

Behaviour change communication for fruit and vegetable consumption: Exploring the drivers of dietary behaviour in rural Ethiopia



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This brief presents study results on behavioral, social, and structural factors impacting fruit and vegetable consumption aim to enhance SBCC strategies for Ethiopian FBDGs adoption. The study also tests and refines the methodology for broader use.

1. Introduction

Unhealthy diets pose a threat to public health, contributing to the prevalence of micronutrient deficiencies, obesity, non-communicable diseases and mortality rates (WHO, 2020). The impact of micronutrient deficiencies during early life impairs child growth and mental development and leading to poor school performance and decreased productivity (Martorell, 2017). Particularly, the consumption of fruit and vegetables, given their rich vitamins and minerals content, is important. Incorporating fruits and vegetables into daily diets in sufficient quantities (about 400 grams/day) can play an important role in reducing the risk of non-communicable diseases such as cardiovascular diseases (WHO, 2021).

In Ethiopia, inadequate intake of essential micronutrients and a low consumption of fruits, vegetables, and animal-sourced products exacerbate malnutrition and increase the risk of non-communicable diseases (Martorell, 2017). The consumption of fruit and vegetables is lower compared to countries in the region. With a per capita consumption of fresh fruits at approximately 7 kg/person/year, Ethiopia falls far below the WHO and FAO recommended minimum intake of 146 kg/person/year (Yazew et al, 2020).

The Ethiopian government has introduced dietary guidelines aimed at raising awareness about a healthy lifestyle and encouraging the adoption of healthy diets (MoH, 2022). The Ethiopian food-based dietary guideline (EFBDG) is one of the identified game-changing solutions of the Ethiopian food systems roadmap. It supports individuals, communities, and policymakers towards achieving a sustainable and healthy dietary habit in Ethiopia (MOA, 2022). It contained 11 key messages that focus on healthy dietary practices. The consumption of diversified fruit and vegetables is one of the key messages in this guideline.

Experiences from other countries, however, show that dietary guidelines alone rarely translate into meaningful

KEY messages

- Fruit and vegetable consumption in Ethiopia is far below recommended levels. Behaviour change communication can play an important role in improving dietary practices but is only effective when grounded in a solid understanding of the local context and the specific barriers people face.
- In Boloso Bombe, attitudes toward fruit and vegetable consumption are positive and social norms present no major barriers. The main obstacles are structural, particularly affordability and seasonal availability, meaning that nutrition education alone is unlikely to drive meaningful change.
- Effective interventions should combine SBCC with structural support such as home garden initiatives and storage technologies, while engaging households as a unit to ensure that home-produced fruits and vegetables are prioritised for consumption rather than sale.
- SBCC messages should be delivered through trusted channels, particularly Health Extension Workers and Development Agents, and tailored to specific population groups, with focused attention on pregnant women where a food taboo around fruit and vegetables is perceived.
- Before developing BCC materials, a systematic analysis of behavioural drivers and constraints should be conducted. The TPB framework used in this pilot generated useful insights, but simpler frameworks such as COM-B may be more practical for routine programme use.

behavioural change. Additional efforts are needed to support households in adopting recommended dietary practices. Social and behaviour change communication (SBCC) interventions are widely recognised as an important approach

for addressing the social, behavioural and cultural barriers that hinder progress toward dietary goals (Briscoe & Aboud, 2012).

Nevertheless, the effectiveness of SBCC interventions on changing consumption pattern in Ethiopia has shown variability, as highlighted by multiple studies (Saaka et al., 2021; Watson et al., 2023). A potential explanation for this variance is that these interventions may be built on assumptions that do not fully reflect the realities of target populations. For instance, while nutrition education is often emphasized as a driver for behavioural change, it may overlook the fact that lack of knowledge is not always the primary constraint (Werner, 2021).

In many contexts, individuals may understand the benefits of healthy diets, but structural constraints such as limited availability and access to healthy diets may limit adoption to these dietary practices (Daba et al., 2021; Kibr et al., 2021). Therefore, gaining insight into behaviours and their contextual nuances is essential for developing evidence-based and impactful behaviour change interventions. This is especially relevant for Ethiopia, where large regional differences exist (Abate & Schaap, 2022).

1.1. Objectives of this study

The objective of this study was two-fold. First, we aimed to obtain a detailed understanding of the behavioural, social, and structural factors influencing fruit and vegetable consumption, to inform the design of more effective SBCC strategies promoting the uptake of the Ethiopian FBDGs. To achieve this, we used the Theory of Planned Behaviour (Ajzen, 1991) as a descriptive and organising framework to map the beliefs and contextual factors shaping dietary behaviour in our study context. This formative research forms part of the second step in the BCC development

process, as outlined in Figure 1 (Hailu et al., 2025) and provides the evidence base needed to define the behaviour change focus, identify target audiences, and select trusted messengers and communication channels for effective SBCC interventions.

Applying the full TPB model can be resource intensive and complex, both in terms of data collection and analysis. Our second objective was therefore to explore whether this more descriptive and accessible use of the framework generates useful insights into region-specific determinants of dietary behaviour. As such, this research serves as a pilot study, which allows us to test and refine our methodology in a real-world setting before considering its wider application. More detail on how our approach relates to the original TPB model is provided in the theoretical framework section.

1.2. Study context

This study is part of the Resilient Agriculture for Inclusive and Sustainable Ethiopian Food System programme (RAISE-FS), a four-year initiative aimed at transforming the food system in Ethiopia. By adopting a food systems approach, RAISE-FS seeks to identify key leverage points for food system transformation by analysing the drivers and activities shaping food availability, access, and consumption (Nutrition International, 2019).

The study was conducted in Boloso Bombe *woreda*, situated in the Welaita Zone of the South Ethiopia Regional State. Boloso Bombe was selected based on insights from a Rapid Food System Appraisal (RFSA) conducted as part of the RAISE-FS project (Bekele et al., 2023). The *woreda* has also been the focus of an ongoing home garden intervention, and the findings of this study have the potential to complement and strengthen those efforts.

