

# Nutrition knowledge, attitudes, beliefs and practices: a comparison of urban and rural adults in the Free State province of South Africa

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**Objective:** A study was undertaken to explore the differences in nutrition knowledge, attitudes, beliefs and practices and their correlations among adults in both urban and rural communities in the Free State province of South Africa.

**Design:** This study forms part of the cross-sectional Assuring Health for All in the Free-State (AHA-FS) study.

**Setting:** The AHA-FS study is conducted in urban and rural parts of the Free State province of South Africa. The rural and urban stages of the study were conducted in 2007 and 2009, respectively.

**Subjects:** The sample included 846 adult household members, aged between 25 and 65 years, from both rural and urban areas of the Free State province.

**Outcome measures:** Nutrition knowledge, attitudes, beliefs and practices were measured.

**Results:** The sample included predominantly females (78.2%). Rural adults had significantly better nutrition knowledge ( $p < 0.001$ ), positive attitudes ( $p < 0.001$ ) and positive beliefs ( $p < 0.001$ ) and their nutrition knowledge and attitudes ( $r = 0.27$ ,  $p < 0.001$ ), nutrition knowledge and beliefs ( $r = 0.16$ ,  $p < 0.001$ ), and nutrition attitudes and beliefs ( $r = 0.38$ ,  $p < 0.001$ ) were significantly correlated with each other. However, nutrition knowledge, attitudes and beliefs were not correlated with nutrition practices among our sample in either the urban or rural setting.

**Conclusion and implication:** The results of the current study confirm that relevant and culturally acceptable nutrition education interventions for translating nutrition-related knowledge, attitudes and beliefs into practices are required.

**Keywords:** nutrition knowledge, nutrition attitudes, nutrition beliefs, nutrition practices, adults, urban and rural

## Introduction

Food plays an essential role in health and well-being. 'A healthy diet is health-promoting and disease-preventing. It provides adequacy without excess, of nutrients and health-promoting substances from nutritious foods and avoids the consumption of health-harming substances', according to the United Nations Food Systems Summit 2021.<sup>1</sup> Therefore, healthy dietary behaviour decreases the chances of developing chronic diseases, while unhealthy eating behaviours have harmful effects and can increase the risk of developing chronic diseases such as obesity, type 2 diabetes, cardiovascular diseases and cancer.<sup>2</sup> Multiple elements affect people's food choices, such as sensory, environmental, personal, sociocultural and cognitive factors; among cognitive factors, people's knowledge, attitudes and beliefs have an impact on the food they choose to eat.<sup>3</sup>

According to Fautsch and Glasauer, nutrition knowledge encompasses the ability to understand nutrition-related information and facts, while attitudes include emotional, motivational, perceptive and cognitive beliefs that influence the behaviours of individuals.<sup>4</sup> Nutrition attitudes can be considered as an independent influencer of eating behaviour. Beliefs form the foundation for forming attitudes.<sup>5</sup> Therefore, people with positive nutrition beliefs are more likely to have positive nutrition attitudes. Finally, nutrition practices are actions that affect nutrition-related behaviours, including food choices for cooking or consumption.<sup>4</sup> The primary purpose of a nutrition education intervention is to increase nutrition knowledge, attitudes, beliefs and practices (NKABP) towards healthy

eating. A better understanding of NKABP can provide important information to design appropriate and comprehensive nutrition education programmes.

Globally, previous studies mainly focused on nutrition knowledge, attitudes and practices (NKAP) of children<sup>6–10</sup> or adolescents.<sup>11–13</sup> However, parents' nutrition knowledge, attitudes and eating behaviours impact their children's nutrition knowledge, attitudes and eating behaviors.<sup>14,15</sup> Other NKAP studies have targeted a specific group of people (e.g. pregnant women, healthcare workers, medical students)<sup>16–18</sup> or specific nutrients or food ingredients (e.g. whole grain, sugar, fibre).<sup>19–21</sup> However, the NKABP of one nutrient or food ingredient or a specific target group of people cannot be generalised to a community of people. Furthermore, the differences in NKABP of urban and rural communities are seldom recognised<sup>22</sup> and may affect the prevalence of chronic disease and risk factors for developing these,<sup>23</sup> such as dietary practices.<sup>24</sup>

Information regarding the differences and interplay between the NKABP among adults in urban and rural communities in South Africa is lacking. Therefore, this paper aims to examine NKABP and how they are correlated among adults in urban and rural communities in the Free State province of South Africa.

