nutrition

**Category** Taking advantage of health campaigns in the communities, local sport competitions for both adults and children

**Theme** Active Communities

**Interview 022, Adult, M, FT, Lower Focus Group FGD 013, F, Class(D), Medical Doctor/NGO Child, Pupil**

**Quote** “For schools, I also think they need” “We can have balanced diet in school, gardens as it will encourage children to because maybe at home our parents participate in farming and it will may not have money for rice and increase their understanding of food maybe vegetables so in school at least produce especially when it comes to we can eat something better when we introducing children to vegetables. We buy them.” must all work together to achieve this

<b>Code</b>	Make farming an activity	Thriving as a child
<b>Concept</b>	Develop an agricultural school and community intervention	Create a school food programme
<b>Category</b>	Introducing gardens as a form of knowledge and activity	school feeding programme that is affordable and sustainable.
<b>Theme</b>	schools as key settings for diet and exercise interventions	

## APPENDIX 17: STUDY 2 PARTICIPANT CHARACTERISTICS

### Phase I

#### Adult Participants

Participant's Number	Age	Sex	State of Origin	Grade/Occupation	Religion
001	57	F	Delta (South South)	Business Woman	Christianity
002	32	M	Imo ( South East)	Clinical Nutritionist	Christianity
003	30	F	Oyo (South West)	Caterer	Christianity
006	35	F	Ondo (South West)	Food Technologist	Christianity
007	31	F	Ogun (South West)	Health Education Teacher	Christianity
008	53	F	Oyo (South West)	Home Economics Teacher	Christianity
009	32	F	Lagos ( South West)	Physical Education Teacher	Christianity
011	36	F	Cross River (South South)	Nutritionist	Christianity

#### Child Participants

004	8	M	Oyo (South West)	Primary 4	Christianity
005	10	M	Akwa Ibom (South South)	Primary 6	Christianity
010	11	F	Kogi ( North Central)	Primary 6	Islam
012	11	F	Cross River (South South)	Primary 5	Christianity
013	10	F	Ebonyi ( South East)	Primary 6	Christianity

014	9	M	Kogi Central)	(North Primary 5	Islam
015	8	F	Delta South)	(South Primary 4	Christianity
016	10	M	Anambra (	South Primary 6 East)	Christianity
017	10	M	Borno (North East)	Primary 4	Islam
018	10	F	Ogun West)	(South Primary 6	Christianity

## Phase II

### Adult Participants

019	55	F	Lagos West)	(South Ministry Education	of Christianity
020	49	F	Lagos West)	(South Headmistress	Christianity
021	45	F	Oyo (South West)	Principal	Christianity
022	26	M	Lagos West)	(South Medical Doctor/NGO	Islam
029	31	F	Lagos West)	(South Community Development Worker	Christianity
030	32	M	Oyo (South West)	Development Manager	Christianity
031	22	F	Kogi Central)	(North Physical Education Teacher	Christianity
032	59	M	Delta South)	(South NGO director	Christianity

### Child Participants

023	10	M	Kaduna (North West)	Student JS1	Christianity
024	10	M	Oyo (South West)	Student JS1	Christianity
025	10	F	Imo (South East)	Primary 6	Christianity
026	10	F	Kwara (North Central)	Primary 5	Christianity
027	10	M	Akwa Ibom (South South)	Primary 6	Christianity
028	11	F	Delta (South South)	Student JS1	Christianity

### Phase III

#### Adult Participants

Participant's Number	Age	Sex	State of Origin	Grade/ Occupation	Religion
033	45	M	Lagos (South West)	Civil Servant	Christianity
034	49	M	Lagos (South West)	Civil Servant	Christianity
035	50	M	Oyo (South West)	Civil Servant	Christianity
036	52	M	Lagos (South West)	Civil Servant	Christianity
037	40	M	Ogun (South West)	Civil Servant	Christianity
038	40	M	Lagos (South West)	Civil Servant	Christianity
039	50	F	Oyo (South West)	School Headmistress	Christianity
040	39	F	Abia (South East)	Teacher	Christianity
041	30	F	Lagos (South West)	Trader	Islam
042	28	F	Lagos (South West)	Trader	Islam