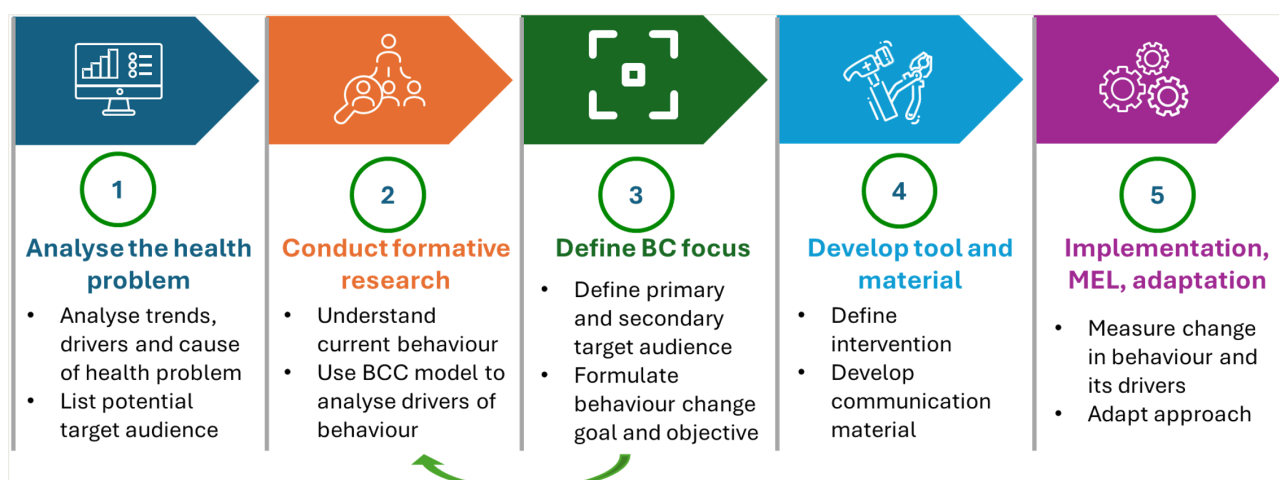


Figure 1: Process for developing effective BCC material (Hailu et al. (2025), adapted from Nutrition International (2019)

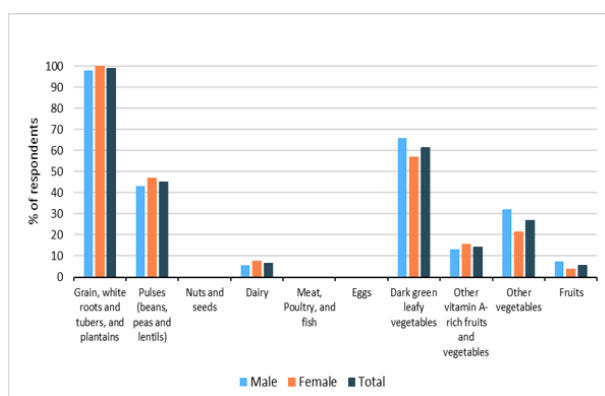


Figure 2: Food groups consumed in Boloso Bombe based on 24-hour recall data from the RAISE-FS Rapid Food System Appraisal (Bekele et al., 2023)

The dominant food groups consumed in Boloso Bombe are grains and root & tuber crops, followed by leafy vegetables, mainly kale, and pulses (Bekele et al., 2023). The baseline measurement revealed that many households struggle to adhere to the national guideline recommending a daily intake of 100–200 grams of various fruits and vegetables of different colours, such as bananas, papayas, kale, carrots and tomatoes (MoH, 2022). Using a 24-hour recall method, we identified that vegetable consumption in Boloso Bombe is relatively high compared to other woredas: 62% of households consumed dark green leafy vegetables, 14% vitamin A-rich fruits and vegetables, and 27% other vegetables, compared to national averages of 36%, 7%, and 37%, respectively (Abate & Schaap, 2022). Fruit consumption, however, is low at 6%. These patterns underline the need for a deeper understanding of the behavioural and structural determinants shaping food choices.

2. Theoretical framework

This study uses the Theory of Planned Behaviour (TPB) as its analytical framework. TPB is one of the most widely used models for understanding and predicting behaviour, and has been extensively applied in health and nutrition research (Ajzen, 1991; Li et al., 2019; McDermott et al., 2015). Most applications of TPB have been conducted in western, high-income contexts, which makes it particularly interesting to explore whether the framework is suitable for capturing dietary behaviour determinants in a low-income, resource-limited setting such as rural Ethiopia.

At the core of the TPB is the idea that a person's intention to perform a behaviour is shaped by three types of beliefs: behavioural beliefs, normative beliefs, and control beliefs (Ajzen, 1991). These beliefs are in turn shaped by background factors such as age, sex, education, income, and cultural habits, which implies that the determinants of behaviour may differ considerably across population

groups (Ajzen, 1991). The TPB model is therefore particularly suitable for designing context-specific SBCC interventions, as it starts from beliefs that are identified within the study population itself, instead of using general beliefs and its constructs can be directly linked to types of messages, messengers and practical barriers that should be addressed.

According to TPB, as visualised in Figure 3, it can be predicted whether a person intends to conduct a specific behaviour based on three key constructs which relate to the three types of beliefs; whether the person is in favour of doing it (attitude), how much the person feels social pressure to do it (subjective norm), and whether the person feels in control of the action in question ('perceived behavioural control'). Together, these constructs predict behavioural intention, and ultimately behaviour itself. By targeting one of these three constructs, also called determinants or predictors of behaviour, the likelihood that a person intends to perform a desired behaviour can be increased. These constructs can be measured using both direct and indirect measures. Direct measures capture overall evaluations of the behaviour. Indirect measures assess the specific beliefs underlying these evaluations.

In this study, our application deviates from the full TPB model developed by Ajzen (1991) in two important aspects. First, as we were primarily interested in understanding the different drivers of dietary behaviour, we focused on mapping the underlying beliefs and the power of those beliefs, and not on predicting the intention to perform the behaviour. Second, as the aim was to produce findings that are directly understandable and actionable for designers of SBCC interventions, we used a descriptive approach to visualise patterns in belief scores across demographic groups, and did not conduct full statistical analyses. A detailed overview of the theoretical framework and how this applies in the context of the behaviour of adhering to the recommended consumption of fruits and vegetables is provided in the supplementary material, Figure A. (Ajzen, 1985).

3. Methodology

The study applied a mixed-method approach consisting of three main activities: an expert focus group discussion, a survey amongst community members and interviews with local experts.

