Original Article

Lifestyle patterns and the awareness of the risks of non-communicable diseases in Sudan: a community study

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Anastatia بمزحة والوعي بمخاطر الأمراض غير السارية في السودان: دراسة مجتمع

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The objective of this study was to explore the knowledge and practices regarding lifestyle (healthy diet, physical activity and tobacco use) in relation to awareness of the risks of NCDs in Sudan.

Methods
It was a qualitative study conducted in three states in Sudan (Northern state, Blue Nile State and Red Sea State) in May 2011, as part of the Risk Behavior Survey. The fifteen states of Northern Sudan were ranked into four zonal groups. Each zonal group was given scores according to health indicators that are based on data from representative national health surveys. Twenty-four focus group discussions were conducted; eight in each state, four in rural areas and four in urban areas.

Results
The results revealed that the respondents were aware of the benefits of all lifestyle habits that are related to NCDs; such as the effect of physical exercise and the negative effect of obesity. However, only few respondents were engaged in regular physical activity with the
purpose of exercise. Consumption of cooked vegetables occurred on daily basis in all states; however, fruit consumption was much less depending on accessibility and prices. Respondents identified white meat as a healthier option; however, they consumed red meat much more. There were also high consumption rates of both white sugar and salt. All tobacco users were aware of tobacco health-related hazards. The respondents showed their desire to quit tobacco use but lack of support and resources were the main barriers.

Conclusion
Knowledge of the Sudanese community with regards to healthy diet, physical activity and tobacco was found to be quiet adequate. However, the daily lifestyle practices are almost unhealthy and contradict their knowledge. Behavioral interventions are needed to improve the lifestyle of the Sudanese community.

Introduction
Chronic non-communicable diseases (NCDs) became a prevalent public health problem facing both the developed and developing countries. NCDs include cardiovascular diseases, diabetes, cancer, chronic respiratory diseases and mental diseases. Almost 80% of NCD deaths take place in low and middle income countries\(^{(1)}\). It is predicted that seven out of every ten deaths in developing countries will be caused by NCDs by the year 2020\(^{(2)}\). There is substantial evidence that unhealthy lifestyle, especially smoking, physical inactivity and unhealthy diet are common modifiable risk factors for chronic NCDs. Evidence also indicates that following a healthy lifestyle by eating diet rich in fruits and vegetables, deficient in saturated fats in addition to engagement in regular physical exercise is associated with better health outcomes\(^{(3)}\). In Sudan, the burden of NCDs especially diabetes, heart diseases and hypertension, is significantly increasing and this is mainly attributable to changes in life-style. In 1996, the prevalence of diabetes was 3.4\(^{(4)}\). Ten years later, the Sudan Household Health Survey (SHHS) 2006 found that the prevalence of diabetes increased to 12%. Also, the SHHS (2006) showed hypertension to be more prevalent than diabetes. Whereas breast, cervical and ovarian cancers are the most prevalent tumors among Sudanese females, chronic myeloid leukemia, non-Hodgkin lymphoma and bladder cancer are the most common carcinogenic lesions among Sudanese males\(^{(5)}\).

The SHHS (2010) found that the prevalence of NCDs in Northern State to be slightly high (11.2), while in Red Sea State it was found to be 4.0. Blue Nile had a percentage in between the previous two states; it was 7.3\(^{(6)}\).

The ascending trends of chronic NCDs should be faced by a rigorous, multi-disciplinary and evidence-based approach to control and reduce their negative impact \(^{(7)}\). Interventions aimed at behavioral and lifestyle changes should be informed by in-depth analysis of the current situation regarding health-related knowledge and practices of the population. The aim of our study was to explore health-related lifestyles in Sudan using qualitative methods.

The objective of this study was to explore the knowledge and practices regarding lifestyle; healthy diet, physical activity and tobacco use and their relation to NCDs in Sudanese communities.

Methodology
This was a qualitative study conducted in Sudan in May 2011. It was part of the Risk Behavior Survey; a cross-sectional study funded by the World Health Organization (WHO) and conducted by the Public Health Institute, Sudan. The reporting of this research was according to "Consolidated criteria for reporting qualitative research"\(\text{(COREQ)}\)\(^{(8)}\).