043	40	F	Lagos (South West)	Trader	Islam
044	45	F	Lagos (South West)	Trader	Christianity
045	19	M	Lagos (South West)	Student	Christianity
046	45	M	Anambra (South East)	Businessman	Christianity
047	35	M	Lagos (South West)	Teacher/Sports Official	Christianity
048	32	F	Lagos (South West)	Sport Official	Christianity

## APPENDIX 18: CHECKLIST FOR WATER AND A QUESTIONNAIRE ADAPTED FROM THE UNHCR WASH IN SCHOOLS TEMPLATE

Hand washing demonstrations involved the school children divided into ten groups and the researcher and a volunteer who was trained for the WASH session who underwent rigorous training on research ethics, minimization of bias, and study tools and protocols, demonstrated to the groups how to wash their hands using soap and water following the steps provided by WHO ([https://www.who.int/gpsc/clean\\_hands\\_protection/en/](https://www.who.int/gpsc/clean_hands_protection/en/)). The researcher and volunteer observed students washing their hands to determine whether they used three key steps: lathering hands thoroughly with soap, rubbing between fingers, and air drying following the steps provided by WHO as a guide. Each child approached the handwashing area, instructed them to wash their hands as they typically do, and observed the child's handwashing procedure using an observation checklist.

### WASH IN SCHOOLS CHECKLIST - iRHIS

#### GENERAL INFORMATION

COUNTRY: \_\_\_\_\_ CAMP/SETTLEMENT NAME: \_\_\_\_\_

SCHOOL NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

STATUS (iRHIS): ☐ Emergency ☐ Post-Emergency

TYPE OF SCHOOL: ☐ Pre-school (Ages 4-5) ☐ Primary School (Ages 6-12) ☐ Secondary School (Ages 13-19)

ENROLMENT: Total \_\_\_\_\_ Boys \_\_\_\_\_ Girls \_\_\_\_\_

STAFF: Total \_\_\_\_\_ Full-time \_\_\_\_\_ Part-time \_\_\_\_\_

#### CORE JMP QUESTIONS - WASH IN SCHOOLS

1. What is the main source of drinking water provided by the school? (check one - most frequently used)

##### Improved

- ☐ Piped
- ☐ Tube well/Borehole
- ☐ Protected dug well
- ☐ Protected spring

##### Unimproved

- ☐ Unprotected dug well
- ☐ Unprotected spring
- ☐ Surface water (River/Lake/Canal)
- ☐ No water source



	<input type="checkbox"/> Rain water  <input type="checkbox"/> Tanker truck  <input type="checkbox"/> Other: _____																												
2.	Is drinking water from the main source <u>currently</u> available at the school?  <input type="checkbox"/> Yes <input type="checkbox"/> No																												
1.	Type of toilets/latrines (select one – most common):  <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <b><u>Improved</u></b>   <input type="checkbox"/> Flush/Pour-flush to sewer   <input type="checkbox"/> Flush/Pour-flush to tank or pit   <input type="checkbox"/> Flush/Pour-flush to open drain   <input type="checkbox"/> Pit latrine with slab/covered         </td> <td style="width: 50%; vertical-align: top;"> <b><u>Unimproved</u></b>   <input type="checkbox"/> Pit latrine without slab/open   <input type="checkbox"/> Bucket   <input type="checkbox"/> Hanging toilet/latrine   <input type="checkbox"/> None         </td> </tr> </table>	<b><u>Improved</u></b>  <input type="checkbox"/> Flush/Pour-flush to sewer  <input type="checkbox"/> Flush/Pour-flush to tank or pit  <input type="checkbox"/> Flush/Pour-flush to open drain  <input type="checkbox"/> Pit latrine with slab/covered	<b><u>Unimproved</u></b>  <input type="checkbox"/> Pit latrine without slab/open  <input type="checkbox"/> Bucket  <input type="checkbox"/> Hanging toilet/latrine  <input type="checkbox"/> None																										
<b><u>Improved</u></b>  <input type="checkbox"/> Flush/Pour-flush to sewer  <input type="checkbox"/> Flush/Pour-flush to tank or pit  <input type="checkbox"/> Flush/Pour-flush to open drain  <input type="checkbox"/> Pit latrine with slab/covered	<b><u>Unimproved</u></b>  <input type="checkbox"/> Pit latrine without slab/open  <input type="checkbox"/> Bucket  <input type="checkbox"/> Hanging toilet/latrine  <input type="checkbox"/> None																												
S2 & S3 (alt) How many toilets/latrines are at the school (insert number)?  <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%; text-align: center;"><b><i>Girls' only toilets</i></b></td> <td style="width: 33%; text-align: center;"><b><i>Boys' only toilets</i></b></td> <td style="width: 33%; text-align: center;"><b><i>Common use toilets</i></b></td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td colspan="4"><i>Total number</i></td> </tr> <tr> <td colspan="4"><i>Number that are <u>currently</u></i></td> </tr> <tr> <td colspan="4"><i>usable (available, functional,</i></td> </tr> <tr> <td colspan="4"><i>private</i></td> </tr> <tr> <td colspan="4"><hr/></td> </tr> </table>			<b><i>Girls' only toilets</i></b>	<b><i>Boys' only toilets</i></b>	<b><i>Common use toilets</i></b>	<hr/>				<i>Total number</i>				<i>Number that are <u>currently</u></i>				<i>usable (available, functional,</i>				<i>private</i>				<hr/>			
	<b><i>Girls' only toilets</i></b>	<b><i>Boys' only toilets</i></b>	<b><i>Common use toilets</i></b>																										
<hr/>																													
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<i>Number that are <u>currently</u></i>																													
<i>usable (available, functional,</i>																													
<i>private</i>																													
<hr/>																													
1.	Are there handwashing facilities at the school?  <input type="checkbox"/> Yes <input type="checkbox"/> No																												
2.	Are both soap and water <u>currently</u> available at the handwashing facilities?  <input type="checkbox"/> Yes, water and soap  <input type="checkbox"/> Water only  <input type="checkbox"/> Soap only  <input type="checkbox"/> Neither water or soap																												
<b>JMP EXPANDED QUESTIONS - WASH IN SCHOOLS</b>																													

