

# Narratives of urban female adolescents in South Africa: dietary and physical activity practices in an obesogenic environment

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## Abstract

**Objectives:** The objectives of this study were to investigate the narratives pertaining to dietary and physical activity practices by female adolescents in Soweto.

**Design:** This was exploratory qualitative research, using duo interviews (pairs of best friends) (n = 29) from adolescent females.

**Setting:** The setting was three urban high schools in the township of Soweto, South Africa.

**Subjects:** Subjects were twenty-nine pairs of Grade 12 female adolescents predominantly, with a mean age of 18 years (15.3-21.6, standard deviation 1.1).

**Outcome measures:** The outcome measure was body mass index, interpreted in relation to eating practices and exercise participation.

**Results:** Locally prepared convenience foods were reported to replace home-prepared breakfast. The majority of participants did not prioritise eating breakfast at home, but purchased deep-fried dough balls ("fat" cakes) from vendors before school. Lunch boxes were also not commonly used as participants preferred to use spending money to purchase food from the school tuck shop. *Kotas*, "fat" cakes and snacks were popular lunch choices because of their affordability, convenience, peer influence and popularity. Respondents engaged in minimal active recreational activities. A lack of facilities and concerns about safety were barriers to activity.

**Conclusion:** This study highlights the importance of investigating the immediate social context as a potential intervention point to improve the lifestyle of adolescents, to enable them to make the affordable and convenient choice, the healthier choice.

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## Introduction

Adolescence offers a unique opportunity to influence the adoption of healthy eating, exercise and less sedentary behaviour, in terms of short- and long-term health benefits.<sup>1,2</sup> For example, physical activity in young people reduces cardiovascular disease (CVD) risk factors and improves bone mass acquisition and peak bone mass.<sup>3</sup> High-income country studies have shown that many adolescents engage in a high intake of fast foods, a low intake of fruit, vegetables and dairy foods, and erratic eating behaviour, such as meal skipping.<sup>4-6</sup> These practices may contribute to rising obesity levels. According to recent findings, obesity was identified in African female and male children as early as between two and five years of age by the South African National Health and Nutrition Examination Survey (SANHANES-1), where the combined prevalence of overweight and obesity was found to be 23.8% and 21.9%, respectively. African adolescents aged 10-14 years also had a high combined prevalence of overweight and obesity at 22.3% and 10.2% for females and

males, respectively, in the same national study.<sup>7</sup> These findings are similar to those of the second national South African Youth Risk Behaviour Survey conducted on youth in grades 8-11, where pooled overweight and obesity prevalence almost doubled from 2002 to 2008 in black males (6.9% to 11.5%). The prevalence of pooled overweight and obesity in female participants in the same study increased significantly from 30% to 37.6% between the first and second South African Youth Risk Behaviour Surveys.<sup>8</sup> The combined prevalence of overweight and obesity was 40.9% and 9.5%, among females and males, respectively, in the age group 15-24 years of age (SANHANES 2012).<sup>7</sup>

Previously, in urban Soweto, the combined prevalence of overweight and obesity in girls and boys was 27.3% and 6.9%, respectively, at age 17 years, within the birth to 20 cohort.<sup>9</sup> Poor eating habits across the domains of the home, school and community in adolescents were reported in the same cohort. Within the home, adolescent girls and boys aged 13, 15, and 17 years showed a decrease in regular (at

least three times a week) breakfast consumption practices (76.4%, 63.8% and 65.3%, respectively). At school, lunch box usage was uncommon, and declined from 17% at age 13 years to 8.6% by age 17.<sup>10</sup> More than 80% of participants bought food from the tuck shop. The five most popular purchases for all ages were sweets, crisps, cold drinks, fried chips and white bread, accounting for 62% of purchases. Female participants consumed more confectionary options than males within the community environment. Sweets, crisps and soft drinks were the three most popular confectionary or beverage items, accounting for > 65% of items purchased at all time points.<sup>10</sup>

Interventions aimed at modifying adolescent eating and physical activity practices have met with mixed success,<sup>5</sup> which, in part, may be because of inadequate understanding of the factors that govern eating and exercise beliefs and behaviour by adolescents.