The fifteen states of Northern Sudan were grouped into four zonal groups. Each zonal group was given scores according to health indicators that are based on data from
representative national health surveys. The state with the lowest score from each zonal group was chosen. These states were: Northern State, Red Sea State and Blue Nile State. According to the Sudan Central Bureau of Statistics, the Northern state has an area of 348,765 km² and an estimated population of 833,743, the Red Sea state has an area of 212,800 km² and an estimated population of 1,396,000, and the Blue Nile state has an area of 45,844 km² and an estimated population of 832,112.

The study population was stratified by the area of residence into rural and urban. The participants were selected using purposive sampling and approached by the assistance of local community leaders and authorities. Before starting the study, the research team met local community leaders and the heads of the local public committees to clarify the study objectives and asked their help in selecting eligible participants for the focus group discussions (FGDs) which differ according to the subject under study. The number of participants in each group was documented. There were two different populations in this study: the first, to explore the condition of healthy diet and physical exercise; adult males and females (≥18 years) were recruited, and the second, to investigate the domain of tobacco use we studied males above 18 years old.

This study used FGDs as the main tool for data collection. The FGDs were semi-structured, topic guided and audio recorded. The topics were identified after thorough literature reviews. The moderators were university graduates with previous training and extensive experience in qualitative research methods. The discussions were held in public places such as community clubs; this ensured both comfort and privacy of the participants. The study was not piloted due to time limitations. The number of participants in each group ranged from 4-17 participants.

Moderators often commenced the discussion by asking questions. Participants answered the questions individually and were also encouraged to interact with each others. Notes were taken during the discussions by a note taker. Each focus group took about 45-60 minutes. The FGDs included only the participants, a moderators and a note taker. Transcripts were not returned to participants for comments and corrections due to the fact that the analyses took place in Khartoum state away from the study areas.

Twelve FGDs were carried out with adult males and females to study the knowledge and practices concerning healthy diet and physical activity. Two FGDs were held with men, one in an urban area and one in a rural area, the same was carried out with women, giving a total of four FGDs in each one of the three chosen states.

Another twelve FGDs were held with adult males (≥18 years) using any kind of tobacco (snuff, cigarettes) to study the knowledge and practices regarding tobacco use and related risks. Four FGDs were held with adult males, two in an urban area and two in a rural area, giving a total of four FGDs in each of the three chosen states.

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Reports of the discussions were recorded in writing (transcribed verbatim) and were checked against audio recording and notes for accuracy. A total of three coders participate in data coding. The results were manually analyzed into themes derived from the data. No specific software was used. The approach was to group similar ideas to form common themes using color coding in order to simplify comparison of themes across groups. Also the frequencies of similar words or phrases were distinguished to assist in identifying important themes. Major and minor themes were reported. The results were not returned to the participants for feedback because the analyses took place in Khartoum state away from the study areas. No quantitative analysis performed due to the qualitative nature of the
study.

Ethical considerations

This study was approved by the Sudan National Research Technical Ethical Committee. Approvals from states’ authorities were also obtained beforehand. A verbal consent was obtained from all study participants. The permission of the participants was taken prior to recording of the discussion. Participation was fully voluntary. Participants’ names were not recorded as part of the FGDs to ensure confidentiality. All facilitators and moderators were trained on the ethical approach to deal with study participants.

Results

The total number of FGDs was 24; eight in each of the three states four in rural areas and four in urban areas giving a total number of 215 participants in the three selected states (Table 1).