## Methods

The detailed methodology that was applied to collect the data for the Assuring Health for All in the Free State (AHA-FS) study has previously been published elsewhere.<sup>25</sup>

### Study design and setting

The current sub-study forms part of the cross-sectional AHA-FS research study in both urban and rural areas of the Free State province of South Africa. The rural leg of the AHA-FS study was conducted in three rural areas, including Trompsburg, Philippolis and Springfontein of the Xhariep district in 2007, while the urban leg was conducted in 2009 in Buffer, Freedom Square, Kagisanong, Chris Hani, Namibia and Turflaagte areas of the Mangung district.

### Study participants and data collection

In both rural and urban areas, men and women in selected households aged 25–65 years were eligible to participate in the study. Senior dietetic students interviewed adults from households under the supervision of lecturers from the Department of Nutrition and Dietetics at the University of the Free State (UFS). Prior to data collection, the purpose of the study was explained and written informed consent obtained from all participants. Information on sociodemographic characteristics (e.g. gender, level of education, employment status), and NKABP were collected using fieldworker-administered questionnaires completed in a structured one-on-one interview with each participant. Where necessary, interpreters assisted in translating English questions into the local languages of Sesotho, Setswana, Afrikaans and isiXhosa.

### Nutrition knowledge, attitudes, beliefs and practices questionnaire

The NKABP questionnaire was adapted from the validated South African National Food Consumption Survey (NFCSS) questionnaire.<sup>26</sup> It consisted of four sections: (i) Nutrition Knowledge with 12 questions; (ii) Nutrition Attitudes with 8 questions; (iii) Nutrition Beliefs with 7 questions; and (iv) Nutrition Practices with 9 questions. For the purpose of the current study, the overall cut-offs for each section were classified as low (< 40%), moderate (41–75%) and good ( $\geq$  75%). The nutrition knowledge section focused on people's knowledge of the food-based dietary guidelines for South Africa. The complete score for the nutrition knowledge section was 12 points, with correct and incorrect answers given 1 and 0 points respectively. Nutrition knowledge was categorized as: (i) Good (10–12), (ii) Moderate (5–9) and (iii) Poor (0–4). The primary focus of the nutrition attitudes section was on attitudes related to the health effects of eating, time of eating and food purchasing, while the nutrition beliefs section focused on beliefs related to healthy eating, nutrition advice and food purchasing. In both sections, positive nutrition attitudes and beliefs and negative nutrition attitudes and beliefs were given 1 and 0 points respectively. Attitudes were classified as (i) Good (7–8), (ii) Moderate (4–6) and (iii) Poor (0–3). Similarly, nutrition beliefs were categorised as (i) Good (6–7), (ii) Moderate (3–5) and (iii) Poor (0–2). In the practices section, the questions focused mainly on the practical application of the food-based dietary guidelines for South Africa and a total of 18 points could be achieved. Regular healthy nutrition practices, occasional healthy nutrition practices and unhealthy nutrition practices were given 2, 1 and 0 points respectively. Nutrition practices were classified as (i) Good (14–18), (ii) Moderate (8–13) and (iii) Poor (0–7).

### Statistical analysis

Statistical analyses were performed using the R statistical software program (version 4.2.1; R Foundation for Statistical Computing, Vienna, Austria). Only those participants who had complete NKABP data were included in the analysis. The socio-demographic characteristics are presented using descriptive

statistics (frequencies [%]). Fisher's exact test was used to compare sociodemographic characteristics among categorical variables between urban and rural areas. The Shapiro–Wilk test was used to test the normality of the data. Due to the non-normal distribution of the NKABP data, the data are presented in median (Q1–Q3), and the Mann–Whitney U-test was performed to compare NKABP of adults between urban and rural areas. The Spearman correlation method was used to determine correlations between NKABP domains. The analysis was adjusted for multiple comparisons using Bonferroni correction, and a *p*-value of less than 0.002 was considered statistically significant.