Qualitative research methodology has been shown to be an effective research method to elucidate multiple factors that may explain dietary and physical activity, and beliefs and practices.<sup>11-16</sup> Identifying dietary and exercise beliefs and behaviour in South African urban adolescents, as well as factors that influence them, is critical for future research and intervention development as part of the strategy to curtail the burgeoning obesity epidemic in South Africa, especially in black females. Therefore, this study examined adolescent female narratives around lifestyle practices to better understand socio-environmental influences (community, school and home) in an urban obesogenic environment through the utilisation of an innovative qualitative methodological approach.

## Method

### Recruitment and study design

The study took place in the township of Soweto, situated in the south-western part of the Johannesburg metropolis, which comprises several townships. With an estimated 1-1.5 million people, Soweto is one of the largest urban concentrations of black Africans on the continent.<sup>17</sup> Four high schools that were identified by local researchers as “long standing” in the community were chosen from different areas of Soweto. Grade 12 female students, i.e. in the last year of high school, were the target study population for the study. Recruitment was carried out by submitting an invitation and study information letter to the Gauteng Soweto Education district office. After permission was granted to visit the schools, the study was explained to the principals and teachers. Three schools agreed to participate in the study. One declined because of concerns relating to student examinations. Innovative qualitative, duo interviews were utilised for the study, whereby a participant and her best friend were interviewed, so as to facilitate greater information sharing. A best friend was defined as “someone of your own age, who you know very well, with whom you meet regularly (i.e. a couple of times a week) and with whom you engage in activities, ‘hang out’ and/or ‘chill out’ with, and with whom you share emotional moments”.

During a series of school visits, the research was introduced to the grade 12 teenagers, who were then asked to volunteer for participation, together with a best friend. Informed consent forms

were provided to the volunteers. Thirty-two students returned the completed forms to their teachers. Parental consent was telephonically confirmed for all of the participants. All 32 pairs were then invited for an interview that took place at the Research Unit at Chris Hani Baragwanath Hospital. Three participant pairs were excluded from the study as they had decided not to take part. This resulted in 29 completed duo interviews, with 15, 9, and five friend pairs recruited from the three schools. This study was approved by the Human Research Ethics Committee (Medical) at Witwatersrand University (M090427).

### Conceptual framework and development of a semi-structured interview schedule

Conceptual frameworks are useful in understanding the dynamics of behaviour, the processes for changing it and the effects of external influences on it.<sup>15,18</sup> In this study, the Theory of Triadic Influence was applied,<sup>19-21</sup> which presumes that intentions of certain behaviour derive 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 that relate to the physical environmental. Biological and personality factors represent stable intrapersonal influences, originating from an inherited disposition (gender and age) and personality characteristics. The Theory of Triadic Influence has been successfully applied in nutrition research.<sup>22,23</sup> The current study focused on the social environment, in particular, to explore both distal (i.e. social normative beliefs) and proximal factors of influence that potentially affect lifestyle practices in the context of food choice, dietary patterns and physical activity. A semi-structured, open-ended interview schedule was formulated, using the expertise of a panel of qualitative and nutrition researchers who were familiar with the study setting.

### Interview procedure

The interview schedule was piloted on four pairs of friends, who were not part of the study sample. Consequently, adjustments were made to the interview schedule. Changes included the rephrasing of questions for better understanding. A local researcher conducted all of the interviews in a combination of local languages, and was familiar with “township” culture and local food items. Cultural aspects were taken into account by using a local interviewer, and giving the participants the choice of responding in the interview in English, Zulu, Sesotho or a combination of languages, thus enhancing participants’ comfort and willingness to engage freely. The trained interviewer began the interview by clarifying the goals of the study, building rapport and explaining confidentiality. An observer took notes, and measured weight and height after the interviews to enable an understanding of the current nutritional status of the participants. Weight to the nearest gram, and height to the nearest millimetre were measured while the subjects wore light clothing and no shoes.

