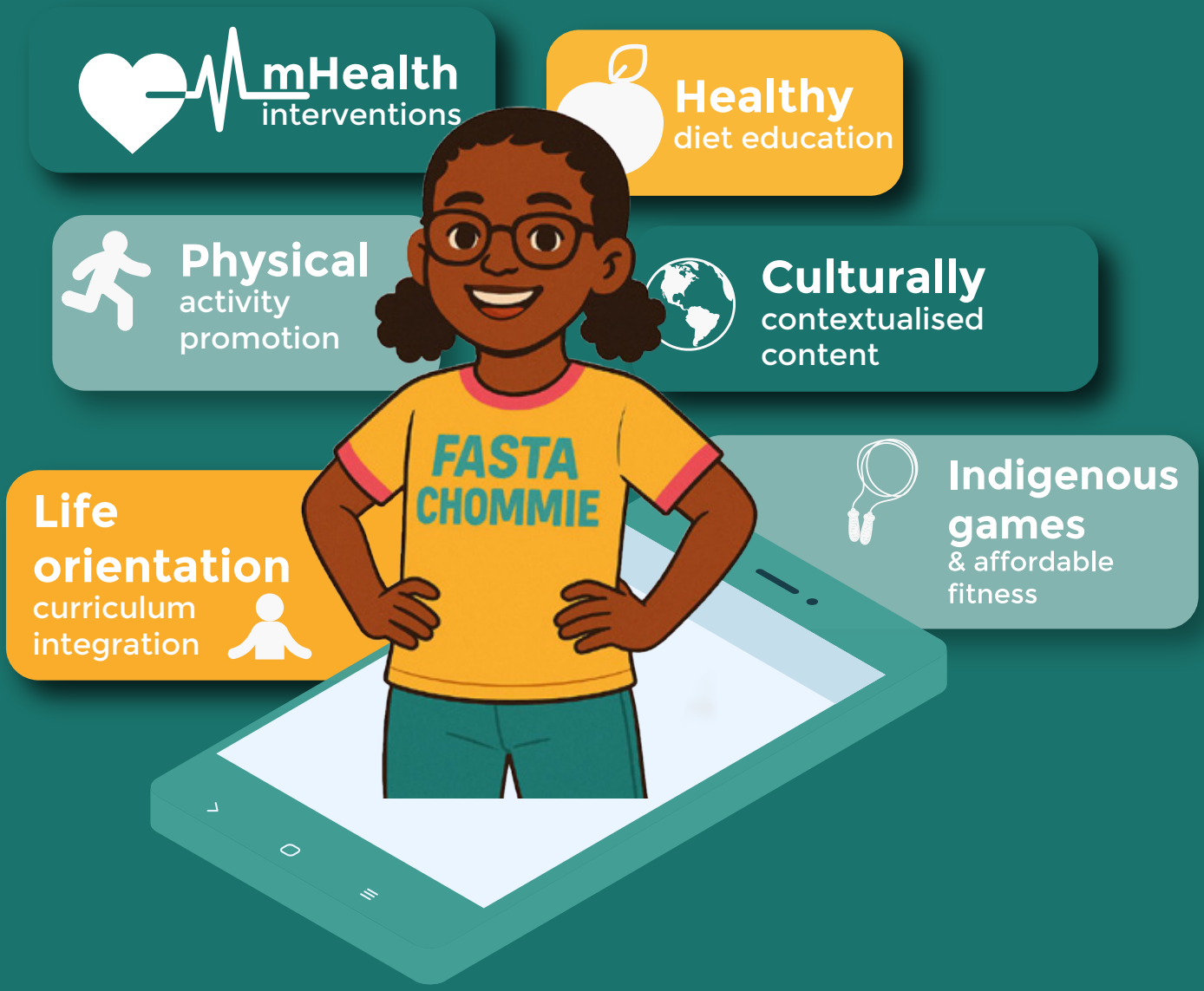


Evaluation of the Feasibility and Acceptability of Smartphone Technology in delivering diet and physical activity interventions for Adolescent obesity prevention (FASTA):

Final report 2026

Empowering young learners in iLembe, KZN through mobile technology to make informed choices for a healthier future

science, technology & innovation
Department: Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation

saMRC advancinglife

HSRC Human Sciences Research Council

Funders

This work is based on the research supported in part by the National Research Foundation of South Africa (Ref Numbers CSRP23040389087)

Research in this report was supported by the South African Medical Research Council under a Self-Initiated Research Grant. The views and opinions expressed are those of the author(s) and do not necessarily represent the official views of the SAMRC.

Collaborators

Suggested Citation:
Dukhi, N., Petersen, Z., Parker, W., Jobe, W., Chambale, P., Hlekwane, A., Bashe, S., Sewpaul, R., Sekgala, M.D., Fagbamigbe, A.F., and Taylor, M. (2026) Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention (FASTA) Final Report. Pretoria. Human Sciences Research Council.

Table of Contents

List of Figures iii
List of Tables iii
List of Acronyms and Abbreviations iii
Acknowledgements iv
Research and Administration team iv
Executive summary v
Aims and specific objectives v
Methodology vi
Key findings viii

1. Introduction 1
2. Aims and specific objections 3
3. Methodology 6
3.1. Phase 1: Elicitation Phase (Year 1) 7
3.2.Phase 2A: Development of application content and methodology (Year 2) 7
3.3.Phase 2B: Pre-testing and refinement of application content (Year 3) 8
4. Results 10
4.1 Phase 1: Elicitation Phase (Year 1) 11
4.2. Phase 2A: Health Content Library Development (Year 2) 13
4.3. Phase 2B: Pre-testing and refinement of app content (Year 3) 14
5. Discussion 20
6. Conclusion 25
7. Appendices 26
7.1. Appendix 1: Learner FGD schedule 27
7.2. Appendix 2: Principal KII schedule 29
7.3. Appendix 3: LO teacher KII schedule 31
7.4. Appendix 4: School nurse KII schedule 33
7.5. Appendix 5: FASTA Pamphlets 35
7.6. Appendix 6: Learner FGD schedule for app usage 37
7.7. Appendix 7: LO teachers semi structured survey 40
7.8 Appendix 8: FASTA mobile app functionality 43
8. References 45

List of Figures

Figure 1: FASTA study learners FGD sample from the selected schools.....5

List of Tables

Table 1: Summary of Phase 1 elicitation findings by objective.....11
Table 2: Summary of Facilitators and Barriers.....12
Table 3: Summary of the content for each domain across three learning dimensions.....14
Table 4: Priority refinements to the FASTA app arising from the pre-testing.....17
Table 5: Life Orientation teacher questionnaire responses (n = 2).....18
Table 6: App use by module and feature (101 registered accounts.....19

List of Acronyms and Abbreviations

AI	Artificial intelligence
BREC	Biomedical Research Ethics Committee
cRCT	Cluster randomised controlled trial
DoE	Department of Education
FASTA	Feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention
FBDG	Food-based dietary guideline/s
FGDs	Focus group discussions
HBSC	Health Behaviour in School-aged Children
HSRC	Human Sciences Research Council
KII	Key informant interview
KZN	KwaZulu-Natal
LO	Life Orientation
mHealth	mobile Health
NRF	National Research Foundation
PA	Physical activity
POPIA	Protection of Personal Information Act
PWA	Progressive web app
QR	Quick response (code)
SA	South Africa/n
SAMRC	South African Medical Research Council
3G / 4G	Third- / fourth-generation (mobile network)
TTM	Transtheoretical Model
WHO	World Health Organization

Acknowledgements

We are grateful for the support, effort, and time of various individuals, without whom this study would not have been possible.

Mrs Thembelihle Mungwe, Programme Manager for Adolescent and Youth Health, Health Promotion and the Integrated School Health Programme, iLembe Health District, for her unwavering support during the study.

Principals, Life Orientation (LO) teachers, school nurses, and Grade 5 learners at the three participating primary schools in iLembe District, KwaZulu-Natal, for their participation in this study, and valuable inputs.

The entire research and administrative team for your continuous commitment and dedication to the study.

Prof William Jobe and the technical team at University West, Sweden, for developing the FASTA app and analysing its usage data.

We would also like to sincerely thank the National Department of Health, Director: Nutrition, Ms Rebone Ntsie, for her ongoing support of the study.

A special thank you to our previous financial administrator, Mr Benelton Jumath, for his dedication to the study.

Our gratitude also extends to our funders, the National Research Foundation (NRF) and the South African Medical Research Council (SAMRC), for the financial support during this study.

Research and Administration team

HSRC	
Research team	
Dr Natisha Dukhi	Principal Investigator
Dr Whadi-ah Parker	Co-Principal Investigator
Dr Zaino Petersen	Co-Investigator, Qualitative Research Lead
Dr Ronel Sewpaul	Co-Investigator, Statistics Lead
Ms Prudence Chambale	Co-Investigator, data collection, transcriber
Ms Songeziwe Bashe	Co-Investigator, app content, pamphlet
Administration and financial management	
Mrs Jill Ramlochan	Project Administrator
Mr Bongumusa Shange	Financial Administrator
Research team external to the HSRC	
University of KwaZulu-Natal	
Prof Myra Taylor	Co-Principal Investigator
University of Cape Town	
Dr Machoene Derrick Sekgala	Co-Investigator
University of KwaZulu-Natal	
Mr Ayanda Hlekwane	Co-Investigator, data collection, transcriber
University West	
Prof William Jobe	Co-Investigator, Informatics Lead
University of Ibadan	
Dr Adeniyi Fagbamigbe	Co-Investigator, Statistics Lead

Executive summary

Overweight and obesity are increasing in South African (SA) adolescents, where urbanisation, increased availability of processed high-calorie foods, and other determinants are leading to reduced physical activity and unhealthy eating, thereby placing adolescents at increased risk of adverse chronic health conditions. There are increasing developments in the use of mobile health (mHealth) behavioural interventions aimed at improving dietary behaviours and increasing physical activity. While previous interventions for adolescent obesity prevention have been implemented with some success in low-income areas of different countries, literature for school-based dietary- and PA-related mHealth interventions targeting school-going children in African settings remains limited.

There is a need to develop and implement interventions tailored to the health needs and context of South African school-going adolescents. Thus, the Feasibility and Acceptability of Smartphone Technology in Delivering Dietary and Physical Activity Interventions for Adolescent Obesity Prevention (FASTA) study was conceptualised and was conducted in the poverty-challenged iLembe District in KwaZulu-Natal (KZN). This study includes 1) formative elicitation research to inform intervention development, 2) development of a mobile health application (mHealth app) that focuses on improving diet and physical activity in Grade 5 (aged 10-12 years) learners, and 3) pre-testing of the app to assess its feasibility and acceptability.

This report presents the completed formative research in the iLembe District, and its associated app content development, which assessed the current status of school-based health promotion, explored stakeholder attitudes towards adolescent obesity, and identified key facilitators and barriers to implementing diet and physical activity interventions. It also documents the finalisation of a tailored, age-appropriate health content library for the mobile app, aimed at obesity prevention among Grade 5 learners. Finally, it reports on the pre-testing of the working app prototype, in which Grade 5 learners at the same three schools used the app, initially in a supervised in-school orientation and then independently at home over a period of two weeks, before sharing their experiences in six focus group discussions (FGDs) in September 2026.

Aims and objectives

The primary aim of this study was to initiate stakeholder engagements and conduct a formative assessment to inform the development and pre-testing of a mobile health app for an adolescent obesity prevention intervention study.

The study was conducted in two phases, the first of which was comprised of elicitation research followed by phase two which included the development of the message library and development of the application. The specific objectives for each phase included:

Phase one: Elicitation research

1. To assess the health promotion status of adolescents in the iLembe district schools, explore and understand the schoolchildren's attitudes, cultural beliefs, vision and ideas regarding obesity, and identify the extent to which health promotion has been utilised in the schools, and the attitudes and perceptions of the Life Orientation (LO) or Life Skills teachers, school principals, and school nurses toward the prevention of childhood obesity through addressing diet and physical activity.
2. To identify facilitating and constraining factors for health promotion about diet and physical activity in the schools in the iLembe district, according to the key stakeholders (principals, teachers and school nurses).
3. To identify what adolescents understand about mobile health and if mobile technology has a place in addressing health, especially in overweight and obesity prevention in this age group.

Phase two: Message library and application development

4. To develop a relevant health content library, delivered via an app that is tailored and targeted to adolescents in the South African context. It also contains interventions and LO-related content relevant to the study.
5. To pre-test the app's context-specific content among schoolchildren, including ease of navigation, in-app instructions, visual appeal, and engagement with interactive tasks and games, using quantitative and qualitative measures to refine the app.

Data collection for the Phase 1 elicitation research was conducted from the 16th of October to the 25th of October 2024. The health content library and app development took place in 2025. Pre-testing of the app took place in August 2026, with final data collection conducted in September 2026, to explore adolescents' experiences, perceptions, usability challenges, behaviour changes, and suggestions for improvement regarding the FASTA mobile app.

Methodology

Qualitative interviews were conducted to determine the current status of school-based health promotion in the iLembe district, KwaZulu-Natal. The study also explored stakeholder attitudes towards adolescent obesity, identified facilitators and barriers to diet and physical activity interventions, and examined adolescents' perceptions of mHealth. Additionally, these findings, which captured learners' own ideas and priorities, informed the development of a tailored health content library for a mobile application aimed at obesity prevention among Grade 5 learners. A total of 72 Grade 5 learners (aged 10–12) participated in focus group discussions (FGDs), and nine school-associated staff members (LO teachers, school nurses and principals) participated in key-informant interviews (KIIs) across three selected schools in the iLembe District in 2024.

In 2025, an app content workshop was held in which the health content library was created using data from the FGDs and KIIs, to develop the app. The content was aligned to the study framework to address knowledge, attitudes and behaviours related to diet and physical activity. The content also aligned with the transtheoretical model approach by incorporating elements designed to elicit thoughts about, and preparation and motivation for, behaviour change.

FASTA Mobile APP Research Methodology



In 2026, a new cohort of Grade 5 learners at the same schools pre-tested the app prototype: all Grade 5 learners, approximately 450, received a pamphlet explaining how to use the app, one class per school (approximately 150 learners) also participated in a supervised orientation session, 56 learners from the oriented classes took part in six focus group discussions, and two LO teachers completed a questionnaire on supporting learners' use of the app. Qualitative data from the KIIs and FGDs were analysed thematically using a rapid analysis approach, supported by ATLAS.ti, and the LO/Life skills teacher survey questionnaire responses, as well as the app's usage records were summarised descriptively.

Key findings

Phase one: Elicitation research

There was strong support for this initiative among the school principals, LO/Life Skills teachers and school nurses, as well as the learners, who all viewed it as beneficial. There is a need to inform adolescents about health promotion and their potential role in it, and the learners who participated in the FGDs were enthusiastic about an app that shows them how to exercise and eat healthily. While most households and schools have access to mobile phones and the internet, availability varies and was taken into account when developing the app.

The World Health Organization's (WHO) concept of "Health Promoting Schools" is implemented in a few schools in South Africa, and the school nurses have a heavy workload in terms of the number of schools they oversee. Thus, the burden falls on the LO/Life Skills teacher, with those interviewed expressing enthusiasm for an app that could assist adolescent learners in acquiring skills and knowledge to improve their nutrition and health status. Some interviewees also suggested that such an app could benefit adult nutrition and family health. South Africa has experienced a nutrition transition, and most of the population is not fully aware of the consequences of a fast-food diet.

The learners in the FGDs reported positive attitudes to learning about nutrition and how they can improve their diet and health. They understood that obesity is a concern and that obese children are often unhealthy and may also be teased/bullied, affecting their emotional wellbeing.

The constraining factors for health promotion about diet and physical activity in the schools in the iLembe district, according to the key stakeholders (principals, teachers and school nurses), were mainly that many working parents lacked the time to cook regular meals for their children and to focus on their children's wellbeing, due to the socio-economic status of households.

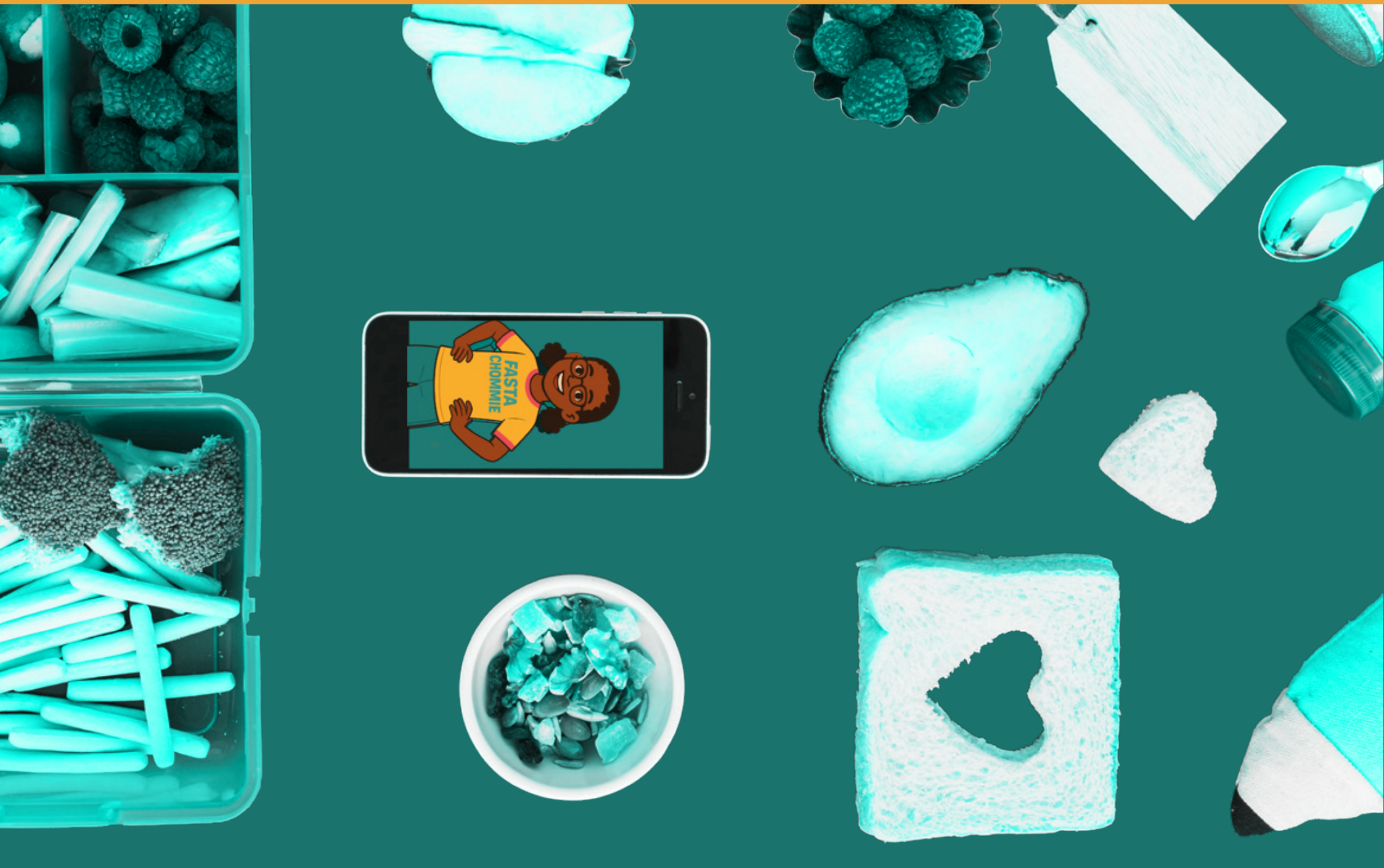
All the interviewees acknowledged the problem of overweight and obesity; they supported the idea of mobile health and were enthusiastic about mobile technology having a place in addressing the community's health and nutrition status, especially in overweight and obesity prevention.

