

# Physical activity and diet among adolescents of Kathmandu, Nepal: Knowledge and attitudes

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## Abstract

**Background:** Non-communicable diseases are becoming more prevalent in Nepal and many risk factors attributing to these diseases are behaviour-related and therefore preventable.

**Objective:** The aim of this study was to investigate the attitudes among students of grade eight and nine in Kathmandu toward physical activity and diet and their knowledge about how it affects their health.

**Methods:** We conducted four focus groups that included 24 students to explore knowledge and attitudes toward physical activity among them. Focus groups were recorded and transcribed verbatim later. Method described by K. Malterud, inspired by Giorgi's phenomenological method was used to analyze the transcribed material.

**Results:** Participants considered physical activity to be beneficial for health in many ways. They also believed that healthy food is important to avoid diseases. Several participants mentioned that a balanced lifestyle is essential for a healthy life.

**Conclusion:** Though the students saw the importance of physical activity and a healthy diet to avoid diseases and stay healthy, most of them did not connect a lack of physical activity and unhealthy diet to possible noncommunicable diseases in the future.

**Key words:** Exercise/activity, Focus groups, Food, Health behaviour, Teenagers/adolescents, South Asia

## Introduction

Nepal is a country located between China in the north and India in the south, east and west<sup>1</sup>. It has an estimated population of 27 million people<sup>2</sup>. Although the population is still young, the number of older people is increasing and the proportion of the population 65 years and older is estimated to increase from 4.2% in 2000 to 5.8 % in 2025<sup>3</sup>. 24.8% of the population is living below the international poverty line (earning < \$ 1.25 per day), placing Nepal among the poorest countries in the world<sup>4</sup>.

While malnutrition and infectious diseases remain great health challenges in Nepal<sup>5</sup>, non-communicable diseases (NCD) are becoming more prevalent and 65.7% of all deaths in Nepal are now attributable to NCD<sup>3</sup>. The

four major NCD are, according to WHO, cardiovascular diseases, cancer, diabetes and asthma or chronic respiratory disease. These are estimated to cause 60% of deaths globally, with 80% of these in low- and middle-income countries. If nothing is done this burden will increase by 17% over the next ten years and strike particularly hard in developing regions like South-East Asia<sup>6</sup>. There are many causes of the rising prevalence of NCD. An aging population will in itself increase the prevalence of NCD, as they are generally more common with increasing age<sup>3</sup>. A demographic change in Nepal with increasing urbanization<sup>7</sup> leads to more lifestyle-related risk factors such as changes in dietary habits<sup>8</sup> and reduced physical activity (PA)<sup>9</sup>. Even malnutrition can be a risk factor for NCD<sup>10,11</sup>. Many of the risk factors for NCD are behaviour-related and therefore preventable. A healthy diet and regular PA are examples of interventions that can help reducing the risk of getting NCD<sup>12</sup>. One study on coronary heart disease among South Asian immigrants in the United States showed that the knowledge about the causes and prevention of some of these diseases seem to be limited<sup>13</sup>. Information on how to reduce risk factors for these diseases is important<sup>12</sup>.

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WHO has developed the 2008-2013 Action Plan<sup>6</sup> for the Global Strategy for the Prevention and Control of Noncommunicable Diseases. The aim is to guide member states on how to assess NCD on a national level, reduce risk factors and improve health care for people with NCD. Focus is especially on the low-and middle-income countries. It also highlights the connection between NCD and socioeconomic development and the importance of also targeting areas apart from health to control the NCD. The goal is that the member states themselves make and implement policies for prevention and control of NCD in different sectors, such as health care, education, taxation and trade<sup>6</sup>. The Ministry of Health and Population in Nepal is currently working on a national policy on NCD, which is yet to be endorsed. In September 2011 there was a national workshop on the prevention and control of NCD<sup>14</sup>.

Schools in Nepal are divided into government-supported community schools and institutional schools, which are not financially supported by the government. Both types follow the national curriculum on physical activity and health education, but in general institutional schools have more educational resources because of higher student fees<sup>15</sup>. Although evidence shows that school-based education is effective in creating healthy habits<sup>12</sup> few studies have focused on the awareness of and thoughts around health behaviour among children. A study among European adolescents showed that dietary habits varied depending on their self-reported level of PA, however, there was no correlation between a higher level of PA and healthier eating habits in this study<sup>16</sup>. Studies in this area are especially sparse in developing countries like Nepal. Our aim with this qualitative study was therefore to investigate the attitudes among students of grade eight and nine in Kathmandu toward PA and diet and knowledge about how it affects their health.