## Analysis

The audio-recorded interviews were transcribed verbatim and translated into English, when necessary. The quality of the final transcripts and translation were checked by the researcher and a multilingual research assistant. The transcripts were analysed for emerging themes relating to dietary and exercise practices. Preliminary analysis occurred concurrently with the continued administration of interviews to identify emerging subthemes to be pursued in subsequent interviews.<sup>24</sup> Five transcripts were read, coded and discussed in detail by two researchers. Themes were developed based on the Theory of Triadic Influence framework and interview content analysed.<sup>25</sup>

Using transcripts of five interviews, initial codes and themes were confirmed and agreed upon, including:

- **Food and activities:** The context included the community, school and home settings.
- **Individual and environmental factors that influence food choices:** These factors included the relevance of eating breakfast and personal food choices, as well as behaviour relating to dieting and physical activity.

The remaining transcripts were then read repeatedly and coded manually for emerging themes and validated until saturation was reached, i.e. when no new themes emerged.<sup>26,27</sup> NVivo® version 8 was used to analyse the qualitative data and Stata® version 10, the quantitative data. The cut-off point for the body mass index classification of participants > 19 years of age was used according to the World Health Organization (WHO) criteria for adults: underweight, < 18.5 kg/m<sup>2</sup>; normal weight, 18.5-24.9 kg/m<sup>2</sup>; overweight, 25-30 kg/m<sup>2</sup>; obesity class I, 30-34.9 kg/m<sup>2</sup> and obesity class II and III, ≥ 35 kg/m<sup>2</sup>. The classification of the BMI categories for participants ≤ 19 years of age was adjusted for age according to the WHO growth reference data.<sup>28</sup>

## Results

Of the 32 pairs of adolescents, three pairs were not available for follow-up. Twenty-nine completed the duo interviews, which lasted 90 minutes each on average. More than half (51.7%) of the 58 participants were either overweight or obese, and their age ranged from 15-21 years (mean 18, standard deviation 1.1). According to WHO growth reference charts,<sup>28</sup> in terms of height for age, the participants mean age and height were at the 15<sup>th</sup> percentile for 18-year-old women (Table I).

### Food and activities

#### Community and social setting

Adolescents in the study reported a strong sense of cultural identity in terms of being “Sowetan”. Comments included: “Soweto is a place where people love each other, and the youth have respect for the elderly”, and “People in Soweto love each other. As a young person in Soweto, you are expected to greet your elders when you meet them in the street”. This theme was consistent, despite the broad range of ethnic groups within the community.

**Table I:** Anthropometric characteristics of the participants (n = 58)

Measurement	Mean	SD	Minimum	Maximum
Age (years)	18	1.2	15.3	21.6
Height (cm)	157.4	5.6	139.9	169.5
Weight (kg)	64.6	14.3	43.7	109.1
Body mass index (kg/m <sup>2</sup> )	26.1	5.8	17.3	44.1
Body mass index international grades <sup>a</sup>	n	%		
Underweight (< -1 SD)	2	3.4		
Normal weight (-1 SD to 1 SD)	26	44.8		
Overweight (1 SD to 2 SD)	17	29.3		
Obesity class I (2 SD to 3 SD)	10	17.2		
Obesity class II and III (≥ 3 SD)	3	5.2		

SD: standard deviation

<sup>a</sup> For participants >19 years of age cut-off point for classification are used according to the WHO criteria for adults; underweight <18.5; normal weight 18.5-24.9; overweight 25-30; obesity class I 30-34.9; obesity class II+III ≥35. For participants ≤19 years of age classification of BMI category was adjusted for age according to the WHO Growth reference data<sup>28</sup>



Figure 1: An example of a Sowetan kota<sup>a</sup>

Respondents reported that the most common community activities were “chilling at street corners” and going to fast food outlets with friends. They said that social occasions often involved sharing food, such as *magwinya* (“fat” cakes that are deep fried in cake flour dough), *kotas* [a quarter loaf of white bread filled with a portion of fried chips, a slice of processed cheese and processed meat (Figure 1)], or “street-roasted chicken”. Street food was considered to be appealing because it is affordable, offered in large portion sizes and can be shared.