Phase two: Message library and application development

Based on the elicitation findings, the team finalised the app's health content library, tailored and targeted to adolescents in the South African context, spanning nutrition, physical activity, and mental wellbeing, the latter added in response to learners raising it during the co-creation process.

Pre-testing indicated that the FASTA app was highly acceptable to Grade 5 learners, who described it as fun, colourful and made for children like them. The running and rope-skipping activities and the games were the most widely enjoyed features. The food scanner divided learners: those who could operate it valued it highly, while others found it difficult to photograph their food and needed help to do so. Most learners could use the app independently once logged in, but registration and login, which required an email address and password, were the most common difficulties and the main reasons learners sought help from parents, siblings, and other relatives. Learners reported short-term changes such as eating fewer sweets, drinking more water and exercising more at home. Although the app was designed for children and contains no specific content for adults, many learners showed its nutrition content to family members, some of whom reportedly began using it themselves. Mental health, while reported as useful by some learners, was the least understood content area. Mobile data costs, weak network signal and shared devices constrained use, and learners almost unanimously said they would use the app more if it worked offline. Of approximately 450 learners who received the app pamphlet, 101 registered an account. Among these, 87% used the app at least once and more than half used each of the three modules, but use was mostly brief: the median account was active on a single day, and fewer than two in five returned. The two LO teachers who completed a questionnaire reported that learners were highly engaged. They were willing to continue supporting the app but did not feel fully familiar with it and asked for a quick-reference guide and more time to explore the app beforehand. These findings identify priority refinements to login, offline functionality, food-scanner feedback, character design, game instructions, teacher support and the mental health module ahead of the planned FASTA-Schools cluster randomised controlled trial (cRCT).

INTRODUCTION



1. Introduction

The rapid increase in obesity in children and adolescents, largely due to unhealthy eating and physical inactivity, is strongly influenced by the physical environment as well as cultural, social and economic factors. Adolescents, 10-19 years of age as defined by the World Health Organization (WHO), are targeted for interventions, as it is during this growth and developmental period that health attitudes, beliefs and behaviours are formulated and continue into adulthood. The normal physical, psychosocial and emotional development of adolescents may be altered due to obesity [1]. Data from the Health Behaviour in School-aged Children (HBSC) study show how persistent these patterns have been. The 2001/2002 survey, conducted among young people aged 11, 13 and 15 years in 35 countries and regions in Europe and North America, found that sweets and soft drinks were displacing nutritious food in young people's diets. Almost a third of young people ate sweets at least once a day, while boys were more likely to drink sugary soft drinks daily. The survey also linked obesity with skipping meals and snacking, partly driven by the ready availability of palatable but non-nutritious foods, and found that obesity was accompanied by low self-esteem and feelings of sadness and anxiety [2]. Two decades later, the 2021/2022 survey of more than 280 000 adolescents in 44 countries and regions across Europe, Central Asia and Canada showed that the problem had grown.

Just over one in five adolescents (22%) were living with overweight or obesity, compared with 20% in 2018, and the burden fell more heavily on boys and on young people from poorer households. Dietary quality remained low: under two in five adolescents (<40%) reported eating fruit or vegetables every day, and fewer were eating breakfast than in 2018. Physical activity levels were similarly poor, with only a quarter of boys (25%) and fewer than one in six girls (15%) achieving the recommended daily hour of physical activity. Concerns about body weight were also widespread, as almost three in ten adolescents described themselves as "too fat", a perception more common among girls (34%) than boys (24%) [3]. Engagement in physical activity has shown health benefits for both overweight and normal weight-children and adolescents [4]. A major concern is the imbalance between energy intake and expenditure in this age group, largely due to decreased physical activity, which contributes to rising obesity rates. This rising trend in sedentary behaviour may be due to television viewing, smartphone use, self-consciousness, a lack of or minimal sporting activity, and increased industrialisation [5].

In South Africa, the picture is similar but less closely monitored. The Healthy Active Kids South Africa 2022 Report Card [6], which graded evidence published between 2018 and 2022, awarded a B– for overall physical activity, with about half of South African children and adolescents meeting global physical activity recommendations. However, overweight and obesity received a D, and organised sport participation a D–. Although most physical activity indicators had improved since the previous report card, those for body composition and nutrition had stagnated, and the authors found little tangible evidence that relevant policies and programmes were being implemented. They also noted a lack of nationally representative data for most indicators, with no current national studies on overweight and obesity [6]. This gap in current national evidence underlines the need for locally grounded research on children's diet and physical activity.

However, children and adolescents cannot be expected to take total responsibility for healthy eating and physical activity. To curb the rising trend of obesity, they should be raised and educated in a health-promoting environment that empowers them to make informed choices about their health, rather than by simply following the habits of others [7]. According to Kirby and Gibbs [8], children frequently feel as if they have limited opportunities to make decisions at school, as well as feeling that they are not heard by adults. Therefore, to address issues and advance decision-making in children, it is important that their views are considered by refocusing the relationship between the child and adult in the classroom setting [9]. To engage in authentic decision-making and participation with adults, children must actively participate in school health promotion activities and be empowered to act on health issues and their underlying determinants, as well as to sustain the positive changes resulting from these initiatives.

The health-promoting schools approach facilitates this, as it is oriented around a multifaceted approach to health [10]. Guided by the Ottawa Charter [11], health-promoting schools aim to create a supportive, healthy environment that incorporates health education, health services and health promotion programmes, building healthy policies that guide health promotion activities, strengthening the school and community relationships, and developing skills of members of the school environment [12].

Previously, in addressing childhood obesity, only behavioural health determinants were considered, and recommendations for school programs and interventions were limited to "best practice" [13]. Previous program outcomes also focused only on body mass, behaviour, or lifestyle [10]. Thus, in addressing unhealthy eating and physical inactivity in children and adolescents, it is important to consider both environmental and behavioural health determinants that influence child development [13]. While modern theories acknowledge that both a child's environment and biology influence their growth and development, the focus is now on the roles that each plays and their interactions in the child's ongoing development.

In adolescents, lifestyle modification is a complex process, suggesting that this unique age group requires specific intervention strategies and an interdisciplinary focus. Treatment programs should have a multi-domain structure, focusing on issues such as nutrition and physical education, family involvement and psychological support, while also utilising age-appropriate language and technological resources [14]. Thus, based on these observations, the Transtheoretical Model (TTM)/Stages of Change model is increasingly adopted by health researchers and professionals as an intervention strategy in lifestyle modification programmes targeting diet and physical activity. A systematic review found that TTM-based interventions were associated with reductions in weight and in energy and fat intake, alongside increases in fruit and vegetable intake and physical activity, although most studies were conducted among adults [15]. Among adolescents, a TTM-based programme delivered through interactive technology improved fruit and vegetable consumption and led learners who changed one behaviour to change others [16]. In health behaviour, long-term changes include various adaptations and actions over time, with some individuals not ready to make changes, whilst others may already be making changes to their diet and physical activity. Therefore, this study proposes using the TTM to develop and evaluate the FASTA study's future intervention, which will focus on the individual's motivation to change their lifestyle based on the five stages of change. These stages include 1) Precontemplation – where there is no recognition of interest in or need for change within the next six months; 2) Contemplation - where there are thoughts about change (next six months); 3) Preparation – planning for change (within the next month); 4) Action – the adoption of new habits (for approximately six months); and, 5) Maintenance – ongoing adoption and practice of new habit/s over another six months, with very little chance to revert to old habits [17]. In addition, an individual's motivation to change their lifestyle along these stages is related to their knowledge, attitudes and behaviours regarding diet and physical activity.

To encourage behaviour change and prevent malnutrition, including overweight and obesity, nutrition education (including diet and physical activity) is an important strategy to consider [18]. Nutrition education extends beyond simply sharing information about food. It involves addressing the needs of children, parents, and the community; empowering individuals to make informed choices about food; and encouraging changes in attitudes and beliefs based on available resources and personal needs. It also seeks to improve and promote nutrition knowledge within cultural boundaries [19, 20]. Nutrition education serves not only to impart important nutrition information and health messages, but also to engage the community in activities and/or interventions that will improve dietary intake and health [21].

Regarding physical activity, South Africa is privileged to maintain its heritage through indigenous games [22]. The Department of Sport and Recreation actively promotes indigenous games as recreational or formal options. There are nine games identified as part of the national indigenous games programme [23]. These include: *dibeke* (a running ball game, similar to football and dodgeball); *diketo* (a coordination game); *kgati* (a rope jumping game); *ncuva* (a board game); *morabaraba* (a board game); *jukskei* (a throwing and target game); *kho-kho* (a running game); *iintonga* (a stick fighting game); and drie stokkies (a running and jumping game).

Every year, the Indigenous Games Festival brings South Africans of all ages from the nine provinces together to promote unity whilst encouraging physical activity. The Department of Sports and Recreation targets schools and communities to train and play these indigenous games for recreation, while also promoting them as competitive sports at the community, regional, provincial, and national levels [23]. It is important to capitalise on such opportunities as they serve as inexpensive, culturally and context-specific tools that contribute to child and adolescent health research.

The HealthKick study, comprising diet and physical activity interventions, in primary schools in low-income settings in the Western Cape, is one of the few studies in South Africa that aimed to prevent overweight in children and reduce the risk of chronic diseases such as type 2 diabetes. The intervention improved learners' nutrition knowledge within the first year, and their dietary self-efficacy by the end of the third year, but it did not change their eating behaviour [24], or significantly improve the quality of their diets, a result the authors attributed in part to weak implementation in a setting where many children came from low-income homes [25]. The process evaluation found that implementation fell short of expectations, with limited parental involvement identified as a key barrier, and recommended greater parental involvement, stronger support from the Department of Basic Education and greater commitment from schools in future interventions [26]. This study, along with other international studies, has helped the development of the FASTA study. The FASTA study identified the strengths and weaknesses of previous South African studies, and while these studies were implemented with some success in low-income areas, the literature for school-based diet and physical activity interventions and mobile health (mHealth) interventions targeting school-going children in African settings is still limited [27-29]. There is also increasing development in the use of mHealth in addressing dietary and physical activity interventions [30-33].

The use and ownership of cellular phones, in particular smartphones, is rapidly growing. In 2017, smartphone ownership was highest in South Africa (51% of adults) and about one-third in Kenya, Nigeria, Senegal and Ghana, and in every country surveyed, adults aged 18–29 were

more likely than those aged 50 and older to own one [34]. In South Africa, smartphone use has continued to grow: by September 2025 there were more than 83 million smartphone subscriptions on South African networks, and fourth-generation (4G) mobile network coverage reached 99.5% of the population nationally and 99% in rural KwaZulu-Natal [35]. Network coverage does not, however, mean that households can afford to use it, and the cost of data remains a practical constraint on how often people go online. In 2011, 72% of South African high school learners reported having their own cell phones, and this has likely increased since [36]. Beyond communication, young people in South Africa and elsewhere in sub-Saharan Africa use their phones to search for health information, call for help during illness and obtain medicines, although those in rural areas are less able to do so because they have less access to devices, airtime, social networks and digital skills [37].

In South Africa, the National Digital Health Strategy for South Africa 2019-2024 envisioned a healthy and long life for all South Africans with mHealth integrated as a core component of health care service delivery to meet key health system needs, including health education, data management and information communication [38]. Internationally, there has been significant investment in mHealth research and implementation. However, in South Africa, this is limited due to insufficient funding and resources.

Therefore, there is a need to develop and implement interventions that are specific to different health situations and to target the age groups relevant to South Africa. Such interventions are often difficult to conduct and sustain due to a lack of funding and resources, such as the WHO's Health Promoting Schools' initiative [39]. The FASTA study was developed to address childhood obesity in the iLembe District of KwaZulu-Natal, South Africa. It involves the development and testing of a mobile content application as a foundation for broader school-based interventions, focusing on diet and physical activity among Grade 5 learners aged 10-12 years.

Although the FASTA study was designed to address diet and physical activity, its mobile app also includes content on mental wellbeing. While this was not part of the original study plan; it was added in response to learners themselves raising it during the co-creation process in the elicitation research. The addition is consistent with evidence that physical activity, diet and mental health are closely linked in childhood. Regular physical activity is associated with better mental health in children and adolescents, including potential benefits for depression, self-esteem and cognitive functioning [40]. Unhealthy dietary patterns are likewise associated with poorer mental health in this age group [41]. Including mental wellbeing therefore, responded to learners' own priorities, while the study's primary focus remained on diet and physical activity.



AIMS AND OBJECTIVES



2. Aims and specific objectives

The primary aim of this study was to initiate stakeholder engagements and conduct a formative assessment to inform the development and pre-testing of a mobile health app for an adolescent obesity prevention intervention study.

The study was conducted in two phases, the first of which was comprised of elicitation research followed by phase two which included the development of the message library and development of the application. The specific objectives for each phase included:

Phase one: Elicitation research

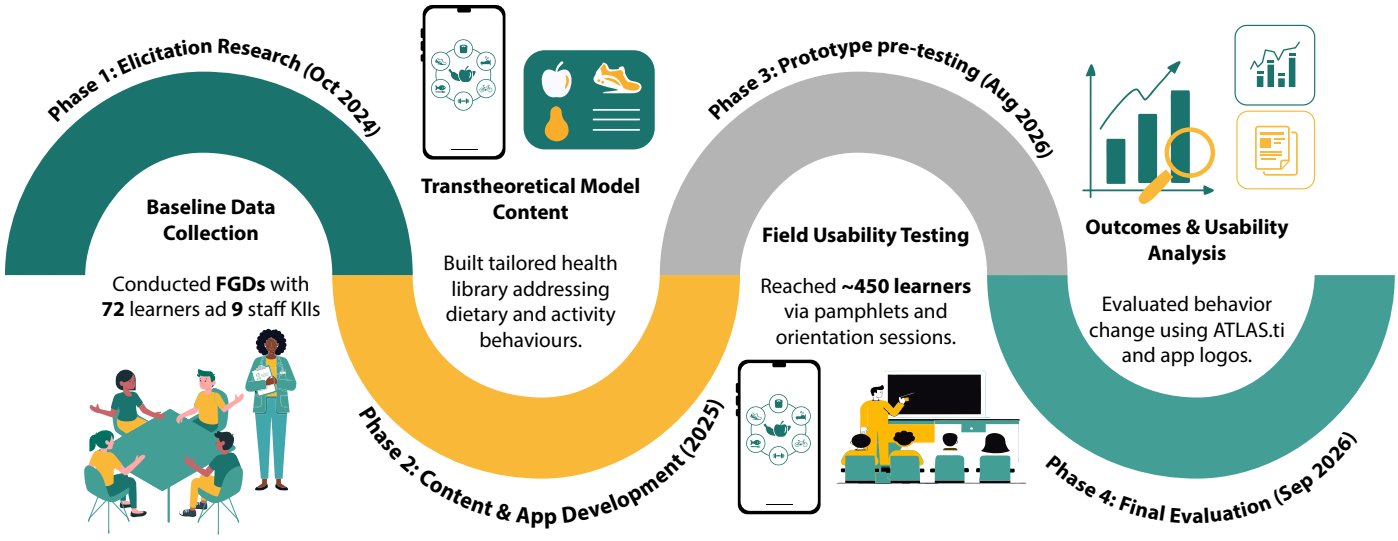
1. To assess the health promotion status of adolescents in the iLembe district schools, explore and understand the schoolchildren's attitudes, cultural beliefs, vision and ideas regarding obesity, and identify the extent to which health promotion has been utilised in the schools, and the attitudes and perceptions of the Life Orientation (LO) or Life Skills teachers, school principals, and school nurses toward the prevention of childhood obesity through addressing diet and physical activity.

2. To identify facilitating and constraining factors for health promotion about diet and physical activity in the schools in the iLembe district, according to the key stakeholders (principals, teachers and school nurses).

3. To identify what adolescents understand about mobile health and if mobile technology has a place in addressing health, especially in overweight and obesity prevention in this age group.

FASTA App Development: Research Methodology Timeline

The FASTA research project tracks the development of an adolescent obesity prevention mobile app in iLembe District, KwaZulu-Natal. The multi-year methodology spans baseline qualitative research, content creation anchored in the Transtheoretical Model, prototype pre-testing, and final evaluation.



