

## **Social, Economic and Cultural Influences on Adolescent Nutrition and Physical Activity in Jimma, Ethiopia: Perspectives from Adolescents and their Caregivers**

Mubarek Abera\*<sup>1</sup>, Polly Hardy-Johnson<sup>2</sup>, Alemseged Abdissa<sup>3,4</sup>, Abdulhalik Workicho<sup>5</sup>, Rahma Ali<sup>5</sup>, Susie Weller<sup>6</sup>, Caroline Fall<sup>2</sup>, Sarah H Kehoe<sup>2</sup>, Mary Barker<sup>2</sup>, Abraham Haileamlak<sup>1</sup>, on behalf of the TALENT collaboration.

### **Affiliation**

<sup>1</sup>Faculty of Medical Sciences, Institute of Health, Jimma University, Ethiopia

<sup>2</sup>MRC Lifecourse Epidemiology unit, Southampton General Hospital, University of Southampton, UK

<sup>3</sup>Armauer Hansen Research Institute (AHRI), Addis Ababa, Ethiopia

<sup>4</sup>Faculty of Health Sciences, Institute of Health, Jimma University, Ethiopia

<sup>5</sup>Faculty of Public Health, Institute of Health, Jimma University, Ethiopia

<sup>6</sup>ESRC National Centre for Research Methods, University of Southampton, Southampton, UK

**Email Contact:** MA: [abmubarek@gmail.com](mailto:abmubarek@gmail.com); AA: [alemseged.abdissa@gmail.com](mailto:alemseged.abdissa@gmail.com) ;  
AW:[abdulhalikw@gmail.com](mailto:abdulhalikw@gmail.com); RA: [rahmiii.ali@gmail.com](mailto:rahmiii.ali@gmail.com); AH: [kasechab@gmail.com](mailto:kasechab@gmail.com)

**Corresponding author:** Dr. Mubarek Abera, Faculty of Medical sciences, Institute of Health, Jimma University, Jimma, Ethiopia. Phone: +251918968803;Email: [abmubarek@gmail.com](mailto:abmubarek@gmail.com); [mubarek.abera@ju.edu.et](mailto:mubarek.abera@ju.edu.et)

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The TALENT collaboration comprises:

**Laurence Adonis-Koffy**, Yopougon University Hospital Faculty of Medical Sciences - UFHB de Cocody Abidjan Ivory Coast; **Ulka Banavalli**, BKL Walawalkar Hospital and Rural Medical College, Dervan, India; **Edna Bosire**, University of the Witwatersrand, Johannesburg, South Africa; **Harsha Chopra**, Centre for the Study of Social Change, Mumbai, India; **Meera Gandhi**, Centre for the Study of Social Change, Mumbai, India; **Abraham Haileamlak**, College of Public Health and Medical Sciences, Jimma University, Jimma, Ethiopia; **Ramatoulie Janha**, MRC Keneba, MRC Unit The Gambia; MRC Keneba, **Landing Jarjou**, MRC Unit The Gambia; **Julie Jesson**, Inserm U1027, University of Toulouse, Paul Sabatier, France; **Shama Joseph**,

Epidemiology Research Unit, CSI Holdsworth Memorial Hospital, Mysore, India; **Kejal Joshi Reddy**, Unit, KEM Hospital, Pune, India; **Elizabeth Kimani-Murage**, African Population and Health Research Center (APHRC), Nairobi, Kenya; **Egnon Kouakou**, PAC-CI, Abidjan, Ivory Coast; **GV Krishnaveni**, Epidemiology Research Unit, CSI Holdsworth Memorial Hospital, Mysore, India; **Kalyanaraman Kumaran**, MRC Lifecourse Epidemiology Unit, University of Southampton and Head, UK and Epidemiology Research Unit, CSI Holdsworth Memorial Hospital, Mysore, India; **Valeriane Leroy**, Inserm U1027, University of Toulouse, Paul Sabatier, France; **Sophie Moore**, Kings College London, London, UK; **Shane Norris**, Developmental Pathways Research Unit, University of the Witwatersrand, Johannesburg, South Africa; **Suvarna Patil**, BKL Walawalkar Hospital and Rural Medical College, Dervan, India; **Sirazul Ameen Sahariah**, Centre for the Study of Social Change, Mumbai, India; **Kate Ward**, MRC Lifecourse Epidemiology Unit, University of Southampton, UK; **Stephanie Wrottesley**, University of the Witwatersrand, Johannesburg, South Africa; **Chittaranjan Yajnik**, Diabetes Research Unit, KEM Hospital, Pune, India; **Pallavi Yajnik**, Diabetes Research Unit, KEM Hospital, Pune, India.

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**Ethics:** This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the institutional review board of Jimma University, ID number: IHRPGO/406/2018). Written informed consent was obtained from all subjects/patients.