3.1. Data collection

To develop the questionnaire, we followed the practical guidance provided by Francis et al. (2004) for constructing TPB-based instruments. As a first step, a focus group discussion was organised with food system experts involved in the RAISE FS

project. They were asked to reflect on the advantages and disadvantages of eating fruits and vegetables, the social expectations surrounding this behaviour, and the factors that make it easier or more difficult for people to do so. Their input identified the key issues to include in the questionnaire and ensured that the questions reflected the specific situation in the region.

The survey included both open-ended questions and rating scale items. The open-ended questions focused on people's current fruit and vegetable consumption and the barriers they encounter. The rating scale items assessed the three TPB constructs (attitudes, subjective norms, and perceived behavioural control) using both direct measures and indirect measures (belief strength combined with how positively or negatively the belief is viewed). Participants were also asked about their preferred communication channels and trusted community members to inform the development of a future SBCC strategy. To avoid challenges related to illiteracy and the diversity of languages spoken in Ethiopia, trained enumerators with an agricultural and/or nutrition background conducted the survey.



Data collection in Boloso Bombe. An enumerator conducts the survey with the support of a local translator

In addition to the survey, two expert interviews were conducted with local agricultural development agents and health extension workers, as well as two expert interviews with experts at woreda and regional levels. This provided additional insights into structural barriers, community dynamics, and institutional perspectives, and helped validate and contextualise the survey findings.

1.2. Study sample

As this study served as a pilot of the proposed methodology, a small sample of 25 respondents was selected. Participants were recruited through local partners and selected to represent different demographic groups, consisting of female adolescents (20–24 years), male adolescents (20–27 years), adult women (40–65 years), adult men (28–40 years), and elderly men (60–65 years).

1.2. Data analysis

The analysis followed the general approach recommended in the handbook of Francis et al. (2004), with adaptations to suit the exploratory purpose of this study as described in chapter 2. For the direct measures, negatively worded items were first recoded so that higher scores reflected more positive evaluations. Items belonging to each construct (i.e., attitude, subjective norms, perceived behavioural control) were averaged into a single score (on a scale from 1 to 5).

For the indirect measures, each construct was measured through its underlying beliefs, scored on a scale from 1 to 5, multiplied by their corresponding evaluations, scored on a scale from -2 to +2, producing combined scores ranging from -10 to +10 per item. For example, the question 'to what extent do you think fruit and vegetable consumption is good for your brain?' reflects a behavioural belief, which is then multiplied by the corresponding outcome evaluation: 'to what extent do you find good brain functioning important?'. Behavioural beliefs were multiplied by their outcome evaluations to produce an indirect attitude score, covering beliefs about the health consequences of fruit and vegetable consumption such as physical strength, prevention of illness and brain functioning. Normative beliefs were multiplied by motivation to comply to produce an indirect subjective norm score, covering the perceived opinions and behaviours of family members and the broader community. Control beliefs were multiplied by their perceived power to produce an indirect perceived behavioural control score, covering factors such as affordability, year-round availability, market access and the capacity to cultivate fruits and vegetables at home. These combined scores for each belief were then summed to produce overall scores for attitude, subjective norms and perceived behavioural control.

For the indirect measures, a positive overall score indicates that the beliefs within a construct taken together support fruit and vegetable consumption. A negative overall score indicates that beliefs act as a barrier or that enabling conditions do not translate into increased consumption in practice. For example, participants may strongly agree that fruits and vegetables are available year-round in local markets, and at the same time feel that this availability does not help them consume the recommended amounts, resulting in a negative score. A score close to zero can have multiple causes. The belief itself may be weak, the factor may be perceived as having a neutral influence on consumption, or positive and negative belief scores within the same construct may balance each other out. As the direct measures are scored on a scale from 1 to 5, negative scores only apply to the indirect measures.

Unlike the full analytical procedure proposed by Francis et al. (2004), we did not conduct any statistical tests, discriminant analyses or regression models, as this falls out of the scope of this research. Instead, the scores were used descriptively to visualise patterns across groups. A heat map (a graphical way of displaying data) was developed to visualise these patterns and to highlight beliefs that may serve as entry points for BCC interventions.

4. Results

4.1 Results of the BCC survey

General insights

Respondents reported either Protestant or Orthodox Christian religion. Household size varied from 2 to 11 members. Education levels ranged from no formal education to university degree, showing clear differences in schooling within the sample. The main livelihood activities were predominantly based on crop and livestock farming, with some households also engaged in trade or daily labour.

Food-related decision-making was primarily reported to be carried out by women, particularly mothers. In some households, however, decision-making was shared between multiple household members, including fathers and older children. Intra-household food distribution commonly followed age- and gender-based patterns. In several households, food was consumed according to a clear hierarchy, where certain members (often children or women) ate after others, while in other households food was reported to be shared and consumed at the same time by all members.

Reported fruit and vegetable consumption

Respondents indicated that consumption of fruits and vegetables is highly dependent on seasonality and availability of produce from home gardens or farms. Respondents indicated a high variety in yearly consumption patterns, with fruit intake ranging from only during harvesting periods or around 1 day per week to daily consumption when fruits were available. Most participants reported fruit consumption between 2 and 4 times per week. Women and female adolescents generally reported more frequent fruit consumption than men, male adolescents, and elderly participants. Vegetable consumption was relatively similar across groups, generally around 3 to 4 times per week, although some participants reported no vegetable consumption at all.

Nearly half of the participants indicated that they mainly consume fruits and vegetables during the fasting period.

Figure 4 presents a heat map summarising the mean score of the direct measures and the total score of the indirect measures across the three key constructs for the behaviour of consuming the recommended amount of fruit and vegetables. The colour scale supports interpretation of these patterns, with green representing more positive influences towards the behaviour and red representing negative influences. This visualisation illustrates how attitudes, subjective norms and perceived behavioural control vary across age groups, revealing differences in how respondents perceive fruit and vegetable consumption. The heat map highlights which beliefs are more strongly endorsed and which vary most across demographic groups.

Attitudes

Attitude towards eating fruit and vegetables is very positive across all age groups. Most participants considered fruit and vegetables important, healthy and tasty, and they held positive beliefs about the consequences of eating them. For example, many respondents agreed with the statement "Eating vegetables will make me strong." The score for female youth is slightly lower as some of them believed that consuming fruits and vegetables does not prevent illness. When these beliefs are weighted by how important respondents consider the outcome, for instance how important they find it to be strong, an overall positive attitude was identified across all age groups.