1.	In the previous two weeks, was drinking water from the main source available at the school throughout each school day?															
	<input type="checkbox"/> Yes <input type="checkbox"/> No															
2.	Is drinking water from the main source typically available throughout the school year?															
	<input type="checkbox"/> Yes ( <i>always</i> ) <input type="checkbox"/> Mostly ( <i>unavailable ≤ 30 days total</i> ) <input type="checkbox"/> No ( <i>unavailable &gt; 30 days</i> )															
3.	Is drinking water accessible to those with limited mobility or vision?															
	<input type="checkbox"/> Yes <input type="checkbox"/> No															
4.	Is drinking water accessible to the smallest children at the school?															
	<input type="checkbox"/> Yes <input type="checkbox"/> No															
5.	How many drinking water points (e.g., taps) are at the school?															
	<input type="checkbox"/> Insert Number _____															
XW6a. Does the school do anything to the water from the main source to make it safe to drink?																
	<input type="checkbox"/> Yes <input type="checkbox"/> No															
XW6b. If yes, what treatment method is used?																
	<input type="checkbox"/> Filtration <input type="checkbox"/> Boiling <input type="checkbox"/> Chlorination <input type="checkbox"/> SODIS <input type="checkbox"/> Ultraviolet <input type="checkbox"/> Other _____															
XW7. Is the school's main water source compliant with national standards for drinking water?																
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d3d3d3;"> <th style="text-align: left; padding: 5px;"><b>Contaminant</b></th> <th style="text-align: left; padding: 5px;"><b>Tested in past 12 months</b></th> <th style="text-align: left; padding: 5px;"><b>Compliant</b></th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"><i>Ecoli</i></td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> </tr> <tr> <td style="padding: 5px;"><i>Arsenic</i></td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> </tr> <tr> <td style="padding: 5px;"><i>Lead</i></td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> </tr> <tr> <td style="padding: 5px;"><i>Other</i> _____</td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> <td style="padding: 5px;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know</td> </tr> </tbody> </table>	<b>Contaminant</b>	<b>Tested in past 12 months</b>	<b>Compliant</b>	<i>Ecoli</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<i>Arsenic</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<i>Lead</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<i>Other</i> _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know
<b>Contaminant</b>	<b>Tested in past 12 months</b>	<b>Compliant</b>														
<i>Ecoli</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know														
<i>Arsenic</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know														
<i>Lead</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know														
<i>Other</i> _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know														