Interestingly, attendance and involvement at church during the week and on Sundays was a common social community activity. This activity was shared with family and friends. Participants were unanimous in that there were not many recreational physical activities in which young women could engage within the community owing to “concerns about safety” and the “limited availability of opportunities”.

#### School social setting

As in the community setting, sharing resources with friends at school was a common activity: “We combine money and buy snacks most of the time. We buy them because they are cheap” and

“We buy school pies if money is limited”. Taking a lunch box to school, as opposed to buying food at the tuck shop, was less favoured. Participants bought lunch boxes to school on Mondays containing leftover food from Sunday, or on days when they could bring food to school that they enjoyed and which was available at home, such as burgers or cheese and meat sandwiches. Most participants thought that a “lunch box was for younger children” and “was embarrassing” for a Grade 12 student. Food that was likely to be included in the lunch box was also seen as embarrassing because it reflected their “poor” status, e.g. traditional food, such as pap. Other reasons for not bringing a lunch box to school were that lunch money would then not be provided, and that the preparation of its contents was too time consuming. Participants who took lunch boxes to school said that they did so because they wanted to save money, the school food was not enjoyable, the queues for food at school were too long, or they wanted to be in control of what they ate in terms of energy intake. Participants mentioned that food choices at school were dependent on available lunch money. For example, although some participants said that they would like to eat fruit at lunch time, they couldn’t afford it as “fruit was expensive at the school tuck shop” and its quality mostly poor.

The teenagers ate *kotas* at school because they were filling and affordable. They said that they would like to be able to choose from a greater variety of food at school, including pies, muffins or sandwiches. However, they admitted, that even if such options were available, they would still buy *kotas* as they enjoyed eating them and could share them with friends.

Participants’ activities were primarily sedentary during break, e.g. “chatting with friends”, “going to the library”, “completing unfinished school work” and attending “church services” within the school. Although some participants said that they were active, e.g. running and playing in the school yard, they were in the minority.

### **Home setting**

Participants agreed that their home environment influenced what they ate, e.g. in terms of what was available. They reported that what they consumed at home was not always healthy. Caregivers and elders (mothers, grandmothers and aunts, and in a few cases, grandfathers or fathers) determined what the household ate. A few participants cited cooking as a responsibility that they enjoyed. Some actively included vegetables when it was their turn to cook. Others said that there was an expectation that at least one vegetable should be included in the evening meal, even though vegetables were not always available in the household. Most households ate dinner together, especially while “watching television”.

On weekends, participants said that household members often ate *kotas* as an alternative to home-cooked food as they were “cheaper, convenient, easily accessible and filling”. “Fish and chips”, “burger with chips”, “home-fried chips” and “samp with beans” were other fast food options that were eaten by household members on Friday evenings and Saturday afternoons. Most participants enjoyed eating the main meal on Sunday because of the variety of food served on this day.

Going to the mall was the main household activity, particularly at the month end, when caregivers had money. Participants said that they

didn’t go out as a family to eat, but would go out individually with friends at the end of the month when there was money, or if they had saved their own.

### **Individual factors that influence food choices**

#### *The relevance of eating breakfast and personal food choices*

Most participants said: “Breakfast is the most important meal of the day” and “Breakfast gives you energy. It boosts the system”. However, the majority said that they didn’t eat breakfast. Very few adolescents ate breakfast every morning. The majority of those without the time to eat breakfast would “buy something to eat before school started” or “ask a friend to buy them something to eat”. Those who could afford it bought “fat” cakes which were sold at most schools before classes commenced. A few of the participants ate sweets and potato crisps purchased from community vendors before attending school.