Experts had highlighted the belief that fruits and vegetables are mainly considered to be for the poor. This belief was confirmed among female adolescents (score 5 out of 5) and mentioned by some elderly respondents, but it was not a dominant belief in the sample. Similarly, the belief that fruit and vegetable consumption can be harmful during pregnancy was present but not a dominant belief in the sample and was only confirmed by 8 participants.

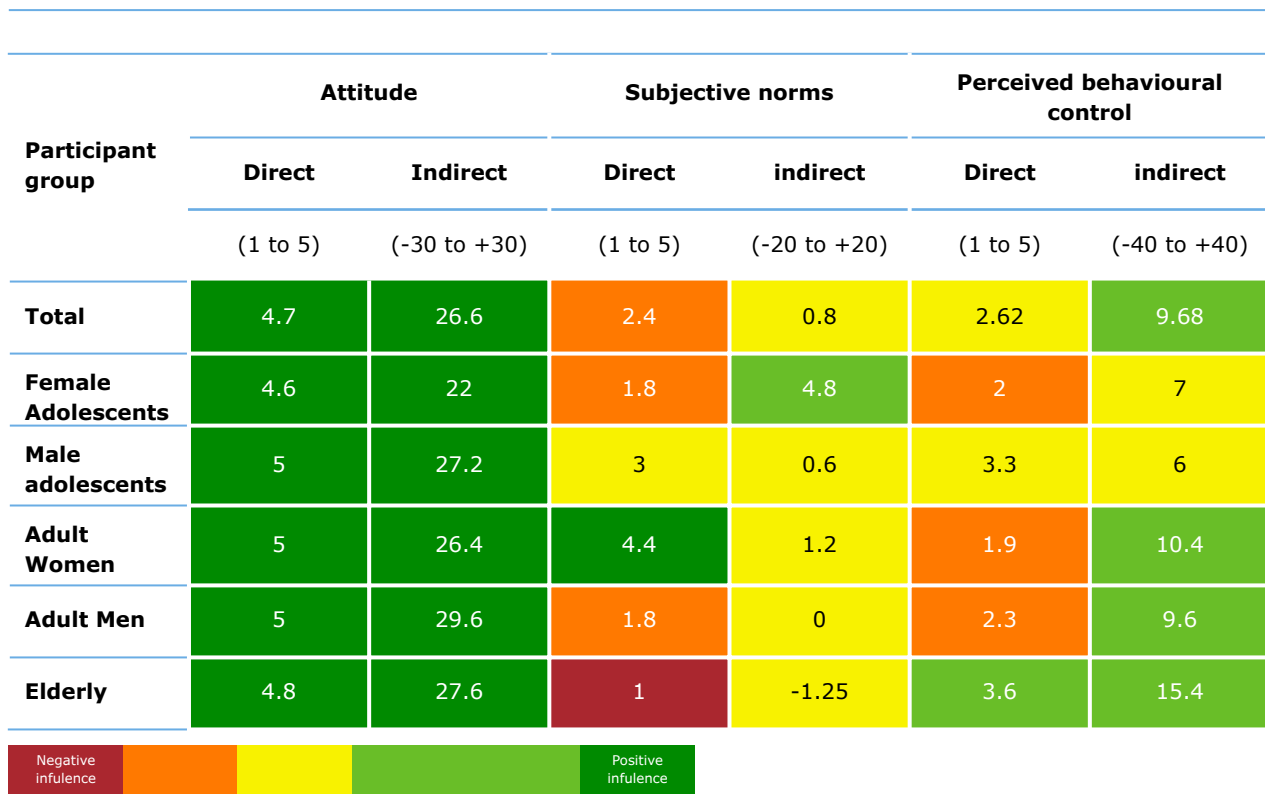


Figure 4: Heat map of results of TPB survey on determinants of fruit and vegetable consumption in Boloso Bombe

Subjective norms

For subjective norms, the heat map shows a mix of colours, indicating that scores for this construct vary across participants. When asked directly about the social pressure they feel to consume fruit and vegetables, most participants reported very little pressure. Looking at the age groups separately, older adults reported no social pressure at all, with a score on 1.0, while adult women indicated experiencing considerable pressure to consume fruits and vegetables, with a score of 4.4.

When measuring subjective norms indirectly, participants were asked about the opinions of their family and community and the extent to which these opinions influence their dietary behaviour. Participants generally believed that their family considers fruit and vegetable consumption important, with an average score of 4.8 out of 5, and they reported a high motivation to comply with family expectation.

Participants also believed that fruit and vegetable consumption is common in their community, with an average score of 4.6 out of 5. However, when combined with the extent to which participants felt motivated to follow community expectations, this resulted in a negative score (-1.5). This indicates that community norms were not a strong driver of participants' own consumption behaviour.

These findings suggest that family opinions have a positive influence on dietary behaviour, whereas community opinions have little to no influence. As a result, these two influences appear to counterbalance each other, resulting in an overall subjective norm score close to zero.

Perceived behavioural control

The results of the survey reveal a moderate level of perceived behavioural control among participants regarding their ability to consume the recommended amounts of fruits and vegetables. The average scores for measuring perceived behavioural control directly were around 2.6 on a scale of 1 to 5, indicating that while some individuals felt confident in their ability to meet these dietary recommendations, many experienced constraints. Adult women perceived the lowest control over their diet, with a score of 1.9, while elderly participants reported the highest, with a score of 3.6.

Indirect measures provided a more detailed understanding of the factors shaping perceived behavioural control (PBC) over fruit and vegetable consumption, resulting in an overall moderately positive profile. Most respondents indicated that fruits and vegetables are available year-round at local markets (mean = 4.3 out of 5) and that access to markets is high (mean = 4.2 out of 5). These factors were also considered to have a positive influence on participants' ability to consume fruits and vegetables, with respective scores of 8 and 6 on a scale from -10 to 10. However, there was variation between participants in how strongly they felt these conditions translated into actual consumption, suggesting that despite generally high perceived availability and access, these factors do not directly translate into a strong sense of control over fruit and vegetable consumption for everyone.