1 **Abstract (250 words)**

2 *Objective:* to explore influences on adolescent diet and physical activity, from the perspectives of  
3 adolescents and their caregivers, in Jimma, Ethiopia.

4 *Design:* qualitative design, using focus group discussions (FGD).

5 *Setting:* a low-income setting in Jimma, Ethiopia.

6 *Participants:* five FGDs with adolescents aged 10-12 years and 15-17 years (n=41) and three  
7 FGDs with parents (n=22) were conducted.

8 *Results:* Adolescents displayed a holistic understanding of health comprising physical, social and  
9 psychological well-being. Social and cultural factors were perceived to be the main drivers of  
10 adolescent diet and physical activity. All participants indicated that caregivers dictated  
11 adolescents' diet, as families shared food from the same plate. Meals were primarily determined  
12 by caregivers, whose choices were driven by food affordability and accessibility. Older  
13 adolescents, particularly the boys, had opportunities to make independent food choices outside of  
14 the home which were driven by taste and appearance, rather than nutritional value. Many felt that  
15 adolescent physical activity was heavily influenced by gender. Girls' activities included domestic  
16 work and family responsibilities whereas boys had more free time to participate in outdoor games.  
17 Girls' safety was reported to be a concern to caregivers, who were fearful of permitting their  
18 daughters to share overcrowded outdoor spaces with strangers.

19 *Conclusions:* Adolescents and caregivers spoke of a range of social, economic and cultural  
20 influences on adolescent diet and physical activity in Jimma, Ethiopia. Adolescents, parents and  
21 the wider community need be involved in the development and delivery of effective interventions  
22 that will take into consideration these social, economic and cultural factors.

23 **Key words:** Adolescent, nutrition, physical activity, qualitative, Jimma, Ethiopia

## 24 **Introduction**

25 Adolescence, the period of transition from childhood to adulthood, is commonly regarded as the  
26 second window of opportunity for nutrition intervention to reverse growth retardation and the  
27 intergenerational effects of malnutrition (1). The 2016 UNICEF report showed that there are  
28 currently 1.2 billion adolescents in the world (2), 90% of whom reside in low- and middle-income  
29 countries (LMICs) (3). In sub-Saharan Africa (2), including Ethiopia (4), adolescents account for  
30 a quarter of the population. The 2018 Global Nutrition Report indicated that malnutrition is  
31 unacceptably high across many countries, including Ethiopia. Moreover, as many LMICs are  
32 undergoing rapid nutritional and lifestyle transition, countries are faced with the coexistence of  
33 adolescent undernutrition and obesity (5). This double-burden during adolescence has negative  
34 health consequences for adolescents now, in the future and for their offspring (6).

35 Influences on adolescent nutrition are multiple (7), and involve complex interactions between  
36 individual, familial, community and environmental level factors (8–13). Although adolescents’  
37 undernutrition is the main problem in LMICs, there has been a recent shift in the dietary habits of  
38 adolescents with the rise in consumption of calorie dense, packaged foods (13) alongside a steep  
39 decline in energy expenditure, both of which contribute to an increased risk of adolescent obesity  
40 (14). To date, no research has explored perceptions of these influences among adolescents living  
41 in Jimma, Ethiopia.

42 Despite its importance to health throughout the lifecourse, adolescent nutrition and physical  
43 activity have either been neglected (6) or given limited emphasis in LMIC research (15), including  
44 that from Ethiopia. Existing studies of adolescent nutrition in Ethiopia have focussed on  
45 quantitative outcomes like the prevalence of, and factors associated with, malnutrition. To date,  
46 there has been limited qualitative research exploring the views, motivations and influences on  
47 these broad determinants (16). Adolescents may have different experiences, perspectives and  
48 explanations regarding their nutrition and physical activity than adults, so hearing adolescents’  
49 voices is important to gain insights into their lives and behaviours if we wish to design effective  
50 interventions. Our study aimed to fill this knowledge gap by using a qualitative research design to  
51 capture the voices of adolescents and caregivers living in Jimma, Ethiopia. Contextual information  
52 was also gathered using a survey of socioeconomic status, growth (height and weight), and dietary  
53 diversity. This study formed part of Transforming Adolescent Lives through Nutrition (TALENT);

54 an international collaboration aiming to understand adolescents' dietary behaviour and  
55 opportunities for physical activity.