### Ethical considerations

The Health Sciences Research Ethics Committee (HSREC) of University of the Free State (UFS-HSD2017/1435) and the Free State Department of Health approved the study protocol. This sub-study was also approved by the Institutional Review Board (IRB) of Texas Tech University (IRB2022-353). Written informed consent was obtained from participants and all information was kept confidential. The data used for this sub-study will be kept for three years after the publication date.

### Results

#### Sociodemographic characteristics

A total of 846 participants were included, of whom 363 (42.9%) and 483 (57.1%) were from urban and rural communities respectively. The sociodemographic characteristics of the participants are presented in Table 1. Participants were predominantly women (78.2%) compared with men (21.8%). The proportion of men and women among urban and rural communities was not significantly different ( $p = 0.9329$ ). Most participants had primary school education (34.0%) or had completed grade 6–8 (25.5%). Although urban participants had significantly higher education levels than rural adults ( $p = 0.005926$ ), rural participants had a significantly higher level of income ( $p = 0.000463$ ).

#### Nutrition knowledge

Overall, adults had a moderate level of nutrition knowledge with a median (Q1–Q3) score of 9 (8–10) out of 12. However, the median (Q1–Q3) score of nutrition knowledge among rural adults 9 (8–10) was significantly higher ( $p = 1.424e-07$ ) compared with urban adults with a median score of 8 (7–9). In rural areas, 34.2% had a good level of knowledge, compared with 22.6% of urban participants. Figure 1 represents the percentages of correct responses for the statements representing nutrition knowledge. For most variables, rural participants had better knowledge than urban participants.

#### Nutrition attitudes

In general, adults had a moderate level of positive nutrition attitudes with a median (Q1–Q3) score of 6 (4–7) out of 8. Adults in rural areas had a median (Q1–Q3) nutrition attitudes score of 7 (6–7), reflecting significantly higher positive nutrition attitudes than those living in urban areas with a median score of 5 (4–6) ( $p < 2.2e-16$ ). Among the rural adults, 58.4% had good nutrition attitudes compared with only 14.0% of urban adults. Figure 2 demonstrates the positive responses of participants to statements representing nutrition attitudes.

#### Nutrition beliefs

Overall adults had a median (Q1–Q3) score of 5 (5–6) out of 7 in nutrition beliefs and positive nutrition beliefs among rural

Table 1: Sociodemographic characteristics of participants

Factor	Overall, n (%)	Urban, n (%)	Rural, n (%)	p-value for % difference
Gender (n = 844):				
Men	184 (21.8%)	80 (22%)	104 (21.6%)	0.9329
Women	660 (78.2%)	283 (78%)	377 (78.4%)	
Education (n = 791):				
None	176 (22.3%)	60 (16.9%)	116 (26.7%)	0.005926
Primary school	269 (34.0%)	126 (35.4%)	143 (32.9%)	
Student 6–8	202 (25.5%)	90 (25.3%)	112 (25.7%)	
Student 9–10	131 (16.6%)	73 (20.5%)	58 (13.3%)	
Tertiary education	6 (0.8%)	3 (0.8%)	3 (0.7%)	
Don't know	7 (0.9%)	4 (1.1%)	3 (0.7%)	
Household income* (n = 825):				
None	18 (2.2%)	9 (2.5%)	9 (1.9%)	0.000463
R100–R500	141 (17.1%)	82 (22.7%)	59 (12.7%)	
R501–R1000	290 (35.2%)	110 (30.5%)	180 (38.8%)	
R1001–R3000	325 (39.4%)	132 (36.6%)	193 (41.6%)	
R3001–R5000	21 (2.5%)	9 (2.5%)	12 (2.6%)	
Over R5000	14 (1.7%)	7 (1.9%)	7 (1.5%)	
Don't know	16 (1.9%)	12 (3.3%)	4 (0.9%)	