Phase two: Message library and application development

4. To develop a relevant health content library, delivered via an app that is tailored and targeted to adolescents in the South African context. It also contains interventions and LO-related content relevant to the study.

5. To pre-test the app's context-specific content among schoolchildren, including ease of navigation, in-app instructions, visual appeal, and engagement with interactive tasks and games, using quantitative and qualitative measures to refine the app.

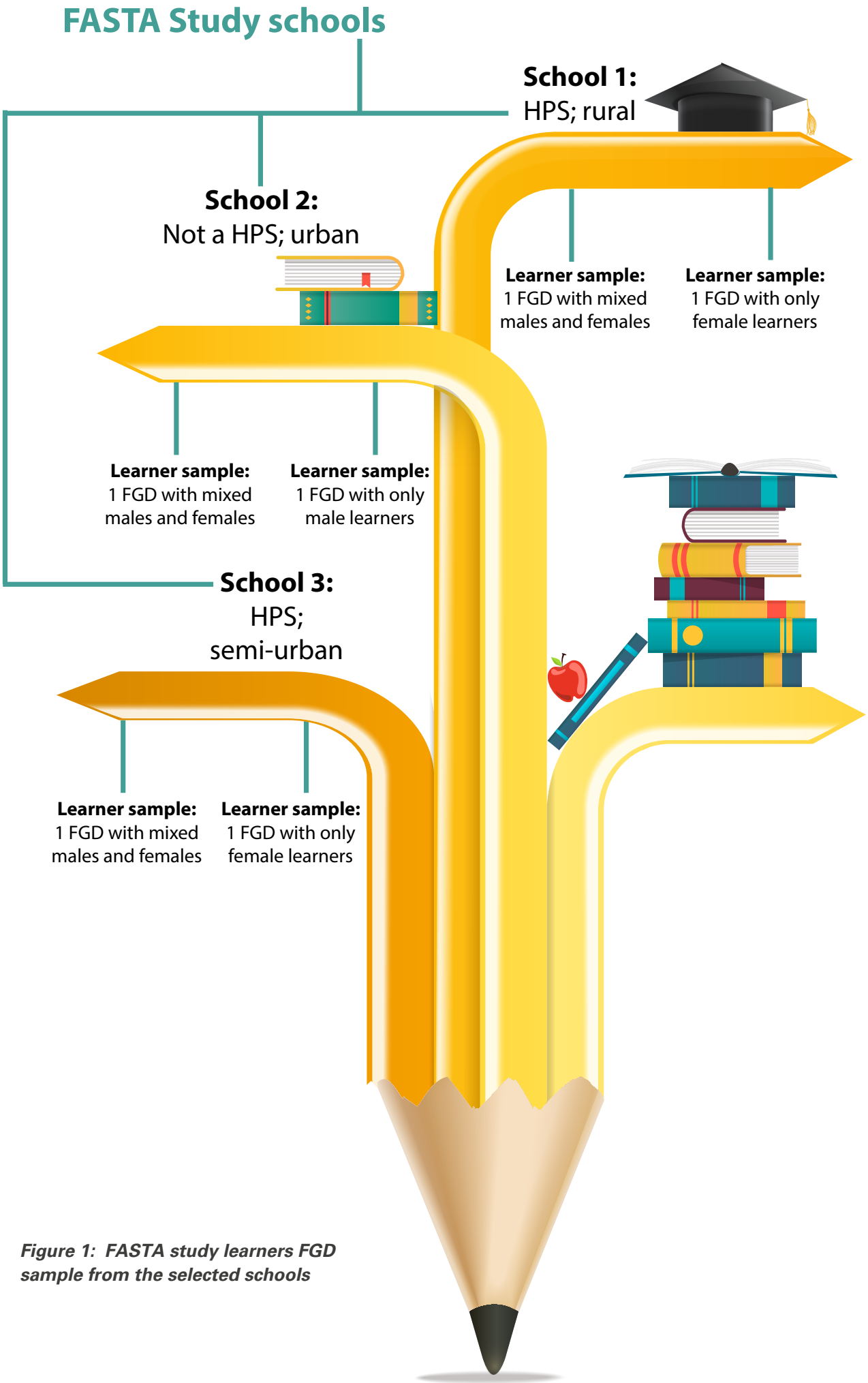


Figure 1: FASTA study learners FGD sample from the selected schools

METHODOLOGY



3. Methodology

3.1 Phase 1: Elicitation Phase (Year 1)

Study Design and Sampling

To address objectives 1-3, phase 1 (Elicitation phase) of the study utilised a qualitative approach and was conducted among Grade 5 learners aged 10-12 years, school principals, LO teachers, and school nurses at three primary schools in the iLembe district, KwaZulu-Natal. The three schools were purposely selected by the Health Promotion manager at the iLembe Health District Office, together with colleagues from the iLembe District office of the Department of Basic Education. Two of the three schools were implementing the health-promoting schools' programme. The three schools were located in the sub-district of KwaDukuza in the iLembe District.

Prior to recruitment and data collection, the research team engaged with the health-promoting schools programme manager, who in turn arranged meetings between the research team and the school principals to inform them about the study and discuss strategies for recruitment and data collection.

School principals, grade 5 LO teachers and school nurses were purposively selected for participation in key informant interviews (KIIs) at each of the three selected schools.

Inclusion criteria for the focus group discussions (FGDs) were learners currently enrolled in grade 5, aged 10-12 years old, in any of the three primary schools.

Data Collection

The research team developed the research instruments, based on past literature [42, 43] and experience. Two postgraduate interns from the research team were trained in qualitative interviewing techniques, including conducting KIIs and FGDs. There were no pre-existing relationships between participants and the interns.

Informed written consent was obtained from all participating school staff. Nine KIIs were conducted with school staff at three iLembe District primary schools, namely principals (n=3), LO teachers (n=3) and school nurses (n=3).

Information sheets and consent forms were distributed to the learners to take home for their parents to provide consent and sign. Informed written consent was obtained from parents for their child's participation in the study, and assent was obtained from participants themselves. Learners who returned the signed consent forms were selected for participation.

Data collection included face-to-face FGDs with grade 5 learners (Appendix 1) as well as face-to-face KIIs with school principals (Appendix 2), LO teachers (Appendix 3), and school nurses (Appendix 4). Data collection was conducted between the 16th and 25th October 2024.

Six FGDs, with 12 grade 5 learners each (2 FGDs per school), were conducted (Figure 1), for a total of 72 participants. At each school, one FGD was held with a single-gender group and one with a mixed-gender group.

KIIs and FGDs were conducted in English or isiZulu, as preferred by participants, using interview schedules. These are the two predominant languages spoken in the district. Data collection was conducted until data saturation was reached. All participants in the FGDs were offered refreshments.

Data analysis

An interpretive paradigm [44] was adopted for the analysis of the qualitative data, using ATLAS.ti. The audio-recorded KIIs and FGDs were transcribed verbatim, with isiZulu transcripts translated into English, before undergoing coding and analysis using a rapid analysis technique [45]. The research team began by immersing themselves in the transcripts, reading and re-reading them to build a thorough understanding of both the content and the context in which it was shared. Coding was then applied systematically across the transcripts, with segments of text assigned codes to capture recurring ideas, patterns, and concepts. These codes were subsequently consolidated into broader categories, from which themes were developed to reflect the substance of participants' accounts. Themes were refined through an iterative process to ensure they remained an accurate reflection of participants' perspectives, and the team reviewed them collectively to check for consistency and reliability, cross-referencing each theme against the original data throughout. The final set of themes was drawn together in a coherent narrative connecting participants' insights to decisions about the app's design and functionality, ensuring that the content that followed was grounded in the lived experiences and social contexts of the adolescents involved.

3.2 Phase 2A: Development of application content and methodology (Year 2)

Objective 4 involved using data from the FGDs and KIIs to develop novel, culturally appropriate, contextual and age-specific healthy lifestyle content for the app interventions. This entailed an app content workshop in which the researchers discussed the data, explored what existing nutrition/PA/lifestyle apps offered, and developed ideas to make the content more adolescent-friendly and engaging, considering the importance of culture, context, and age. Although the study was designed to address diet and physical activity, mental health was added as a third content area in response to learners raising it during the elicitation research, reflecting the study's commitment to shaping the app around learners' own priorities. The team then continued to discuss each of the ideas in depth, taking into consideration the sensitivity related to being overweight or obese. Based on the study framework, the research team concluded that the content should be aligned to address knowledge, attitudes and behaviours related to diet and physical activity.

The content also aligned with the transtheoretical model (TTM) approach by incorporating elements designed to

elicit thoughts about, and preparation and motivation for, behaviour change. The app development team provided extensive feedback on the developed content. Decisions regarding the prototype's delivery and operability were also finalised. A mobile web app was chosen as the main delivery route, as it is cost-effective (one codebase for all devices), works on any modern mobile device that can access the web, allows for constant real-time updates and performs as well as native applications; Android versions were also developed (Section 4.2). However, aware of the costs and access to data, the development team aimed to develop most of the content with functionality such that initial registration would require data and then allow for content accessibility to be as data-free as possible. There were ongoing discussions to address the content as the prototype was developed. As a final step in content development, the project's Principal Investigator and the international app developer convened a closing review of the app content compiled by the research team, refining it further to ensure the South African context was accurately and appropriately represented.

3.3 Phase 2B: Pre-testing and refinement of application content (Year 3)

Study design and Sampling

Objective 5 involved usability testing of the finalised working app prototype, in which the finalised health content library was deployed on a functional build of the app. All Grade 5 learners at the three schools received a printed pamphlet (Appendix 5) explaining how to access and use the app, and testing was conducted in two stages: a supervised in-school orientation session for one Grade 5 class at each school, followed by a two-week period of independent use at home, which was open to all learners who had received the pamphlet.

Stage 1: Supervised in-school orientation session

At each of the three schools, the printed pamphlet detailing how to access and use the app was distributed to all Grade 5 learners (aged 10-12 years), approximately 450 learners in nine classes of about 50 learners each. In addition, one Grade 5 class at each school, approximately 150 learners in total, participated in a supervised orientation session in which the research team showed learners the app and how to use it, on their own or their parents' smartphones. These learners were a new cohort; the Grade 5 learners who took part in the 2024 elicitation research had since moved on to Grade 7. Team members demonstrated the app's navigation and content, observing learners' reactions and engagement with the interactive tasks and games, and explained the contents of the pamphlet in full.

Stage 2: Independent use at home

All learners who received the pamphlet could then use the app independently at home, on their own or a parent or caregiver's phone, with assistance from their parent or caregiver as needed, over a period of two weeks. This stage allowed the research team to assess the app's usability and acceptability outside of a supervised setting, and the extent to which the pamphlet, the orientation session, and parental or caregiver support facilitated independent engagement.

Data collection:

A mixed-methods approach, including focus group discussions with learners, record reviews of app data, and a short survey for LO teachers, was used in this phase of the study.

Focus group discussions

Following the home-use period, six FGDs (two per school) were conducted with learners across all three schools, between the 9th and 11th September 2026, covering their experience of both the in-school orientation and the period of independent use at home (Appendix 6). FGD participants were drawn from the class that had taken part in the orientation session at each school. Groups comprised seven to 10 learners. The intention was to mirror the Phase 1 design, in which each school had one single-gender and one mixed-gender group. This was achieved at Schools A and B, which each had one girls-only and one mixed-gender group. At School C, all the boys available to participate took part in a boys-only group, so the second group was held with girls only rather than as a mixed-gender group, ensuring that no learner participated in more than one discussion. FGDs were facilitated by two trained members of the research team using a semi-structured guide. FGDs covered first impressions and visual appeal, ease of navigation, clarity of the pamphlet and in-app instructions, engagement with the interactive tasks and games, perceived learning and behaviour change, sharing of the app with family and friends, device, data and connectivity access, suggestions for improvement, and the extent to which the pamphlet and parental/caregiver support facilitated independent use at home. FGDs were conducted in English or isiZulu, according to participant preference, audio-recorded, transcribed verbatim, and, where necessary, translated into English.

Record reviews of app usage data:

The app's built-in usage records provided a measure of engagement that did not depend on learners' own accounts. When learners registered, each new account was automatically assigned, in equal numbers, to either the React or the Flutter version of the app, so that the two technical approaches could be compared; the content of the two versions was identical. The records captured the screens learners viewed, the features they completed and basic technical performance data for each session. Accounts belonging to research staff and test users were removed before analysis, and the usage data were summarised descriptively by the technical team at University West.

Short Survey

In addition, the Grade 5 LO teachers at the three schools were invited to complete a paper-based questionnaire (Appendix 7) developed by the research team. After background questions about the school, the number of Grade 5 learners in the teacher's class and the teacher's years of experience teaching LO, the questionnaire's 24 items covered four areas: demonstrating the app to learners at school (Section A), reminding learners to use the app at home (Section B), supporting learners with questions and difficulties in navigating the app (Section C), and the teacher's overall experience as a support teacher (Section D). Items used five-point frequency scales (from never to always), five-point agreement scales (from strongly disagree to strongly agree), single- and multiple-response options, and open-ended questions for further comments. Items on learners using their own phones in class were completed only where this had occurred. Two of the three teachers completed the questionnaire; the teacher at School C was not available during data collection.

Data Analysis

Qualitative findings from the learner FGDs were analysed thematically, using the same rapid analysis approach as Phase 1, with the domains of the discussion guide providing initial deductive codes, while further codes were developed inductively from learners' accounts. Responses to the questionnaire completed by LO teachers were summarised descriptively, and given the small sample size, were reported individually. Both sets of findings were used to identify refinements to the prototype; including the navigation and interface adjustments, content pacing and visual design changes; prior to finalisation of the app for the planned FASTA-Schools evaluation study.

Ethical considerations

The University of KwaZulu-Natal Biomedical Research Ethics Committee (BREC) granted ethics approval for the study (BFC555/17). Permission to conduct research in the KZN schools was granted by the KZN Department of Education (DoE) (2/4/8/120). Support to conduct research in iLembe District was granted by the iLembe Health District Office.

Because the Year 3 pre-testing was a separate round of data collection from the 2024 elicitation research, consent was obtained afresh. Written informed consent was obtained from school principals for their school's participation and from LO teachers for completing the questionnaire. Parents or caregivers gave written permission for their children to take part in the FGDs, and learners gave their own assent. Permission to audio-record the FGDs was obtained as part of this process.



RESULTS



4. Results

4.1 Phase 1: Elicitation Phase (Year 1)

Qualitative research key findings are summarised in Table 1 according to the three Phase 1 objectives, together with the objective 4 from Phase 2, health content library that was developed from them: 1) health promotion status and perceptions of obesity, 2) facilitators and barriers, 3) adolescent understanding of mobile health and 4) health content library.

Table 1: Summary of Phase 1 elicitation findings by objective

Objective	Key findings
1. Health promotion status and perceptions of obesity	Learners had a basic awareness of healthy eating but strongly preferred fried and sugary foods. Obesity was associated with teasing and bullying. School staff reported that school health promotion was ad hoc and poorly resourced, and LO teachers reported limited training in nutrition and physical activity. School nurses reported that the Health Promoting Schools Initiative was not always implemented.
2. Facilitators and barriers	**Facilitators**: principals and LO teachers described school leadership as supportive and open to digital tools, and teachers and learners were enthusiastic about interactive health content. **Barriers**: school staff reported that smartphones were often shared within households, and school nurses raised the cost of data. Limited digital infrastructure and poor internet connectivity were reported in some schools. School staff also reported that competing academic demands reduced the time allocated to LO, and that household socio-economic circumstances shaped the community's diet and physical activity.
3. Adolescent understanding of mobile health	Learners were familiar with smartphones but had little experience of health apps. They wanted games, challenges and rewards, and wanted parents and teachers involved. LO teachers saw an app as complementing classroom teaching, and school nurses noted its appeal to learners. A few learners raised mental wellbeing unprompted.
4. Health content library	A library covering nutrition, physical activity and mental health was structured around knowledge, attitudes and practices, and aligned with the Transtheoretical Model Approach.

4.1.1. Health Promotion Status and Perceptions of Obesity

Learner perspectives: Most learners demonstrated a basic awareness of healthy eating and physical activity but lacked a comprehensive understanding of the long-term consequences of obesity. While the majority indicated an understanding of the need to eat a balanced diet, some admitted to enjoying and regularly consuming sugary and unhealthy foods. The quotes below illustrate these points:

> *"Yes, it is important so that a person cannot be obese and to avoid being bullied by other learners because when you are, they will call you with names such as 'sdudla mafehlefehle' (isiZulu) (Fatty)." (Learner, FGD)*

The learners were aware of the social consequences of obesity, but in one FGD, they openly shared details about their favourite foods:

> Participant 1: *"I like slap chips, cold drink, chips and fat cakes."*
> Participant 2: *"Simba chips and cake are my favourite."*
> Participant 3: *"I like Simba chips, chocolate, fat cakes and fries."*
> Participant 4: *"I like eating Simba chips, chocolates and fat cakes."*
> Participant 5: *"Eating chocolate and fat cakes is my favourites."*
> Participant 7: *"Fat cakes and polony."*
> Participant 10: *"Cold drink and fat cakes."*

Learners listed many high-sugar and fried foods as their favourites. While they showed awareness of healthy eating, the strong preference for unhealthy snacks suggests a gap between knowledge and behaviour, likely influenced by food availability and social norms.

A rationale to understand the issue was suggested by one learner:

> *"Availability of unhealthy foods in school tuckshops and at home" (Learner, FGD)*

This concern was echoed by the school staff who were interviewed.

> *"A very challenging issue with children is that they eat junk food a lot and that compromises their health" (Principal, KII).*

Teacher perspectives: LO teachers reported an awareness and knowledge that obesity can lead to several diseases if not addressed, but they also highlighted limited training in the promotion of healthy nutrition and physical activity.