#### *Behaviour relating to dieting and physical activity*

Dieting was defined by participants as “food deprivation”, “eating a balanced diet” or “eating less food”. Most participants thought that “only fat people should diet”, or “those who were unhappy with the way they looked”, or “those who wanted to get in shape”. Some cited dieting practices included drinking lemon water, only eating snacks, missing dinner and not eating carbohydrates. Some of the women said that they had tried to diet, but stopped prematurely “as it was very hard”. In general, portion size reduction was a popular way of managing weight. Some consumed snacks, rather than meals, such as crisps, that were sold at school to lose weight. A major source of excess energy was reported to derive from foods deemed to be unhealthy, such as energy-dense snacks. Yet “junk food” was preferred owing to its affordability, availability and the fact that there was a large available variety of it.

All of the participants said that exercise was “important for good health”, but very few participated in any physical activities. A few said that exercise was only necessary for “fat people to lose weight”, while others believed that “everyone should exercise to keep fit and prevent illness”. Most had participated in exercise at some time. They said that they had stopped because of concerns about “community safety”, “getting tired quickly”, “lack of support or someone to exercise with”, “sweating”, “concerns about what others would say if they saw them running”, and because of time management conflicts with respect to studying. Those who were physically active participated in running, cycling (using a stationary exercise bike at home), walking, going to the gym, street dancing and street soccer. The few participants who said that they ate and cooked vegetables and salads, as well as small portions of food, also took part in regular exercise, such as jogging or playing soccer. Most of the teenagers who ate chips, sugared beverages and fast foods, such as *kotas*, did not cook at home or participate in exercise. They also took part in sedentary activities.

### **Discussion**

The aim of this study was to recount the narratives of young urban adolescent women with regard to dietary and physical activity practices across various levels of influence, including the self,

household, school and community. There was a high prevalence of overweight and obesity in this study, as observed in other urban studies.<sup>29-31</sup>

### Dietary practices

The findings from this study show that respondents were able to articulate an understanding of healthy dietary practices, and why less healthy food choices involved a health risk. However, there was a disparity between what they knew and what they practised. Only a few participants routinely made healthy food choices. This finding is similar to the results observed in high-income settings, such as the USA, in which it was demonstrated that knowledge alone did not enable adolescents to adopt healthy eating behaviour.<sup>32</sup> The association of nutrition knowledge with dietary behaviour was found to be weak ( $r = 0.10$ ) following a meta-analysis of literature on adults, adolescents and children.<sup>33</sup>

In this study, female adolescents reported common dietary practices, including the consumption of fast foods, such as *kotas* and “fat” cakes, and a low intake of fruit and vegetables at home and at school, as well as meal skipping. The consumption of these foods seemed to be driven by economic reasons as these foods were affordable and accessible, unlike fruit and vegetables. At household level, a limited income and the increasing time and cost of food preparation for families could be important in the shifting of family dietary practices to less healthy choices.

The narratives of the adolescents suggest that currently schools do not provide healthy and affordable food options, either for breakfast or lunch. Our findings show that young women wanted to have more choices to buy healthy foods, were aware of the poor quality of food sold at their schools, but bought it anyway. This is in line with quantitative evidence with regard to grade 7-10 students in Cape Town, where the majority of the food consumed at school was also purchased at school, and to a large extent these were unhealthy choices.<sup>16</sup>

### Physical activity

Listening to music, watching films, street dancing, going to the local mall, drinking alcohol and visiting friends were popular leisure time activities for the adolescents in this community. While street dancing was mentioned, but “formal” exercise was not. Limited community resources, such as youth recreational and sporting facilities, and community safety, were reported as contributing factors to limited participation in physical activities by these young women. Outside of performing household chores, participants were also not physically active at school or home. As with diet, we observed that our findings in relation to physical activity were similar to those in high-income countries. For instance, Pearson et al<sup>1</sup> found that physical activity was low in adolescent females aged 12-16 years in the UK. The majority of participants in this study had knowledge of the benefits of physical activity, but few had experienced these benefits.