\*Income is based on 2007 for rural areas and 2009 for urban areas.  $p < 0.05$  is significant for sociodemographic characteristics.

adults with a median (Q1–Q3) score of 6 (5–6) were significantly higher ( $p = 1.334e.13$ ) compared with urban adults with median (Q1–Q3) score of 5 (4–6). In rural areas, the majority of adults (58.0%) were categorised as having a good level of positive nutrition beliefs, while in urban areas the majority (66.7%) had a moderate level of positive nutrition beliefs. Figure 3 represents positive responses of participants to statements representing nutrition beliefs. The majority of the participants had good nutrition beliefs towards all variables measured except for the belief that healthy eating is good if the television/radio says it is a good thing to do.

### Nutrition practices

Overall, the median (Q1–Q3) score for nutrition practices was 9 (8–11) out of 18. The median (Q1–Q3) score of urban adults was 9 (8–12), which was not significantly different from the median (Q1–Q3) score of rural participants with a score of 9 (8–11) out of 18 ( $p = 0.03$ ). Most of the participants in both urban (71.9%) and rural (74.3%) areas had moderate nutrition practices scores. Figure 4 represents the responses of participants who regularly practiced the statements representing nutrition practices. The percentage of regular healthy nutrition practices was low among most participants in both rural and urban areas.

### Correlations between nutrition knowledge, attitudes, beliefs and practices domains

The correlations between nutrition knowledge and attitudes ( $r = 0.25$ ,  $p = 1.187e-13$ ), knowledge and beliefs ( $r = 0.19$ ,  $p = 2.454e-08$ ), and attitudes and beliefs ( $r = 0.36$ ,  $p < 2.2e-16$ ) were statistically significant for the total group. However, when comparing urban and rural areas, these correlations were only significant among adults in rural areas (see Table 2).

### Discussion

To our knowledge, this is the first study to examine the nutrition knowledge, attitudes, beliefs and practices (NKABP) and their correlations among adults in the Free State province of South Africa. Our study findings suggest that adults in the Free State province had a moderate level of nutrition knowledge. In

terms of nutrition attitudes and beliefs, overall, adults had a moderate level of positive nutrition attitudes and beliefs toward the listed statements. Similarly, the nutrition practices score among our sample demonstrated a moderate level of nutrition practices. In support of our results, the South African National Health and Nutrition Examination Survey (SANHANES-1), which focused on general nutrition knowledge and beliefs regarding developing obesity, also found a moderate level of general nutrition knowledge and a moderate level of nutrition beliefs for various variables among adults in the Free State province of South Africa<sup>27</sup>. Since the SANHANES-1 was the only South African survey that assessed nutrition knowledge and beliefs, we have compared our findings with those of studies from other countries. The Tehranian Lipid and Glucose Study (TLGS) focused on measuring the nutrition knowledge, attitudes and practices regarding non-communicable diseases, bodyweight, dietary lipids, sugar, fibre, fruits, vegetables and salt among adults. That study demonstrated that more than half of the population had a medium score of nutrition knowledge, attitudes and practices<sup>28</sup>. Similarly, a study by Lin and colleagues reported mean  $\pm$  SE scores of nutrition knowledge ( $19 \pm 0.19$  out of 31), nutrition attitudes ( $67.65 \pm 0.22$  out of 95) and nutrition behaviour ( $76.81 \pm 0.42$  out of 120) in the 2005–2008 Nutrition and Health Survey in Taiwan, which included adults aged 19–64 years old, and showed a moderate level of nutrition knowledge, attitudes and behaviour.<sup>29</sup>

