FACILITATORS AND BARRIERS TO HEALTHY EATING PRACTICES AND
PHYSICAL ACTIVITY AMONG ADOLESCENT GIRLS IN RURAL SOUTH
AFRICA
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Abstract

Background
The dietary behaviours and physical activity are modifiable risk factors in the increasing public health problem of increasing obesity prevalence levels among children and adolescents. This paper explores perceptions, attitudes, barriers and facilitators related to healthy eating and physical activity practices of adolescent girls in rural South Africa.

Methods
A qualitative study was conducted in the rural Agincourt Health and Socio-demographic Surveillance System (HDSS) community in Mpumalanga, South Africa. Semi-structured duo-interviews were carried out with 11 pairs of adolescent girls aged 16-19 years. Thematic content analysis was used.

Results
Locally grown and traditional foods, especially fruits and vegetables were great facilitators of healthy eating among majority of participants. The female caregivers and school feeding programs also facilitated healthy eating practices. Most participants shared the belief of the importance of breakfast, even though for the majority availability of food within the household was a barrier to eating breakfast before going to school. The majority cited limited accessibility to healthy food options as a major barrier to healthy eating, as they ate what was available. On the whole, the girls shared the awareness of benefits of physical activity, and they engaged in various physical activities within the home, community and school domains, such as household chores and walking long distances to school, traditional dancing activities, and extramural activities.
**Conclusion**
Findings show the need to preserve the knowledge and practice of consuming locally grown and traditional food items in a population that is undergoing nutrition transition, with limited access and food availability as barriers to healthy eating practices. School feeding programs need to be strengthened and improved as a facilitator to healthy eating, and breakfast eating should be considered as part of the feeding program. Walking to school, cultural dance, and extramural activities can be encouraged and employed as useful facilitators to improving physical activity among rural adolescent girls where the prevalence of overweight and obesity is on the increase.

**Keywords**
Adolescent, barriers, eating, facilitators, girls, healthy, practices, physical activity, rural

**Introduction**
Eating habits of children and adolescents are of public health interest globally. In studies conducted in the developed countries such as United States of America (USA) and Western countries, adolescents have been found to consume less fruit, vegetables and milk, and noticeably more sweetened drinks, confectionery, fast foods, refined grains and other foods with high fat content; all of which have been connected to obesity risk [1, 2].

In South Africa, the Youth Risk Behaviour Survey (YRBS) conducted in 2002, and then again in 2008, among adolescents in grades 8-11, found that combined overweight and obesity prevalence almost doubled in black males (6.9% to 11.5%) and among female participants the prevalence increased significantly from 30% to 37.6% [3]. Recently in 2013, the SANHANES-1 (South African National Health and Nutrition Examination Survey) found that in young males and females 15-24 years of
age, the combined prevalence of overweight and obesity was 40.9% and 9.5% respectively [4].

Evidence from rural Agincourt (Mpumalanga province) in South Africa highlights a high prevalence of overweight and obesity among black African females – a steady increase with age that reached 25% by late adolescence. Central obesity risk (waist circumference cut-offs) also increased with puberty and peaked at 35% by early adulthood in females[5]. Clearly, there is an impetus to investigate in greater depth the environmental factors within households, schools, and the community that contribute towards adolescent obesity risk.

Limited research has explored the perceptions of facilitators and barriers to healthy eating practices and physical activity within rural South African female adolescents. Within urban South Africa (Soweto), in a previous study, we found that although overweight rates were high, no association between friends was found; neither did friends share eating behaviours. Both at school and during visits to the shopping malls, foods were commonly shared and money pooled together by friends to make joint purchases,[6]. Furthermore, the majority of participants did not prioritise eating breakfast at home, but purchased deep fried dough balls (fat cakes) from vendors before school started. Lunchboxes were also not commonly used, participants preferred to have spending money to purchase food from the school shop. The “kota”, fat cakes, and snacks were widespread lunch choices due to affordability, convenience, peer influence, and popularity. Respondents reported minimal active recreational activities. Barriers to activity were a lack of facilities and concerns about community safety [7]. However, there is limited research that has explored the perceptions of facilitators and barriers to healthy eating practices and physical activity within rural South African female adolescents.
The current study employed a qualitative approach to uncover the perceptions, barriers and facilitators towards healthy eating and physical activity practices in Mpumalanga provinces in rural South Africa similar to our previous study in urban Soweto.