## 56 **Methods**

### 57 **Study setting**

58 The study was conducted in Jimma City, Ethiopia between June and July 2018. Jimma is situated  
59 in the southwestern region of the country, 352 km from the Capital, Addis Ababa. It is one of the  
60 oldest cities in Ethiopia, established around 1830. The town is known for its multi-ethnic and  
61 diverse religious inhabitants living together harmoniously. Jimma is growing rapidly through  
62 expansion of construction and infrastructure like roads, public facilities (e.g., schools and  
63 hospitals) and modern facilities (e.g., gymnasiums and swimming pools). There is high inward  
64 migration from the surrounding rural areas because people are searching for better-paid jobs,  
65 education for their children and a better quality of life. Although Ethiopia is classified as a lower  
66 income country (LIC), the lifestyle of the Jimma population can be described as that of a low-and  
67 middle-income setting (LMIC). Some of the population live in extreme poverty, with an  
68 inadequate income to account for the cost of living including education, food and other basic daily  
69 needs. There are also many segments of the population that live in better conditions whereby they  
70 earn enough for their children to be educated and to cover the cost of basic needs. These individuals  
71 live in large compounds or apartments. Based on the 2011 population estimation, a total of 205,163  
72 (nearly 0.2% of the total population in Ethiopia) people reside in Jimma City, 40,418 (19.7%) of  
73 whom are 15 – 24 years and 97,679 (47.6%) are below 15 years. The majority of adolescents  
74 (nearly 80%) in Jimma attend school. However, approx. 20% of adolescents leave school to get  
75 jobs to support themselves and their parents financially.

### 76 *Research Design and Participants*

77 Adolescents and their parents were recruited through convenience sampling. **Accordingly**, 41  
78 adolescents participated in five focus group discussions (FGDs) and 22 parents in 3 FGDs. Urban  
79 health extension workers (HEW), already working in the communities, recruited participants by  
80 approaching families they already knew. Capitalising on the rapport that existed between  
81 participants and researchers maximised the success of the recruitment process. A heterogeneous

82 sample of adolescents was recruited from low and lower- middle income families. The HEWs were  
83 not involved in conducting the FGDs.

84 Initially, adolescents completed a quantitative socio-demographic questionnaire and provided  
85 anthropometric data to contextualise the qualitative data. A sub-sample of survey respondents  
86 were invited to take part in a FGDs. FGDs were chosen as the most appropriate data collection  
87 method to obtain insights from adolescents and their parents, as well as a sense of the social norms  
88 arising from group discussion (17).

89 *Sociodemographic questionnaire:* Information on maternal education and job status, head of  
90 household, occupational status of the head of household, household information, sources for  
91 drinking water, and use and ownership of various household goods was collected.

92 *Anthropometric measurements:* height was measured to the nearest of 0.1cm using a stadiometer  
93 (SECA, Hamburg, Germany) while weight was measured in kilograms to the nearest of 0.1kg  
94 using Tanita 418 (Tanita Corp, Arlington Heights, Illinois) scale.

95  
96 *FGD Guide:* The FGD guide aimed to facilitate discussions to explore adolescent diet and physical  
97 activity (which includes walking, running, physical exercise, sports, gyms, playing ball, and  
98 chores), from the perspectives of both adolescents and their caregivers.

## 99 **Data Collection**

100 Prior to data collection, researchers attended a five-day training workshop on qualitative data  
101 collection methods as part of the TALENT collaboration. The FGD guide was developed by the  
102 primary researcher, and members of the TALENT team (SW, MB, PHJ) during the workshop and  
103 subsequently piloted and revised based on feedback and discussions (*see the FGD guide in*  
104 *supplementary material*).

105 FGD groups included both younger (aged 10-12 years) and older adolescents (15-17 years). Each  
106 FGD was conducted by one facilitator and one observer. Boy and girl FGDs were conducted  
107 separately.

108 The time and location of the FGDs were arranged based on participants' convenience. Once  
109 consent/assent was obtained, researchers began by introducing themselves, reiterating the study

110 aims and procedures, and ensuring that the participants were happy for the FGD to be recorded.  
111 FGDs lasted approximately 90 minutes.

## 112 **Data Analysis**

### 113 *FGDs*

114 The FGDs were conducted in participants' local language to facilitate better rapport and  
115 understanding. The data were transcribed verbatim, translated into English to aid comparison  
116 across the TALENT collaboration, and checked against the audio recording to ensure accuracy.  
117 Thematic analysis following Braun and Clarke's (2006) step-by-step guide was conducted (18),  
118 with the aid of qualitative analysis software (NVIVO Version 12). Transcripts were re-read until  
119 the researchers were immersed in the data. Emerging themes were noted down to form the  
120 beginning of the coding framework. Transcripts were coded inductively, and the coding  
121 framework was revisited and revised. Codes were checked by members of the TALENT  
122 collaboration (SW, PHJ, MB). Once all of the data had been coded, similar codes were merged  
123 together and categorised. Categories were revisited and revised, discussed among the research  
124 team and developed into main themes. These themes are presented below, with direct quotes from  
125 the participants used throughout, to retain participants' voices in the report.

### 126 *Contextual survey data*

127 Frequencies and percentages were computed for categorical data, mean, median and standard  
128 deviation were computed for continuous data. The World Health Organization (WHO) Anthroplus  
129 software was used to generate adolescent growth standard (Z-score) and compared with WHO  
130 2007 reference data.