<i>Contaminant</i> <i>unknown</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know
<hr/>		
1.	Are water and soap available in a private space for girls to manage menstrual hygiene? <input type="checkbox"/> Yes, water and soap <input type="checkbox"/> Water, but no soap <input type="checkbox"/> No water	
2.	Are there covered bins for disposal of menstrual hygiene materials in girls' toilets? <input type="checkbox"/> Yes <input type="checkbox"/> No	
3.	Are there disposal mechanisms for menstrual hygiene waste at the school? <input type="checkbox"/> Yes <input type="checkbox"/> No	
4.	How many times per week are the student toilets cleaned? <input type="checkbox"/> At least once per day <input type="checkbox"/> 2-4 times per week <input type="checkbox"/> Once per week <input type="checkbox"/> Less than once per week	
5.	In general, how clean are the student toilets? <input type="checkbox"/> Clean <input type="checkbox"/> Somewhat clean <input type="checkbox"/> Not clean	
6.	Is there at least one usable toilet/latrine that is accessible to the smallest children at the school? <input type="checkbox"/> Yes <input type="checkbox"/> No	
7.	Is there at least one usable toilet/latrine that is accessible to those with limited mobility or vision? <input type="checkbox"/> Yes <input type="checkbox"/> No	
8.	Where are the student toilets located?	

	<input type="checkbox"/> Within school building <input type="checkbox"/> Outside building, but on premises <input type="checkbox"/> Off premises
9.	When are students permitted to use the school toilets/latrines? <input type="checkbox"/> At all times during the school day <input type="checkbox"/> During specific times during the school day <input type="checkbox"/> There are no toilets available for use at the school
10.	Are culturally appropriate anal cleansing materials currently available to all students? <input type="checkbox"/> Yes <input type="checkbox"/> No
11.	Is there currently functional lighting in the student toilets? <input type="checkbox"/> All toilets <input type="checkbox"/> Some toilets <input type="checkbox"/> None
12.	Are latrines or septic tanks emptied (or latrines safely covered) when they fill up? <input type="checkbox"/> Yes <input type="checkbox"/> No
1.	Are there handwashing facilities accessible to those with limited mobility or vision? <input type="checkbox"/> Yes <input type="checkbox"/> No
2.	Are there handwashing facilities accessible to the smallest children at the school? <input type="checkbox"/> Yes <input type="checkbox"/> No
3.	Where are handwashing facilities with water and soap located at the school? <i>(mark all that apply)</i> <input type="checkbox"/> Toilets <input type="checkbox"/> Food preparation area <input type="checkbox"/> Food consumption area <input type="checkbox"/> Classrooms <input type="checkbox"/> School yard

	<input type="checkbox"/> Other _____
4.	<p>How many handwashing facilities with water and soap are located at the school? (<i>insert number of taps</i>)</p> <p> <input type="checkbox"/> Total number of taps _____         <input type="checkbox"/> Number with soap &amp; water _____       </p>
5.	<p>How many times per week are group handwashing activities conducted for all students?</p> <p> <input type="checkbox"/> At least once per school day  <input type="checkbox"/> 2-4 days/week  <input type="checkbox"/> Once per week  <input type="checkbox"/> Less than once per week       </p>
6.	<p>Which of the following provisions for menstrual hygiene management (MHM) are available at the school?</p> <p> <input type="checkbox"/> Bathing areas  <input type="checkbox"/> MHM materials (e.g., pads)  <input type="checkbox"/> MHM education       </p>
7.	<p>How is solid waste (garbage) from the school disposed of?</p> <p> <input type="checkbox"/> Collected by municipal waste system  <input type="checkbox"/> Burned on premises  <input type="checkbox"/> Buried and covered on premises  <input type="checkbox"/> Openly dumped on premises       </p>