Affordability emerged as a clearly defined barrier. Nearly all participants agreed that fruits and vegetables are too expensive to consume on a daily basis, reflected in a mean score of 3.9 out of 5. When this control belief was combined with belief power, the results became more heterogeneous. The majority of participants viewed high prices as a major barrier and indicated that reduced prices would increase their consumption of fruits and vegetables. However, others reported that lower prices would not necessarily lead to higher intake. This pattern suggests that for some participants, additional determinants, such as habitual dietary practices and cultural preferences, may play a more influential role in shaping consumption than price alone. It may also indicate that, even when fruits and vegetables are sold at more affordable prices, households continue to face competing expenditures and may prioritise purchases of staple foods or non-food costs such as school fees or social obligations.

Participants' capacity to cultivate fruits and vegetables themselves, including access to land, water, seeds and knowledge, received a moderate average score of 3.2 out of 5. There was considerable variation across demographic groups, with scores ranging from 2.4 among adult women to 5.0 among female adolescents. To assess whether home production would translate into consumption, participants were asked whether they would prefer to sell their produce rather than consume it. The overall mean score of 2.3 suggests that most participants would prioritise consumption, although female adolescents showed a stronger inclination toward selling.

4.2. Relevant communication channels

The data on communication and information sources revealed clear differences in how participants receive and trust health-related advice, with all scores expressed on a scale from 1 to 5. Among the various channels assessed, health extension workers were the most consistently followed, with an average score of 4.7, indicating a high level of trust and reliance on these services for health information. Agricultural extension workers were also widely followed, with an average score of 4.5, highlighting their important role in providing information related to nutrition and food production.

Radio showed greater variation, with an average score of 2.7, suggesting that while some participants frequently listen to the radio, it does not reach all groups equally as a source of health information. Advice received through church was moderately valued, with an average score of 3.6, indicating that religious institutions play a meaningful but not dominant role in health communication. Similarly, schools were identified as an important source of health information by some participants, with an average score of 3.4, but this varied depending on individual circumstances, such as whether participants had children attending school. Overall, these findings suggest that extension services, both health and agricultural, are trusted and

potentially effective channels for delivering SBCC messages aimed at improving fruit and vegetable consumption. Other channels like radio, schools, and churches may play complementary roles but appear to have less consistent reach or influence across the study population.

4.3 Insights from expert interviews

The interviews with health and agriculture experts at the regional, woreda, and kebele levels provided important contextual insights into fruit and vegetables production and consumption in Boloso Bombe.

Contextual conditions shaping fruit and vegetable production and consumption

Farmers cultivate a range of crops, including mango, avocado, banana, papaya, Ethiopian kale, taro and enset, and most households rely heavily on their backyard for household consumption. Despite this diversity, vegetable consumption is dominated by Ethiopian kale and tomatoes, and overall intake is strongly tied to the harvest season from November to March. Gender roles shape production responsibilities, with men more involved in fruit production and women primarily responsible for vegetable production. These roles influence who feels accountable for ensuring household access to fruits and vegetables.

Experts explained that elders and children traditionally do not eat together, yet food is generally shared equitably within households, suggesting that intra-household distribution does not systematically disadvantage specific groups. Religious fasting periods also influence dietary patterns, as vegetable consumption increases during Orthodox fasting seasons.

Attitude towards fruit and vegetable consumption Experts described farmers in Boloso Bombe as generally holding positive views about fruit and vegetable consumption, particularly during the main harvest season when these foods are abundant. During this period, fruits and vegetables are perceived as desirable and beneficial, and consumption naturally increases. Experts also noted a specific negative belief related to pregnancy: some community members discourage pregnant women from eating fruits and vegetables because they believe this may lead to a heavier foetus and a more difficult delivery. Apart from this pregnancy-related concern, experts indicated that attitudes toward fruit and vegetable consumption are largely favourable.

Subjective norm

Experts noted that cultural and social norms have evolved, and there are no longer major cultural barriers restricting fruit and vegetable consumption.

Development agents, health extension workers and NGOs such as Geshiyaro project, play an important role in shaping social influences around healthy eating by providing nutrition information and supporting farmer groups. The interviews suggest that while strong social pressure to consume fruits and vegetables is not present, trusted intermediaries, gender roles and religious practices shape dietary behaviour in meaningful ways.

Perceived behavioural control

This study revealed that, several external barriers limit farmers' ability to consume fruits and vegetables consistently. These include the high cost of produce, seasonal availability fluctuations, limited access to markets, and insufficient knowledge about healthy diets. Such constraints reduce farmers' confidence and perceived control over maintaining a healthy diet throughout the year. To improve perceived behavioural control, experts recommended interventions such as home gardening promotion, nutrition education, and innovative communication methods including cell phone voice messages and community microphone broadcasts (i.e., Public audio announcements made through loudspeakers).

Communication

Experts explained that development agents and health extension workers are the primary and most trusted sources of nutrition-related information for both women and men. Development agents provide advice seasonally, mainly during irrigation and harvest periods, while health extension workers visit households or communities on a monthly basis. These two actors form the core of the local information system around diet, health and agriculture.

In addition to these government structures, the community previously received nutrition and WASH-related messages through the GASHERO project, a local NGO that collaborated closely with Health extension Workers (HEWs). Geshiyaro used microphone announcements and prerecorded radio messages delivered to farmer groups organised in a 1-to-30 structure (which is the Ethiopian development group system/limat buden). These messages were broadcast seasonally and reinforced key practices. The project has now phased out, and experts expressed concern that this may reduce the continuity and frequency of nutrition communication.

Experts also noted that many households have access to mobile phones, and that cell-phone voice messages and community microphone broadcasts are familiar and acceptable channels for sharing information. Radio listening occurs, but the raw data does not specify which stations are preferred or how consistently people listen.

Overall, the interviews suggest that nutrition communication in Boloso Bombe is not embedded in a stable, long-term system but instead depends heavily on project-based initiatives. While interpersonal channels such as Development Agents and Health Extension Workers form the backbone of information exchange, these are complemented only intermittently by community-level audio methods such as microphones and prerecorded messages. The phase-out of NGO support has already reduced the frequency and consistency of these messages, highlighting that current communication efforts are vulnerable to shifts in external funding and may not be sustainable without more institutionalised structures.