## 131 **Results**

132 A total of 8 FGDs were conducted including five with adolescents (n=41; 25 older and 16  
133 younger). Ten and fifteen of the older, and seven and nine of the younger adolescents were boys  
134 and girls, respectively. Three additional FGDs for parents included 8 fathers and 14 mothers,  
135 separately. A detailed description of the socio-economic profile of the participants is presented in  
136 Table 1 and table 2.

137 ***Table 1 here:***

138 Table 2 shows that the mothers of adolescents in this study averaged 3 years of formal education  
139 and the majority were self-employed. Other sociodemographic characteristics of the adolescents  
140 are presented in Table 2.

141 ***Table 2 here:***

142 *Adolescent Characteristics*

143 As can be seen from Table 3, there were age and gender differences in the nutritional status of  
144 adolescents. Among our sample, stunting was only present among the older adolescent girls (13%)  
145 and underweight was only present among the younger adolescent girls, compared to the other  
146 groups. In addition, overweight and obesity was present (20% and 6.7%, respectively) in the older  
147 girls and not reported among the boys or younger girls.

148 ***Table 3 here:***

149 The dominant themes from the discussions with adolescents and their caregivers included  
150 adolescents' holistic view of health, and perceptions of the social, economic and cultural influences  
151 on adolescent diet and physical activity. Adolescents and caregivers also provided some  
152 suggestions for effective interventions to improve adolescent diet and physical activity.

### 153 **Adolescents' holistic view of health**

154 The adolescents in this study displayed a holistic understanding of health. When asked about what  
155 made a person healthy, they gave a wide variety of answers including psychological, social and  
156 physical aspects of a person's well-being. Psychological well-being was highlighted as an  
157 important aspect of health for many of the adolescents:

158 *"When someone has happiness both in and outside I call him/her healthy person." (Older girls,*  
159 *FGD 3)*

160 Adolescents also felt that a sign of a healthy person was being able to maintain good relationships  
161 with others, including both peers and family members. Both loneliness and conflict were perceived  
162 to be associated with poor health, whereas altruism and open communication with people were  
163 seen to be allied with good health:

164

165 *"Those who talks and sit alone are unhealthy people." (Younger boy, FGD 2)*



166

167 *“If individuals are happy while at home, plus if the family members understand them well and*  
168 *discuss everything, they are healthy. Arguing makes individuals unhealthy. (Older girl, FGD 3)*

169

170 Many adolescents associated having a good physical appearance with both beauty and physical  
171 performance, both of which they considered indications of a healthy person:

172 *“Those with shiny faces and those who are strong are healthy people.” (Younger boy, FGD 2)*

173

174 We know about living a healthy life

175 Adolescents were well informed about the influence of health behaviours on health outcomes.  
176 Despite specifically being asked about their perceptions of health in relation to diet and physical  
177 activity, many emphasised the importance of avoiding substance abuse in being healthy.

178 *“Those who protect themselves from different addictions are healthy.” (Older boy, FGD 4)*

179 They understood the negative effects of cigarette smoking, alcohol, Khat (a psychoactive stimulant  
180 leaf from an evergreen plant cultivated in the horn of Africa), and other drugs.

181 Overall, adolescents demonstrated a detailed understanding of how nutrition and physical activity  
182 influence health outcomes. They perceived food as healthy if it contained more vegetables, less  
183 oil, and was cooked hygienically:

184 *“...those which have positive impact on health... like fruits, vegetables - these are healthy food*  
185 *stuffs.” (Younger boy, FGD 2)*

186 Whereas, unhealthy foods were described as those resulting in some sort of illness:

187 *“What determines is our health, e.g when some eats peppery “wot<sup>1</sup>” food, they might get sick so*  
188 *what determines our choice is our inner body and health”.” (Younger boy, FGD –2)*

189

190 Participants viewed physical activity as being important for both physical and psychological well-  
191 being:

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<sup>1</sup> Wot: a traditional dish in Ethiopia prepared in the form of souse made from the mixture of different spices such as ‘berbere’, onion, garlic, turmeric, beans powder, vegetables, and meat.

192 *“If someone performs and become physically active, then he/she can be physically and mentally*  
193 *competent and also prevent the occurrence of diabetes, hypertension and heart diseases”.* (Older  
194 boy, FGD 4)

### 195 **Perceptions of social, economic and cultural influences on adolescent diet and physical** 196 **activity**

197 Generally, participants reported the most prominent influences on adolescent health behaviours to  
198 be social and cultural in nature. These included the family environment, socio-economic status,  
199 and gender. In general, food choice and physical activity depended on cultural norms included  
200 what/where to eat, who decides and controls on family menus. Social factors included family  
201 economic status, access and availability of food stuffs, and spaces for physical exercise. Moreover,  
202 differences in age and gender determined capacity for food choice and access to physical activity  
203 were described as being both socially and culturally determined.