## WASH IN SCHOOLS CHECKLIST – NOTES

### CORE JMP – WASH IN SCHOOLS QUESTIONS

- W1 1. *If there is more than one source, the one used most frequently for drinking water should be selected. If children need to bring water from home because water is not provided by the school, “no water source” should be selected. Response options should be modified to reflect the local context and terminology such that respondents are able to clearly understand each one, and they are able to be categorized as improved, unimproved or no water source.*
- W2 2. *To be considered available, water should be available at the school at the time of the survey or questionnaire, either from the main source directly or stored water originally from the main source.*
- S1 3. *If more than one type is used, the most common type of student toilet/latrine should be selected. Response options should be modified to reflect the local context and terminology such that responses are able to be categorized by improved, unimproved or none.*
- S2 & 4. *Only count toilets/latrines that are usable at the time of the survey or questionnaire,*  
S3 alt *where “usable” refers to toilets/latrines which are*
- (1) available to students (doors are unlocked or a key is available at all times),*
- (2) functional (the toilet is not broken, the toilet hole is not blocked, and water is available for flush/pour-flush toilets), and*
- (3) private (there are closable doors that lock from the inside and no large gaps in the structure) at the time of the questionnaire or survey. If any of these three criteria are not met, the toilet/latrine should not be counted as usable. However, lockable toilets may not be applicable in pre-primary schools.*
5. *Single-sex toilets means that separate girls’ and boys’ toilets are available at the school, or it is a single-sex school and has toilets. To be considered separate, facilities should provide privacy from students of the opposite sex, but this definition should be further defined based on local context, as needed. For schools that have separate shifts for girls and boys (i.e. girls attend the school at a separate time from boys), depending on local culture, the response could be “yes” since at the time of use, the toilets are only for girls. This question may not be applicable in pre-primary schools.*
6. *It should meet the following conditions:*
- (1) can be accessed without stairs or steps,*

- (2) handrails for support are attached either to the floor or sidewalls,*
- (3) the door is at least 80 cm wide, and*
- (4) the door handle and seat are within reach of people using wheelchairs or crutches/sticks.*

- H1 7. *A handwashing facility is any device or infrastructure that enables students to wash their hands effectively using running water, such as a sink with tap, water tank with tap, bucket with tap, tippy tap, or other similar device. Note: a shared bucket used for dipping hands is not considered an effective handwashing facility.*
- H2 8. *To be considered available, water and soap must be available at one or more of the handwashing facilities at the time of the survey or questionnaire. If girls and boys have separate facilities, soap and water should be at both. Soapy water (a prepared solution of detergent suspended in water) can be considered as an alternative for soap, but not for water, as non-soapy water is needed for rinsing. Surveys may choose to add other response categories for ash or alcohol hand rub, but these should be kept as separate categories from soap to support SDG monitoring.*

#### **EXPANDED JMP – WASH IN SCHOOLS QUESTIONS**

- XW1 9. *Only respond “yes” if water was available at all times during the school day for the previous two weeks. Respond “no” if water was not available, at any time during any of the school days in the previous two weeks.*
- XW2 10. *Respond “no” if the total time without water during the school year is more than 30 days.*
- XW3 11. *To be considered accessible, water can be accessed (directly from the source or from a storage container) via a clear path without stairs or steps\* that is free of obstructions and has age-appropriate handrails, the tap can be reached from a seated position, and the water source/dispenser can be opened/closed with minimal effort Yes with one closed fist or feet.*
- XW4 12. *To be considered accessible, the water tap can be reached and easily opened/closed by the smallest children. May not be applicable in secondary schools.*
- XW5 13. *Count the total number of drinking water points at the school for students. This includes any point where children can get water to drink when needed. These could include, but are not limited to, piped taps, water fountains, jugs, water coolers, and buckets with taps, as well as protected wells or rainwater tanks if children get water directly from those sources.*
- XW6a 14. *The water treatment equipment / supplies should be observed, if possible.*

- XW7 15. *The structure can be modified for surveys that don't accept matrix style questions. If the water was tested, but the contaminants tested are unknown, the "contaminant unknown" row can be used. For surveys that test water as part of data collection, the "tested in past 12 months" column can be changed to "sample taken." WHO guidelines recommend a standard of zero E. coli (or thermotolerant coliform bacteria) in any 100-mL sample, a maximum arsenic level of 0.01 mg/L, and a maximum lead guideline of 0.01 mg/L. The contaminants in the table can be changed based on the context. If chlorine residual is tested, this may also be recorded; the drinking water guideline is at least 0.2 mg/L.*
- XS1 16. *Check yes if water and soap are available for discrete personal hygiene (hand and body washing), cleaning clothes/uniform, and washing reusable menstrual hygiene products (as applicable). This questions is not applicable in pre-primary schools.*
- XS2 17. *This question is not applicable in pre-primary schools.*
- XS3 18. *Disposal mechanisms can include incineration or another safe method on-site, or safe storage and collection via a municipal waste system, as appropriate. Not applicable in pre-primary schools.*
- XS4 19. *Although this question focuses on operation and maintenance processes, and not outputs, it is intended to provide a proxy for toilet cleanliness and may be more appropriate for self-response administration surveys than XS5.*
- XS5 20. *Visit as many of the student toilets as possible, and then select the appropriate description based on your general impression and the following definitions.*
1. *Clean: all toilets do not have a strong smell or significant numbers of flies or mosquitos, and there is no visible faeces on the floor, walls, seat (or pan) or around the facility.*
  2. *Somewhat clean: there is some smell and/or some sign of faecal matter in some of the toilets.*
  3. *Not clean: there is a strong smell and/or presence of faecal matter in most toilets.*
- This question is only appropriate for surveys that include observation by trained enumerators.*
- XS6 4. *To be considered accessible, a toilet/latrine should be available that can be used by the smallest children, which has a smaller toilet hole, a lower seat, and a lower door handle. May not be applicable in secondary schools.*
- XS7 5. *To be considered accessible, the facility can be accessed via a clear path without stairs or steps\* that is free of obstructions and has age-appropriate handrails, there is enough space inside for a wheelchair user to enter, turn, close the door and park by the toilet (1.5*