5. Discussion

5.1. Interpretation of findings

The results of this study showed that attitudes toward fruit and vegetable consumption are highly positive across the whole survey group, a finding confirmed by the expert interviews. Participants consistently recognised the health benefits of fruits and vegetables, and experts noted that these foods are widely viewed as desirable, particularly during the main harvest season from November to March when availability is high and consumption naturally increases. This contrasts somewhat with findings from Glaser et al. (2024), who found that in the Southern regions, vegetables were mentioned as part of a healthy meal by only half of the focus groups, and fruits were hardly mentioned at all. This difference may reflect methodological differences between the studies, as the specific focus on fruits and vegetables in this survey may have introduced social desirability bias or led participants to rate these foods more positively than they would have in a broader dietary assessment where other food groups may be considered more central.

One exception concerns pregnant women, as some community members discourage them from consuming fruits and vegetables out of a belief that this may lead to a heavier foetus and a more difficult delivery. This is consistent with findings from Gebregziabher et al. (2023), who found in a systematic review that in the Southern regions bananas are considered a food taboo during pregnancy due to the belief that they increase the size of the foetus, and that in the neighbouring Oromia region certain leafy vegetables are avoided during pregnancy out of fear that they may cause immediate death of the newborn. These deeply rooted beliefs represent a concrete entry point for targeted SBCC efforts, as they may discourage consumption of nutritious foods among a particularly vulnerable group.

Subjective norms played only a limited role. Most participants reported very little social pressure to consume fruits and vegetables, and community expectations were not perceived as influential. Family opinions mattered more, especially for women, but did not create strong normative pressure. Experts confirmed that major cultural barriers to fruit and vegetable consumption no longer exist, and that social norms have evolved in a largely favourable direction. The absence of strong norms, therefore, reflects a neutral environment in which fruit and vegetable consumption is neither actively encouraged nor discouraged. Gender norms and household decision-making around food production and consumption remain important influences on dietary behaviour, which may partly explain why women in this study reported lower perceived behavioural control than other groups (Hailu et al., 2025).

Despite positive attitudes, consumption remained low because perceived behavioural control was constrained. Although individual belief scores for availability and market access were positive, reflecting that participants recognised these as enabling conditions, the combined control-belief scores for both factors were negative, suggesting that availability and access alone do not feel sufficient to support consumption of the recommended amounts. Expert interviews reinforced this picture, pointing to high prices, seasonal fluctuations, and gaps in nutritional knowledge as the main obstacles to consistent intake. This is in line with Glaser et al. (2024) and Hailu et al. (2025), who both found that structural factors such as affordability and availability are more limiting than knowledge for many food groups. An average Ethiopian household would need to spend 11% of its income to meet the international recommendation of two servings of fruits and three servings of vegetables per person per day (Hirvonen et al. 2018). The affordability of a healthy diet relative to wages is among the highest in the Southern regions (Alemayehu et al., 2023). However, participants varied in the extent to which they felt that lower prices would enable their consumption, suggesting that for some, additional factors such as habitual dietary practices, cultural food preferences, or competing household expenditures also play an important role.

Home production offers some potential to improve perceived behavioural control, though the relationship between home production and actual consumption is not straightforward. Nutrition-sensitive agriculture (home gardens and/or animal production) combined with messaging on behavioural change, and in some areas work to address gender dynamics within the household, was able to increase women's dietary diversity (Pittore et al., 2025). However, in this study, some participants, particularly female adolescents, indicated a preference for selling home-grown produce rather than consuming it, reflecting the

broader livelihood pressures that shape household food decisions. This is consistent with broader evidence that the correlation between home production and consumption of fruits and vegetables differs considerably across contexts (Stadlmayr et al., 2023). While household engagement in own production was associated with more frequent vegetable intake among adults in South Africa, no association was found for fruit intake, possibly because fruits were more likely to be sold than consumed. In low-income urban areas in Ibadan, Nigeria, home production did not enable increased fruit and vegetable consumption at all, as low-income citizens preferred selling over consumption (Stadlmayr et al., 2023). These findings underline that home gardening interventions do not automatically lead to healthier diets and must be accompanied by targeted SBCC efforts and household-level engagement to ensure that the produce is prioritised for consumption rather than sale.

5.2.Limitations of the findings

While this pilot study provides useful first insights into fruit and vegetable consumption behaviours, several limitations should be considered when interpreting the results. The most important constraint is the small sample size, which restricts the statistical power of the analysis and conclusions should be drawn with caution. Data were collected only within the Bombe Zuria kebele in Boloso Bombe woreda, meaning that the findings cannot be generalised to other kebeles or regions with different socio-economic or cultural contexts. At the same time, this local and limits the extent to which findings can be generalised beyond the study population. Furthermore, responses may have been influenced by social desirability bias, with participants providing answers they believed were expected rather than reflecting their actual practices. Some participants may also have had a limited understanding of certain survey questions, which could affect the accuracy of reported attitudes, norms, and perceived behavioural control. These factors highlight the need for careful interpretation when using the findings to inform SBCC strategies or intervention decisions and are further reflected upon in the discussion of the analytical framework in section 5.4.

5.3Targeting structural and behavioural barriers through SBCC and interventions

The findings of this pilot study offer useful indications of the factors shaping fruit and vegetable consumption and point to areas relevant for future interventions and SBCC efforts. The gap between intention and behaviour appears to be linked mainly to practical and economic constraints, as captured through perceived behavioural control.

Although people expressed positive views toward fruit and vegetable consumption, this does not imply that no further promotion or nutrition education is needed.

It is likely that these favourable attitudes have been shaped, at least in part, by previous SBCC efforts, and maintaining this foundation is important. Education can still be effective for specific groups and food categories where awareness gaps remain (Glaser et al., 2024). The pregnancy-related food taboo discussed in section 5.1 represents a particularly important target for focused messaging. Continued communication can help reinforce existing knowledge, prevent attitudes from weakening over time and ensure that future generations also grow up with a clear understanding of the benefits of fruits and vegetables. Ongoing education therefore remains valuable, but it should be paired with strategies that address the practical and economic barriers that currently limit consumption (Hailu et al., 2025).