In contrast to the findings of community-based surveys, studies that have targeted specific groups of people have reported results that are different from the findings of the current study. A cross-sectional study, which included 42 questions around 14 subjects, was conducted among young Polish adults, aged 18–32 years, studying nutrition-related fields. That study found that the mean score of nutrition knowledge indicated a low level of nutrition knowledge.<sup>30</sup> Munuo and co-authors conducted a study among healthcare workers in Tanzania that included both questionnaires and focus groups for data collection and found that more than half of the participants (59.4%) had low nutrition knowledge.<sup>17</sup>

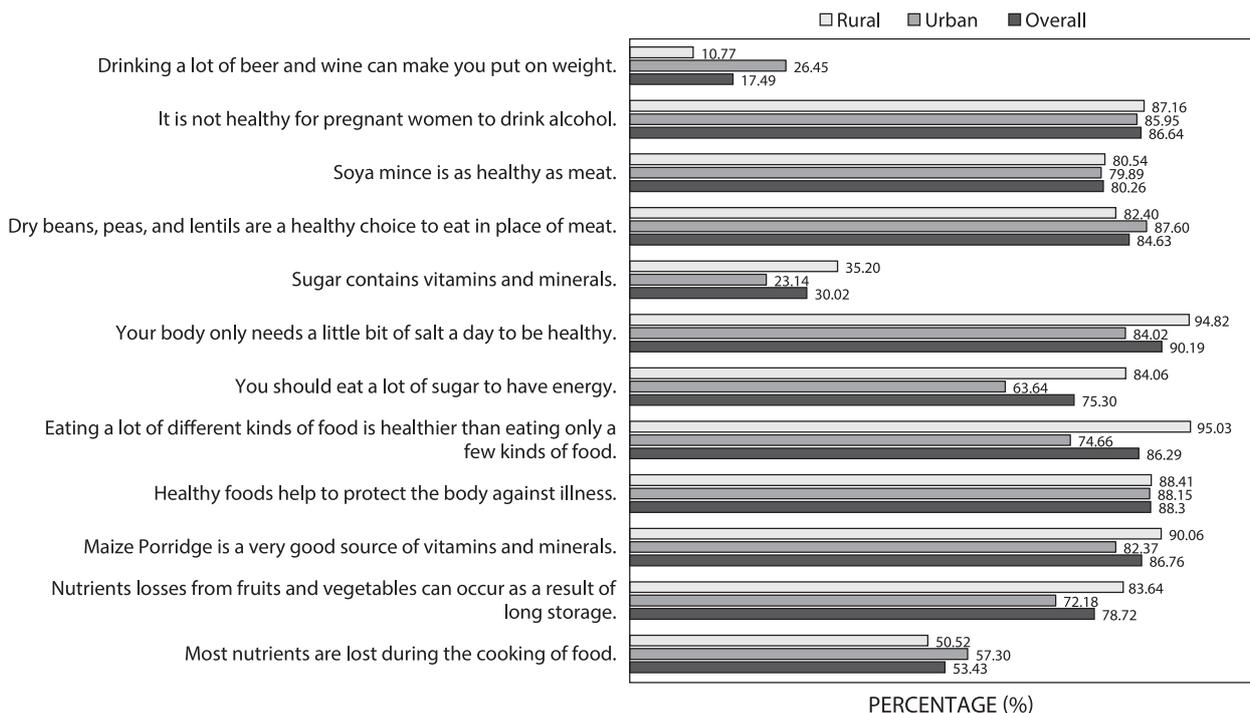


Figure 1: Correct responses of participants to statements representing nutrition knowledge.

In the current study, the nutrition knowledge, attitudes and beliefs of adults from rural areas was generally better than those adults living in urban areas. However, the nutrition practices were not significantly different between urban and rural adults. Similar to our results, a cross-sectional study among adolescents from Austria found that adolescents in rural areas had better nutrition knowledge compared with those in urban areas.<sup>31</sup> The SANHANES-1 also found that South Africans in urban and rural areas have a medium level of nutrition knowledge and more than half of them had high levels of positive

nutrition beliefs towards the variables assessed in the survey.<sup>27</sup> In contrast to our results, a cross-sectional study among Italian adults reported that adults in urban areas have significantly higher general nutrition knowledge, nutrition knowledge on diet–disease associations, nutrition knowledge on food and energy content, and nutrition knowledge on experts’ recommendations compared with rural adults.<sup>32</sup> Similarly, the results from the 2015 China Health and Nutrition Survey (CHNS) among adult residents assessed the diet-related knowledge of the Dietary Guidelines for Chinese