m2), the door is wide enough for a wheelchair (at least 80 cm) and opens outward with minimal or no difference in floor height between outside and inside, and the door handle and seat are within reach of children using wheelchairs or crutches/sticks, including a fixed raised pan or movable raised toilet seat to accommodate children who may have difficulty squatting.

\* Maximum ramp slope should follow national standards. In the absence of national standards, the following guidelines are recommended: a maximum ramp slope of 1:20 without handrails or 1:10 with handrails for the first 10 meters (if a longer ramp is needed, there should be an intermediate level landing every 10m).

- XS8 6. If there are multiple locations, respond based on the most frequently used by students. This question may be especially applicable in cold climates, boarding schools, and in regions with prolonged periods of darkness during school hours.
- XS9 7. Where feasible, such as in small program evaluations or sub regional surveys, this question may provide more accurate information if asked of students.
- XS10 8. Response should be based on the time of the questionnaire or survey and should be observed if possible. Anal cleansing materials will likely vary between countries and over time, and should be defined based on local context. In schools that have a multi-cultural student body, respond “yes” only if materials are provided to suit the needs of Yes all students.
- XS11 9. Response should be based on the day of the survey or questionnaire and should be observed if possible. This question may be especially appropriate for boarding schools and in countries or regions with prolonged periods of darkness during the school day, but is relevant in most settings. Where day-time toilet lighting is of interest, electric lighting or construction that allows natural light to enter is acceptable.
- XS12 10. This question does not apply to all sanitation facilities (e.g., sewer connection) but primarily to the management of faecal sludge from onsite systems.
11. Respond “no” if there are any latrines at the school that are currently too full to be used and the pit has not been emptied (or a new pit has not been dug and the full pit safely covered).
12. Additional questions regarding safely managed sanitation could be added based on household questions for SDG monitoring, but the scope of questions may only be realistic up to the school boundary (e.g., if pits are emptied, the school can likely only provide information up to the point where the sludge left the school premises, not about how the sludge is managed after leaving the school).

- XH1 13. *To be considered accessible, handwashing facilities can be accessed via a clear path without stairs or steps\* that is free of obstructions and has age-appropriate handrails, the tap and soap are reachable from a seated position and the tap can be operated by feet and/or one closed fist with minimal effort.*
- \* Maximum ramp slope should follow national standards. In the absence of national standards, the following guidelines are recommended: a maximum ramp slope of 1:20 without handrails or 1:10 with handrails for the first 10 meters (if a longer ramp is needed, there should be an intermediate level landing every 10m).*
- XH2 14. *To be considered accessible, the smallest children should be able to reach the tap and soap, and be able to operate the tap on their own with minimal effort. May not be applicable in secondary schools.*
- XH3 15. *Only mark those areas where both water and soap are available at the time of the survey or questionnaire.*
- XH4 16. *Insert the total number of handwashing points (e.g., taps) that exist at the school and the number that have both water and soap at the time of the survey or questionnaire.*
- XH5 17. *Applicable in countries that have adopted the Three Star Approach (or similar).*
- XH6 18. *Bathing areas are separate from latrines and toilets. The design may vary based on local context, but at minimum should have water and soap inside and be private (have closable doors that lock from the inside, and no holes, cracks, windows or low walls that would permit others to see in). MHm Material types may vary based on local context. Availability may be via free distribution or for purchase. MHM education should be institutionalized (i.e. regularly taught in class or through a regular school program) to be considered as a response for this question.*
- XH7 19. *The first three are considered appropriate forms of solid waste disposal. Openly dumped on-premises is not considered an appropriate form of disposal.*