### Future direction

The value of examining multiple contexts that influence eating and physical activity practices is highlighted by the combination of a conceptual framework and an innovative approach using

duo interviewing. Within this environment, where a significant proportion of the young women were either overweight or obese, it was clear that the consumption of convenient food took place in all social contexts. The results strongly suggest that choosing less healthy food options at home, school and within the community are often driven by cost and accessibility. Unhealthy eating, coupled with limited engagement in physical activity within these social settings, is troubling. It appears that despite the fact that Soweto is economically disadvantaged relative to high-income country communities, its individuals share similar behavioural patterns with those in high-income country communities, which suggests the advancement of epidemiological and nutritional transition.

The study findings suggest that there is a need to act, given the burgeoning obesity epidemic in South Africa. Possible interventions could target specific social contexts. In our study, the young women said that they respected the elders in their community, which means that the latter could be important resource to utilise when encouraging teenagers to make healthier food choices. The fact that adolescents viewed the lunch box as more suited to younger children renders it a less appealing intervention strategy. Interventions to improve the availability of affordable healthy foods at school might have more success than those that focus on lunch brought in from home. Studies are needed to assess the cost and effectiveness of lunch subsidies to increase the availability of healthy foods, such as fruit, within schools. Such approaches worked in several studies in which the availability of fresh fruit, vegetables and vending snacks containing less fat in high-school settings were increased by between 10-50%. Weekly sales of the items also increased by up to two-fold in some cases.<sup>34-36</sup> The consumption of fast food, e.g. the *kota* (mean total energy 5 970 kJ), needs to be addressed. One option would be to encourage vendors, both formal and informal, to sell healthier, less energy-dense products.<sup>9</sup>

The participants in this study knew the importance of breakfast, but most of them did not eat it before school. Cross-sectional and longitudinal research has shown that young people who regularly eat breakfast are less likely to be overweight than those who skip it.<sup>37,38</sup> Despite the health benefits, young people are more likely to skip breakfast than any other meal.<sup>39</sup> Furthermore, these results show that some students would benefit from breakfast programmes, such as Maryland Meals for Achievement (MMFA), which provides free breakfasts to classes. A study that evaluated the impact of serving breakfast in the classroom as part of the school day using the MMFA programme reported improvements in the students' performance, attendance, attention and behaviour.<sup>40</sup> The results of this study suggest that there is potential for breakfast programmes to be considered as a potential intervention tool in the urban South African context.

It might be beneficial to consider indoor physical activity facilities. Street soccer and street dancing could be encouraged, as some of the participants said that they already took part in these activities, which were also viewed as appropriate for female adolescents. Most participants in this study were involved in church activities, currently reported to be sedentary in nature. Thus, churches could be considered as a potential vehicle for intervention in terms of

the promotion of physical activity. Churches have the potential to provide a safe environment in which adolescents could engage in exercise. For example, in the USA, churches (60 in eight North Carolina counties) were used as a vehicle in a five-year randomised study to identify barriers and motivators of dietary changes in African Americans in order to develop culturally sensitive interventions.<sup>41</sup>

## Conclusion

This study demonstrates that the behaviour pertaining to diet and physical activity exhibited by female adolescents in the Sowetan context is not dissimilar to that of adolescents in disadvantaged urban communities in high-income countries. The study participants were aware of the benefits of healthy eating and the need for physical activity, and had knowledge of obesity and non-communicable disease risks. Eating less healthily was favoured in community, family and school settings owing to the cost, convenience and availability of such food. Limited community resources and safety were primary reasons for limited participation in physical activities. The findings show the importance and need for immediate intervention efforts that are sensitive to socio-cultural contexts and realities within this community. Clearly, a multifaceted approach using interaction with various community stakeholders (churches, schools and vendors), government, families and the young women themselves, would be essential to target the rapidly rising rates of adolescent obesity and the subsequent risk of CVD in the Sowetan population. There is also a need to understand whether or not the same challenges exist for the male adolescents within this community, where the obesity rate is currently much lower than that in females, but nevertheless rising over time.