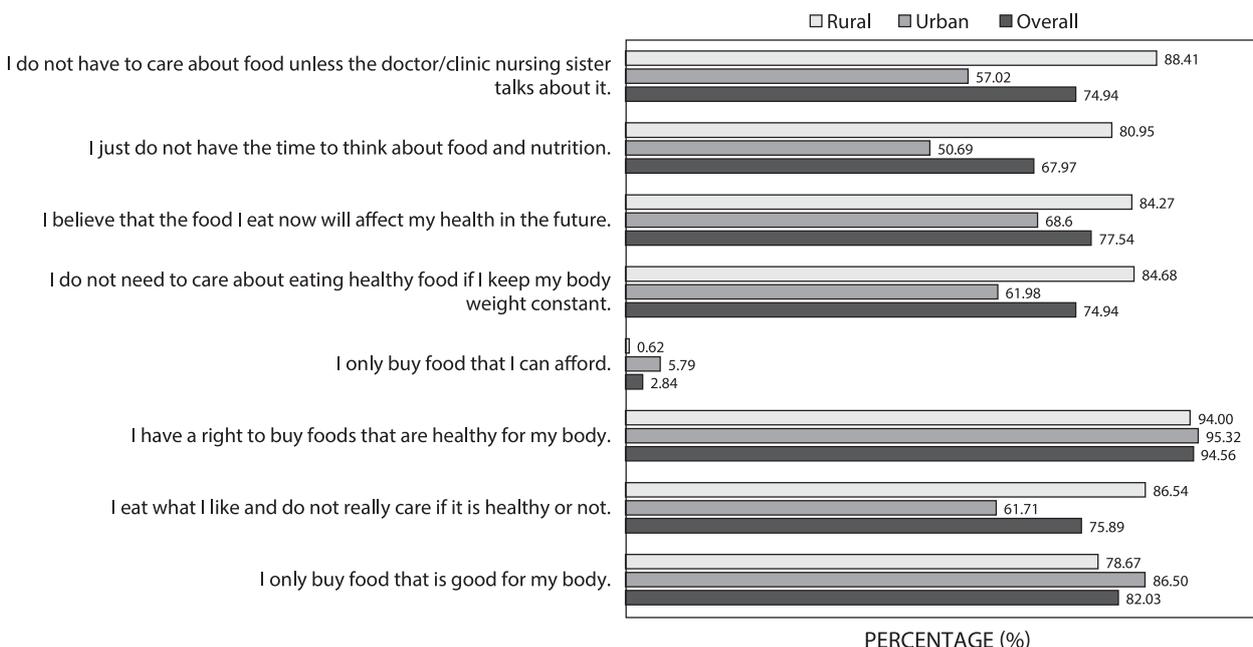


Figure 2: Positive responses of participants to statements representing nutrition attitudes.