The aim of this study was to explore perceptions and attitudes in adolescent girls in rural South Africa regarding healthy eating practices and physical activities. The findings of this study will contribute towards identification of strategies to address barriers and build on the facilitators that female adolescents experience in rural areas, thereby creating conditions that encourage healthy eating practices and physical activities.

**Methods**  
**Study setting**  
This study was conducted in November-December 2009, in Agincourt, a sub-district of Bushbuckridge in rural Mpumalanga province. The study site is located in the northeast bordering the Kruger National park conservation area and close to the border with Mozambique. It provides the foundation for the Rural Public Health and Health Transitions research Unit of the Medical Research Council (MRC) and University of Witswatersrand, South Africa (the MRC/Wits-Agincourt Unit). The Agincourt Health and Socio-Demographic Surveillance System (AHDSS) covers an area of 420km$^2$ comprising a sub-district of 27 villages with traditional and elected leadership. The AHDSS originated in the early 1990s from the University of Witswatersrand’s ‘Health Systems Development Unit’, with focus on district health systems development, sub-district health centre networks and referral systems and training of clinically oriented primary health care nurses [8, 9]. In this region, there is high levels of unemployment and low income levels between 40–50%. House types
range from traditional mud houses to brick houses, and the residents are usually provided with a small stand that is insufficient to support subsistence farming and hence the crops grown are mostly not enough to supplement the family’s food [5].

**Study design and data collection**
We employed the duo interview method to encourage in-depth discussion [10]. This approach has previously been successfully applied in nutrition research [11, 12], and was appropriate for this anecdotally known as mostly conservative rural community of females as it would encourage openness, engagement and information sharing. Moreover, participants would build upon each other’s responses and point out untrue statements. Eleven duo semi-structured qualitative interviews were conducted and saturation was reached, as we did not expect that more interviews would not add much new information in relation to our research question, we had reached saturation.

Participants consisted of adolescent girls aged 16–19 years and their close friends residing within rural Agincourt. A close friend was defined as “*someone of your own age group, you know very well, with whom you meet regularly (i.e. a couple of times a week), you are engaged in activities, hang out and/or chill out with and you share emotional moments. This can be someone from the same neighbourhood and may not be from the same school.*”

The sampling and recruitment for this study was done through the AHDSS. Information about the study was discussed with the volunteers and caregiver(s) during the recruitment process. All participants signed an informed consent form, and the ones younger than 18 years also got a signed informed consent from their caregivers before participating in the study. Ethics approval for the survey was
Field work was conducted by the study manager (TG), a fieldworker, and a transcriber whose first language was Shangaan and resided within Agincourt. The principal researchers (MHS and KE) trained the field workers and role plays were conducted to ensure that the field workers were conversant with the interview schedule. The interview guide was piloted on two pairs of friends who were not part of the study population, after which changes were made to make it more understandable for the study participants. The principal researcher (MHS) offered technical assistance during data collection and quality controlled the interviews.

The interview guide captured the following aspects: attitudes and perceptions around healthy eating and physical activity, dietary and physical activity practices, perceived barriers and motivators towards healthy eating and physical activity, understanding of health risks associated with obesity, eating and exercise practices at school and outside school, attitudes towards weight control, body image, cultural beliefs and family factors. The questions were informed by the Triadic Influence on Behaviour Model [13-15], which presumes that intentions of certain behaviours are derived from three streams of influence; namely the cultural environment, the social environment and biological and personality factors. Cultural factors represent the broad macro-environment, including factors such as religion and ethnicity. The social situation represents the immediate micro-environment, including influences such as household structure, parenting, peers, community, and factors relating to the physical environmental. The Theory of Triadic Influence has previously been successfully
applied in nutrition research [11, 16]. The interviews were conducted by a local experienced fieldworker in Shangaan (the local vernacular) while the study manager (TG) attended as observer. Each interview lasted for approximately 70 minutes and, was digitally recorder (with signed consent). Debriefing sessions were held daily after the fieldwork to discuss issues and themes emerging from the interviews and to ensure consistency of meaning to the questions. Preliminary analysis occurred concurrently with the continued administration of interviews to identify emergent sub-themes to be pursued in subsequent interviews.