> *"I think children are overweight because of the living conditions they are growing under, their socio-economic background contributes to children being overweight, children nowadays don't go out to play, they stay indoors and watching TV, they are no longer afforded the opportunity to go and play with other kids in the field.'' (LO Teacher, KII)*

> *"I think this is very important for children to stay active. If I can make an example I have two learners in my class, after break they come back really sweaty from playing and when I asked them, they said they don't play at home.'' (LO Teacher, KII)*

Instead, most health promotion efforts in schools were undertaken ad hoc and were poorly resourced. The schools believed that existing policies did not adequately address these issues, leading to limited implementation of programmes such as the 'Health Promoting Schools Initiative' as indicated by school nurses.

> *"I do not have an answer, I do not know anything that the government is doing to assist in such issues." (School nurse, KII)*

Regarding health promotion status in schools, school staff reported that few structured, curriculum-aligned health promotion initiatives were consistently implemented across schools.

4.1.2 The Facilitators and Barriers to Health Promotion

Table 2 shows a summary of the facilitators and barriers identified during interviews with school principals, LO teachers and school nurses.

Table 2: Summary of Facilitators and Barriers

Facilitators	Barriers
High smartphone interest among learners	Limited access to devices in some homes
Supportive attitudes from LO teachers	Expensive or limited data access
School leadership openness	Competing academic priorities
Willingness to engage with digital tools	Limited health promotion training for teachers

Many of those interviewed identified facilitators that could enable effective health promotion. Teachers and learners expressed strong enthusiasm for interactive and engaging health content.

> *"Yes, this initiative will be very useful, it will assist us as life skills teachers to refer to it when we teach.''*
> *(LO Teacher, KII)*

This study also noted that while smartphones are commonly available among learners, they are often shared within households. School principals and LO teachers were very helpful and expressed the view that the school leadership is supportive and open to innovation and the use of digital tools.

Barriers that were identified, included limited digital infrastructure and poor internet connectivity in some schools. Concerns about data costs and device access were also raised:

> *"So, a learner can install it on parents' phone? But it should be a free app, not data. But if it requires data it will be hard due to data affordability. Data is expensive, there are kids who live with grannies. Or lack access to smartphones.'' (School nurse, KII)*

School staff also expressed that competing academic demands reduce the time allocated to the Life Orientation subject, and that socio-economic challenges influence the community's dietary habits and physical activity patterns.

4.1.3 Adolescent Understanding of Mobile Health

Most learners were familiar with smartphones but had limited experiences with health-related apps. However, they expressed strong interest in using health apps that incorporate games, challenges, or rewards tied to healthy eating and exercise.

In one of the FGDs the learners provided input on the proposed content. Their suggestions:

> *"Exercises and eating healthy foods, and how to play soccer.'' (Learner, FGD)*

Some learners were supportive of their parents and teachers also being involved.

> *"I would like it to be on my parent's phone'' and, "I would like the teacher to have it too." (Learner, FGD)*

LO teachers viewed mobile apps as a valuable knowledge-sharing tool that could complement classroom teaching, particularly if it is supported by parental involvement and aligned with the curriculum.

> *"Yes, one, its quicker and two, they are familiar with it, it's more interesting than a book if you compare a phone and a book, you see moving objects but in a book pictures are stationary: these kids will really love it a lot. Even during the lesson, you see that if you display something on a projector they engage, so imagine putting a person who dances they will imitate that, definitely.'' (LO Teacher, KII)*

> *"Yes, anything that is safe is going to help them in the long run, in fact for their whole life. There are people who want to adopt healthy eating but don't know how, so having an app will be really helpful.'' (LO Teacher, KII)*

There was also support from the school nurses, noting its appeal to learners:

> *"Yes, so if you look, kids love phones, so it will be easy to participate because they love phones.'' (School nurse, KII)*

A few learners referred to their mental health, and this is significant, as literature has indicated that those individuals who engage in physical activity more often and eat healthily are more likely to have better concentration, moods and a positive mental health status.

> *"Yes, it can help me be to be fit in mind and body." (Learner, FGD)*

4.2. Phase 2A: Health Content Library Development (Year 2)

A finalised health content library has been developed, informed by the elicitation findings. The content was designed using age-appropriate language and with visual appeal, incorporating interactive tasks and games focused on:

(a) Promoting good nutrition;
(b) Enhancing understanding of exercise and sport, including practical ways to integrate them into daily schedules; and
(c) Building awareness of mental health and the importance of seeking support.

The library aims to influence learners' knowledge, attitudes, and behaviours in a practical and relatable way. Table 3 summarises the content for each domain at each of these three levels.

The nutrition module covers the South African food-based dietary guidelines, food groups, label reading, hydration tracking, a meal-building game, a food-frequency questionnaire and a plate scanner that uses a commercial artificial intelligence (AI) service, Google Gemini, to analyse a photograph of the learner's meal. The physical activity module covers activities at three levels of difficulty, traditional South African games, video instructions, a timer and an activity log. The mental wellness module covers an emotions tracker, a gratitude garden and guided meditation.

The app, named Fasta Chommie, was built by the technical team at University West as four versions with identical content, developed from two independent code bases. A React web application was delivered as a progressive web app (PWA) and as an Android app, and a Flutter application was delivered as a web app and as a native Android app. All four versions offered nutrition, physical activity and mental wellness modules, together with a shared reward system in which learners collect "carrots".

Learners register with an email address and password, choose an avatar from male, female and neutral options, and are welcomed by Fastachommie, a mascot designed for children to identify with (Appendix 8). Carrots are intended for self-motivation only, and the app deliberately has no leaderboard. All versions are reached through a single web address (fastachommie.org) and share one secure online database, in which each learner's data is kept separate, and research access is limited to authorised team members. The PWA stores the app's files on the device so that parts of it work without a connection. The app records the screens learners view and the features they complete, together with basic technical performance data, so that engagement can be monitored.

Table 3: Summary of the content for each domain across three learning dimensions

Learning Dimension	Nutrition	Physical Activity	Mental Health
Knowledge	• Food-based dietary guidelines (FBDGs) • Food labels and group diversity • Macro and micronutrients • Nutrition myths vs. facts • Healthy food alternatives	• Daily movement as part of lifestyle • Easy, moderate, and hard sports • Introduction to South African indigenous sports	• Major emotions (anger, frustration, sadness, jealousy/envy, happiness, optimism) • Emotional destigmatisation • Fastachommie imagery adapted to convey emotions
Attitude	• My favourite foods • Favourite fruits & vegetables • Screen time vs. active move time (gamified)	• Stretch counter rewards • Sleep time & exercise targets to increase sleep hours	• Gratitude Garden (reflecting on happiness & desired changes) • Emotion journaling to manage troubling feelings
Practices & Behaviours	• Plate scanning & food item identification • Food type frequency logging • Meal Game: Good vs. bad choices with rewards ('carrots') • Meal Game: Food heroes & character meal choices • Healthy snack packer tool • Hydration Tracker: Water importance & +/- cup logging bar	• Physical activity intro landing page with visuals • Categorized exercises (easy, moderate, hard) with video guides • Interactive exercise selection wheel • 1-minute timer countdown tailored to ability • Activity logger for sports and household chores • Exercise Buddy, Tamagotchi pet • Indigenous sport participation & sustainability videos	• Gratitude Garden: Weekly emotion logging • Mood improvement options for negative emotions (talk, exercise, meditate) • Guided self-meditation with visuals • Daily breathing exercises • Relaxation & brain break techniques • Tamagotchi Expansion: Pet responds to mood and actions

4.3. Phase 2B: Pre-testing and refinement of app content (Year 3)

Six FGDs were held with 56 Grade 5 learners across the three participating schools. Learners' accounts clustered around seven themes: first impressions and visual appeal; usability, navigation and help-seeking; engagement with the three content areas; perceived learning and self-reported behaviour change; learners as health messengers; access to devices, data and connectivity; and suggestions for refinement. Since this phase included learners only, selected quotations are not labelled.

4.3.1. First impressions and visual appeal

Learners' first encounters with the FASTA app were overwhelmingly positive. Across all six groups they described feeling happy, excited or interested when they first opened it, and several tied this directly to what the app was for:

> *"I liked the app, and I was interested in it because it taught me about the right types of food, or healthy foods, that I should eat in order to stay healthy."*

A minority recalled feeling nervous or confused at first, and this usually gave way to confidence as they used the app:

> *"I also felt a bit nervous at first, but after a few days I was comfortable and confident."*

The colours, characters and games stood out most. Some learners described the colours as *"so bright"* and *"clear and beautiful"*.

The characters drew the most divided responses. Learners identified with the range of avatars, *"I loved the san and khoi khoi character"*; *"I love the character with an afro"*, and *"I love the dreadlocks and green shirt character"*. While a few other learners found them artificial stating, *"The characters are not realistic. They are AI."*

One learner group proposed uploading their own photographs as profile pictures, with the whole group agreeing. Most learners felt strongly that the app had been made for children like them, and they linked this to its language, its foods and its games:

> *"I did not feel like it is not meant for someone my age; I actually feel that it was perfectly made for people like me. We are young; we don't have the knowledge that older people have."*

> *"Because we were familiar with the food and games that are in the app."*

4.3.2. Usability, navigation and help-seeking

Once logged in, most learners found the app easy to navigate. Several credited the in-school orientation and the printed pamphlet:

> *"It was easy because when you introduced the app, you explained well how to use it."*

Logging into the app was identified as one of the main obstacles. Registration and login required an email address and a password, and this was the most common reason learners sought help. It was also the only feature that one learner group unanimously described as confusing. Setting up an account was usually done by an adult or an older sibling *("I asked my sister to help with the email address"; "My father helped with the login email").* Because the app was mainly accessed as a mobile web app, through a web address rather than an app store, some learners initially struggled to find it. One asked whether it could be downloaded, and a learner at School B suggested making it available *"on the Play Store for people to access and download".* The developer has submitted the prototype for publication on the Google Play Store. Upon publication, it will allow the app to be found more easily by learners.

Within the app, learners had most difficulty with the food (plate) scanner, the quizzes and some of the games. Some learners described needing help *"with taking pictures"* and *"with scanning my plate"*, and by contrast, other learners described scanning food as one of the easier features. A few learners found scanning a quick response (QR) code confusing. Some learners had to restart and refresh some videos repeatedly. Quiz questions could not be refreshed once a quiz was completed, and some learners assumed that there was a leaderboard and therefore they were unable to find it. Help at home came from a wide network of mothers, fathers, older siblings, aunts, friends and, in one case, neighbours. Where the network was thin, using the app independently was harder:

> *"I found it difficult because I live with my grandmother, and she was unable to help me."*

By the end of the home-use period, every group that was asked said its members could use the app independently, and all said they would use it again.

4.3.3. Engagement with nutrition, physical activity and mental health content

The nutrition section was valued across all six groups. Learners described learning how to tell healthy foods from unhealthy ones, to cut down on sugar and oily food, to drink more water and to choose brown bread over white. How learners felt about the food scanner depended largely on whether they could get it to work. For some learners, it was the feature they enjoyed most, and those who mastered it used it well beyond their own plates:

> *"The app helps me a lot because of scanning food and running, because I used to eat a lot of chocolates, but when I used the FASTA app. I scanned all the food. I scan every food I eat; I even scan for my mother."*

> *"Scanning food, I now eat madumbe (taro) because I didn't eat them before"*

The scanner labelled food as either healthy or unhealthy, which also caused confusion and, at times, discomfort. One learner questioned why potato crisps were labelled unhealthy when *"they are made of potatoes".* Another described giving a burger away after scanning it. A third avoided the feature for fear of being judged:

> *"It was hard for me to scan a picture of my food. I felt someone else would see my food and judge me based on what I'm eating."*

Learners asked for more local foods, naming amasi,(*fermented milk*) sugar beans, chicken feet, tripe and cow's heart. One learner pointed out that the app says nothing about food allergies.

In the physical activity content, running, rope skipping (ingqathu), warm-ups, push-ups and squats were widely enjoyed. Learners linked being active to growth, strength, energy and concentration. The indigenous games divided opinion more than any other feature. Several learners enjoyed stick fighting and umlabalaba (strategy board game), one saying that umlabalaba *"helps with your mind",* and one learner reported that their grandmother *"loved the indigenous games".* Other learners found umlabalaba boring or confusing, and a few learners did not know how to play traditional games at all. Learners asked for mainstream sports, including soccer, netball, volleyball, tennis and gymnastics. Some described activities as *"too tiring",* and one noted seeing *"videos of things I wasn't able to do".*

Mental health was the least understood of the three content areas. When learners in one group were asked what they had learned about mental health, no one answered. In several other groups, learners' answers merged mental health with diet and exercise:

> *"I learned that you must eat healthy because your brain will be tired from eating junk food."*

Learners who had engaged with the mental health features valued them. Some learners named monitoring their emotions and meditation among the parts of the app most useful in daily life. Others mentioned sleep and being able to concentrate in class.

> *"When you are always active, even your mind will always be active wherever you are, including in your thoughts."*

> *"I use the app to relieve stress using the emotional tracker."*

4.3.4. Perceived learning and self-reported behaviour change

Learners in every group reported trying to change at least one behaviour. The changes they described most often were eating fewer sweets, cutting down on fizzy and sugary drinks, drinking more water, eating vegetables they had previously avoided, switching from white to brown bread and exercising at home. Several said family members had noticed:

> *"My mom told me it is a good app because before using it, I did not want to exercise."*
>
> *"My Sister noticed me; I am eating a lot of fruits now because I never used to. Also, she noticed that I eat carrots and scan food using the app for my whole family."*
>
> *"My mother noticed that I now eat healthy, and she now prepares healthy food such as mash. FASTA Chommie taught me to eat healthy."*

Learners were equally clear about what limited change. These limits included taste preferences (*"I like the meat, and it makes me happy"*), the cost and availability of vegetables (*"My parents do not buy vegetables often"*; *"They are expensive"*) and the difficulty of exercising every day. They also included the food environment at home and at school:

> *"Because I stay with people who don't change the behaviours. But they expect me to change."*
>
> *"I changed sugary foods such as sweets. Here at school, we eat so many sweets and ice cream and donuts. My mother said I should stop eating them because I will get sick. So, I should eat healthy food like grapes, carrots, and so on."*

These changes were self-reported after only two weeks of use. In some groups, facilitators' prompts were answered as a group rather than by individuals, so these findings indicate perceived effects rather than measured ones.

4.3.5. Learners as health messengers at home and among peers

A striking finding was how far the app travelled beyond the learner. The app was designed for children, and shaped by their inputs, and contains no content aimed at adults, so everything family members learned from it reached them through the child. Learners at all three schools described showing the nutrition section to mothers, fathers, siblings and grandparents, often explicitly to change what the household ate. One learner showed her mother the app *"so that she would stop eating white bread and eat brown bread"*. A grandmother reportedly began using the nutrition section herself. A father wanted to learn more about physical activity. A learner showed her older brother exercises he could add to his gym routine. Initial scepticism at home sometimes turned into support:

> *"They were unsure at first at home when I started using the app, but after they saw my eating habits changing and me exercising more often, they started supporting it."*
>
> *"My friends noticed that I eat fewer sweets now."*
>
> *"I started drinking more water. My family saw that, and they were happy about it."*

The app also reached learners' friends. They passed on messages about water, vegetables and exercise. One learner won over a doubtful friend by scanning chocolates together, and two sisters competed *"for more carrots and a higher leaderboard"*. Influence had limits, though. Several learners reported that siblings who liked sweets, fizzy drinks or chips had not changed.

Some family encouragement was framed around body weight rather than health: *"My aunt said I must use it so that I won't gain weight"*; *"My mother said I need to be fit like other boys"*; *"My sister encouraged me so that I can lose weight"*. This framing was not part of the app's content, but it shows how quickly weight-related messages can attach to an app of this kind once it enters the home.

4.3.6. Access to devices, data and connectivity

Learners used a mix of their own phones and shared devices, most often their mothers' phones, but also siblings', fathers' and grandfathers' phones, tablets and, in one case, a family laptop. Most relied on mobile data, bought mainly by mothers and grandmothers. For many learners a bundle lasted about a week or less. When data ran out, learners asked a parent to buy more, connected to a mother's, sister's or grandmother's hotspot, used home Wi-Fi where they had it, or simply waited. Homework came first. In one group every learner indicated that homework took priority when data is available. Access was further limited by parental rules on school days, during exams, at night, during church on Sunday mornings and as punishment, and by physical access to the phone.

> *"I cannot use it when I am doing my schoolwork."*
>
> *"When my father leaves the house, I don't have access to his phone, so I don't have access to the internet."*

The majority of the learners said the FASTA app did not use much data, although some learners rationed it. Poor network signal was common, *"especially when the weather is windy"*. Learners almost unanimously said they would use the app more if it worked offline, and one expected this to widen its reach:

"If it was offered offline, more than five friends in school and community members would use it."

"Sometimes I stopped using it when I did not have enough data."

"The signal is bad where we stay."

4.3.7. Learners' suggestions for refinement

Learners' suggestions were practical and specific. The most frequent were offline access and a simpler login without an email address. They also asked for more characters, or the option to use their own photographs; more games and mainstream sports; clearer instructions for activities; reminder notifications to drink water, exercise and eat healthily; and the ability to do activities with friends.

Although the app has no leaderboard, learners at two of the schools expected or wanted one. Learners at one school compared their carrot totals in a race for *"a higher leaderboard",* and one learner at another school wanted a leaderboard placed *"next to all the features"*. Not everyone agreed: another learner felt that *"seeing the ones winning was a bad suggestion".* Voice narration was welcomed, with a clear preference for a familiar voice. Some learners chose their own voice, one explaining, *"because teachers shout"*. Some learners at another school preferred a friend or "bestie", and learners at the third school were split between a teacher's voice, their own and a family member's.

Several learners wanted social features such as video calls and chat. One of them immediately added a safety feature that *"would restrict dirty minds"* and safeguard the app from people with bad intentions. Others wanted music *"that will calm us down"* and challenge-style videos. Learners also proposed widening the app's scope. One group suggested content on plants, water conservation, litter and animals, and another group on the dangers of alcohol and smoking for adults. They suggested promoting the app through posters, Facebook and TikTok, and having teachers use it in class. Table 4 summarises the refinements that follow from these findings.