#### 204 We eat together as a family

205 Both caregivers and adolescents reported that parents dictated adolescents’ diet, and as is the  
206 custom in Ethiopia, adolescents often ate their daily meals from the same plate as the rest of the  
207 family. Caregivers decided the menu at home and adolescents were not allowed to prepare separate  
208 meals for themselves. Generally, it was accepted, as part of Ethiopian culture, that:

209 *“...food for the whole family is prepared together and all the all family members eat from the same*  
210 *plate.”* (Older girl, FGD 1)

211 The purpose of this shared food preparation and consumption was to save time, labour, cost and  
212 resources:

213 *“the responsibility to prepare food in the household is on the shoulders of my mother. You can*  
214 *imagine how much time she needs to prepare different food for children, adolescents and adults*  
215 *...three times a day. So she prepares the meal together and [it is] shared from the same plate.”*  
216 *(Older boy, FGD 4).*

217 As parents have the authority to decide on the constituents of the family meals, the availability and  
218 variety of food for adolescents are mainly influenced by the family. Although adolescents felt that

219 their diet was strictly dictated by their parents, caregivers felt that contemporary adolescents were  
220 much harder to ‘control’ than they used to be:

221 *“At this time compared to decades ago, it is becoming very difficult to control and manage*  
222 *adolescents eating habits, as adolescents are getting out of family control.” (Mother, FGD6)*

223 Parents were worried that this lack of control would result in children being exposed to unhealthy  
224 foods, like street and fast foods and that this could have a negative influence on their weight and  
225 health. From all of the caregiver’s FGDs, it was understood that older adolescents were more  
226 challenging and more likely than younger adolescents to challenge their parents over diets in  
227 favour of independent choices:

228 *“These days our adolescents are focusing on packaged food, chips and sweet things outside*  
229 *home.” (Father, FGD 8)*

230

231 In these circumstances, some of the older boys described making food choices which were driven  
232 by taste, colour and appearance of the food, rather than nutritional value. They also described how  
233 certain foods made them feel good:

234 *“It is my psychological response aroused from the taste of the food as well as satisfaction, and my*  
235 *drive to look for and eat some specific food items” (Younger boy, FGD 2)*

236 We eat what we can afford

237 Participants described family economic status as a strong driving force in determining adolescent  
238 diet. Generally, parents were influenced by the affordability and accessibility of certain foods when  
239 deciding what to cook for their families. Adolescents wanted a more varied diet and mothers  
240 wanted to provide this for their children, though many felt they did not have the financial capacity  
241 to do so:

242 *“I think when they grow-up, their needs become greater, but it depends on whether we can*  
243 *afford that or not. If we afford we can provide, if not, we can’t do anything.” (Mother, FGD 3)*

244

245 The mothers told a story of financial struggle, where they were, in some cases, unable to afford  
246 the very basics such as water for their families:

247

248 *“If you can afford it, you will be motivated to prepare different foods. Sometimes we can’t even*  
249 *afford to buy a single jerrican of water.” (Mother, FGD 7)*

250

251 The adolescents echoed this story. To be able to purchase foods outside of the family home, they  
252 had to work for the money:

253

254 *“I might want to eat meat but I might not afford it. So our economy decides...Rather I have to*  
255 *work hard to get money.”(Older Girl, FGD 3)*

256

257 How can I let my daughter play outside with strangers?

258 Physical activity opportunities were heavily influenced by gender. Girls’ physical activity was  
259 primarily domestic work whereas boys had the opportunity to participate in outdoor games.  
260 Younger boys ran and played football while older boys joined centres for physical fitness and  
261 played in structured sport zones and clubs. The gaining of physical strength, maintaining good  
262 physical, mental and psychological health/wellbeing and socialising with peers were described by  
263 the boys as their main motivations for engaging in physical activity:

264 *“Those who do exercise will be well and strong. (Younger Boy, FGD 2).*

265 In contrast, despite wanting to play and exercise, adolescent girls were often restricted in relation  
266 to physical activity opportunities. They were often not permitted to leave the home, which  
267 obviously inhibited their use of outdoor spaces, and were aware of the contrast with boys’  
268 experiences:

269 *“We want to do physical activity in school and use sports facilities in our leisure time. However*  
270 *our parents are very controlling and do not allow us to go outside of home for physical activity.*  
271 *So we don’t have the opportunity to be as physically active as our brothers.” (Older girl, FGD 1)*

272 Parents were fearful of permitting their daughters to share overcrowded outdoor spaces with  
273 strangers. They were deeply worried about their daughters’ safety, articulating very clearly this  
274 was the main reason for restricting their outdoor physical activity opportunities:

275

276 “How can I send out my daughter to the field for the sake of exercise while there are mixtures of  
277 different people with good and bad character at the field who may take advantage of girl  
278 adolescents?... We see and fear that our daughters will be sexually exploited, abused or easily  
279 influenced with wrong information.... So unless there is a separate and safe place for girls, it  
280 remains difficult to send our daughter outside for exercise although we believe that the exercise is  
281 important.” (Mother FGD 6)

282 Girls were therefore much more likely to report engaging in sedentary activities in their spare time,  
283 including sitting and watching movies and television programs, as well as helping their mothers  
284 with domestic household activities.