**Data handling and analysis**
The eleven recorded interviews were transcribed and translated into English by the field worker. Four of the transcribed interviews were randomly selected for a quality check by an external local bilingual transcriber. Thematic content analysis was used and themes were identified [17]. The principal researcher (MHS), read the transcripts horizontally (individually) and vertically (across different transcripts) to identify recurrent themes in the data. These themes were used to create a coding system, including coding categories, to guide classification of responses according to codes.

**Results**

**Healthy eating practices**
The majority of participants had an understanding of healthy food as food that builds the body and protects from illnesses. The majority of participants believed that traditional foods, with specific mention of ‘miroho’ (locally grown green leafy vegetables), locally grown legumes, vegetables and nuts are good for health and the consumption thereof prevents and cures illnesses. Participants said their personal attitudes towards certain food items were also influenced by traditional beliefs within
the households (especially the elderly) and the community. Some participants said that the elderly within the community believed that green leafy vegetables were healthier than meat.

Quotes below illustrate perceptions towards healthy foods:

“*Healthy foods are foods that make you live better and with unhealthy food, you will live but it is not the same as healthy food, it makes you gain weight and become sick. Like carrots, when you have eaten them, they make your eyes whiter and clean. Beetroot and spinach is very important in human’s body because it adds blood and spinach makes you healthy in your body*” (pair 3)

“*Healthy foods are vegetables because they don’t have fat and you get vitamins and everything in it, it’s not like meat, it’s not in meat that we get vitamins and everything, meat is making us sick but I never heard someone say she is sick because of eating vegetables, they are not causing illness. Food that we are allergic to, which means it’s unhealthy because is not good for you, everything that makes you uncomfortable after eating I can say it is unhealthy*” (pair 5)

“*Healthy food according to my understanding is foods that build your body, and protect you from illness, like vegetables. Unhealthy food is food that doesn’t build our body, like sweets, chocolate, and food with lot of oil*” (pair 6)

More than half of the participants believed that breakfast was the most important meal of the day, based on what they have heard and have been taught in school and at local
clinics. Most believed in the benefits of breakfast, even though many did not eat breakfast due to limited choices or lack of food.

“I think breakfast is very good, you won’t work without eating and you won’t get power without eating, so you have to take breakfast first to be the able to do all your activities.” (pair 3)

Some mentioned the consequences of not eating breakfast, such as experiencing loss of concentration in class or headaches.

“I didn’t eat today, I’m unable to eat in the morning, I eat at around 12, it is not common that I have breakfast. I think breakfast is healthy because according to law we must not skip breakfast but I’m used to it, I don’t eat breakfast, I am fine, I don’t feel hungry and I don’t have a headache. If I eat breakfast I won’t have my lunch. (pair 5)

“Breakfast is good, we only drink tea for breakfast, there is nothing, or oats if they have bought it then you eat like other people.” (pair 4)