### Research Question

What are the attitudes and knowledge among students of grade eight and nine in Kathmandu toward PA and diet as factors affecting health?

## METHODS

### Material and Procedure

In this study we used focus groups to explore knowledge and attitudes toward PA and diet. The study was conducted at an institutional school in Nepal, selected by convenience sampling. The inclusion criteria for the school were the following: it had to be located in the Kathmandu valley, it had to have some kind of sporting

facility on the school grounds and it had to have more than 50 students in grade eight and nine respectively. We gave the school a letter with information about the study and gained consent. In the study we included students from grade eight and nine. We wanted to get a spectrum of opinions as wide as possible. Because we did not know the classes or students ourselves we asked the teachers of the classes in question to select students for the focus groups. We thoroughly explained the purpose of the study and the study design to them and the teachers were instructed to choose students whom they thought would represent different perspectives with respect to the study questions. Six male and six female students were selected from each grade and asked if they wanted to participate in the study. In total 24 students accepted and four focus groups were conducted.

### Measures

We held the discussions in English with boys and girls separated into different groups and the sessions were recorded by an iPod Nano<sup>®</sup> 4G and a SwitchEasy<sup>™</sup> ThumbTacks<sup>™</sup> microphone. (Author 1) moderated the girls' groups and (Author 2) moderated the boys' groups. To get a similar outline of the discussions we developed a focus group guide. The discussions were centered around the following four key questions: 'What is the reason for you doing or not doing physical activity?', 'Do you think that physical activity affects your health in any way and if so, in what way?', 'What do you think of when you hear the expression "healthy food"?' and 'Do you think expensive food is more nutritious than cheap food?'. We conducted the focus groups on two different days in March 2011, two focus groups on each day. The length of the discussions varied from 50 minutes to 65 minutes. During the sessions the participants were provided fruit and water as refreshments. (Author 1) and (Author 2) then transcribed the recorded material verbatim.

### Analysis

To analyze the transcribed material we used the method described by Kirsti Malterud, inspired by Giorgi's phenomenological method. With this method the first step is to read the transcribed material to find the main themes of the discussion. After that the text is read again to find the meaning units which are words or statements central to the themes. The meaning units are classified in different codes which are derived from the themes that emerged in the first step of the analysis process. The codes are then condensed into constructed quotations that describe their content. These are not the exact words of the respondents but the meaning units

of the code put together to one constructed quotation that describes the views expressed in the code. Finally a summary of the code is written from the constructed quotations<sup>17,18</sup>.

(Author 1) and (Author 2) first read the transcriptions individually, identified meaning units and classified these separately as well. After that they met to discuss the coding until they reached consensus. When writing the summaries of the codes (Author 1) and (Author 2) again worked on their own. Subsequently (Author 1) and (Author 2) read each summary and made modifications until they reached consensus.

### **Ethics**

Ethical approval was given by Kathmandu Medical College (KMC) Institutional Review Board, affiliated to Nepal Health Research Council Ethical Review Board. The researchers informed the students that participating in the study was voluntarily and that all data would be treated anonymously. In the focus group guide we formulated the core questions so that any student's integrity would not be violated. It cannot be fully predicted, however, what matters the students in the focus groups would discuss, and therefore the researchers could not completely assure that no one would feel discriminated or pointed out. As moderators, the researchers had a responsibility to be aware of this.

In qualitative studies anonymity can be difficult to ensure<sup>19</sup>. In this research, however, measures have been taken to keep data and the respondents as anonymous as possible throughout the process and in the report all data is presented in a way that identification of the respondents is impossible. Finally it is also important to be conscious about and respectful to norms and customs of a different culture and society when conducting research in another country<sup>20</sup>. When the data collection was completed the researchers returned to the school and gave a brief presentation of the results as well as advice from WHO regarding PA and diet for a healthy lifestyle. Students who had participated in the study were informed by their teachers and could choose to come and listen and ask questions if they wanted to.

## **RESULTS**

The results are presented in eight sections, each with a title that describes the content of that section. Some illustrative quotations are also included in the text.