In this rural southern Ethiopian context, interventions aiming to improve dietary behaviour may benefit from focusing on the factors that limit people's ability to act on their intentions. Supporting home garden initiatives, including access to diverse seeds, water, and small-scale irrigation, can help reduce reliance on market purchases and improve year-round availability of fruits and vegetables at the household level (Alemayehu et al., 2025). Where surplus production occurs, promoting storage technologies such as pot-in-pot systems can extend the shelf life of produce and reduce postharvest losses (Alemayehu et al., 2025). However, as Stadlmayr et al. (2023) caution, home gardening does not automatically translate into healthier diets. The preference for selling produce over consuming it, observed particularly among female adolescents in this study, underlines the need to engage households as units of change and to explicitly address the tension between nutritional goals and livelihood priorities.

The considerable variation in perceived behavioural control across demographic groups further underlines the importance of tailored approaches. Adult women reported the lowest sense of control, which may reflect limited access to productive resources and greater responsibility for household food preparation within constrained budgets. In contrast, elderly participants reported the highest influence. These differences suggest that interventions and SBCC messages should be adapted to the specific constraints and opportunities of different demographic groups.

Communication plays an important role in helping households navigate the practical and social factors that shape their dietary choices (Hailu et al., 2025). SBCC can support people in making use of available opportunities by strengthening confidence, offering practical ideas for using seasonal availability and highlighting low-cost ways to include fruits and vegetables in daily meals. Messages that reflect local realities, such as seasonal patterns, household priorities and cultural practices, are likely to resonate more strongly. Although direct social pressure around fruit and vegetable consumption was generally low,

family opinions carried meaningful influence, and certain groups, such as women and male adolescents, appeared more responsive to social cues. This suggests that SBCC can incorporate social norms where they are relevant, for example through peer-based activities or family-centred approaches. In the Ethiopian context, a community-based intervention engaging female caregivers to reflect on and discuss food allocation practices within households led to more equitable family eating patterns, suggesting that targeting social norms at the household level can be an effective entry point for improving dietary behaviour (Gulema et al., 2023). Ensuring that BCC messages reach people through trusted and accessible channels will be essential for their effectiveness. Health Extension Workers and Development Agents are well positioned to lead communication efforts, given their high trust scores in this study and their established roles in the local information system. Evidence from an Ethiopian evaluation study on reducing child stunting suggests that combining interpersonal channels with broader community-based and media channels increases the reach and effectiveness of SBCC interventions, as exposure through multiple channels reinforces behaviour change messages (Kim et al., 2019). Radio, schools and churches can complement these activities, while community microphones and mobile voice messages offer familiar options for wider dissemination. Combining these communication means with practical support and household-level engagement can help create conditions in which positive attitudes, supportive family dynamics and improved opportunities are more likely to translate into sustained fruit and vegetable consumption.

5.3 The usefulness of TPB in resource-limited contexts

Using the Theory of Planned Behaviour (TPB) gave us a useful starting point for understanding why people do or do not eat fruits and vegetables. The framework helped us organise the results into three clear areas: attitudes, subjective norms, and perceived behavioural control. This made it easier to see which factors encourage healthy eating and which ones hold people back. In this study, the three constructs were used descriptively to identify where SBCC efforts should focus, not to fully predict behaviour. A full application of TPB to predict behaviour would require measuring intention, a larger sample size, and statistical analyses such as regression or discriminant analysis. This was beyond the scope of this pilot study, and as argued in the objectives section, also beyond its purpose.

At the same time, TPB does not explain the whole picture. The model assumes that behaviour is mainly based on rational decisions and clear intentions (McDermott et al., 2015). In this context, however, eating habits are often shaped by routines, traditions, and circumstances outside of people's control (Daba et al., 2021). Even when attitudes and family

opinions were positive, this did not always lead to higher consumption, suggesting that habits, cultural practices, and structural barriers such as price and availability can be stronger influences than intention alone. In resource-limited settings, the explanatory power of TPB can be strengthened by including indicators of financial scarcity or food insecurity alongside the standard constructs (van der Velde et al., 2022).

A further consideration concerns the practical feasibility of applying TPB in resource-limited programme contexts. The survey requires respondents to answer a large number of questions covering both direct and indirect measures, and the analysis involves multiplying and combining belief scores, which requires careful data management. The use of enumerators is likely necessary in contexts with lower literacy levels, adding to the time and budget required. In addition, working through enumerators also introduces the risk of information loss, particularly in the nuance of responses. This was visible in this study, where many scores were concentrated at the extreme ends of the scale, suggesting that enumerators may have simplified response options or that participants found it difficult to express nuanced views through a structured scale. In settings where resources are limited and literacy is low, focus group discussions may therefore offer a more feasible and nuanced alternative for gathering insights into beliefs and barriers. Nonetheless, for the purpose of this study, which aimed to identify the most important drivers of dietary behaviour and inform SBCC development as a first step, this descriptive application of TPB proved useful without requiring a high investment of time or budget.

For projects aiming to apply a behaviour change framework for designing a SBCC strategy in resource-limited contexts, alternatives that require less data collection and analysis, may be more practical. The COM-B model, which breaks behaviour down into capability, opportunity and motivation, is less mathematically demanding and can be operationalised through interviews or focus group discussions (Michie et al., 2011). Several studies have examined the application of the COM-B model to design effective nutritional behaviour change interventions in Ethiopia and sub-Saharan Africa (McClintic et al., 2022; Shimels et al., 2025; Watson et al., 2023). The Socio-Ecological Model offers another useful alternative, mapping determinants of behaviour across individual, household, community and structural levels, and is frequently applied to assess eating behaviour in contexts where structural barriers are dominant (Story et al., 2008)

To conclude, while TPB provided valuable analytical depth as a pilot in this specific context and demonstrated that the framework can generate structured and actionable insights into dietary

behaviour, its feasibility should be carefully considered in relation to available resources, research objectives, and implementation context. Simpler frameworks such as COM-B or the Socio-Ecological Model may be more practical and sustainable for routine programme use in similar resource-limited settings.

6. Conclusions and recommendations for future research and practice

6.1. Conclusions

This study analysed the determinants shaping fruit and vegetable consumption in Boloso Bombe using an approach inspired by the Theory of Planned Behaviour, with the dual aim of informing SBCC intervention design and piloting an analytical methodology for broader application.