There were also indications of despair, as if some did not voice an opinion about breakfast and simply laughed, as if embarrassed - they would get up in the morning, bath and go to school. For some participants, skipping breakfast was self-protective from feeling hungry as they said if they eat breakfast they will feel hungry sooner before lunch, and would not be able to concentrate in class. One participant said if she doesn’t eat breakfast, she can go for the whole day at school without eating and only eat after school at home, as if it is a benefit. Very few (two participants) who eat something for breakfast, had more than one option. Pap (maize meal porridge) and tea was the most common option among those who consumed breakfast.
Facilitators to healthy eating practices
Most participants associated good health with locally home grown vegetables such as the green leafy vegetables. According to the girls he factors that facilitated consumption of fruits and vegetables were mainly taste and the feeling of health they perceived after eating a particular fruit or vegetable. Family vegetable gardens within yards or vegetables fields outside the household yard, at nearby schools or out in the open fields, also enabled them to eat healthy. Common vegetables grown were beetroot, tomatoes, and green leafy vegetables such as spinach, lettuce, and other indigenous leafy vegetables. Families collected edible wild green leaves that grow outside the rainy seasons to eat with their maize based staple. Locally grown vegetables were also sold by community members at affordable prices and neighbours often shared with each other. For few households that do not have vegetable gardens, they source their vegetables from other relatives/family members or from friends. The influence of the female caregiver on foods the families consume was quoted as a major facilitator in healthy eating practices within households. The vegetable gardens are mainly cultivated by the female caregivers who believe that locally grown vegetables are good for health and they cook them for the families even if some household members don’t like eating them.

Quotes below illustrate facilitators to healthy eating practices.

“I feel great and healthy when I have eaten a lettuce, I just feel good and it makes me happy. I like to cook food for Sunday, I like cooking and making salads, beetroot, pumpkin and cabbage. Salads are healthy.
Healthy food makes a person’s body to be always good, but food that has lot of oil, they say it causes high blood pressure and illness for a person to eat is not a problem but she must have a limit not to always eat it. I

...
like mango because is nice. When it is ripe and you eat it tastes good and lettuce I like it and everything that is grown in the garden, I just like it.” (pair 4)

“According to youth they think healthy food is meat but grannies and our parents, they think it is vegetables” (pair 1)

“Old people are afraid to eat food with oil because they say it causes illness. They want you to also cook green leafy vegetables such as miriho” (pair 3)

“I like oranges and when you have eaten them they are good in the body and make you feel great. Then I fell in love with them.”(pair 8)

“At school we get free healthy food during break. Monday we get pap, Tuesday we get stamp with, Wednesday rice with soup, Thursday samp with beans and Friday we get pap with soup or beans” (pair 6)

Health education messages in clinics, magazines, and at church youth meetings were recognised as encouraging healthy eating practices. Local schools with feeding programs provide cooked meals such as beans with soup, or samp with beans, ‘tihove’ (traditional dish consisting of boiled samp with locally grown crushed nuts) these also served as facilitators towards healthy eating practices.
“Everywhere like when we are in a place which is crowded like the clinic, they teach people that they must eat healthy food. In order to help us in the body” (pair 5)

“When we attend church conferences, they give us carrots, beetroot, cabbage, and small meat; they also add pumpkin and porridge or rice”

(pair 3)

**Barriers to healthy eating practices**

According to the informants, most households do their grocery shopping once a month when they receive money from family members who work in the cities far from home. Limited money and transportation means households only purchase basic necessities once a month, such as mealie meal (corn based staple), chicken feet, frozen chicken etc and most girls referred to strict grocery lists that the households stick to. Groceries purchased monthly do run out sometime during the month and most it was reported that most families can only afford to eat pap and indigenous green leafy vegetables that they buy or pick from the fields. Others believed that eating home grown vegetables is a sign of poverty or lack of food; and meat is a sign of wealth or civilization. Fruits were often cited as “luxuries” or “extras” and bought if there was still some money left after purchasing the basics. It appeared that fruit were not very accessible within the community.

“They think it is a sign of better status when eating meat every day.” (pair 5)

“My family doesn’t like green leafy vegetables and vegetables from the garden, we just like meat and anything from the fridge, when we eat...
vegetables, we only eat salads and it is not always that we grow them, they are very scarce” (pair 1)

At school level, some participants said they don’t bring lunch boxes due to limited resources within the household. They mentioned food items they wished were available for lunch boxes, such as bread, polony, russians (processed sausages), eggs, “everything that tastes good”, and juice. For those who took lunch boxes to school, the choice was limited to what was available at home, in most cases they were only able to take dry bread, and one pair mentioned taking lettuce to school, which would be augmented with atchaar and fatcakes due to limited lunch money and resources at home.