Table 1: Number of participants in each of the focus group discussions, Sudan 2011

<table>
<thead>
<tr>
<th>No.</th>
<th>State</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Healthy diet and physical exercise:</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Blue Nile</td>
<td>17 females</td>
</tr>
<tr>
<td>2</td>
<td>Blue Nile</td>
<td>4 males</td>
</tr>
<tr>
<td>3</td>
<td>Blue Nile</td>
<td>15 males</td>
</tr>
<tr>
<td>4</td>
<td>Blue Nile</td>
<td>10 females</td>
</tr>
<tr>
<td>5</td>
<td>Northern</td>
<td>8 males</td>
</tr>
<tr>
<td>6</td>
<td>Northern</td>
<td>10 females</td>
</tr>
<tr>
<td>7</td>
<td>Northern</td>
<td>9 males</td>
</tr>
<tr>
<td>8</td>
<td>Northern</td>
<td>7 females</td>
</tr>
<tr>
<td>9</td>
<td>Red Sea</td>
<td>12 females</td>
</tr>
<tr>
<td>10</td>
<td>Red Sea</td>
<td>7 males</td>
</tr>
<tr>
<td>11</td>
<td>Red Sea</td>
<td>10 females</td>
</tr>
<tr>
<td>12</td>
<td>Red Sea</td>
<td>10 males</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>119 Participants</td>
</tr>
<tr>
<td></td>
<td>Tobacco use:</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Blue Nile</td>
<td>9 males</td>
</tr>
<tr>
<td>14</td>
<td>Blue Nile</td>
<td>8 males</td>
</tr>
<tr>
<td>15</td>
<td>Blue Nile</td>
<td>10 males</td>
</tr>
<tr>
<td>16</td>
<td>Blue Nile</td>
<td>11 males</td>
</tr>
<tr>
<td>17</td>
<td>Northern</td>
<td>6 males</td>
</tr>
<tr>
<td>18</td>
<td>Northern</td>
<td>8 males</td>
</tr>
<tr>
<td>19</td>
<td>Northern</td>
<td>5 males</td>
</tr>
<tr>
<td>20</td>
<td>Northern</td>
<td>7 males</td>
</tr>
<tr>
<td>21</td>
<td>Red Sea</td>
<td>7 males</td>
</tr>
<tr>
<td>22</td>
<td>Red Sea</td>
<td>9 males</td>
</tr>
<tr>
<td>23</td>
<td>Red Sea</td>
<td>8 males</td>
</tr>
<tr>
<td>24</td>
<td>Red Sea</td>
<td>8 males</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>96 Participants</td>
</tr>
<tr>
<td>Total</td>
<td>215 Participants</td>
<td></td>
</tr>
</tbody>
</table>
and Blue Nile states, sheep meat and beef were the most consumed types while goat meat was the most consumed in the Red Sea state. In all states the respondents acknowledged that white meat, specifically fish, to be the most healthy meat type. For respondents from the Northern and the Red Sea states, this was followed by sheep and camel meat. Surprisingly, fish was the least consumed meat even in the Red Sea state. One participant said, “White meat is much better than red meat; we can eat fish every day unlike red meat.”

Whole-grain local corn flour in the form of porridge or “kisra” (i.e. bread-like product) was reported to be the most used type of flour in the Blue Nile and Red Sea states. In the Northern state households mostly consume bread made of whole grain wheat flour. In the Northern state, bread prepared from refined wheat flour was mostly consumed. Nevertheless, it was the least consumed type. Vegetable oil was used for cooking and as salad dressing in the three states. Margarine was not mainly used in cooking but was added in small quantity to the dish when it is served. However, women and men, particularly in the Red Sea and Blue Nile states, considered margarine healthier than vegetable oil as it is made from milk and it also has a better flavor. In Northern state respondents considered margarine or animal fat consumption to be unhealthy, given that it leads to high cholesterol level and blockage of blood vessels. In contrast most, of the respondents from the Red Sea and Blue Nile states believed that margarine and animal fat consumption is beneficial for health. They believe that it improves the health, strengthens the body and eases child birth. One participant said, “Our families have good health as they always drink margarine.” Sugar was added to tea or coffee by the majority of respondents from all states. Sugar quantity varied from one teaspoon up to six teaspoons. Only a small number of respondents reported not adding sugar to their drinks. Many women added sugar to the tea pot before serving it. While some put the sugar separately and serve tea with no sugar. The majority of the respondents from the Northern state stated that they would never consider drinking tea or coffee without sugar. In Red Sea and Blue Nile states respondents said they would only consider having their drinks without sugar if it was not available or if they were diabetic or elderly. Women in all states did not use standardized measures for salt consumption. Salt is added to the entire food pot in “appropriate” amounts according to their experience in cooking. The amount of salt added to food will be reduced only if high blood pressure exists in the family. In the three states, the majority of the respondents did not exercise but they considered walking to work or social activities as an exercise. They also consider physical activities performed at home or the work place as exercise. Only males were engaged in physical activities as part of exercise and those were mostly from the Red Sea state.