Table 4: Priority refinements to the FASTA app arising from the pre-testing

Finding	Recommended refinement
Registration and login required adult help	Username with PIN or picture password, with no email required; class registration supported by the teacher during orientation.
Data costs, poor signal and shared devices	Offline-first design that caches content and syncs activity when a connection is available; explore zero-rating with mobile network operators.
Binary scanner verdicts caused confusion and fear of judgement	Graded, non-judgemental feedback (for example "everyday" and "sometimes" foods) with a short reason and an affordable local swap; more local foods; a clear child-friendly explanation in the app of how meal photos are processed.
Some games were confusing or hard to play	In-app tutorials and difficulty levels; fix the restart and refresh faults; add mainstream sports alongside indigenous games.
Mental health was poorly understood	Clearer labelling and concrete content on feelings, stress, sleep and concentration; a visible route to a trusted adult, the LO teacher or the school nurse.
Characters seen as artificial	A wider, less artificial set of avatars with customisation, without uploading real photographs; including a pop-up note to teach children about online safety and to refrain from uploading photos of themselves.
Requests for social features and leaderboards	Keep carrots as a measure of each learner's own progress, with no public ranking; opt-in class challenges moderated by the teacher; no open chat or video calling.
Preference for a familiar voice	Optional narration in isiZulu and English using a peer voice.
Orientation raised expectations the app didn't meet	Match orientation messages and the pamphlet to the features the app actually has.
LO teachers were not fully familiar with the app	A quick-reference guide for teachers, and a hands-on orientation with time to explore the app before learners use it.
Only about one in five learners registered, and most of those who did used the app on a single day	Registration in class during LO lessons; optional reminders, which learners themselves requested; short, regular activities that reward return visits; more of the low-effort, game-like and reflective features that drew the most use.

4.3.8. Life Orientation teacher questionnaire

Two of the three Grade 5 LO teachers completed the questionnaire. The teacher at School C was not available during data collection. Because there were only two respondents, Table 5 presents each teacher's responses individually, grouped by the four sections of the questionnaire.

Table 5: Life Orientation teacher questionnaire responses (n = 2)

Item	School A teacher	School B teacher
Background		
Years teaching LO	6–10 years	Less than 2 years
Section A: Demonstrating the app at school		
Demonstrated the app on own phone during LO lessons	Sometimes	Sometimes
Learners attentive and engaged during demonstrations	Always	Always
Pamphlet a useful tool for learners at home	Always	Always
Felt confident demonstrating and explaining the app	Always	Rarely
Learners used own phones to access the app in class	No	No
Biggest challenge when demonstrating	Technical difficulties; not sufficiently familiar with the app	Learners struggled to follow without their own device
Section B: Reminding learners to use the app at home		
Frequency of reminders	A few times a week	A few times a week
Learners' response to reminders	Very positive	Very positive
Reminder methods	Verbal; reference to pamphlet; through parent or guardian	Verbal
Asked learners whether they had used the app	Almost always	Almost always
Learners reported use without being asked	Sometimes	Sometimes
Family members helping learners use the app	Yes	No
Section C: Supporting learners with questions and difficulties		
Had enough knowledge of the app to answer learners' questions	Not answered	Strongly disagree
Support and guidance before the project were sufficient	Not answered	Agree
Knew how to direct learners to the app and pamphlet	Agree	Neutral
Learners' most common questions or difficulties	Understanding the content; privacy or personal information; app not working at home	App not working at home; no device or data at home
Pamphlet's help with difficult questions	Somewhat helpful	Unsure
Section D: Overall experience		
Additional support that would have helped	More detailed orientation; quick-reference guide for teachers; more time to explore the app	Quick-reference guide for teachers; more time to explore the app
Overall experience as a support teacher	Fair	Good
Willing to take on the role again	Yes, definitely	Yes, definitely

The two teachers agreed closely on how learners received the app. Both found learners highly engaged during demonstrations, both regarded the pamphlet as a useful tool for home use, and both described learners' responses to regular reminders as very positive. Both would definitely take on the support role again. They differed more in how prepared they felt. Their confidence in demonstrating the app ranged from always to rarely, and the less experienced teacher strongly disagreed that they knew enough about the app to answer learners' questions. Both asked for a quick-reference guide and more time to explore the app beforehand. The difficulties learners brought to their teachers mirrored those described in the focus group discussions, namely the app not working at home, limited access to devices and data, understanding the content and concerns about privacy. Teachers' views of family support differed between the two schools.

4.3.9. App usage

Approximately 450 Grade 5 learners received the pamphlet, of whom about 150 also participated in an orientation session. By the time the data were exported, 101 learner accounts had been registered, about one in five of the learners who received the pamphlet, with 51 accounts on the Flutter version and 50 on the React version. The usage records do not identify learners' schools or classes, so registration among learners who attended an orientation session cannot be separated from registration among those who received only the pamphlet. Most accounts (80%; 79%) were first active in August and September 2026, and the week of the 24th to 30th August alone accounted for 64 active accounts and about two-thirds of all recorded activity. Of the 101 accounts, 88 (87%) recorded at least one interaction, giving 7,404 recorded events. Engagement was similar on the two versions, with a median of 21 and 19 events per account but was mostly brief. The median account was active on a single day, 38% returned on two or more days, and 14% used the app over a period of at least one week. About 65% of activity took place between 15:00 and 21:00, consistent with use at home after school, and about 94% came from the web versions rather than the Android apps.

Nutrition was the most used module, followed by physical activity and mental wellness (Table 6). The most widely used features were the emotions tracker and the healthy-meal game, each used by 41% of accounts, followed by hydration logging, gratitude entries and guided meditation. Features that took more effort were used rarely: 9% of accounts used the plate scanner and 1% the food-frequency questionnaire. Learners collected a median of four carrots.

Table 6: App use by module and feature (101 registered accounts)

Module or feature	Share of all events	Accounts that used it (% of 101)
Nutrition module	41%	64%
Physical activity module	21%	58%
Mental wellness module	14%	55%
Emotions tracker	-	41%
Healthy-meal game		41% opened; 29% completed a round
Hydration logging	-	32%
Gratitude entries	-	30%
Guided meditation	-	26%
Plate scanner	-	9%
Food-frequency questionnaire	-	1%

The app performed adequately on the devices learners had, which typically had 4 GB of memory, and on connections that were third-generation (3G) or slower for a third of web accounts. Pages loaded within accepted benchmarks for good performance, screens moved smoothly, battery use was low, and 95% of sessions were free of errors. Most errors that occurred were caused by lost or weak network connections rather than faults in the app. The main weakness was the time the React PWA took to respond to taps, which was slower than recommended.



DISCUSSION



5. Discussion

The FASTA study set out to determine whether a co-created smartphone app could be a feasible and acceptable vehicle for diet, physical activity and wellbeing promotion among Grade 5 learners in a resource-constrained district of KwaZulu-Natal. Over three years it moved from formative research with learners, teachers, principals and school nurses, through the co-development of a context-specific content library, to the pre-testing of a working prototype in schools and homes. Taken together, the two phases tell a consistent story. The needs, enthusiasm and constraints identified in the elicitation research shaped the app, and pre-testing largely confirmed both the promise and the constraints that school staff and learners had anticipated. The app proved highly acceptable to the children it was designed for. Its feasibility, however, depends less on the app itself than on the conditions around it: the school's capacity to support health promotion, the household's food environment, and children's access to devices, data and helpful adults.

The elicitation research showed why a new approach was needed. Health promotion in the participating schools was largely ad hoc and poorly resourced. The LO teachers reported limited training in nutrition and physical activity, school nurses were responsible for large numbers of schools, and competing academic demands reduced the time available for LO. Nurses reported that the WHO Health Promoting Schools initiative was not always implemented in practice, even though two of the three schools were part of the programme. The health-promoting schools approach depends on a supportive environment, integrated health education and strong school–community links [10, 12, 39], and these conditions were only weakly present. Against this background, school staff saw a well-designed app as a way to extend what they could offer. They did not see it as a replacement for teaching or health services, but as a resource that could support LO lessons and reach learners at home. The LO teacher questionnaire showed that teachers were willing to take on this role. Both teachers who responded reminded learners to use the app several times a week, found learners highly engaged, and would definitely support the app again. However, it also showed that the training gap identified in Phase 1 applies to the app itself. One teacher felt they lacked enough knowledge of the app to answer learners' questions and rarely felt confident demonstrating it, the other named limited familiarity with the app as a key challenge, and both asked for a quick-reference guide and more time to explore the app beforehand. An intervention that depends on teachers finding extra time, or on nurses visiting more often, is unlikely to be sustained. Integrating FASTA into existing LO content, with a short teacher guide, adequate orientation and minimal additional demands on teachers, is therefore a design requirement rather than an option.

Sekhon and colleagues' theoretical framework of acceptability offers a useful lens on how learners received the app [46]. Learners' affective attitude towards the app was strongly positive, and their repeated sense that it was *"made for people like me"* is exactly the outcome co-creation aims for. Phase 1 learners asked for games, challenges, and rewards, and for content that looked after the mind as well as the body. The content library developed in Phase 2A responded with the carrot reward system, physical activity games that include indigenous games, and a mental health module. The app was designed for children and shaped by their inputs; parents and caregivers were not the target audience, although they supported learners during home use. The learners who tested the app in 2026 were a new Grade 5 cohort who had played no part in its design, yet they repeatedly described it as *"made for people like me"*. This suggests that the co-creation process captured the needs and preferences of the age group as a whole, not only those of the children who participated in it. Intervention coherence, meaning how well users understand what an intervention is for and how it works, was high for nutrition and physical activity and low for mental health. Perceived effectiveness was high in learners' own accounts. The effort of using the app, however, was concentrated at one point: logging in. Use was also limited by what learners had to give up in order to use the app. Mobile data were scarce, and when learners had data, most spent it on homework first, leaving little for FASTA.

The app's usage records add an important counterweight to learners' own reports. Of the approximately 450 learners who received the pamphlet, only about one in five went on to register an account. This uptake is consistent with the barriers learners described: registration that required an email address and adult help, shared devices that were not always available, and the cost of data. Because only one class per school also received a supervised orientation, and the records do not show which learners registered, the study cannot say how much the orientation added compared to only receiving the pamphlet. That comparison is worth building into FASTA-Schools. Among those who did register, 87% used the app at least once and more than half used each of the three modules, but the median account was active on a single day, fewer than two in five returned, and only one in seven used the app across a full week. This does not contradict the enthusiasm learners expressed in the FGDs, but it does mean that the changes they described are best read as a response to a first, intensive encounter with the app rather than to sustained use. The features that drew the most use were low-effort, game-like or reflective, such as the emotions tracker and the healthy-meal game, while tools that required more effort or data entry were rarely used. For FASTA-Schools, the two main challenges are therefore getting learners into the app in the first place and sustaining their engagement beyond the first visit. A simpler login, offline access and in-school registration during LO lessons address the first; reminders, which

learners themselves requested, and short activities that reward return visits address the second.

One of the clearest threads running through both phases is the gap between knowing and doing. In Phase 1, learners showed a basic understanding of healthy eating, yet listed fried and sugary foods as their favourites, and they pointed to the availability of unhealthy food in school tuckshops and at home. In Phase 2B, learners reported eating fewer sweets, drinking more water and exercising more at home. These are encouraging signs, but they come from a two-week exposure and were reported in group settings where agreement tends to be amplified, so they are best read as early and intended change rather than evidence of effect. Learners were equally clear about what limited change: vegetables that households could not afford or did not buy, family members who *"don't change the behaviours"* but expect the child to, and sweets, ice cream and doughnuts that are readily available at school. The HealthKick trial in the Western Cape showed the same pattern. It improved learners' nutrition knowledge and dietary self-efficacy but not their eating behaviour [24] or the quality of their diets [25], and its process evaluation identified limited parental involvement as a key barrier to implementation [26]. Phase 1 school staff described a similar constraint in iLembe: working parents often lacked the time to prepare regular meals, and household socio-economic circumstances shaped what families ate. Bronfenbrenner's ecological systems model captures why knowledge alone is not enough [47]. The app reaches the child directly, but the household, the school tuckshop and the wider food economy determine much of what the child can act on.

The most important finding across the study may be the role of the household. In Phase 1, school staff suggested that an app for learners could also benefit adult nutrition and family health, and learners said they wanted their parents and teachers to have the app too. The app itself contains no content aimed at adults. Even so, Phase 2B showed that it reached adults through the children who used it. Learners showed the nutrition section to mothers, fathers and grandmothers and asked family members to change what they ate. One grandmother reportedly began using the nutrition section herself after her grandchild showed it to her, and one mother reportedly began cooking healthier meals at her daughter's prompting. Everything family members learned from the app came to them through the child. This reverse flow of health information, from child to adult, is rarely designed for, yet it suits a digital intervention that often lives on a family's shared phone. It is consistent with the child participation literature, which argues that children can be active agents in health promotion when their views are taken seriously [8]. It also supports the caregiver arm planned for a new FASTA-Schools study and suggests that the arm should build on children's role as messengers rather than bypass this. The same finding carries an equity warning. In Phase 1, a school nurse noted that many children *"live with grannies"* and lack access to smartphones. In Phase 2B, learners living with grandmothers who could not help them were among those least able to use the app independently. Reducing the app's reliance on adults' digital literacy and skills is therefore a matter of fairness as well as usability.

Weight stigma is a second thread that links the phases. Phase 1 learners associated obesity with being bullied and called names such as "sdudla mafehlefehle" (isiZulu and translates to "fatty"), and the content developed in Phase 2A was deliberately framed to avoid stigmatising language. Phase 2B showed how easily weight-related messages can attach to an app once it enters the home, through family encouragement to use it *"so that I won't gain weight*" or to be *"fit like other boys"*. The food scanner illustrates both the promise and the risks of engaging features. Where learners could operate it, it was among the best-loved parts of the app and the most direct route to reflecting on everyday food choices. Where they could not, it became a source of frustration, most often because learners needed help to photograph their food, and in one case because a learner feared that others would see her meal and judge her. The scanner's value therefore depends on first making it easier and safer to use. The usage records suggest that relatively few learners used the scanner at all: only 9% of accounts did so, which is consistent with the effort and adult help it required. Its prominence in some FGDs may therefore reflect the experience of a small but enthusiastic group rather than the wider cohort. Its healthy-or-unhealthy verdicts also resulted in problems. Learners were confused by some of them, asking, for example, why potato crisps are unhealthy if they are made of potatoes. In a few cases, the verdicts prompted behaviour that points towards shame and seeing foods as "good" or "bad", such as giving food away after scanning it. Stigma is itself harmful to children's health and wellbeing [48]. Feedback that grades foods rather than passing judgement, explains its reasoning, and offers affordable, familiar alternatives drawn from the local foods learners named is more likely to build lasting food literacy than a simple healthy-or-unhealthy verdict.

The indigenous games occupy a similarly double-edged position. They were included because of their low cost, cultural resonance and their national promotion through the Indigenous Games Festival. For some learners, and at least one grandmother, they were a highlight and a point of connection across generations. For others, they were confusing or unfamiliar. This does not suggest removing indigenous games. It argues for supporting them with tutorials and graded difficulty, and for placing them alongside the mainstream sports learners already play, so that heritage becomes an invitation rather than a barrier.

Mental health shows most clearly how the study responded to learners, and how much work remains. It was not part of the original study design. Learners raised it during the elicitation research, and it was added to the content library in Phase 2A. Evidence supports this choice: physical activity is associated with better mental health in children and adolescents, although effects are small

to moderate [40], while sedentary screen time [49] and unhealthy dietary patterns [41] are associated with poorer mental health. Yet in Phase 2B, mental health was the content area learners understood least. Many folded it into eating and exercising, which suggests that the concept, as presented, was too abstract for ten- to twelve-year-olds. The usage records, however, show that the mental wellness features were among the most widely used in the app: 41% of accounts logged an emotion, 30% made gratitude entries, and 26% used guided meditation. Learners used these features readily but did not recognise them as "mental health", which points clearly to the way the module is labelled and introduced rather than to its content. Framing the module around experiences children recognise, such as feelings, stress, sleep and concentrating in class, is likely to improve understanding. Because the app invites children to record negative emotions, it must also offer a clear, age-appropriate route to a trusted adult, the LO teacher or the school nurse, and must not be positioned as a substitute for support.

The access barriers identified in Phase 2B were anticipated from the start. In Phase 1, school staff warned that data was expensive, that devices were shared within households and that an app requiring data would be hard for many families to use. These concerns shaped the Phase 2A decision to build a mobile web app designed to keep data use as low as possible. Phase 2B confirmed that the concerns were justified. Data were typically bought by mothers and grandmothers, often lasted around a week, and was rationed between homework, communication and entertainment, with homework consistently given priority. Mobile network coverage is now almost universal, reaching 99% of the population even in rural KwaZulu-Natal [35], so the barrier is affordability and signal quality rather than the absence of a network. The usage records confirm this. A third of web-version accounts were on 3G or slower connections, most errors were caused by lost connections rather than faults in the app, and about 94% of use came through a web browser rather than the Android apps, supporting a web-first, offline-capable design. In this setting, learners' near-unanimous request for offline access is not a preference but a condition of feasibility at scale. Content caching and offline activity logging should be treated as core requirements. Zero-rating agreements with mobile network operators, together with structured in-school use during LO lessons, could complement home use and reduce dependence on household data.

Finally, learners' requests for photographs, leaderboards, chat and video calls point to a design tension that the FASTA-Schools trial must resolve before scale-up. The app deliberately has no leaderboard, yet several learners expected one, and sisters at one school created their own competition by comparing carrot totals. Social comparison and connection clearly motivate children, but the same features carry privacy and safeguarding risks for primary school children, and not all learners welcomed this ranking system. Learners themselves were alert to these risks ("I would restrict dirty minds"). South Africa's Protection of Personal Information Act (POPIA) requires the consent of a competent person, such as a parent, before a child's personal information is processed [50]. The United Nations Committee on the Rights of the Child's General Comment No. 25 calls for digital services used by children to be safe and private by design [51]. Profile photographs, images of household meals and email-based accounts all add to the personal information the app holds, and meal photographs taken with the plate scanner are currently analysed by a commercial AI service. The app should therefore explain in child-friendly language how photographs are processed and keep them only as long as necessary, and the team should confirm that this processing is covered by the consent obtained. The current design, in which carrots track each learner's own progress, is therefore sound. Any shared challenges added in future should be opt-in, moderated by the class teacher, free of public ranking, and should use avatars rather than real photographs, with no open messaging.