### 285 **Suggestions to improve adolescent nutrition and physical activity**

286 Although the adolescents demonstrated good nutritional and health-based knowledge, when asked  
287 what interventions could help to improve adolescent diet and physical activity, they proposed  
288 school-based education, media information campaigns, and home-based health information,  
289 communication and education:

290 “Advice should have to be given. Especially for street children, training materials should have to  
291 be given for them.” (Younger boy, FGD 2)

292

293 Parents on the other hand, seemed unaware of their adolescents’ nutrition knowledge, suggesting  
294 that health education and communication programs were needed to provide adolescents with the  
295 right information about nutrition to prevent them from consuming junk, fast and street food.  
296 Community-based interventions to change attitudes and perceptions were suggested to improve  
297 opportunities for physical activity. Moreover, caregivers recommended the need for separate  
298 exercise areas for boys and girls, while older girl adolescents proposed health communication and  
299 information to change community attitudes towards physical activity or exercise. Adolescents also  
300 suggested that harnessing adolescents’ desire for good physical appearance would be effective in  
301 encouraging physical activity:

302 *Men mainly spent their time on exercise but the problem is on girls, so you have to give advice on*  
303 *it by relating it with having good body posture.” (Older girl, FGD 3)*

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## 311 **Discussion**

312 The aim of this qualitative study was to explore, from the perspectives of adolescents and  
313 caregivers in Jimma, Ethiopia, influences on adolescent diet and physical activity. Adolescents  
314 displayed a holistic understanding of health, nutrition and physical activity. A range of social,  
315 economic and cultural factors were perceived to be the key drivers of adolescent diet and physical  
316 activity (Table 4). One previous qualitative study of influences on the diets of adolescents in  
317 Ethiopia has been published. (15) This study explored the impact of socio-economic status on food  
318 insecurity in rural Ethiopia. Research presented in this paper is therefore the first to explore  
319 influences on adolescent nutrition and physical activity in urban settings in Ethiopia, from the  
320 perspectives of adolescents and their caregivers.

### 321 *Insert table 4 here*

322 Adolescence is a key period of rapid growth and development which increases the demand for  
323 energy and nutrition (19). Addressing the nutritional needs of adolescents contributes to achieving  
324 Sustainable Development Goal 2 ‘Zero Hunger’, ending malnutrition by 2030. Understanding the  
325 perspectives of adolescents in relation to diet and physical activity is therefore vital if the  
326 intergenerational cycle of malnutrition and poor health is to be broken (15). In this study,  
327 adolescents reported that their diet was primarily dictated by their parents and they usually ate  
328 from the same plate as their family. A number of studies from high-income countries show that  
329 adolescents and young adults spend majority of their meal times with family (20–26). Whether it  
330 is from sharing meal times or food from the same plate, family meals are important because across  
331 all cultures they are associated with adolescents’ increased intake of nutritional food (20–23,26) .  
332 Shared meals increases the likelihood of achieving national dietary recommendations (20). In  
333 addition, sharing meals from the same plate as their family may also have a positive effect on the  
334 psychosocial well-being of adolescents (26).

335 Adolescents demonstrated good knowledge of the health benefits of a nutritious diet and regular  
336 physical activity. Research from both middle-income (Botswana) and high-income settings (USA)  
337 indicate that adolescents understand the benefits of good nutrition (27,28). This study expands on  
338 this by showing that adolescents have a holistic understanding of health, including psychological  
339 well-being in their definitions. Despite good nutritional knowledge, the adolescents continued to

340 consume junk food, a contradiction that might be explained by developmental theory. Adolescents  
341 may be less able to resist the temptations of highly palatable and socially-desirable junk food than  
342 adults because they are hyper-sensitive to emotional and social influences, and prioritise the  
343 immediate over the long-term (29). Moreover, other values such as food preferences and peer  
344 influence are given higher priority health (30). In addition, there are a complex set of social and  
345 environmental factors influencing adolescent health behaviours (8). In this study, there was  
346 conflict between parental control over food and adolescents' desire for autonomy. Parental  
347 decisions over family meals however prevailed due to limited resources and lack of adolescent  
348 purchasing power.