### **Defining Physical Activity**

When asked what the participants first thought of when they heard the expression 'physical activity' many of

them mentioned different sports like football, basketball and badminton. Everyday activities like playing with siblings, walking to school and helping out at home also came up. Most of the participating students regarded PA as activities that involve the body more than the mind, like football and basketball. On the contrary, playing computer games, chess and watching TV was seen as more sedentary and therefore excluded. A boy in grade eight said: 'But when we play computers and watch TV we don't get much physical exercise. Our mind works but our physical body doesn't work.' Some of the students, though, had the opinion that yoga and meditation also should be included in the expression 'physical activity'.

### **Doing Physical Activity is Beneficial for Health**

All participants shared the view that PA is important to stay healthy and avoid diseases. It exercises the body and keeps the body in shape. Common opinions in all focus groups were that PA makes the body fit, that it is good for health and refreshing. One girl concluded that doing exercises made her healthier than her sister, who did not do any exercises. Another girl said that doing PA is rejuvenating. Other participants mentioned that if they do not do PA for a while the body will start aching. A boy in grade eight had a colorful parable for explaining how of physical activity affected his health positively:

"Physical activities make our muscles fit, I want to explain my view with an example: A door that has not been opened for a long time gets creaky, and makes a very creaky noise, and is hard to open. But a door which is always used, and most of the time is opened and closed, is easier to use. So, likewise, our muscles, if not used, not involved in physical activities, if we just sit in a one place, then our bodies will ache, and we'll feel more pain but if we start playing more, and in a systematic way, we'll get stronger".

Some of the boys mentioned that being physically active helps them to not become fat. One boy in one of the ninth grade focus groups talked about a connection between the consumption of too much junk food and obesity and added that PA is needed to control this and not get fat: 'So in this world due to the consumption of too much of junk food we're getting obese and to control that we need to get involved in physical activities.' PA in itself was also important just to get or keep the body in shape:

Physical exercise makes us fit and healthy and I have seen that one who does not play games or does physical exercise gets fat, so in order to maintain our body in a proper shape we should do physical exercise or play games.

During the discussion with boys in grade eight they talked about how PA affects the internal organs, like the heart, lungs and other organs, in a positive way. In all discussions the students shared the view that doing PA can help them to avoid getting sick through, for example, a better functioning organ system and a stronger immune system: 'And therefore, sports persons and persons who are involved more in physical activity suffer less illness.'

A lack of PA was said to lead to diseases like headache, fever, obesity, typhoid and common cold, but also back and leg problems. One of the girls in grade nine even said that she did not believe in antibiotics, but rather in doing exercise instead to stay healthy: '...scientific research has also shown that the antibiotics are less useful than the exercises, the person who wakes up and just does exercises ...'

### ***Doing Physical Activity is Beneficial for the Mind***

Many participants talked about PA as beneficial for the mind. Some said that doing PA refreshes their minds. In three of the groups the participants talked about PA as beneficial for their studies. Their minds would get 'dull' and 'stressed' from their studies if they did not do PA. An eighth grade boy put it this way: '...it relieves us from all tension, from all our hard work...'. One girl sincerely claimed that there would never be any progress in life if they did not do PA. According to several participants doing PA gives them energy and it also makes them concentrate better while studying. 'If we don't do physical activities we become lazy and we feel tired most of the time, we want to sleep all the time, and if we sleep all the time nothing is completed.'

### ***Negative Effects of Doing Physical Activity***

Some of the participants talked about the negative effects of doing PA; that they might get sick from too much PA. When they were asked what they meant by 'sick' one mentioned that they might get muscle problems. Another one said that they will not be able to work properly and study well. A few other participants also said, in contrast to the section above, that PA might actually make it harder for them to concentrate on the studies because it would make them lazy and tired.

### ***Healthy Food***

The participants considered healthy food to be food containing all the nutrients. By eating healthy food they stay healthy and suffer less disease. Some girls mentioned that the cooking method is important; the food should be boiled rather than fried to be healthy.

Healthy food should also not contain any chemicals or too much fat and it should be free from germs. Two boys considered it healthy to eat organic food. When we asked the participants to give examples of healthy food many of them said the first thing they thought of were either fruit and vegetables or homemade food. Some participants also mentioned meat. By homemade food they meant rice, lentil soup and vegetable curry.