Some respondents brought lunch money which would not be enough to purchase healthy food, resulting in some buying cheaper snacks for lunch. Among the items sold at schools, there was bread, fatcakes, the kota, fried chips, snacks, cool drinks, atchaar, and plates of food with pap with chicken or beef. Based on the interviews, few school vendors sell fruit which is mostly more expensive than snacks, which is a barrier towards healthy eating. Most participants share money and food with friends just to make sure they have something to eat

“I don’t feel good about the free food we get at school, because they don’t cook well. After eating it I have stomach cramps, then we decided to stop eating the free food at school, if we don’t have money for lunch, we just walk around the school yard until lunch is over, if we have some money we buy fat cakes and niknaks. We like junk food because we don’t have enough money to make our stomachs full. I don’t like vegetables, I just eat, even if they are
healthy, I don’t care about that. When it comes to carrots, I don’t get the taste of it” (pair 1)

“Usually I take lunch money...when I use it I will buy some snacks and ice pop. If we don’t get food at school, I buy kota, nicknaks and fat cakes” (pair 5)

“I like spatlu (kota) when it has everything on it bread, russian, cheese, chips and atchaar” (pair 10)

Peer perceptions was also a barrier to healthy eating as participants mentioned concerns of peer reaction if they ate miroho (green leafy vegetables) since eating meat frequently is seen as a sign of better economic status or wealth. Clearly barriers cited to healthy eating practices were household poverty, the affordability and accessibility of healthier food, peer influence, and aspirations to purchase more socially desirable convenient foods.

**Perceptions and practices related to physical activity**

The majority of participants believed physical exercise is a good thing for good health, it boosts the body’s ability to fight against illnesses, and it also helps prevent sickness. Even the few who did not participate in physical activity cited physical activity as good for health.

“It’s good to exercise, if you exercise you could lose weight and it is necessary for every person to exercise. At school I’m on athletics and netball. It’s just now we are writing but I was always exercising. When I exercise, I’m not lazy and my body is always right, I don’t get flu easily.” (pair 5)
“I think to exercise is good but I don’t do it. I’m unable to run or jump but when my friend says we must do it I try to do it.” (pair 10)

“Young people should exercise so that the illnesses that are prevalent nowadays must not get us soon” (pair 3)

**Facilitators of physical activity**

Most of the schools have a variety of physical activities during school breaks, after school and during life orientation classes. Most students participate in games such as skipping rope, street dancing, sporting activities such as netball, ladies soccer, volleyball, and a variety of traditional dances. It seems there is also good peer influence towards physical activity with active encouragement by their friends. Some of the students walk long distances to and from school, and thus get an opportunity to exercise. Within the home setting, most participants were involved in household chores such as cleaning, cooking, and working in the vegetable garden or fields, which facilitated physical activity.

“We like dancing and singing, we play songs from cell phones then we dance. Sometimes we just play with kids on the street, we play netball and skipping rope” (pair 3)

“It is good because after playing ball, my friend wants to sit down saying that she is tired, then I force her and set up the clock that now we will play
“We walk when we go to school. It takes me twenty minutes when I walk fast and forty minutes when I walk slow...I also run, in order to always feel good in the body. During break, we dance kwaino, and we play netball. After school we have netball, ladies soccer and volleyball, we play netball. When it comes to culture, we have mchongolo, xibavhana and xipenede. We were also cleaning our class-rooms after school, then we come home. When we get home, we wash dishes and clean the house” (pair 6)

**Barriers towards Physical Activity**

Some participants mentioned that in more senior grades, the school discouraged them from participating in extramural activities as they were encouraged to use that time for studying instead, as sports would disturb them. Majority of these participants alluded to the fact that they were involved in sports in junior grades. Despite peer encouragement a barrier is exercise was peer “gossip” and many girls vocalised their concerns around how they looked when exercising and what their female and male peers would say about them.