This study has a number of strengths. The app's content was co-created with Grade 5 learners in 2024 and tested in 2026 with a new Grade 5 cohort that had played no part in designing it, which provides an independent test of whether the app speaks to children of that age. Phase 1 brought together the perspectives of learners, LO teachers, school principals and school nurses, and each phase built directly on the one before. Data were collected in both English and isiZulu. Prototype testing included two weeks of real-world home use rather than only supervised trials. Both phases included single-gender as well as mixed-gender focus groups, and the app's usage records allowed learners' own reports to be compared with what they actually did. The findings should also be read in light of several limitations. The three schools were purposively selected by district health and education officials; two of them were implementing the health-promoting schools programme, and all are in one sub-district, which limits how far the findings transfer to other settings. FGD participants came from the classes that had received a supervised orientation, so their experience of the app may have been more positive than that of learners who received only the pamphlet. Behaviour change was self-reported after a short exposure, and some responses were given collectively, which raises the risk of social desirability and conformity bias. The app's usage records accounts rather than learners and do not identify schools or classes. Some learners registered with a parent's email address or shared a device, so account numbers cannot be matched exactly to individual learners, and comparisons involving the native Android versions rest on very few users. Only two of the three LO teachers completed the questionnaire, so teacher perspectives on the pre-testing phase are limited and are reported individually. Finally, translating isiZulu contributions into English may have lost some nuance.

CONCLUSION



6. Conclusion

The FASTA study has shown that a smartphone app co-created with Grade 5 learners in iLembe District can respond to a real gap in school-based health promotion and can be highly acceptable to the children it serves. It has also shown that the app can carry health messages from children into their households, even though it contains no content aimed at adults. The elicitation research identified schools where health promotion was ad hoc and under-resourced, learners whose knowledge of healthy eating was not matched by their food choices, and school staff who welcomed a digital tool but anticipated barriers of data, devices and household circumstances. The content library turned these findings into age-appropriate, culturally grounded material on nutrition and physical activity, together with a mental health module that learners themselves requested. Pre-testing with a new cohort of Grade 5 learners, who had played no part in designing the app, showed that they too saw it as made for children like them, and confirmed the barriers school staff had foreseen.

Across both study phases, the study also shows that acceptability is not the same as feasibility. Whether children can benefit from the app depends on whether they can log in without help, whether it works when data runs out or the signal drops, whether its feedback builds food literacy without shame, whether they keep using the app beyond their first visit, whether their teachers feel confident enough with the app to support them, and whether the food environments at home and at school allow children to act on what they learn. Several of these conditions are within the study's reach before the FASTA-Schools cluster randomised controlled trial (cRCT) begins. The app can be given a simpler login, offline functionality, graded and non-judgemental scanner feedback, scaffolded games, a clearer mental health module and privacy-protective design, and teachers can be given a quick-reference guide and a fuller orientation.

For practice, the findings support integrating the app into LO lessons as a supervised complement to home use, that adds little to teachers' workload and is backed by a simple guide that helps teachers answer learners' questions.

This would give every learner, whatever their household's data or device situation, a guaranteed point of access and a teacher on hand to help. For policy, the findings add to the case for zero-rated access to child health content, for genuine implementation of the Health Promoting Schools initiative, and for healthier school food environments, without which individual behaviour change will remain difficult to sustain. For research, the refined app now provides a tested foundation for the FASTA-Schools trial. That trial should combine learners' own reports with the app's usage records, which in this study gave a clearer picture of how briefly most learners engaged, and should use measures that are affordable and suited to the local context. Through its caregiver arm in the FASTA- Schools study, it should also test how best to build on the household influence that learners so clearly demonstrated here.

APPENDICES



7. Appendices

7.1 Appendix 1: Learner FGD schedule

Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention (FASTA).
Focus Group Discussion for Adolescents

*****For Facilitator*****

Welcoming address & Ethics

- Thank you for agreeing to participate in this discussion.
- Overweight and obesity are increasing among South African children, with more people moving to urban areas, which leads to less walking, more television watching, and less exercise. This can lead to a greater risk of illness and health conditions. The chronic disease burden continues to grow in both rural and urban areas, with a particularly high prevalence of obesity among adolescent females. The lack of availability of nutritious, affordable food from street vendors and school tuck-shops, limited resources and the absence of lifestyle-related health policies are common barriers to promoting healthy eating in schools. Lack of physical activity and sport in schools, and excessive screen time, contributes to physical inactivity.

This study aims to understand what you as adolescents understand about health promotion related to diet and physical activity, such as playing, moving around/running, or playing a sport. It is about your beliefs, ideas, cultural beliefs, and attitudes about obesity, as well as the successes and challenges about health promotion in schools, particularly regarding diet and physical activity. Lastly, it aims to identify your perspective on mobile health and whether mobile technology has a place in addressing health issues, especially in preventing overweight and obesity prevention.

- I am interested in learning about your knowledge, experiences and attitudes regarding diet andphysical activity as part of health promotion. I want to understand what you consider as successes and challenges for health promotion on diet and physical activity at the schools within the iLembe district. I will also be asking you about mobile phone apps and its potential use for supporting diet and physical activity.
- I am going to ask a few questions about this aspect
- NOTE that I will not be contributing to the discussion, but I will moderate the session by keeping track of time and ensuring that all issues are discussed.
- We want to hear what you think about these topics. There are no yes/no questions
- We value what each person has to say but we will not be recording names when you speak. We want to learn what you as young people think.
- I will be recording the session, so, please speak loudly and clearly to ensure everything you say is captured. Avoid *speaking over each other.*
- All ethical protocols will be observed (confidentiality, autonomy, honesty, etc.)

Perceptions, Barriers, and Facilitators to Physical Activity and Leisure Screen Time

1. What types of physical activity do you do? (You may need to explain that you are talking about exercise)
2. What activities related to PA/exercise do you participate in at school?
3. What prevents you from participating in physical activity that you would like to do at school?
4. What physical activity activities are you involved in after school (club, community initiative, etc.)
5. What other work at home needs physical activity?
6. (Probe: Going to the shops? Running, cycling, climbing, gardening?)
7. Do you think your school facilities and friends make it easier or harder to do physical activity? (Probe: Why and how?)
8. How much of your leisure/free time do you spend watching screens such as TV, laptop, tablet, cell phone? (Probe what they watch or do with screen time).

Food and Eating

1. Do you think that your current eating habits and food choices are good? (Probe: if yes, why?, if not, ask why? What would you like to change?)
2. Do you enjoy the food you eat at home (if yes, why? if no, probe why?)
3. Do you enjoy the food given to you at school (if yes, why? if no, probe why?) (if school does not provide a meal, ask about food brought from home, food shared by friends)
4. What do you think are considered healthy foods at your age? (Probe: how often do you eat it)
5. Do you like cakes, sweets, Simba chips (or other brands), magwinya, slap chips, cool drink, or any other luxuries (name them).

(Probe yes or no, why)

6. Do you think you need to know any information on food labels and how that can help you eat healthily?
7. Does your school have a fruit or vegetable garden to grow fruit and/or vegetables for anyone at school to eat? (Probe: if yes, which vegetables are grown in the gardens, is it used for school meals, who benefits most from the fruits and vegetables grown in the gardens; if no, do you think it is important to have a garden, and why)

Adolescent understanding of overweight and obesity

1. In your opinion, how important is it for the learners to eat healthy foods and to be active and play some sport. (Probe: why)
2. If children eat unhealthily and they don't do physical activity, do you think they will gain weight and be uncomfortable?
3. If you gain too much weight, do you think it would affect your health, or the way you are able to do things? (Prompt: would you be able to play with your friends or play sports.)
4. Who do you think is responsible for helping children to be healthy? (Prompt: Parents, themselves, community, nurses, school, Government)
5. What do you think can help children to be and stay healthy? (Prompt: learning about choices at school, healthy eating, being physically active, learning from school nurses, support from teachers/parents)
6. What do you think are some of the things that prevent children from making healthy choices? (Prompt: tuck-shop/vendors, advertising, lack of sport facilities, safety concerns).
7. At school, during the LO subject, does your teacher talk about eating healthy foods and playing sport? (Probe: If yes, what does the teacher say or do about it)

Opinions Regarding Content and Delivery of Mobile Application

We're thinking about developing an app that can be accessed on a phone to help children make healthy choices.

1. Does your school have internet access? Is this used for educational purposes? Please explain.
2. Do you have internet access at home? If, yes, what is it used for? (recreation, sport, etc.)
3. Does your household have a cell phone? Or a smart phone? Are you allowed to use it?
4. Have you used any cell phone apps or computer-based programme to help you with anything regarding your health? Tell me more. (probe: content, nature, effectiveness of app/programme).
5. What are your thoughts on using a mobile app to learn more about healthy eating, how you keep fit and exercise?
6. Where do you think the app should be available to you at home (on an adult's phone), or at school during an LO lesson? (Tell us why?)
7. Do you think your parents should be involved in this app? To what extent?
8. What do you think the app should contain? (Probe: games, animated stories, exercise targets/instructions).

7.2 Appendix 2: Principal KII schedule

Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention (FASTA).

*****For interviewer*****

Introduction: Greet [good morning/day/afternoon]. Introduce yourself [My name is XXXX and I am a research assistant/research team member from the HSRC]. I am here to do a key informant interview with you. Let me take a few minutes to tell you about the study. The study is titled Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention.

Overweight and obesity is increasing in South African children, with urbanization and other health determinants leading to reduced physical activity and unhealthy eating, resulting in an increased risk of adverse chronic health conditions. In South Africa the chronic disease burden continues to grow in both rural and urban areas, with a high prevalence of adolescent obesity, especially in females. The availability of low nutritional value and inexpensive foods from street vendors and school tuck-shops, limited resources and lack of lifestyle related health policies are common barriers to promoting healthy eating in schools. Currently, although health-promoting schools are present in the KZN Province there is a lack of documented healthy eating and physical activity intervention programmes at the schools. The current obesity prevalence trends accentuate the significance of designing and implementing overweight and obesity interventions that are effective. Due to the increasing usage of cellular phones and smartphones, the usage of mHealth interventions for the promotion of diet and physical activity looks promising. Therefore, the study aims to identify the extent to which health promotion has been utilized in the schools and the attitudes of key stakeholders such as school principals towards the prevention of childhood obesity regarding diet and physical activity. The study also aims to identify facilitators and barriers for health promotion regarding diet and physical activity in the schools in the iLembe district according to the key stakeholders such as yourself.

- I am going to ask a few questions about what I have just explained.
- We want to hear what you think about these topics. Please share as much as you like and can.
- I will record the session, so, please speak loud and clearly so I can record everything you say.
- All ethical protocols will be observed (confidentiality, autonomy, honesty, etc.)

Name and Code

Name		Code	

1. What is your understanding of the consequences of an adolescent being overweight/obese?
   (Prompt: short-term health problems, long-term health problems, emotional and mental well-being- e.g. bullying, social exclusion)

2. Generally, what do you think are some of the barriers to helping adolescents achieve and maintain a healthy weight?
   (Prompt: diet, snacks, drinks, tuck shops/vendors, school meals, food preparation, portion sizes, physical activity, money, safety issues, advertising)

3. At school, what do you think are some of the barriers to helping adolescents achieve and maintain a healthy weight?
   (Prompt: Food choices, resources, exercise, tuck-shop/vendor choices, advertising, sport facilities, safety)

4. Who do you think is responsible for helping adolescents achieve a healthy weight?
   (Prompt: Parents, themselves, school, community, nurses, school, Government)

5. How do you think schools could facilitate promoting a healthy weight in adolescents?
   (Prompt: assessments, education programmes, physical activity programmes, referrals, support groups, gyms, sports clubs, policies, school health team)

6. What do you think are some of the other support structures/systems that help adolescents achieve a healthy weight?
   (Prompt: sport facilities, doctors, nurses, community or private initiatives)

7. One of the policies of the Department of Education and Health covers Health Promotion in Schools.
   Have you attended any workshops that have introduced Health Promoting Schools (HPS) into the curriculum? (Prompt: explain content)

8. We are interested in improving the health of school-going learners and raising awareness about these issues. What current guidelines or policies or activities are you engaging with to assist your school with health promotion?

9. What are your concerns about the policies/guidelines/activities, if any, which affect health promotion in schools?

10. What support and resources, if any, are being provided and by whom to assist your school as an HPS?

11. What do you think is currently being done by the national and local governments for health promotion in schools, other than what is already in the policy/ies?

12. What should the local and national governments plan to do for health promotion in schools, if it is not currently being done?

13. Do you report to other staff or community members about YOUR health promotion activity, if you have one? (Prompt: monitoring and accountability)

14. Is the School Governing Body at this school involved in school health promotion? If yes, what type of activities are encouraged and if no, do you think that they would be interested in working with you in doing this?

15. As a principal/decision maker what are the barriers that you experience, that prevents a health promotion program such as diet, physical activity and lifestyle changes being implemented and sustained?

16. We are interested in finding out if technology such as mobile apps can be used for educational purposes e.g. diet and physical activity.
    a. Does your school have internet access? Is this used for teaching purposes, and do the learners have access to it? Please explain.
    b. What proportion of children bring cell phones to school? (Probe: Is it a tablet, smartphone?)
    c. In your opinion, if households have cell phones would children have access to such phones for learning purposes?
    d. What are your thoughts on delivering diet and physical activity interventions for adolescent obesity prevention using smartphone technology?

17. Is there anything else that you would like to state or share?

Thank you

7.3 Appendix 3: LO teacher KII schedule

Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention (FASTA).

*****For interviewer*****

Introduction: Greet [good morning/day/afternoon]. Introduce yourself [My name is XXXX and I am a research assistant/research team member from the HSRC]. I am here to do a key informant interview with you. Let me take a few minutes to tell you about the study. The study is titled Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention.

Overweight and obesity is increasing in South African children, with urbanization and other health determinants leading to reduced physical activity and unhealthy eating, resulting in an increased risk of adverse chronic health conditions. In South Africa the chronic disease burden continues to grow in both rural and urban areas, with a high prevalence of adolescent obesity, especially in females. The availability of low nutritional value and inexpensive foods from street vendors and school tuck-shops, limited resources and lack of lifestyle related health policies are common barriers to promoting healthy eating in schools. Currently, although health-promoting schools are present in the KZN Province there is a lack of documented healthy eating and physical activity intervention programmes at the schools. The current obesity prevalence trends accentuate the significance of designing and implementing overweight and obesity interventions that are effective. Due to the increasing usage of cellular phones and smartphones, the usage of mHealth interventions for the promotion of diet and physical activity looks promising. Therefore, the study aims to identify the extent to which health promotion has been utilized in the schools and the attitudes of key stakeholders such as Life Orientation (LO) teachers towards the prevention of childhood obesity regarding diet and physical activity. The study also aims to identify facilitating and constraining factors for health promotion regarding diet and physical activity in the schools in the iLembe district according to the key stakeholders such as you.

- I am going to ask a few questions about what I have just explained.
- We want to hear what you think about these topics. Please share as much as you like and can.
- I will record the session, so, please speak loud and clearly so I can record everything you say.
- All ethical protocols will be observed (confidentiality, autonomy, honesty, etc.)

Name and Code

Name		Code	

1. What is your understanding of the consequences of an adolescent being overweight/obese?
   (Prompt: short-term health problems, long-term health problems, emotional and mental well-being- e.g. bullying, social exclusion)

2. Generally, what do you think are some of the barriers to helping adolescents achieve and maintain a healthy weight?

3. At school, what do you think are some of the barriers to helping adolescents achieve and maintain a healthy weight?
   (Prompt: Food choices, resources, exercise, tuck-shop/vendor choices, advertising, sport facilities, safety)

4. Who do you think is responsible for helping adolescents achieve a healthy weight?
   (Prompt: Parents, themselves, school, community, nurses, school, Government)

5. How do you think schools could facilitate promoting a healthy weight in adolescents?
   (Prompt: assessments, education programmes, physical activity programmes, referrals, support groups, gyms, sports clubs, policies, school health team)

6. What do you think are some of the other support structures/systems that help adolescents achieve a healthy weight?
   (Prompt: sport facilities, doctors, nurses, community or private initiatives)

7. Have you attended workshops for (life skills/ life orientation) teachers regarding modification in diet and physical activity for healthy living for adolescents.
   (Probe when, where, what it involved)

8. Do you encourage learners at school to eat healthy and be active and happy with their body?
   (Probe: how, what do you say do, what worked and did not work)

9. Does the school serve a breakfast or lunch to the learners?
   (Probe: if yes, do you consider the meal to be healthy, are all food groups represented in the meal; if no, why not)

10. Does the school have a garden to grow fruit and/or vegetables for consumption?
    (Probe: if yes, which vegetables are grown in the gardens, is it used for school meals or community, who benefits most from the fruits and vegetables grown in the gardens; if no, do you think it is important to have a garden, and why)

11. Is there a sports ground for learners to use for physical activities?
    (Probe (if no), why, what happened to it if there was one prior; if yes, what are the common sport or activities that the learners enjoy during lunch breaks and after school activities?)

12. What do you think is currently being done by the national and local governments for health promotion in schools, other than what is already in the policy/ies?

13. What should the local and national governments plan to do for health promotion in schools, if it is not currently being done?