## **APPENDIX 19: STUDY 3 INTERVIEW TOPIC GUIDES**

### **Interview topic guides for participants**

URN:

Name:

Age:

Sex:

Occupation:

What do you think has worked well about this programme at the school and the community? (prompt: teaching materials, resources/ activities, delivery?) Is there anything that has not worked well?

Do you think this programme can be sustainable? Will you continue to use the programme if it continues in the future?

Are you able to comment on what school children may have thought about these activities? Can you suggest any recommendations/improvements for the activities used?

What do you think of the resources? Quality of materials? Suitability of materials? Quantity? Do you have any recommendations for the resources? Which ones do you not use/find useful? Which ones do the school children like? And not like? Is anything missing?

Does the programme accommodate for different levels of ability?

Do you think this intervention has had any effects on the school children? (If yes please can you explain further?) Knowledge on healthy eating and physical activity? Attitudes towards healthy eating, physical activity, and WASH? Eating, physical activity and handwashing behaviours? Social interaction? Anything else?

Any effects on parents? (More involvement at school?) Any effects on staff?

Have there been any challenges/barriers to in participating in this intervention? (If yes, please explain (prompt: refer to specific activities). What would help to prevent these challenges in the future?

Can you suggest any improvements or recommendations for this programme?

### Participant Information Sheet



### **PILOTING OF INTERVENTION COMPONENTS PLUS FAMILY INVOLVEMENT TO PROMOTE A HEALTHY DIET AND PHYSICAL ACTIVITY AMONG NIGERIAN SCHOOL CHILDREN**

My name is Oritseweyinmi Orighoye. I am a student at Leeds Beckett University and I am conducting a research study as part of my PhD degree in Nutrition and Dietetics. I am looking for parents and children living in Lagos State, Nigeria to take part in a pilot intervention that promotes a healthy diet and physical activity.

#### **What will be involved?**

The study will involve a health talk, practical demonstrations regarding diet and physical activity. You will be given a questionnaire to complete at the end of each session to assess your knowledge and skills. You may be asked if you would like to be interviewed one to one at a designated place. You will be informed of the time and date of your interview by phone a week beforehand. In the interview we will discuss your views on intervention you are participating in. The interview will last about 30 to 60 minutes. For your child, there will be a child only session with supervision by a school teacher. Your child will be with other children within the same age range and maximum is 10 participants/session. They will be interviewed and involved in activities relating to their views on diet and exercise. This session will last about 30 to 60 minutes. With your permission, your interview and that of your child will be recorded to gain an accurate record of what is being said.

#### **What are the possible benefits of taking part?**

There are no direct benefits, however your information will help in understanding of ways in which we can promote a healthy diet and physical activity intervention in our settings.

#### **What are the possible risks of taking part?**

There are no identified risks for your participation.

#### **Do I have to take part in the study?**

Your participation in this project is voluntary which means you do not have to take part. If you do decide to take part in this project, I will ask you to complete and sign a consent form

indicating that you agree to participate. At any point throughout the interview you have the right to stop the interview without giving a reason. You can withdraw any information you do provide at any point up to the July 31<sup>st</sup>, 2020; the analysis and summarising of the information will have begun by then and it will not be possible to identify the information which came from you.

### **Confidentiality**

All information which is provided to the study by you will be kept strictly confidential. No names will be used in this study. All data will be stored in a secure manner on an encrypted computer that is password protected. All information provided within the interview will remain confidential.

**However, please note:** any information shared within the interview relating to anything that may be considered harmful to you or others will be disclosed to the appropriate authorities.

### **What will happen to my information?**

With your consent, the information you and the other participants provide within the interviews will be transcribed (typed out word for word) and analysed to establish the main ideas that have been shared. Only my supervisor, and I will have access to these data. The results will be summarised and written up in a report (a thesis) and a presentation, including quotes from the interviews, as part of my degree, and might also be suitable for publication in a research paper. No names or other identifying material will be used in the report to protect your anonymity. The data will be kept for six months, and will be destroyed after this period. If you would like to have a copy of the findings please let me know during the study.