“They don’t allow us to play netball or any sports, when you are at grade 12, you don’t participate in anything. Even singing they don’t allow us, they don’t allow us because it will disturb us, this year we were doing nothing at all, like when they go to soccer we use to go with them just to support. After school we used to participate in Sarafina dance last year, this year we were doing nothing at all” (pair 3)
“At school there is netball, soccer, ladies soccer and volley ball, I don’t participate in any activity. My problem is that people who are playing ball at school are talking a lot and I don’t like to talk.” (pair 8)

Discussion

Within a rural South African setting, adolescent girls could articulate an understanding of healthy eating and were aware of healthy vs. unhealthy foods and benefits of locally grown foods. The majority associated healthy foods with health benefits such as prevention against illnesses and feeling of wellness. Similar perceptions about healthy foods were shared by females in an urban setting in Soweto, where the meaning of healthy eating was investigated [7]. The participants described, healthy eating in terms of specific foods, in particular, fruits and vegetables and the benefits of eating such foods, such as improved immune system and protection from sicknesses. In the current study, the participants also associated healthy foods with foods that have less fat and they also associated healthy foods with their traditional and locally grown foods [18]. The knowledge of health benefits attached to traditional foods, which were imparted by female caregivers, and the involvement of female caregivers within households in food agriculture and preparation also enabled adolescent girls to eat healthy. Therefore, a strong facilitator of healthy eating healthy eating at the household level were the availability of family grown vegetables within households or from neighbours, local vendors, and relatives. In a US study that focused on the factors affecting low-income women’s food choices and the perceived impact of dietary intake and socioeconomic status on their health and weight, found that mothers and female caregivers’ attitudes, upbringing, and nutrition knowledge, and cooking skills directly influenced their families’ dietary intakes [19].
Poverty is a clear barrier to healthier eating. For a majority of participants, unavailability of food to eat for breakfast within the home setting caused them not to eat anything before going to school, and for the few who ate something, pap (porridge-maize based) with tea was most common. Most participants felt that they did not have the resources to eat healthy due to limited choices and restricted accessibility to healthy foods. Based on current study findings, the majority of students would benefit from breakfast programs such as the Maryland Meals program for Achievement (MMFA), which provides free breakfast in classrooms. This approach where breakfast was supplied in the classroom as part of the school day showed that the MMFA program resulted in improvements in performance, attendance, attention, and behaviour[20]. This approach will play a major role in facilitation of healthy eating practices in a community with increased levels of household food insecurity due a high prevalence of HIV/AIDS[21].

It appears that peer pressure and possibly community beliefs may hinder the consumption of traditional foods and create a barrier as eating green leafy vegetables is perceived as a sign of poverty. The consumption of meat and fast food is associated with better economic status and is therefore more desirable. With the benefits of poverty reduction that economic transition brings to South Africa urban and rural settings[22], it is concerning that healthy traditional and local eating practices could be eroded as communities adopt unhealthy eating behaviours. The school feeding programme was cited as a providing cooked meals to participants that otherwise would not have had any food. However, adolescents mentioned that fruit was rarely available and that the meals served may not be the healthiest.
Increasing the availability of healthy foods through the school feeding scheme or reduced/subsidized food prices, in this setting, would facilitate healthy eating. This is supported by findings of a systematic review of United Kingdom based studies, which examined the barriers to, and facilitators of healthy eating among young people (11-16 years), where adolescents from majority of the studies believe that better availability of healthy foods would facilitate healthy eating[23]. However, despite the participants acknowledging the school feeding scheme, they did articulate a strong aspiration to rather have the financial resources to purchase convenient foods, such as fried chips, sugar-sweetened beverages etc, from school vendors. These findings are in line with those of a study conducted by Shepherd J et al., 2006, where young people mostly prefer fast foods because of taste, and they valued the ability to choose what they want to eat [23]. This approach should not also involve local food vendors who sell snacks and other food item.