## References

- Pearson N, Timperio A, Salmon J, et al. Family influences on children's physical activity and fruit and vegetable consumption. *Int J Behav Nutr Phys Act*. 2009;6:34.
- Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. *J Am Diet Assoc*. 2002;102(3 Suppl):S40-S51.
- Biddle SJ, Gorely T, Stensel DJ. Health-enhancing physical activity and sedentary behaviour in children and adolescents. *J Sports Sci*. 2004;22(8):679-701.
- Bull NL. Dietary habits, food consumption, and nutrient intake during adolescence. *J Adolesc Health*. 1992;13(5):384-288.
- Heald FP. Fast food and snack food: beneficial or deleterious. *J Adolesc Health*. 1992;13(5):380-383.
- Neumark-Sztainer D, Story M, Resnick MD, Blum RW. Lessons learned about adolescent nutrition from the Minnesota Adolescent Health Survey. *J Am Diet Assoc*. 1998;98(12):1449-1456.
- Shisana O, Labadarios D, Rehle T, et al. The SANHANES-1 team (2013) South African National Health and Nutrition Examination Survey (SANHANES-1). Cape Town: HSRP Press; 2013.
- Reddy SP, Resnicow K, James S, et al. Rapid increases in overweight and obesity among South African adolescents: comparison of data from the South African National Youth Risk Behaviour Survey in 2002 and 2008. *Am J Public Health*. 2012;102(2):262-268.
- Feeley A, Pettifor JM, Norris SA. Fast food consumption among 17-year olds in the Birth to twenty cohort. *S Afr J Clin Nutr*. 2009;22(3):118-123.
- Feeley A, Musenge E, Pettifor JM, Norris SA. Changes in dietary habits and eating practices in adolescents living in urban South Africa: the birth to twenty cohort. *Nutrition*. 2012;28(7):e1-e6.
- Croll JK, Neumark-Sztainer D, Story M. Healthy eating: what does it mean to adolescents? *J Nutr Educ*. 2001;33(4):193-198.
- Monge-Rojas R, Nuñez HP, Garita C, Chen-Mok M. Psychosocial aspects of Costa Rican adolescents' eating and physical activity patterns. *J Adolesc Health*. 2002;31(2):212-219.
- Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *J Am Diet Assoc*. 1999;99(8):929-937.
- Noble C, Corney M, Eves A, et al. Food choice and secondary school meals: the nutritional implications of choices based on preference rather than perceived healthiness. *International Journal of Hospitality Management*. 2003;22(2):197-215.
- O'Dea JA. Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. *J Am Diet Assoc*. 2003;103(4):497-501.
- Puoane T, Matwa P, Bradley H, Hughes G. Socio-cultural factors influencing food consumption patterns in the black African population in an urban township in South Africa. *Hum Ecol*. 2006;14:89-93.
- Stewart S, Wilkinson D, Becker A, et al. Mapping the emergence of heart disease in a black, urban population in Africa: the Heart of Soweto Study. *Int J Cardiol*. 2006;108(1):101-108.
- Chopra M, Lawn JE, Sanders D, et al. Achieving the health Millennium Development Goals for South Africa: challenges and priorities. *Lancet*. 2009;374(9694):1023-1031.
- Flay BR. Youth tobacco use: risks, patterns, and control. In: Slade J, Orleans CT, editors. *Nicotine addiction: principles and management*. New York: Oxford University Press, 1993; p. 365-384.
- Flay BR. Understanding environmental, situational and intrapersonal risk and protective factors for youth tobacco use: the theory of triadic influence. *Nicotine Tob Res*. 1999;1 Suppl 2:S111-S114.