The participants also talked about the importance of a good diet to stay healthy. This is what one boy in grade nine answered when he was asked what the benefits of eating healthy food are: 'We get to stay healthy, we don't suffer from diseases and we get to live long.' Carrots and spinach were said to be beneficial to the eyes and two participants mentioned that healthy food helps their body to grow. Protein was especially important for this. A girl said eating healthy food is good for the digestive system. It was also said that they can avoid diseases like fever, gastric ulcer, typhoid and diarrhoea. Eating healthy food also provides energy which would help them to do their work and not feel tired or lazy.

### ***Unhealthy Food***

Unhealthy food was primarily defined as food that contains a wrong balance of nutrients or food that is dirty. Consuming it might lead to diseases. Talking about unhealthy food many of the participants used the terms 'junk food' or 'fast food'. A very common opinion was that junk food contains too much fat and cholesterol and too few vitamins, which leads to this nutritional imbalance. Another common opinion was that food becomes unhealthy when chemicals are added to it. One boy put it this way: '...junk food is a mixture of food and chemicals.'

In three groups the participants said unclean food is unhealthy. The food would be unclean if those who prepared it did not wash their hands or if they used dirty water. A ninth grade girl considered food sold in the street unhealthy because flies and insects might spread germs on it. Even vegetables and rice could be unhealthy if sold by street vendors, according to some participants. One girl considered spicy food to be unhealthy. The most common given examples of unhealthy food were chips, packaged noodles, pizza, 'mo:mos' (Nepalese dumplings) and different kinds of sweets. The following quotations were the answers of two different participants when asked to give examples of unhealthy food: 'Anything that's sold on the street.' 'The chips and, the noodles that we have, the drinks that contain different types of... like, we get berry drinks and all types of drinks, the chips... that's junk.'

Many participants mentioned that unhealthy food might be harmful to them and consuming it might cause diseases or conditions like typhoid, jaundice, diarrhoea, dysentery, fever, stomach ache, body ache, cancer, malnutrition and diabetes. Some also said they might become fat from eating too much junk food and one boy added that obesity further could cause high blood pressure and diabetes. One boy added that it also might damage their internal organs like the stomach and liver. In one of the groups a girl mentioned that fat and cholesterol make the human body lazy. In the same group it was also said that by eating unhealthy they might find it harder to concentrate on schoolwork.

### **Expensive Food Versus Cheap Food**

Most participants shared the view that expensive food is not necessarily more nutritious and better than cheap food. However the reasons for this varied. Both boys and girls mentioned vegetables and rice as examples of food that is cheap but still healthy. On the contrary the girls considered pizza, French fries and chips as food that is expensive but unhealthy and the boys in grade eight talked about food from the restaurants Kentucky Fried Chicken and Pizza Hut as other examples of this. An eighth grade girl compared chips to vegetables to explain how she thought cheap food is more nutritious than expensive food: 'We can take the examples of, like, chips and vegetables. And vegetables we get at low price, but it's like nutritious... but the chips are not so good for health.'

Another girl talked about the fact that some fruit like pineapple is expensive but also healthy and meat was mentioned by the boys in grade nine for the same reason. The participants also discussed that whether food is expensive or not depends on where it is produced and the amount of production. Sometimes food that is high in demand can also get expensive. 'No I don't think so, expensive and cheap is a question where you live, it's just different from country to country.'

Another aspect two participants mentioned is that shopkeepers sometimes choose to put a high price on food and cheat the customers. This is also an explanation of why expensive food not necessarily is more nutritious than cheap food, they said. One student, however, had the opinion that expensive food is more nutritious than cheap food. He explained it like this:

"I have something to say; for me the more expensive the more nutritious it is, because I have seen in my daily life the ones who are poor they can't afford such expensive food so they buy the cheapest food, and, I

have seen that much more poor people are suffering from many diseases. And rich people, they have, they go to restaurants and buy expensive food and I have seen them walking..., and they look healthy, healthier than the poor ones. So, I consider expensive food as nutritious."

### ***It is Important with a Balanced Lifestyle***

The participants seemed to agree that an overall balance in life is important. Even what is considered healthy food can become unhealthy in too big amounts. Both too much PA and lack of PA is harmful for the body. The following quote summarized the discussion around PA in one of the boy groups: 'Playing sports in a limited way is good, but overplaying has many negative impacts.' The importance of a balanced diet to stay healthy was also mentioned by several participants, just like one boy said: '...if we consume even healthy food too much, we also may get sick from that... we should consume everything in a balanced manner.'