Respondents from all states believed that exercise is useful to the body because it improves blood circulation, gives energy and a person becomes more active, avoids and reduces obesity and builds the body’s muscles. All respondents from the three states affirmed that they can change their diet and exercise habits if needed. One participant said, “We are obligated to comply with doctor’s decision.”

The most preferred channel of education was agreed to be radio and television programmes, followed by lectures and group discussions, then newspapers and booklets. Health care providers and internet and mobile messages were at the middle of the list. Surprisingly, school education was the least preferred channel. In the three states, cigarette was the most type...
of tobacco used by all respondents, especially for young males. On the other hand, tumbak (i.e. local snuff) was mostly used by the older adults. Sheesha was the least type used and mostly by the younger group of the Northern state.

The majority of the respondents were conscious about the health risks of tobacco use.

One participant said, “It is all written on the cigarette box”.

Some of them considered tumbak as less associated with health hazards, in contrast to cigarette, as it does not penetrate inside the body. The participants listed a number of health conditions related to tobacco use: cancer, cough and respiratory conditions, nervousness, loss of appetite, being overweight and insomnia. A number of participants reported to have actually experienced some of these conditions.

The greater part of the respondents stated that the initiation of tobacco use was due to the pressure of friends and classmates.

One participant said, “When you meet with your friends you have to smoke or you will be looked at as a little boy.”

Others claimed that the start of using tobacco was when they were asked to buy it for older family members. Most of the participants stated that they use tobacco when they feel down or nervous. Others believed that tobacco increases their focus at work. Some of them utilized it to sleep whereas others used it to stay awake. Most young males declared using tobacco when bored.

All respondents declared that tobacco use does not have any benefit. They believed it is health damaging and it is also a waste of money.

Nearly all the participants who smoked tried to quit but they failed to achieve their goal. They raised a need to be taught the right way to reach their desire to quit tobacco. They believed that abstaining from smoking during the fasting month of Ramadan offered a great opportunity to reduce or stop tobacco use. A minority of the participants conveyed their intent to quit tobacco use in the future. Some assumed that if smoking was harmful doctors wouldn’t do it anyway.

One participant said, “When I see a doctor smoking I do not worry about myself.”

In all states, most of the participants from all age groups believed that addiction and craving for tobacco was the main obstacle to quit. For most of the youth group and few of the adult group the family members were not aware of their tobacco use. Some said that friends and family members are willing to help them quit.

Tobacco users suffered from being marginalized. For example, they have been told many times by others to go smoke in another place. The respondents believed that tumbak caused more addiction than smoked types of tobacco. Most of the participants were in agreement with the law which prohibits smoking in public places. Only a small number of them were against it and some of them were questioning the usefulness of this law.

One participant said, “The law itself will not reduce smoking - what is forbidden is desired.”

The means of education mentioned by the respondents were TV, lectures, radio shows, health providers, newspapers, phone messages, and religious lectures at mosques.

**Discussion**

This study was based on phenomenology (identifying and understanding people’s lives and experiences).

In this study, the majority of the participants consumed fresh or cooked vegetables regularly. But the amount consumed was hard to calculate due to the traditional Sudanese practice that all family members eat from the same plate. Fruit consumption was found to be infrequent due to high prices and the seasonality of certain types. The studied communities depend only on locally produced fruits and vegetables. This was in line with a
study on perceived access to fruits and vegetables and its association with increased consumption\(^\text{9}\).