349 Opportunities for physical activity were heavily influenced by gender. Girls' physical activity was  
350 primarily domestic work whereas boys had more freedom and opportunity to participate in outdoor  
351 games. Studies in high-income settings also show that girls' physical activity declines as they  
352 progress through adolescence (31). In LMICs, this may be compounded by a culture of removing  
353 girls from public spaces as they become sexually mature. Adolescent girls in this study were not  
354 permitted the same level of freedom to use outside spaces as boys. Parents were particularly  
355 concerned for the safety of their daughters, not wanting them to engage with boys and men, through  
356 fear that they would be sexually exploited. Anthropometric data from the survey indicated that  
357 amongst adolescents in Jimma, only the girls demonstrated levels of both stunting and obesity.  
358 This hints at gender disparities in intra-household food allocation as well. This is a phenomenon  
359 widely documented in South Asia but not so frequently commented on in studies from Africa(32).

360 Cognisant of adolescence as a window of opportunity to break the intergenerational effect of  
361 malnutrition, policies and programs are giving more emphasis to adolescent health and nutrition  
362 than before. Different national and international policies and recommendations are being  
363 formulated for improving adolescent nutrition. The national strategy for adolescent and youth  
364 health in Ethiopia recommends supporting adolescent participation and leadership in the planning  
365 and implementation of programs for adolescent health and nutrition, enhancing innovative health  
366 education and prevention programs using mass media, health extension programs, schools and  
367 digital technologies. Specific interventions in this national strategic plan include improving dietary  
368 diversity and balance, with an emphasis on locally available and iron-rich foods, promoting healthy  
369 dietary habits, imparting knowledge of the intergenerational effects of malnutrition, sensitizing the



370 community to gender bias in food distribution in the household, iron-folic acid supplementation,  
371 scaling-up facility-based nutrition assessment and counselling, and advocacy and promotion of  
372 food fortification.

373 There are, however, challenges to developing effective, context-specific interventions such as the  
374 lack of empirical evidence and absence of the adolescent voice in considerations of what might be  
375 done to improve adolescent nutrition(15). This study addresses this gap by asking adolescents and  
376 parents what interventions they would recommend. Globally, WHO suggests that current missed  
377 opportunities in adolescent health and nutrition include intervention through schools, mass-media  
378 and other sectoral interventions such as through health services (33). Our findings show that  
379 adolescents in Jimma do not just need information on how to improve nutrition and physical  
380 activity opportunities; they are already knowledgeable and understand the health benefits. A  
381 strategy is required which enables them to convert knowledge into practice. Moreover, adolescents  
382 need resources and support from parents and the community to develop healthy lifestyle habits in  
383 terms of diet and physical activity.

#### 384 **Strengths and limitations**

385 The use of qualitative methods enabled the exploration of adolescent nutrition and physical activity  
386 from the perspectives of adolescents themselves and their caregivers in Jimma, Ethiopia. By using  
387 FGDs, adolescents' were able to share and discuss their experiences within one another. Also,  
388 being conducted within the communities that participants lived encouraged them to feel at ease.  
389 By using direct quotes in the report, the adolescent voice has been heard and given prominence.  
390 This study provides new insights into the perspectives of adolescents and their caregivers.  
391 Although adolescents have a good understanding of health, their diet and physical activity  
392 behaviours are not health-focussed but are instead heavily influenced by their families, SES status,  
393 and gender. Our findings can be used to inform the development of much needed, effective  
394 interventions to improve adolescent nutrition. A collaborative approach was taken to this research,  
395 pooling expertise to ensure that high quality data was generated and that the approach to  
396 interpretation and analysis was robust.

#### 397 **Implication of the findings**

398 In summary, despite adolescent's good understanding and knowledge of the benefits of improved  
399 nutrition and increased physical activity, their diet and physical activity behaviours were not health  
400 driven. Instead, they were greatly influenced by developmental stage, gender disparity, socio-  
401 economic and cultural factors, suggesting the need for multifaceted interventions are needed target  
402 these areas if we are to improve their nutritional status. Both parents and adolescents reflected the  
403 need to improve adolescent nutritional status and opportunities for physical activity. In line with  
404 WHO recommendations, study participants suggested the use of mass-media, school or  
405 community-based health information and communication programs as a means for change(6). This  
406 study addresses the need to identify ways of developing effective interventions to improve  
407 adolescent health in LMICs, also currently part of the WHO's agenda. These findings indicate that  
408 adolescents are key agents and have a crucial role to play in improving the health and nutrition of  
409 their own and the next generation. Programs and policies need to involve them in designing and  
410 developing interventions. The findings also highlight the need to involve parents in the co-design  
411 and implementation of programmes.