For this same reason they should also limit the intake of junk food, they said. One girl concluded that different kinds of food contain different kinds of nutrients and that is why it is important to eat all kinds of food. To stay fit they should eat a sufficient amount of food at the right time and not skip meals, according to the girls in one focus group. One of them also added the importance of rest: 'Eat a balanced diet and rest. We need to play also to keep our body fit.'

## **DISCUSSION**

Our purpose with this study was to investigate the attitudes among Nepalese students toward PA and diet and their knowledge about how these factors affect health. The study was qualitative, using focus group discussions. To our knowledge no similar study on this topic has been conducted in Nepal before and there are few studies on adolescents in the country overall. Because previous studies are made primarily in developed countries it is therefore interesting to see if, and how, their views on PA and diet differ.

The participants in our focus groups thought that PA is good to stay healthy and that it increases energy. Findings from other focus group studies among youths confirms this<sup>21-23</sup>, as well as the statement that being physically active is good for the mind<sup>22, 23</sup>. When talking about PA the participating students often mentioned different kinds of team sports such as football and basketball. These sports were also among the most mentioned examples of PA in a study among Emirati College women from 2009<sup>24</sup>.

It has been recognized in several studies<sup>21, 25-27</sup> that children and adolescents often think of fruit and vegetables as healthy food. In our study as fruit and vegetables along with homemade food were the most frequent mentioned examples of healthy food. This connection between the home and healthy food was also described by adolescents in an American study<sup>25</sup>, as well as in an Indian study<sup>28</sup>. During the sessions the participants mentioned the importance of a balanced diet, in consistence with previous findings<sup>25, 26, 29</sup>. Chips and pizza were common examples of unhealthy food, this also analogous to other studies among adolescents<sup>25,27,28</sup>.

A common perception in our focus groups was that unclean food is unhealthy. The focus group participants in above mentioned studies did not express this, which probably reflects the fact that these studies were performed in developed countries whereas our study was performed in a developing country. Only a few participants in our study mentioned obesity and diabetes when asked to give examples of diseases caused by eating unhealthy food. Infectious diseases were more frequently used as examples, which is in contrast to the findings of most of the studies mentioned above. However, in a South Indian study regarding school children's perceptions of healthy eating, infectious diseases were among the most common examples of diseases caused by unhealthy food<sup>28</sup>. Adults in another study among Southeast Asian immigrants in America<sup>21</sup> also believed that excessive intake of meat could cause stomach ache and diarrhoea directly.

No one in our focus groups considered a lack of PA as a risk factor for NCD although some participants said not being physically active leads to obesity. To our knowledge no study has investigated young South Asians' knowledge of NCD risk factors but in one study on this topic among adult South Asians living in the United Kingdom<sup>30</sup>, many participants knew that lack of exercise and an unhealthy diet were risk factors for heart disease. The participating students in our focus groups did not believe that expensive food is necessarily healthier than cheap food. Few studies have investigated such a statement further, but in an Australian study of health attitudes among seven to 11 year old children, the respondents believed that poor people could not afford healthy food<sup>29</sup>, in contrast to our findings. Objectively, studies such as<sup>31,32</sup> have established that lower socioeconomic status is correlated to unhealthier dietary patterns. However the problem is complex and the cost of both healthy and

unhealthy food depends on many factors<sup>33</sup>, as our focus group participants also said.

The sample in this study was taken from grade eight and nine at one school in Kathmandu selected by convenience sampling. Selecting only an institutional school might have limited the results to higher socioeconomic classes. The focus group discussions were held in English, which is neither the mother tongue of the moderators nor of the participants. This might have caused some misunderstandings and it is plausible that the informants found it hard to put their feelings and thoughts into words with the same accuracy in English as in Nepali. Still, conducting the focus groups in Nepali would also have been problematic. Because the majority of the researchers do not speak Nepali, we would have needed to have someone else moderating the discussions as well as doing the transcription and subsequent translation into English. By conducting the focus groups in English, we were instead part of the whole process, from interview to transcription and analysis. PA and a high intake of fruit and vegetables are seen as socially desirable behaviours<sup>34</sup> and there is a risk of report bias because of social desirability<sup>35</sup>. In the focus groups, participants are influenced by each other's views during the discussions and they might choose a more socially desirable answer rather than actually reporting their own opinion.