- Flay BR, Petraitis J, Hu FB. The theory of triadic influence: preliminary evidence related to alcohol and tobacco use. In: Ferting JB, Allen JP, editors. *Alcohol and tobacco: from basic science to clinical practice*. Washington: United States Department of Health and Human Services, 1995; p. 37-56.
- De Bruijn G-J, Kremers SP, Schaalma H, et al. Determinants of adolescent bicycle use for transportation and snacking behavior. *Prev Med*. 2005;40(6):658-667.
- Wiefferink CH, Peters L, Hoekstra F, et al. Clustering of health-related behaviors and their determinants: possible consequences for school health interventions. *Prev Sci*. 2006;7(2):127-149.
- Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field Methods*. 2006;18(1):59-82.
- Bradley EH, Curry LA, Devers KJ. Qualitative data analysis for health services research: developing taxonomy, themes, and theory. *Health Serv Res*. 2007;42(4):1758-1772.
- Ryan GW, Bernard HR. Techniques to identify themes. *Field Methods*. 2003;15(1):85-109.
- Strauss A, Corbin JM. *Grounded theory in practice*. New York: Sage Publications; 1997.
- Onis Md, Onyango AW, Borghi E, et al. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Organ*. 2007;85(9):660-667.
- Joubert J, Norman R, Bradshaw D, et al. Estimating the burden of disease attributable to excess body weight in South Africa in 2000. *S Afr Med J*. 2007;97(8):683-690.
- Malhotra R, Hoyo C, Østbye T, et al. Determinants of obesity in an urban township of South Africa. *South Afr J Clin Nutr*. 2008;21(4):315-320.
- Reddy S, Resnicow K, James S, et al. Underweight, overweight and obesity among South African adolescents: results of the 2002 National Youth Risk Behaviour Survey. *Public Health Nutr*. 2009;12(2):203-207.
- Contento IR, Manning AD, Shannon B. Research perspective on school-based nutrition education. *J Nutr Educ*. 1992;24(5):247-260.
- Axelsson ML, Federline TL, Brinberg D. A meta-analysis of food-and nutrition-related research. *J Nutr Educ*. 1985;17(2):51-54.
- French SA, Jeffery RW, Story M, et al. Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study. *Am J Public Health*. 2001;91(1):112-117.
- French SA, Jeffery RW, Story M, Hannan P, Snyder MP. A pricing strategy to promote low-fat snack choices through vending machines. *Am J Public Health*. 1997;87(5):849-851.
- French SA, Story M, Jeffery RW, Snyder P, Eisenberg M, Sidebottom A, et al. Pricing strategy to promote fruit and vegetable purchase in high school cafeterias. *J Am Diet Assoc*. 1997;97(9):1008-1010.
- Burghardt J, Gordon A, Chapman N, Gleason P, Fraker T. The School Nutrition Dietary Assessment Study: school food service, meals offered, and dietary intakes. *Mathematica Policy Research*; 1993.
- Neumark-Sztainer D, Story M, Toporoff E, et al. Covariations of eating behaviors with other health-related behaviors among adolescents. *J Adolesc Health*. 1997;20(6):450-458.
- Johnson RK, Johnson DG, Wang MQ, et al. Characterizing nutrient intakes of adolescents by sociodemographic factors. *J Adolesc Health*. 1994;15(2):149-154.
- Murphy JM, Rankin E, Feeney K, et al. Effects of a universally free, in-classroom school breakfast program: results from the second year of the Maryland Meals for Achievement evaluation. Interim report. MMFA; 2000.
- Ammerman A, Corbie-Smith G, St George DMM, et al. Research expectations among African American church leaders in the PRAISE! project: a randomized trial guided by community-based participatory research. *Am J Public Health*. 2003;93(10):1720-1727.