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**Table 1: Description of participants in each FGD, Jimma, Ethiopia**

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<b>Characteristics</b>	<b>FGD1</b>	<b>FGD6</b>	<b>FGD4</b>	<b>FGD5</b>	<b>FGD3</b>	<b>FGD2</b>	<b>FGD7</b>	<b>FGD8</b>
<b>Setting (city district)</b>		Bosa Kito		Bocho Bore		Hermata Mentina		
<b>Sex</b>	Girls	Mothers/father	Boy	Girl	Girls	Boy	Mothers	Fathers
<b>Age (years)</b>	10-12	Adult	15-17	10-12	15-17	10-12	Adult	Adult
<b>n</b>	8	6/1	10	10	7	7	7	8

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<b>Background characteristics</b>	<b>Young adolescent (10-12 years); N=16</b>	<b>Older adolescent (15-17 years); N=25</b>
<b>Mother's education</b> (years); Mean ( $\pm$ SD)	8, (3.40)	9.2 (3.00)
<b>Head of household's occupation; n (%)</b>		
Paid employment	1(6.25)	8 (32.00)
Self-employed	9 (56.25)	12 (48.00)
Not employed	6 (37.5)	5 (20.00)
<b>Main source of drinking water; n (%)</b>		
Piped to the house	14 (87.50)	25 (100.00)
Hand pump	1 (6.25)	0
Public tap	1 (6.25)	0
<b>Type of household toilet facility; n (%)</b>		
Own flush toilet	0	3 (12.00)
Shared flush toilet	0	1 (4.00)
Own pit toilet	13 (81.25)	12 (48.00)
Shared pit toilet	3 (18.75)	8 (32.00)
Public pit toilet	0	1 (4.00)
<b>Leisure time</b>	<b>Boys/girls</b>	<b>Boys/girls</b>
<b>Time per day spent watching entertainment programmes on TV/a computer/phone (hours); Mean (<math>\pm</math>SD)</b>	0.6 (0.8) / 4.7 (5.3)	4.5 (1.1) / 3.3 (1.4)
<b>Time per day spent playing computer games (hours); Mean (<math>\pm</math>SD)</b>	2.9 (4.9) / 2.8 (4.8)	1.3 (1.9) / 0.3 (1.0)
<b>Time per day spent doing school work on a computer (hours); Mean (<math>\pm</math>SD)</b>	0, / 0	0.6 (1.9) / 0.6 (1.0)



**Table 3: Growth characteristics and diet diversity score for adolescent participants in the qualitative study**

<b>Anthropometry *</b>	<b>Young adolescent (10-12 years)</b>	<b>Older adolescent (15-17 years)</b>
	Boys/girls	Boys/girls
<b>HAZ; mean (±SD)</b>	-.626(0.86) / 0.08 (0.67)	-0.712 (0.42) / -1.226 (0.88)
<b>BAZ; mean (±SD)</b>	Boys : -.441 (0.72)/ -.619 (1.09)	-0.515 (0.82) / 0.352(1.01)
<b>Stunting; n (%)</b>	0/0	0/2 (13.30)
<b>Thinness; n (%)</b>	0/1 (11.11)	0/0
<b>Overweight; n (%)</b>	0/0	0/3(20.00)
<b>% obesity</b>	0/0	0/1(6.70)
<b>Diet Diversity Score †</b>		
<b>Score up to 10; mean (±SD)</b>	4.7 (1.60)	5.4 (1.70)
<b>DDS≥5 n (%)</b>	3 (42.90)/ 3 (33.30)	5 (50.00)/7 (46.70)

\*WHO 2007 Growth standards, HAZ=Height-for-Age Z-score, BAZ=BMI-for-age Z-score. Stunting = HAZ<-2SD, Thinness=BAZ<-2 SD, Overweight or obese=BAZ> +2 SD); † Minimum dietary diversity score for women, FAO 2016

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**Table 4. Summary of main themes identified in the focus group discussions**

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<b>Adolescents' holistic view of health</b>	<ul style="list-style-type: none"><li>- Psychological health (e.g., well-being and happiness)</li><li>- Social health (e.g., lack of conflict and friendships)</li><li>- Physical health (e.g., strength and beauty)</li><li>- Families primarily influenced adolescent diet</li><li>- Affordability and accessibility as a barrier to a healthy diet</li></ul>
<b>Perceptions of social, economic and cultural influences on adolescent diet and physical activity</b>	<ul style="list-style-type: none"><li>- Gender differences and perceived safety of outside spaces influenced and opportunities for physical activity, particularly among girls</li><li>- School, media and home based interventions.</li><li>- Health education</li></ul>
<b>Suggestions to improve adolescent nutrition and physical activity in Jimma, Ethiopia.</b>	<ul style="list-style-type: none"><li>- Addressing attitudes around gender and opportunities for physical activity</li><li>- Focus on appearance (looking strong and fit)</li></ul>

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## **Legend**

Table 1: Description of participants in each FGD, Jimma, Ethiopia

Table 2: Characteristics of the adolescent participants in the qualitative study

Table 3: Growth characteristics and diet diversity score for adolescent participants in the qualitative study

Table 4: Table 4. Summary of main themes identified in the focus group discussions