## CONCLUSION

The participating students were aware that being physically active and eating healthy food is important to stay healthy and avoid diseases. However, most of them did not specifically describe lack of PA and unhealthy eating habits as risk factors for NCD. It would be interesting to conduct focus groups on this topic at a Nepali community school as well. To find out where and how preventive measures would be best implemented, further studies are needed to explore the knowledge of NCD and its risk factors among Nepali adolescents.

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## DECLARATION OF CONFLICTING INTERESTS

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## REFERENCES

1. Ministry of Health and Population (NP); New ERA; Macro International Inc. Nepal demographic and health survey 2006. Kathmandu: Ministry of Health and Population; 2007. 244 p. Co-published by New ERA, Macro International Inc.
2. The World Factbook [Internet]. Central Intelligence Agency (US); 2011 [cited 2011 Sep]. Available from: <https://www.cia.gov/library/publications/the-world-factbook/geos/np.html>
3. Engलगau MM, El-Saharty S, Kudesia P, Rajan V, Rosenhouse S, Okamoto K. Capitalizing on the demographic transition – tackling noncommunicable diseases in South Asia. Washington DC: World Bank; 2011. 90p.
4. World Bank. Nepal country overview 2012 [Internet]. World Bank; 2012 [cited 2012 June]. Available from: <http://www.worldbank.org/np/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/NEPALEXTN/0,,contentMDK:22147453~pagePK:141137~piPK:141127~theSitePK:223555,00.html>
5. Suvedi BK. Of what diseases are Nepalese people dying? Kathmandu Univ Med J. 2007;5(1):121-3.
6. Alwan A, editor. 2008-2013 Action plan for the global strategy for the prevention and control of noncommunicable diseases [Internet]. Geneva: World Health Organization; 2008 [cited 2012 Jan]. 42p. Available from: [http://whqlibdoc.who.int/publications/2009/9789241597418\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241597418_eng.pdf)
7. Survo I, editor. Statistical yearbook for Asia and the Pacific 2009 [Internet]. Bangkok: UNESCAP; 2010 [cited 2011 Sep]. Available from: <http://www.unescap.org/stat/data/syb2009/index.asp>
8. Vaidya A, Krettek A, Shakya S. Obesity prevalence in Nepal: public health challenges in a low income nation during an alarming worldwide trend. *Int J Environ Res Public Health*. 2010;7:2726-44. doi: 10.3390/ijerph7062726
9. The urban environment [Internet]. Geneva: World Health Organization; 2011 [cited 2011 Nov]. Available from: <http://www.who.int/heli/risks/urban/urbanenv/en/>
10. Barker DJ, Osmond C, Simmonds SJ, Wield GA. The relation of small head circumference and thinness at birth to death from cardiovascular disease in adult life. *BMJ*. 1993;306:422-6.
11. Moore VM, Davies MJ, Willson KJ, Worsley A, Robinson JS. Dietary composition of pregnant women is related to size of the baby at birth. *J Nutr*. 2004 Jul;134(7):1820-6.
12. Alwan A, editor. Global status report on noncommunicable diseases 2010 [Internet]. Geneva: World Health Organization; 2011 [cited 2012 Jan]. 176 p. Available from: [http://www.who.int/nmh/publications/ncd\\_report2010/en/](http://www.who.int/nmh/publications/ncd_report2010/en/)
13. Kandula N, Tirodkar M, Lauderdale D, Khurana N, Makoul G, Baker D. Knowledge gaps and misconceptions about coronary heart disease among U.S. South Asians. *Am J Prev Med*. 2010;38:439-42. doi: 10.1016/j.amepre.2009.12.034
14. Nepal Public Health Foundation. Completion of national workshop on non-communicable diseases (NCDs) [Internet]. Kathmandu: Nepal Public Health Foundation; 2011 [cited 2012 Jan]. Available from: [http://www.nphfoundation.org/display/show\\_activities.php?id=15](http://www.nphfoundation.org/display/show_activities.php?id=15)
15. Government of Nepal, Ministry of Education, Department of Education. A comparative study of school cost between community and institutional schools, final report [Internet]. Kathmandu: Department of Education; 2008 [cited 2011 Sep]. Available from: <http://www.doe.gov.np/index.php?option=download&id=39>
16. Ottevaere C, Huybrechts I, Béghin L, Cuenca Garcia M, De Bourdeaudhuij I, Gottrand F, et al. Relationship between self-reported dietary intake and physical activity levels among adolescents: the HELENA study. *Int J Behav Nutr Phys Activity*. 2011;8. doi: 10.1186/1479-5868-8-8
17. Malterud K. Shared understanding of the qualitative research process. Guidelines for the medical researcher. *J Fam Pract*. 1993;10(2):201-6.
18. Malterud K. [Qualitative methods in medical research]. 2nd ed. Lund: Studentlitteratur AB. 2009. 244 p. Swedish.
19. Richards HM, Schwartz LJ. Ethics of qualitative research: are there special issues for health service research? *Fam Pract*. 2002;19(2):135-9.
20. Harrowing JN, Mill J, Spiers J, Kulig J, Kipp W. Culture, context and community: ethical considerations for global nursing research. *Int Nurs Rev*. 2010;57:70-7. doi: 10.1111/j.1466-7657.2009.00766.x
21. Pham KL, Harrison GG, Kagawa-Singer M. Perceptions of diet and physical activity among California among adults and youths. *Prev Chronic Dis*. 2007 Oct;4(4):A93.
22. Perry C, Hoffman B. Assessing tribal youth physical activity and programming using a community-based participatory research approach. *Public Health Nurs*. 2010;27:104-14. doi: 10.1111/j.1525-1446.2010.00833.x
23. Woodgate RL, Leach J. Youth's perspectives on the determinants of health. *Qual Health Res*. 2010;20:1173-82. doi: 10.1177/1049732310370213