14. We are interested in finding out if technology such as mobile apps can be used for educational purposes e.g. diet and physical activity.

    a. Does your school have internet access? Is this used for teaching purposes, and do the learners have access to it?
    b. What proportion of children bring cell phones to school? (Probe: Is it a tablet, smartphone?)
    c. In your opinion, if households have cell phones would children have access to such phones for learning purposes?
    d. What do you think about using technology such as a mobile app to learn about diet and physical activity for healthy living to make it more interesting and informative for the learners and their families?
    e. Would you be interested in learning new methods of communicating information and encouraging learners to choose healthy foods and get involved in exercise through an app?
    f. What are your thoughts on delivering diet and physical activity interventions for adolescent obesity prevention using smartphone technology?

15. Is there anything else that you would like to state or share?

Thank you

7.4 Appendix 4: School nurse KII schedule

Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention (FASTA).

*****For interviewer*****

Introduction: Greet [good morning/day/afternoon]. Introduce yourself [My name is XXXX and I am a research assistant/research team member from the HSRC]. I am here to do a key informant interview with you. Let me take a few minutes to tell you about the study. The study is titled Evaluation of the feasibility and acceptability of smartphone technology in delivering diet and physical activity interventions for adolescent obesity prevention.

Overweight and obesity is increasing in South African children, with urbanization and other health determinants leading to reduced physical activity and unhealthy eating, resulting in an increased risk of adverse chronic health conditions. In South Africa the chronic disease burden continues to grow in both rural and urban areas, with a high prevalence of adolescent obesity, especially in females. The availability of low nutritional value and inexpensive foods from street vendors and school tuck-shops, limited resources and lack of lifestyle related health policies are common barriers to promoting healthy eating in schools. Currently, although health-promoting schools are present in the KZN Province there is a lack of documented healthy eating and physical activity intervention programmes at the schools. The current obesity prevalence trends accentuate the significance of designing and implementing overweight and obesity interventions that are effective. Due to the increasing usage of cellular phones and smartphones, the usage of mHealth interventions for the promotion of diet and physical activity looks promising. Therefore, the study aims to identify the extent to which health promotion has been utilized in the schools and the attitudes of key stakeholders such as school nurses towards the prevention of childhood obesity regarding diet and physical activity. The study also aims to identify facilitating and constraining factors for health promotion regarding diet and physical activity in the schools in the iLembe district according to the key stakeholders such as you.

- I am going to ask a few questions about what I have just explained.
- We want to hear what you think about these topics. Please share as much as you like and can.
- I will record the session, so, please speak loud and clearly so I can record everything you say.
- All ethical protocols will be observed (confidentiality, autonomy, honesty, etc.)

Name and Code

Name		Code	

1. What is your understanding of the consequences of an adolescent being overweight/obese?
   (Prompt: short-term health problems, long-term health problems, emotional and mental well-being- e.g. bullying, social exclusion)

2. Generally, what do you think are some of the barriers to helping adolescents achieve and maintain a healthy weight?
   (Prompt: diet, snacks, drinks, tuck shops/vendors, school meals, food preparation, portion sizes, physical activity, money, safety issues, advertising)

3. At school, what do you think are some of the barriers to helping adolescents achieve and maintain a healthy weight?
   (Prompt: Food choices, resources, exercise, tuck-shop/vendor choices, advertising, sport facilities, safety)

4. Who do you think is responsible for helping adolescents achieve a healthy weight?
   (Prompt: Parents, themselves, school, community, nurses, school, Government)

5. How do you think schools could facilitate promoting a healthy weight in adolescents?
   (Prompt: assessments, education programmes, physical activity programmes, referrals, support groups, gyms, sports clubs, policies, school health team)

6. What do you think are some of the other support structures/systems that help adolescents achieve a healthy weight?
   (Prompt: sport facilities, doctors, nurses, community or private initiatives)

7. Who is responsible for administering the nutrition services in schools specifically?
8. What structures/resources are in place to deliver the nutrition services in schools?

9. How often do the person/people responsible for nutrition-related services visit the school/s AND which services are currently provided?

10. Are there any NGOs, community-based projects or faith-based projects that are working with the school with regards to nutrition issues?

11. What do you think is currently being done by the national and local governments for health Promotion (diet and physical activity) in schools, other than what is already in the policy/ies?

12. What should the local and national governments plan to do for health promotion (diet and physical activity) in schools, if it is not currently being done?
    (Prompt: Advertising, tax, education programmes, physical activity programmes, parks, community gyms)

13. We are interested in finding out if technology such as mobile apps can be used for educational purposes e.g. diet and physical activity.
    a. How many of the schools that you visit do have internet access? (Number of schools with internet access/number of schools visited by school health teams?)
    b. In your opinion do you think it is useful to provide more information about the importance of good nutrition and the dangers of being overweight to parents and their children? (Probe: Why?)
    c. In your opinion, if households have cell phones would children have access to such phones for learning purposes?
    d. What are your thoughts on delivering diet and physical activity interventions for adolescent obesity prevention using smartphone technology?

14. Is there anything else that you would like to state or share?

Thank you

7.5 Appendix 5: FASTA Pamphlets



FASTA CHOMMIE

FUEL YOUR BODY. EMPOWER YOUR FUTURE.

APP LAUNCH!

*A smarter, healthier generation **starts here.***

THE ADOLESCENT NUTRITION & PHYSICAL ACTIVITY APP

FASTA CHOMMIE is your all-in-one app designed for adolescents to make healthy choices, stay active, boost your mood and build a stronger, **healthier YOU!**



WHAT YOU'LL FIND INSIDE

NUTRITION
Discover healthy foods, build smart meals and make better choices every day.

PHYSICAL ACTIVITY
Fun ways to get active, improve fitness and challenge yourself.

MENTAL HEALTH
Tips and tools to manage stress, build confidence and feel good inside and out.

NCDs AWARENESS
Learn about non-communicable diseases, how to prevent them and live a healthier life.

LEARN PLAY GROW THRIVE!

ALL IN ONE APP!

MADE FOR YOU. BY YOU.

Co-designed with young people for young **people.**

LAUNCH DATE
Coming Soon!

WHERE
Schools, Communities & Online Platforms

WHO CAN USE IT?
All adolescents!
Teachers, parents, coaches & community members are welcome to explore and support.

SCAN TO DOWNLOAD & BE PART OF THE HEALTHY GENERATION!

WHY FASTA?

- Easy to use
- Fun & interactive
- Backed by science
- Empowers you every day

Healthy Habits. Strong Minds. Active Lives. | Together, we can build a **healthier South Africa!**

7.6 Appendix 6: Learner FGD schedule for app usage

FASTA GRADE 5 ADOLESCENT FOCUS GROUP DISCUSSION INSTRUMENT

Purpose
To explore adolescents' experiences, perceptions, usability challenges, behaviour changes, and suggestions for improvement related to the FASTA mobile app.

Duration
Approximately 90 minutes

Group Size
6–10 participants per group

Materials Needed
- Printed screenshots or a demo of the app
- Book and pen to make additional notes
- Audio recorder (with permission)

1. Opening (5 minutes)
Facilitator script:
"Thank you for joining me today. We are going to be talking about your experience using the FASTA app. Remember, there are no right or wrong answers; we just want your honest opinions, as this app is new, and we want to make it useful and interesting for young people like you.

You can choose not to answer questions that make you uncomfortable or which you are not willing to answer, and you can stop at any time. Please also allow others to speak and respect each other's views."

Ground Rules:
- One person speaks at a time
- Respect different opinions
- No judging or laughing at others
- Confidentiality is important

2. First Impressions (9 minutes)
Purpose: Understand initial reactions and visual appeal.
- Please describe how you felt when you first used the FASTA app.
  Probe: Easy? Confusing? Interesting? Boring? Excited?
- Did it look exciting and appealing? If yes, what made it look exciting and appealing
- Explain what the things are that stood out for you right away?
  Probe: Colours, characters, language, layout?

3. Usability & Navigation (8 minutes)
Purpose: Explore how adolescents interact with and move through the app.
- How did you find moving/navigating through the app?
  Probe: Was anything hard to find? Easy to find?
- Describe which parts of the app were easiest to use, and which parts were difficult?
- What help did you need from anyone to use the app, if any? Who did you ask for help?

4. Learning, Meaning, and Relevance (11 minutes)
Purpose: Explore knowledge gained and relevance to real life.
- Let's describe one thing that you learned from the app about food?
- Now, let's describe one thing that you learned from the app about physical activity.
- Can you also describe one thing you learned from the app about mental health?
- Which parts of the app feel useful for your daily life?
- How can this app help you be/keep healthy, if at all? Please explain
- Please explain the parts of the app that were unrealistic (for example, it cannot be achieved) or hard to apply to your own life?
  Probe: Too expensive? Not available? Time constraints? Access constraints (to device)

5. Behaviour & Lifestyle Changes (10 minutes)

Purpose: Identify real or intended behavioural changes.

- What did you try to change about what you ate, drank or did after using this app?
- What are the things that friends or family noticed or said about the things that changed, if any?
  For those of you who did not change any behaviours, please explain why you think that is.
- Which suggestions in the app do you think are good ideas, and why?
- Were there any suggestions in the app that you didn't like or felt were too hard to do? Why?

6. Social Dynamics (8 minutes)

Purpose: Understand peer and family influence.

- What do you talk to your friends about concerning the app, if any?
- Please explain what parts of the app you showed others at home, if any.
- How did others encourage you to use the app? Which other family members or friends also wanted to use the app for themselves?

7. Access and Connectivity (12 minutes)

Purpose: Understand data use, access, and affordability challenges.

Internet Access Patterns

- Please describe your online activity: do you go online every day, a few times a week, or only sometimes?
- Describe the activities that you mostly use the internet for? (e.g., chatting, schoolwork, games, reels, videos, apps like FASTA, other apps)

Device & Connection Type

- Can you describe the device that you use when you use the FASTA app or go online, and is it your own phone, do you share a device, is it a family phone, or someone else's?
- Do you use Wi-Fi, mobile data, or both?

Data and Time Availability

- How often, and how much time do you have on your phone to go online? Every day and for how long? Every week, or specific days?
- Who is the person that pays for your data or airtime most of the time?
- How long does your data last, and do you ever run out of data before the end of the week or month?
- If yes, explain what you do when your data runs out?

Cost and Prioritization

- When you have/get data, how do you choose between using data for school, chatting, games, or apps like FASTA? (explain which takes priority).
- Did the FASTA app use too much data, and how did you deal with it?
  Probe: Would you use it more often if it worked offline?

Access Barriers

- Explain at which times you are not allowed to use the internet at all, if any?
- What would you say makes it difficult to access the internet (think of things like data cost, signal, phone sharing, or anything else that you have experienced?

Improvement Ideas

- If the FASTA app could help you save data or work offline, how would that help you?
- What would make it easier for you to use the app more often?

8. Engagement, Enjoyment & Motivation (8 minutes)

Purpose: Understand emotional engagement and user satisfaction.

- Explain what parts of the app you enjoyed the most?
- Explain the parts of the app do you want more of?
- Describe the parts that were boring, confusing, or too long?
- Would you use the app again on your own? Why or why not?

9. Barriers & Equity (5 minutes)

Purpose: Explore general usability and inclusion challenges.

- How can we make it easier to use in your school or community?
- Have you ever felt like this app was not made for someone like you? Tell me more about that.

10. Improvement and Co-Design (9 minutes)

Purpose: Capture adolescent-driven design recommendations.

- If you were the designer, what would you change, remove, or add?
  Probe: More videos? More games? Local foods? Offline mode? Voice narration?
- Who should the app sound like?
- Probe: A peer, influencer, or teacher tone?

11. Closing (5 minutes)

Facilitator script:

"Thank you for sharing your ideas. Everything you said helps us improve the app for people your age. Is there anything else you want to say before we finish?"

Time Summary (90 minutes total)

Section	Duration (minutes)
1. Opening	5
2. First Impressions	9
3. Usability & Navigation	8
4. Learning, Meaning & Relevance	11
5. Behaviour & Lifestyle Changes	10
6. Social Dynamics	8
7. Access & Connectivity	12
8. Engagement, Enjoyment & Motivation	8
9. Barriers & Equity	5
10. Improvement & Co-Design	9
11. Closing	5
Total	**90 minutes**

7.7 Appendix 7: LO teachers semi-structured survey

Evaluation of the Feasibility and Acceptability of Smartphone Technology in delivering diet and physical activity interventions for Adolescent obesity prevention (FASTA)

Quantitative questionnaire for Life Orientation (LO) Teachers

Interviewer	
Interviewer Code	
Date	
Interview start time	
Interview end time	

LO Teacher Questionnaire

Background

School name: _____

Number of Grade 5 learners in your class: _____

Number of years teaching LO: ☐ Less than 2 yrs ☐ 2–5 yrs ☐ 6–10 yrs ☐ More than 10 yrs

Section A: Demonstrating the App to Learners at School

For questions 1–4, please mark one response per row with a cross or tick. If some learners brought their own phones, also complete questions 5–8.

	Never	Rarely	Sometimes	Often	Always
1. I demonstrated the app to learners using my phone during LO class.					
2. Learners were attentive and engaged during my demonstrations.					
3. The pamphlet was a useful tool to help learners understand the app at home.					
4. I felt confident demonstrating the app and explaining its content to learners.					

Sub-section: Learners Using Their Own Phones at School

Please complete this sub-section only if some learners brought their own phones to school.

5. Did any learners use their own phones to access the app during class?

☐ Yes ☐ No ☐ Unsure

If No, please skip to Question 9.

6. Approximately how many learners used their own phones to access the app during class?

☐ 1–5 learners ☐ 6–10 learners ☐ More than 10 learners

7. During the demonstration, compared to learners who only watched the demonstration, learners who used their own phones appeared to be:

☐ Much more engaged and understood the app better

☐ Slightly more engaged

☐ About the same level of engagement

☐ More distracted when navigating through the app than those watching the demonstration

☐ I could not tell the difference

Other (specify): _____

8. What challenges, if any, arose from having some learners on their own phones while others were not? (Select all that apply)

- ☐ Learners without phones felt left out or became disengaged
- ☐ It was difficult to manage both groups at the same time
- ☐ School staff or management raised concerns about phone use
- ☐ Learners with phones were distracted by other apps or content
- ☐ No challenges arose

Other (specify): _____

9. What was the biggest challenge you faced when demonstrating the app to learners?

- ☐ Technical difficulties (connectivity, battery, screen visibility for the class, inability to project the screen)
- ☐ Learners struggled to follow along without their own device
- ☐ Learners were distracted or disengaged during the demonstration
- ☐ I was not sufficiently familiar with the app myself
- ☐ Time constraints within the lesson
- ☐ The pamphlet did not adequately support the demonstration

Other (specify): _____

Section B: Reminding Learners to Use the App at Home

10. How often did you remind learners to use the app at home?

☐ Never ☐ Once or twice in total ☐ A few times a week ☐ Daily

11. How did learners generally respond to your reminders?

- ☐ Very positively - they seemed motivated and interested
- ☐ Positively - they acknowledged reminders without much reaction
- ☐ Neutrally - neither positive nor negative
- ☐ Reluctantly - they seemed uninterested or resistant
- ☐ I am unsure / did not observe their response

12. What method(s) did you use to remind learners? (Select all that apply)

- ☐ Verbal reminder at the start or end of class
- ☐ Reference to the pamphlet during class
- ☐ Written reminder in homework diary
- ☐ Message via school communication platform
- ☐ Reminder sent through a parent/guardian

Other (specify): _____

13. How often did you ask learners if they had used the app at home?

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Almost always

14. How often did learners report back to you (without you asking) that they had used the app at home?

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Almost always

15. Are family members with phones at home helping the learner to use the app?

- ☐ Yes, learners get help from family members with phones.
- ☐ No, family members with apps at home do not help the learner to use the app.
- ☐ Learners appear to lack support at home for app use.
- ☐ I have not asked this question, but I will try to find out.

Section C: Supporting Learners with Questions and Difficulties in navigating the app

For questions 16–18, please mark one response per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16. I had enough knowledge about the app to answer learners' questions.					
17. The support and guidance provided to me before the project were sufficient.					
18. I knew how to direct learners to the app and to navigate the pamphlet when I could not answer their questions.					

19. What types of questions or difficulties did learners most often discuss with you? (Select all that apply)

- ☐ How to find or open the app on their device
- ☐ Understanding the content (nutrition, physical activity, emotional wellbeing)
- ☐ Concerns about privacy or personal information
- ☐ The app was not working on their device at home
- ☐ They did not have access to a device or data at home
- ☐ Learners did not bring difficulties to me
- ☐ Learners had no interest in using the app and found engaging with it difficult

Other (specify): _____

20. How helpful was the pamphlet in aiding you to respond to difficult questions learners discussed with you? (Select only one response)

- ☐ Very helpful - it answered most questions before they reached me
- ☐ Somewhat helpful - it helped with some but not all questions
- ☐ Not very helpful - learners still needed significant support
- ☐ I am unsure

Section D: Overall Experience

21. What additional support would have helped you in your role? (Select all that apply)

- ☐ A more detailed orientation to the app before the project began
- ☐ An improved or more detailed pamphlet for learners
- ☐ A quick-reference guide specifically for teachers
- ☐ Regular check-ins or updates from the research team
- ☐ More time to explore the app independently beforehand
- ☐ I did not need additional support

Other specify): _____

22. How would you rate your overall experience as a support teacher in this project?

☐ Excellent ☐ Good ☐ Fair ☐ Poor

23. Would you be willing to take on this support role again in a future phase of the project?

☐ Yes, definitely ☐ Yes, with some changes ☐ Unsure ☐ No

If No, Unsure, or Yes with changes - what would need to change?

_____

24. Any final comments or suggestions for the research team?

_____

_____

Thank you for your time and dedication to this project.
Your input directly shapes the next phase of development.

7.8 Appendix 8: FASTA mobile app functionality

App onboarding and user navigation flow
Before reaching the core learning matrix, children navigate through 4 interactive onboarding steps designed to personalise their experience and introduce their virtual companion, Fastachommie

Step / Stage	User Experience & Functional Description
1st: Login Page	Secure access points for children to authenticate and sign into their personal profiles.
2nd: Welcome & Mascot Screen	A landing page featuring Fastachommie, an interactive Tamagotchi-style mascot companion that children identify with. Displays a small introductory welcome text once logged in. A global (3-stripe hamburger) menu icon is positioned in the top bar for account settings and seamless app navigation.
3rd: Avatar Personalisation	Children choose and customize their own avatar from three inclusive character options: Male, Female, and Neutral.
4th: Main App Dashboard	The central hub featuring three interactive entry blocks: Nutrition, Physical Activity, and Mental Health. Selecting any block navigates directly to topic-specific modules, gamified tasks, and progress trackers.