Clearly, as rural communities transition and become more urbanised it is important that lessons from urban areas are acknowledged. In a similar study conducted in an urban setting, urban Soweto girls were skipping breakfast, but consuming unhealthy high energy breakfast options such as fat cakes or snacks sold by school vendors instead. More than their rural counterparts, urban girls reported to be consuming more fast foods at household level during weekends (“kota” and fat cakes for breakfast), due to convenience and cost. Some of the urban girls even replace supper during the week with the “kota”, which results in less sharing of family meals [7]. This could suggest that as the cost of living, availability and access to fast foods increases in rural settings, there is a possibility for families to consume more fast food options. This could result in a decline in the consumption of locally grown and traditional vegetables in the rural setting.
It is important to consider the impact of poverty and food security, the importance of food vendors in rural communities, the food composition of school feeding programmes, and the aspirations of youth (taste preferences and emotional connotation to food) when envisaging interventions to improve healthier dietary behaviours. Furthermore, within the community setting, churches play a significant role in facilitating healthy eating practices through the variety of foods they prepare for youth at church conferences. Clinics were also mentioned as giving health education messages which promote and encourage healthy eating practices.

Participants believed that physical activity helped to prevent sicknesses. The school setting is a major facilitator of physical activities engagement through extramural activities including sport and cultural activities.

Most participants in the current study walked long distances to and from school (atleast 40 to 60 minutes a day), and engaged in traditional dances, which also facilitated physical activity. The chores that majority of participants engage in at home such as household cleaning, cooking and working in the vegetable gardens, also facilitated physical activity but were not viewed favourably as such.

In comparison to urban girls, Soweto participants were also participating in house chores, but majority were not walking long distances to and from school as their rural counterparts, and some were using transportation to get to school [7]. In both settings, dancing (street and traditional) can be employed in interventions to increase physical
activity, and the participation in household chores can also be considered in the community and household domains.

These findings are in line with those of a study conducted in rural Limpopo, Dikgale village, where adult female participants were found to be largely active as they walked with increased intensity for long distance due to transport limitations, participated in household work, yard work, and farming activities [24]. In another study conducted in USA, Florida among adolescents aged 13-14 years old, where the broader impact of walking to school was investigated, walking to school was associated with higher overall mode of vigorous physical activity throughout the day compared to traveling by car, bus or train[25].

The schools play a major role in facilitating and motivating physical activity among the female students. Schools need to encourage students even at grade 12 level, to participate in physical activity, in order to encourage the practice even after they leave school. Based on recent findings in the same community, school authorities need to prioritise of provision of equipment and facilities for non-classroom activities [26]. In another South African township based study among secondary school learners based in Durban, which focused on reasons for non-participation in sports by black learners, inadequate sports facilities was cited as the primary reason for non-participation[27].

**Conclusions**
As nutrition transition advances in rural South African settings, there is a need to protect and promote availability and access to locally grown foods and traditional dishes, in order to promote and facilitate healthy eating among female adolescents. The female caregivers and the elderly can play a major role in teaching the young females about the health benefits of traditional foods as they are mainly involved in
preparing family meals. Food availability needs to be addressed as a major barrier among adolescents who know about the benefits and importance of consuming breakfast. School feeding programs can be enhanced and improved as a vehicle and facilitator to breakfast and general healthy eating among adolescents who do not have enough access to healthy options at household and school level.

Physical activities that adolescents engage in within the home such as performing household chores, walking long distance to and from school, and traditional dances within the community and school environment should be preserved and encouraged in a society with increasing prevalence of overweight and obesity. Extramural activities and sports facilities should be strengthened and promoted to increase physical activity at school level. Future studies should explore how community based and household structures such as churches, clinics, and schools can be employed to promote and protect healthy eating practices among female adolescents. Intervention strategies to help reduce the prevalence of overweight and obesity among young girls should utilise these available avenues. The level of physical activity amongst the female adolescents needs to be investigated further, also taking into account activities that girls engage in within the household, community, and school setting.

**Competing interests**
The authors declare that they have no competing interests.

**Authors' contributions**
MHS, SN, KK, and KE were involved in the initial conceptualisation of the research question. MHS and TG collected the data. MHS coded the data with assistance from
KK and SN. MHS was responsible for the data analysis with inputs from KE, AI, SN, and KK. MHS took the lead in drafting the manuscript with input from SN, KE, AI, TG and KK.

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