24. Berger G, Peerson A. Giving young Emirati women a voice: participatory action research on physical activity. 2009;15:117-24. doi: 10.1016/j.healthplace.2008.03.003
25. Croll J, Neumark-Sztainer D, Story M. Healthy eating: what does it mean to adolescents? *J Nutr Educ Behav.* 2001;33:193-8.
26. McKinley MC, Lowis C, Robson PJ, Wallace JM, Morrissey M, Moran A, Livingstone MB. It's good to talk: children's views on food and nutrition. *Eur J Clin Nutr.* 2005 Apr;59(4):542-51. doi: 10.1038/sj.ejcn.1602113
27. Power T, Bindler R, Goetz S, Daratha K. Obesity prevention in early adolescence: student, parent, and teacher views. *J Sch Health.* 2010;80:13-9. doi: 10.1111/j.1746-1561.2009.00461.x
28. Swaminathan S, Thomas T, Kurpad AV, Vaz M. Perceptions of healthy eating: A qualitative study of school-going children in south India. *Health Educ J.* 2009;68(2):94-110.
29. Hesketh K, Waters E, Green J, Salmon L, Williams J. Healthy eating, activity and obesity prevention: a qualitative study of parent and child perceptions in Australia. *Health Promot Int.* 2005;20:19-26. doi: 10.1093/heapro/dah503
30. Netto G, McCloughan L, Bhatnagar A. Effective heart disease prevention: lessons from a qualitative study of user perspectives in Bangladeshi, Indian and Pakistani communities. *Public Health.* 2007;121:177-86. doi: 10.1016/j.puhe.2006.11.001
31. Rydén PJ, Hagfors L. Diet cost, diet quality and socio-economic position: How are they related and what contributes to differences in diet costs? *Public Health Nutr.* 2011;14(9):1680-92.
32. Temple NJ, Steyn NP, Fourie J, De Villiers A. Price and availability of healthy food: A study in rural South Africa. *Nutrition.* 2011; 27(1), 55-8.
33. Friel S, Baker PI. Equity, food security and health equity in the Asia Pacific region. *Asia Pacific J Clin Nutr.* 2009;18(4):630-2.
34. Warnecke RB, Johanson TP, Chavez N, Sudman S, O'Rourke DP, Lacey L, et al. Improving question wording in surveys of culturally diverse populations. *Ann Epidemiol.* 1997;7:334-42. doi: 10.1016/S1047-2797(97)00030-6
35. Motl R, McAuley E, DiStefano C. Is social desirability associated with self-reported physical activity? *Prev Med.* 2005;40:735-9. doi: 10.1016/j.ypmed.2004.09.016.