REFERENCES



8. References

1. World Health Organization. Addressing the socioeconomic determinants of healthy eating habits and physical activity levels among adolescents [Internet]. Copenhagen: WHO Regional Office for Europe; 2006 [cited 2026 Oct 8]. Available from: https://www.hbsc.org/publications/reports/addressing-the-socio-economic-determinants-of-healthy-eating-habits-and-physical-activity-levels-among-adolescents/
2. Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O, et al., editors. Young people's health in context: Health Behaviour in School-aged Children (HBSC) study: international report from the 2001/2002 survey [Internet]. Copenhagen: WHO Regional Office for Europe; 2004 [cited 2026 Oct 8]. (Health Policy for Children and Adolescents; No. 4). Available from: https://www.who.int/europe/publications/i/item/9789289013727
3. Rakić JG, Hamrik Z, Dzielska A, Felder-Puig R, Oja L, Bakalár P, et al. A focus on adolescent physical activity, eating behaviours, weight status and body image in Europe, central Asia and Canada: Health Behaviour in School-aged Children international report from the 2021/2022 survey. Volume 4 [Internet]. Copenhagen: WHO Regional Office for Europe; 2024 [cited 2026 Oct 8]. Available from: https://iris.who.int/handle/10665/376772
4. Strong WB, Malina RM, Blimkie CJ, Daniels SR, Dishman RK, Gutin B, et al. Evidence based physical activity for school-age youth. J Pediatr. 2005;146(6):732-7. doi:10.1016/j.jpeds.2005.01.055
5. Elgar FJ, Roberts C, Moore L, Tudor-Smith C. Sedentary behaviour, physical activity and weight problems in adolescents in Wales. Public Health. 2005;119(6):518-24. doi:10.1016/j.puhe.2004.10.011
6. Nyawose ZZ, Naidoo R, Christie C, Bassett S, Coetzee D, van Gent M, et al. Results from South Africa's 2022 Healthy Active Kids' Report Card on physical activity, body composition proxies, and nutritional status in children and adolescents. J Phys Act Health. 2024;21(9):861-71. doi:10.1123/jpah.2023-0708
7. Branscum P, Kaye G, Warner J. Impacting dietary behaviors of children from low income communities: an evaluation of a theory-based nutrition education program. Calif J Health Promot [Internet]. 2013 [cited 2026 Oct 8];11(2):43-52. Available from: https://cjhp.scholasticahq.com/article/93242
8. Kirby P, Gibbs S. Facilitating participation: adults' caring support roles within child-to-child projects in schools and after-school settings. Child Soc. 2006;20(3):209-22. doi:10.1002/chi.872
9. Lister-Sharp D, Chapman S, Stewart-Brown S, Sowden A. Health promoting schools and health promotion in schools: two systematic reviews. Health Technol Assess. 1999;3(22):1-207. doi:10.3310/hta3220
10. Pike J, Ioannou S. Evaluating school-community health in Cyprus. Health Promot Int. 2017;32(2):185-94. doi:10.1093/heapro/dat044
11. World Health Organization. Ottawa Charter for Health Promotion [Internet]. First International Conference on Health Promotion; 1986 Nov 21; Ottawa, Canada. Geneva: WHO; 1986 [cited 2026 Oct 8]. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/health-promotion/population-health/ottawa-charter-health-promotion-international-conference-on-health-promotion/charter.pdf
12. World Health Organization. Improving health through schools: national and international strategies [Internet]. Geneva: WHO; 1999 [cited 2026 Oct 8]. Available from: https://www.who.int/publications/i/item/improving-health-through-schools-national-and-international-strategies
13. Jansen W, Raat H, Joosten-van Zwanenburg E, Reuvers I, van Walsem R, Brug J. A school-based intervention to reduce overweight and inactivity in children aged 6-12 years: study design of a randomized controlled trial. BMC Public Health. 2008;8:257. doi:10.1186/1471-2458-8-257
14. Boff RM, Liboni RPA, Batista IPA, de Souza LH, Oliveira MDS. Weight loss interventions for

overweight and obese adolescents: a systematic review. Eat Weight Disord. 2017;22(2):211-29. doi:10.1007/s40519-016-0309-1

15. Menezes MC, Bedeschi LB, Santos LC, Lopes ACS. Interventions directed at eating habits and physical activity using the Transtheoretical Model: a systematic review. Nutr Hosp [Internet]. 2016 [cited 2026 Oct 8];33(5):1194-204. Available from: https://www.nutricionhospitalaria.org/articles/00586/show
16. Mauriello LM, Ciavatta MM, Paiva AL, Sherman KJ, Castle PH, Johnson JL, et al. Results of a multi-media multiple behavior obesity prevention program for adolescents. Prev Med. 2010;51(6):451-6. doi:10.1016/j.ypmed.2010.08.004
17. Prochaska JO, DiClemente CC. Transtheoretical therapy: toward a more integrative model of change. Psychother Theory Res Pract. 1982;19(3):276-88. doi:10.1037/h0088437
18. National Department of Health. Strategy for the prevention and management of obesity in South Africa 2023-2028 [Internet]. Pretoria: National Department of Health; 2023 [cited 2026 Oct 8]. Available from: https://www.health.gov.za/wp-content/uploads/2023/05/Obesity-Strategy-2023-2028_Final_Approved.pdf
19. Department of Health, South Africa. Implementation guidelines for nutrition interventions at health facilities to manage and prevent child malnutrition [Internet]. Pretoria: Department of Health; 2013 [cited 2026 Oct 8]. Available from: https://www.policyvault.africa/policy/implementation-guidelines-for-nutrition-interventions-at-health-facilities
20. Food and Agriculture Organization of the United Nations. Nutrition education – essential but often neglected. In: FSN Forum: knowledge sharing for improved food security and better nutrition [Internet]. Rome: FAO; 2010 [cited 2026 Oct 8]. p. 11-6. Available from: https://www.fao.org/4/i0594e/i0594e01.pdf
21. Contento IR, Randell JS, Basch CE. Review and analysis of evaluation measures used in nutrition education intervention research. J Nutr Educ Behav. 2002;34(1):2-25. doi:10.1016/S1499-4046(06)60220-0
22. Prest Talbot J, Thornton L. A Chance To Play: a manual promoting play for children in Southern Africa [Internet]. Rev ed. [place unknown]: A Chance To Play Southern Africa; 2017 [cited 2026 Oct 8]. Available from: https://oerafrica.org/system/files/2024-01/chance-play.pdf
23. South African Government. Sport and Recreation South Africa hosts annual Indigenous Games Festival, 20 to 24 Sept [Internet]. Pretoria: South African Government; 2015 Sep 17 [cited 2026 Oct 8]. Available from: https://www.gov.za/speeches/sport-and-recreation-south-africa-hosts-annual-indigenous-games-festival-20-24-sept-17-sep
24. de Villiers A, Steyn NP, Draper CE, Hill J, Gwebushe N, Lambert EV, et al. Primary school children's nutrition knowledge, self-efficacy, and behavior, after a three-year healthy lifestyle intervention (HealthKick). Ethn Dis [Internet]. 2016 [cited 2026 Oct 8];26(2):171-80. Available from: https://www.ethndis.org/archive/files/ethndis-26-171.pdf
25. Steyn NP, de Villiers A, Gwebushe N, Draper CE, Hill J, de Waal M, et al. Did HealthKick, a randomised controlled trial primary school nutrition intervention improve dietary quality of children in low-income settings in South Africa? BMC Public Health. 2015;15:948. doi:10.1186/s12889-015-2282-4
26. de Villiers A, Steyn NP, Draper CE, Hill J, Dalais L, Fourie J, et al. Implementation of the HealthKick intervention in primary schools in low-income settings in the Western Cape Province, South Africa: a process evaluation. BMC Public Health. 2015;15:818. doi:10.1186/s12889-015-2157-8
27. Draper CE, Kolbe-Alexander TL, Lambert EV. A retrospective evaluation of a community-based physical activity health promotion program. J Phys Act Health. 2009;6(5):578-88. doi:10.1123/jpah.6.5.578
28. Naidoo R, Coopoo Y, Lambert EV, Draper CE. Impact of a primary school-based nutrition and physical activity intervention on learners in KwaZulu-Natal, South Africa: a pilot study. S Afr J Sports Med [Internet]. 2009 [cited 2026 Oct 8];21(1):10-5. Available from: https://journals.assaf.org.za/index.php/sajsm/article/view/301

29. Draper CE, de Kock L, Grimsrud AT, Rudolph M, Nemutandani S, Kolbe-Alexander T, et al. Evaluation of a school-based physical activity intervention in Alexandra Township. S Afr J Sports Med [Internet]. 2010 [cited 2026 Oct 8];22(1):12-9. Available from: https://journals.assaf.org.za/index.php/sajsm/article/view/320

30. Ambrosini GL, Hurworth M, Giglia R, Trapp G, Strauss P. Feasibility of a commercial smartphone application for dietary assessment in epidemiological research and comparison with 24-h dietary recalls. Nutr J. 2018;17:5. doi:10.1186/s12937-018-0315-4

31. Hebden L, Cook A, van der Ploeg HP, Allman-Farinelli M. Development of smartphone applications for nutrition and physical activity behavior change. JMIR Res Protoc. 2012;1(2):e9. doi:10.2196/resprot.2205

32. Kirkpatrick SI, Vanderlee L, Raffoul A, Stapleton J, Csizmadi I, Boucher BA, et al. Self-report dietary assessment tools used in Canadian research: a scoping review. Adv Nutr. 2017;8(2):276-89. doi:10.3945/an.116.014027

33. World Health Organization. mHealth: new horizons for health through mobile technologies [Internet]. Geneva: WHO; 2011 [cited 2026 Oct 8]. (Global Observatory for eHealth series; Vol. 3). Available from: https://iris.who.int/handle/10665/44607

34. Pew Research Center. Majorities in sub-Saharan Africa own mobile phones, but smartphone adoption is modest [Internet]. Washington (DC): Pew Research Center; 2018 Oct 9 [cited 2026 Oct 8]. Available from: https://www.pewresearch.org/global/2018/10/09/majorities-in-sub-saharan-africa-own-mobile-phones-but-smartphone-adoption-is-modest/

35. Independent Communications Authority of South Africa (ICASA). The state of the ICT sector in South Africa 2026 report [Internet]. Pretoria: ICASA; 2026 Mar 31 [cited 2026 Oct 8]. Available from: https://www.icasa.org.za/uploads/files/The-State-of-the-ICT-Sector-Report-of-South-Africa-31-March-2026.pdf

36. Reddy SP, James S, Sewpaul R, Sifunda S, Ellahebokus A, Kambaran NS, Omardien RG. Umthente Uhlaba Usamila: the 3rd South African National Youth Risk Behaviour Survey 2011 [Internet]. Cape Town: South African Medical Research Council; 2013 [cited 2026 Oct 8]. Available from: https://www.spotlightnsp.co.za/wp-content/uploads/2026/04/3rd-annual-youth-risk-survey-2011.pdf

37. Hampshire K, Porter G, Owusu SA, Mariwah S, Abane A, Robson E, et al. Informal m-health: how are young people using mobile phones to bridge healthcare gaps in Sub-Saharan Africa? Soc Sci Med. 2015;142:90-9. doi:10.1016/j.socscimed.2015.07.033

38. National Department of Health. National Digital Health Strategy for South Africa 2019-2024 [Internet]. Pretoria: National Department of Health; 2019 [cited 2026 Oct 8]. Available from: https://www.health.gov.za/wp-content/uploads/2020/11/national-digital-strategy-for-south-africa-2019-2024-b.pdf

39. Langford R, Bonell CP, Jones HE, Pouliou T, Murphy SM, Waters E, et al. The WHO Health Promoting School framework for improving the health and well-being of students and their academic achievement. Cochrane Database Syst Rev. 2014;(4):CD008958. doi:10.1002/14651858.CD008958.pub2

40. Biddle SJH, Asare M. Physical activity and mental health in children and adolescents: a review of reviews. Br J Sports Med. 2011;45(11):886-95. doi:10.1136/bjsports-2011-090185

41. O'Neil A, Quirk SE, Housden S, Brennan SL, Williams LJ, Pasco JA, et al. Relationship between diet and mental health in children and adolescents: a systematic review. Am J Public Health. 2014;104(10):e31-42. doi:10.2105/AJPH.2014.302110

42. Clarke JL, Pallan MJ, Lancashire ER, Adab P. Obesity prevention in English primary schools: headteacher perspectives. Health Promot Int. 2017;32(3):490-9. doi:10.1093/heapro/dav113

43. Hayba N, Khalil C, Allman-Farinelli M. Enabling better nutrition and physical activity for adolescents from Middle Eastern backgrounds: focus groups. Nutrients. 2021;13(9):3007. doi:10.3390/nu13093007

44. Alharahsheh HH, Pius A. A review of key paradigms: positivism vs interpretivism. Glob Acad J Humanit Soc Sci [Internet]. 2020 [cited 2026 Oct 8];2(3):39-43. Available from: https://www.gajrc.com/media/articles/GAJHSS_23_39-43_VMGJbOK.pdf

45. Palinkas LA, Mendon SJ, Hamilton AB. Innovations in mixed methods evaluations. Annu Rev Public Health. 2019;40:423-42. doi:10.1146/annurev-publhealth-040218-044215

46. Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. BMC Health Serv Res. 2017;17:88. doi:10.1186/s12913-017-2031-8

47. Bronfenbrenner U. The ecology of human development: experiments by nature and design. Cambridge (MA): Harvard University Press; 1979.

48. Puhl RM, Heuer CA. Obesity stigma: important considerations for public health. Am J Public Health. 2010;100(6):1019-28. doi:10.2105/AJPH.2009.159491

49. Hoare E, Milton K, Foster C, Allender S. The associations between sedentary behaviour and mental health among adolescents: a systematic review. Int J Behav Nutr Phys Act. 2016;13:108. doi:10.1186/s12966-016-0432-4

50. Protection of Personal Information Act, No. 4 of 2013. Government Gazette No. 37067 (2013 Nov 26) [Internet]. Pretoria: Government of South Africa; 2013 [cited 2026 Oct 8]. Available from: https://www.gov.za/documents/protection-personal-information-act

51. United Nations Committee on the Rights of the Child. General comment No. 25 (2021) on children's rights in relation to the digital environment [Internet]. Geneva: United Nations; 2021 [cited 2026 Oct 8]. (CRC/C/GC/25). Available from: https://www.ohchr.org/en/documents/general-comments-and-recommendations/general-comment-no-25-2021-childrens-rights-relation

mHealth interventions

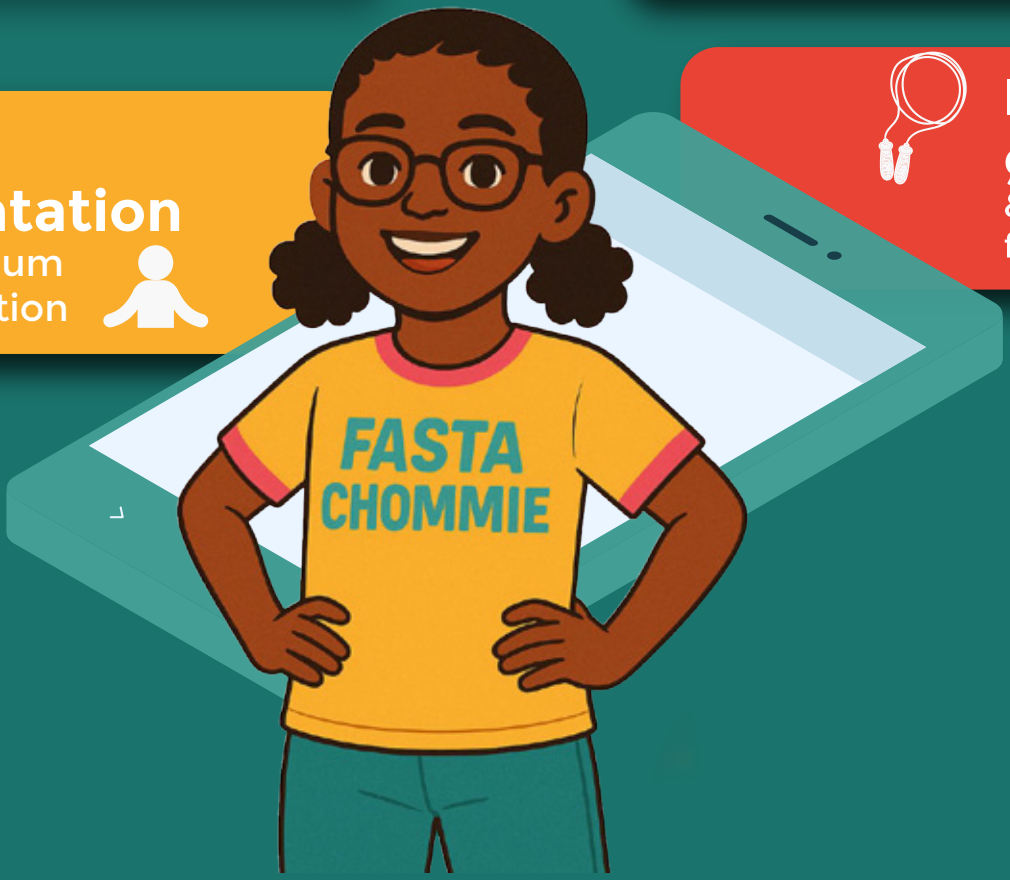
Healthy diet education

Physical activity promotion

Culturally contextualised content

Life orientation curriculum integration

Indigenous games & affordable fitness



science, technology & innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation

saMRC advancinglife

HSRC Human Sciences Research Council