### **Ethical approval**

The study has been given ethical approval by the Local Research Ethics Coordinator, School of Clinical and Applied Sciences, Leeds Beckett University, the Lagos State Ministry of Health and The Lagos State Ministry of Education.

**Thank you for reading this information sheet. Please contact me or my supervisor if you have any further queries**

### **Researcher details:**

Oritseweyinmi Orighoye

Email: o.orphoye8274@student.leedsbeckett.ac.uk

**Supervisor details:**

Tanefa Apekey

Email: [t.a.apekey@leedsbeckett.ac.uk](mailto:t.a.apekey@leedsbeckett.ac.uk)

**If you wish to contact someone about the study who is not directly involved in the study then please get in touch with Angela Hill (School Research Administrator)**

**Independent contact details**

Angela Hill

Email: [A.Hill@leedsbeckett.ac.uk](mailto:A.Hill@leedsbeckett.ac.uk)

## APPENDIX 21: STUDY 3 CONSENT FORMS

### Participant Consent Form

#### PILOTING OF INTERVENTION COMPONENTS PLUS FAMILY INVOLVEMENT TO PROMOTE A HEALTHY DIET AND PHYSICAL ACTIVITY AMONG NIGERIAN SCHOOL CHILDREN

Please initial the boxes  
below if you agree with the  
statements

1. I confirm that I have read and understood the information sheet (V1 1/10/18) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that I and my child's participation is voluntary and that I am free to withdraw myself and my child at any time, without giving any reason<sup>1</sup>. ☐
3. I understand that all information given is confidential and only for the study and that all data will be anonymised. ☐
4. I agree to take part in the study and be interviewed. ☐
5. I agree that my child(ren) can take part in the study and be interviewed ☐
6. I agree to my interview being digitally recorded ☐
7. I agree that the research results can be included in a report, presentation and research paper and that all personal identifying details will be removed. ☐

If you wish to take part, please write and sign your name below:

If you wish for your child (ren) to take part in the study, please write their name(s), class and school name below:



**Data Protection Act**

I understand that data collected about me during my participation in this study will be stored on computer and that any files containing information about me will be made anonymous. I agree to a student from Leeds Beckett University recording and analysing this information. I understand that information will be used only for the purpose of this study and my consent is conditional upon the University complying with its duties and obligations under the Data Protection Act.

**Name of participant****Signature****Date**

**Participant Consent Form**



**PILOTING OF INTERVENTION COMPONENTS PLUS  
FAMILY INVOLVEMENT TO PROMOTE A HEALTHY DIET AND PHYSICAL ACTIVITY  
AMONG NIGERIAN SCHOOL CHILDREN**

**Please initial the boxes  
below if you agree with  
the statements**

1. I confirm that I have read and understood the information sheet (V1 1/10/18) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason<sup>1</sup>. ☐
3. I understand that all information given is confidential and only for the study and that all data will be anonymised. ☐
4. I agree to take part in the study and to complete a questionnaire and be interviewed. ☐
5. I agree to my interview being digitally recorded ☐
6. I agree that the research results can be included in a report, presentation and research paper and that all personal identifying details will be removed. ☐

If you wish to take part, please write and sign your name below

**Data Protection Act**

I understand that data collected about me during my participation in this study will be stored on computer and that any files containing information about me will be made anonymous. I

agree to a student from Leeds Beckett University recording and analysing this information. I understand that information will be used only for the purpose of this study and my consent is conditional upon the University complying with its duties and obligations under the Data Protection Act.

**Name of participant**

**Signature**

**Date**

#### **FOR COMPLETION BY THE RESEARCHER**

I Oritseweyinmi Orighoye, confirm that I have informed the above named about this research project. I have given them the Information Sheet. To the best of my knowledge, they have understood and have given free and informed consent to become a participant in the research project.

Signed ..... Date  
.....

<sup>1</sup>Participants can withdraw from the study at any point without giving a reason. However to maintain anonymity and confidentiality we will not ask you for your name or any other information which will identify you. For this reason, if you do complete an interview or focus group discussion but afterwards you wish to withdraw from the study, you can do this up to the July 31<sup>st</sup>, 2019; the analysis and summarising of the information will have begun by then and it will not be possible to identify the information which came from