Reducing the consumption of red meat is one of a set of recommendations to reduce coronary heart diseases\(^\text{10}\). Results from a meta-analysis showed that consumption of red meat is related to a high risk of stroke and ischemic heart diseases\(^\text{11}\). Participants in this study believed that white meat, especially fish, is healthier than red meat. However, they reported to consume red meat more than white, possibly due to affordability.

Participants in this study reported predominant use of vegetable oil although they believed that butter is healthier, because it is from an animal source. While olive oil is found to be a great source for anti-oxidants, the anti-thrombotic oleic acid and vitamin-E\(^\text{12}\); none of the participants reported using it.

Many epidemiological studies suggested that whole grains are protective against cardiovascular diseases and specific types of cancer due to their high amount of fiber, resistant starch, minerals and antioxidants\(^\text{13}\). Fortunately, in our study, the consumption of whole grain flour was reported to be relatively high in the three states.

A high amount of white sugar used with drinks was documented in this study. Almost all participants utilized sugar with their drinks daily. This habit contradicts the internationally recommendation to avoid adding high amounts of simple sugars in order to decrease dental caries, obesity, type 2 diabetes and to a lesser extent, coronary heart diseases\(^\text{14}\).

The SHHS (2010) found that consumption of iodized salt in Sudan is only 11\(^\%\)\(^\text{6}\). In our study, we did not ask about iodized salt we only asked about the amount and measurement of salt and it seems that commonly there is consumption of high amounts of table salt.

The associations between dietary patterns and health outcomes have been observed in a variety of observational studies. The bulk of studies showed that individuals consuming diets high in fruits, vegetables, fish and whole grains or fiber and low in saturated and trans-unsaturated fats have lower rates of coronary heart disease and specific types of cancer\(^\text{11}\). However, this study has shown that there is a low tendency to eat fruits and fresh vegetables due to unaffordability; consequently health education alone will not lead to improvement in consumption of a healthier diet\(^\text{7}\).

This study showed that cigarette smoking is the most used type of tobacco among the participants especially among young adults. Unsurprisingly, the majority of the participants were aware of tobacco-related health hazards; cancer was at the top of the list, followed by cough and other respiratory conditions. This is consistent with the result of a study conducted in the United Kingdom, where nearly every participant identified a health risk associated with tobacco use\(^\text{15}\). An important observation in our study was that participants perceived non-smoked types of tobacco to have no health hazards. This bad concept should be considered when designing future health messages.

Initiation of tobacco use was reported to be mostly influenced by peers and friends. Smoking was also started by sampling the tobacco that they were sent to buy for an elder family member. This also agrees with the results of a study conducted among a community of Bangladeshi male smokers in the United Kingdom, where younger respondents reported that the drive to start smoking was due to the influence of either parents or friends at school\(^\text{15}\).

The reason behind using tobacco varied from the need to calm down when stressed at work to the desire of younger participants to improve image among peers. Most importantly young smokers in this study reported that tobacco use was a means to fill their spare time. This emphasizes the importance of providing entertaining activities
for this age group. All participants declared that smoking had no advantage and was harmful to the health in addition to its financial burden. The majority of the participants had tried to quit tobacco without success. However, only a minority had an intention to try again to quit. The unmet need for professional support in smoking cessation may stand behind this attitude. The fact that the majority of the respondents were with prohibiting smoking in public places, reflects their desire to stop tobacco use.

All respondents agreed that the holy month of Ramadan provided a great opportunity to reduce or even quit smoking. This was also reported by a Muslim community in the United Kingdom where all respondents believed that Ramadan was a big support to reduce or give up smoking\(^{15}\). This fact could assist when designing smoking cessation interventions.

We concluded that the knowledge of the Sudanese community with regards to healthy diet, physical activity and tobacco use is quiet adequate. Yet, the daily lifestyle practices are almost unhealthy opposing their knowledge. This is mostly due to low income and cultural believes. Intervventional behavioral programs are needed to improve the lifestyle of this community.

**Limitations of the study**

Number of non-participants (refusal) and reason for non-participation were not documented. However, the rate of non-participation was very low. Transcripts were not returned to participants for triangulation, given that transcription and analysis were conducted centrally after the return of the research teams to Khartoum, the capital.

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**References**