The findings show that attitudes toward fruit and vegetable consumption are broadly positive across all demographic groups, while social norms play a limited role. The primary barrier to adequate intake is perceived behavioural control, driven mainly by affordability, seasonal availability, and competing livelihood priorities at the household level. Perceived behavioural control varied considerably across demographic groups, with adult women reporting the lowest sense of control. These findings underline that SBCC interventions alone are unlikely to drive substantial changes in consumption. Effective strategies must combine nutrition education with structural support, including home garden initiatives, improved storage technologies, and household-level engagement. Communication efforts should be delivered through trusted channels, particularly Health Extension Workers and Development Agents, and should reflect local seasonal patterns, cultural practices, and the specific needs of different population groups.

With regard to the analytical approach, this pilot demonstrates that TPB can generate useful and actionable insights into dietary behaviour in a resource-limited context. However, the use of surveys administered by enumerators introduces the risk of information loss. The complexity of the survey and analysis raises questions about its feasibility for routine programme use, and simpler frameworks such as COM-B or the Socio-Ecological Model may be more practical for wider application.

6.2. Recommendations for BCC practitioners

Based on our findings, we propose the following recommendations for developing effective BCC interventions to promote adherence to the

recommended guidelines for fruit and vegetable consumption, clustered into four areas:

a) Design and deliver evidence-based interventions

- Before developing BCC materials, make an inventory of the behavioural drivers and constraints specific to the target population and context, using a behaviour change framework such as COM-B or the Socio-Ecological Model, to ensure that interventions are evidence-based and precisely targeted to the most relevant barriers.
- Engage influential community members to promote supportive social norms and institutionalise nutrition communication structures to ensure continuity beyond individual project cycles.
- Develop context-specific communication materials delivered through trusted channels, including health extension workers, development agents, community microphones and mobile voice messages.



b) Create a supportive food environment

- Explore and promote locally available indigenous fruits and vegetables to increase the quantity and diversity of available fruits and vegetables
- Increase year-round access to fruits and vegetables by promoting home gardens, school gardens, and improved market linkages, complemented by context-specific storage technologies such as pot-in-pot systems to extend availability beyond the harvest season.



c) Address knowledge and behavioural drivers

- Provide targeted nutrition education for specific groups, including adult men, female adolescents and pregnant women, with focused messaging addressing the food taboo around fruit and vegetable consumption during pregnancy.
- Strengthen cooking demonstrations to build food preparation confidence and support households in making better use of home-grown or locally available fruits and vegetables
- Encourage households to prioritise fruit and vegetable consumption alongside income generation goals, through household-focused training that engages all household members, including men.

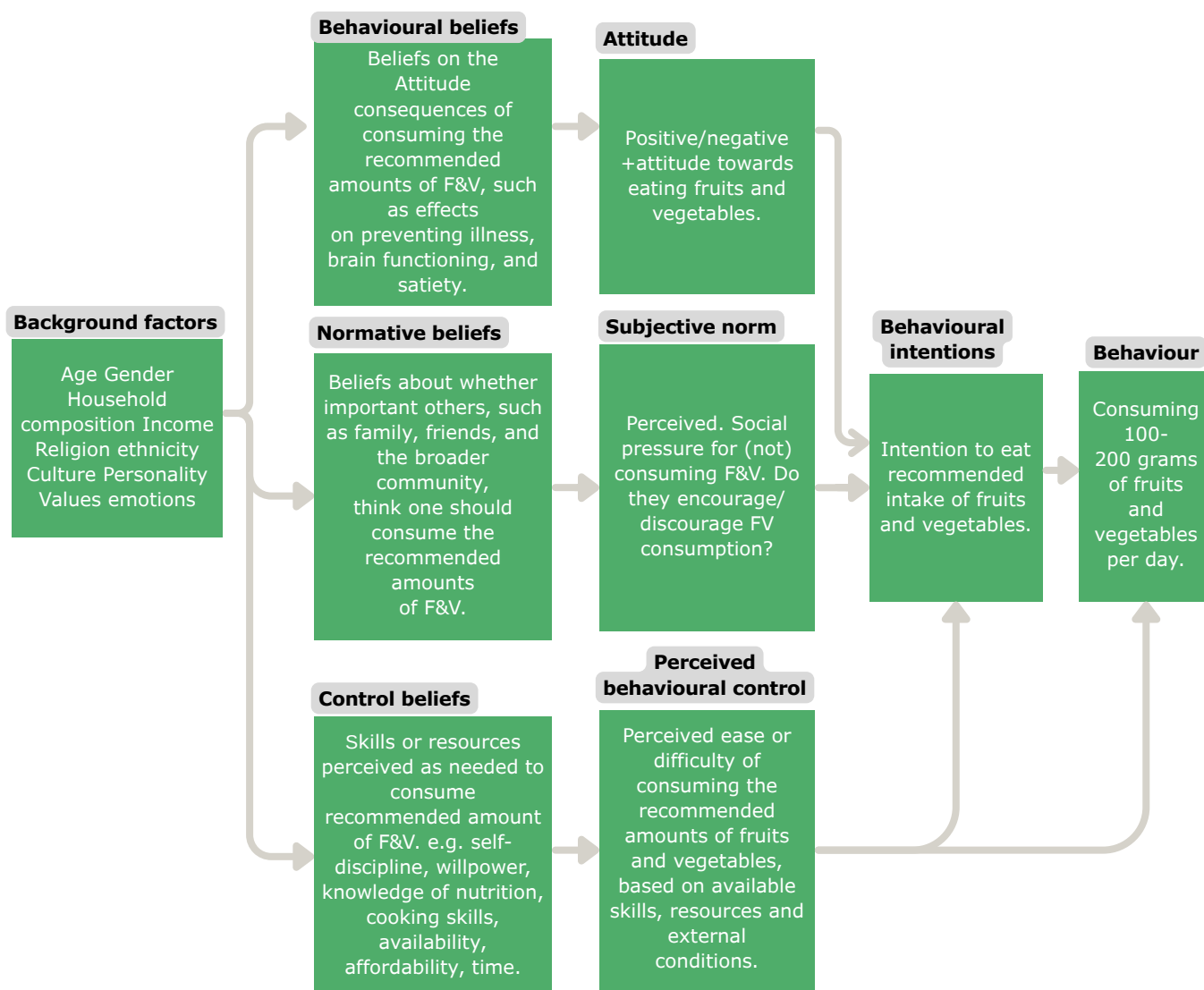


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Annex



Framework of Theory of Planned Behaviour, applied to behaviour of consuming the recommended amount of fruits and vegetables per day

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