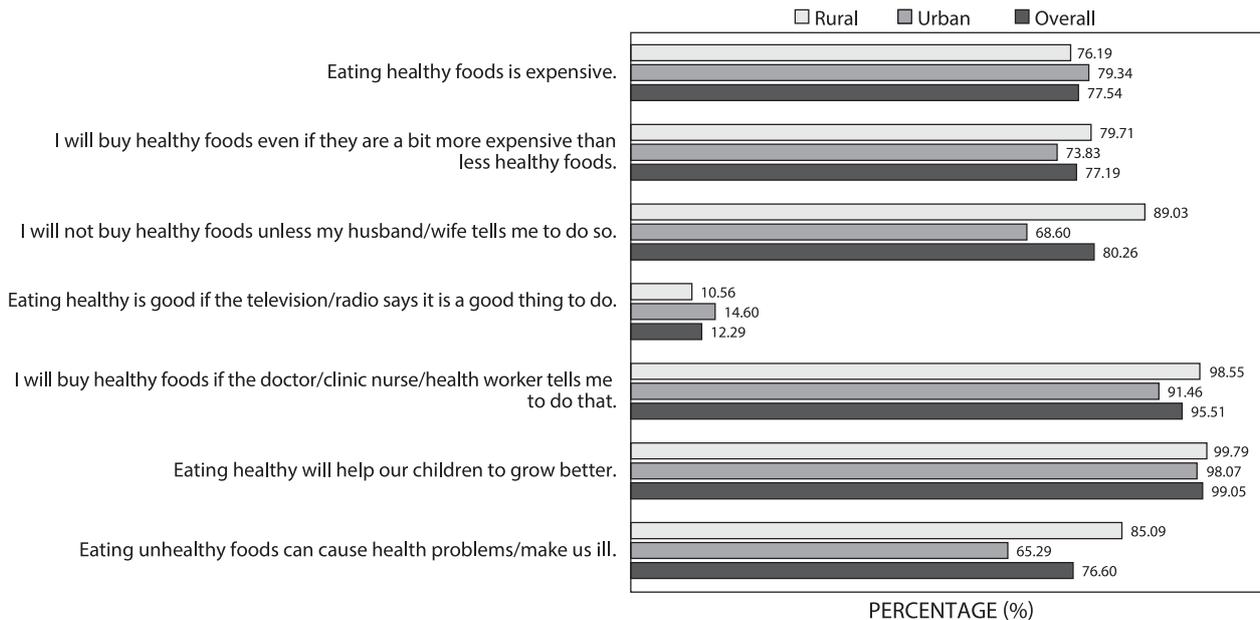


Figure 3: Positive responses of participants to statements representing nutrition beliefs.

residents and dietary knowledge literacy, diet-related attitudes and diet-related behaviours; for all of these aspects, adults in urban areas achieved significantly better scores than participants living in rural areas.<sup>33</sup>

The results of studies in other age groups have provided mixed findings. A cross-sectional survey by Jeinie and co-authors compared NKAP among urban and rural secondary school students and found that nutrition knowledge scores among students were not significantly different between urban and rural participants; however, urban school students had better nutrition attitudes and practices than those from rural areas.<sup>6</sup> In contrast, a cross-sectional study on NKAP in an urban setting in Kenya demonstrated that urban primary school children had a moderate level of nutrition knowledge; however, they had negative nutrition attitudes and poor nutrition practice.<sup>34</sup>

In terms of correlations, our results showed significant positive correlations between nutrition knowledge and attitudes, nutrition knowledge and beliefs, and nutrition attitudes and beliefs. However, nutrition knowledge, attitudes and beliefs were not significantly correlated with nutrition practices. Similar to our study, both the Tehran<sup>28</sup> and Taiwan<sup>29</sup> studies reported a significant positive correlation between nutrition knowledge and attitudes. In contrast to our results, both these studies found significant positive correlations between nutrition knowledge and practices, and nutrition attitudes and practices. Another study by Wardle and co-authors among adults in England that focused on nutrition knowledge regarding expert recommendations on healthy eating, knowledge of nutrient content of food, and everyday food choices found that nutrition knowledge was correlated with healthy eating behaviour.<sup>35</sup> The Polish study among young adults focused on nutrition knowledge, attitudes, pro-Healthy Diet Index (pHDI) and non-Healthy Diet Index (nHDI). These authors found that nutrition knowledge was negatively correlated with nHDI and attitudes towards food and nutrition.<sup>30</sup> The results from studies in other age groups are also mixed. A cross-sectional study conducted among adolescents in Malaysia

by Shaziman and co-authors found no significant correlations between nutrition knowledge and attitudes and nutrition knowledge and practices; however, they have found a significant correlation between nutrition attitudes and practices.<sup>10</sup>

Findings of associations among adults in urban and rural communities are surprisingly different. In our study the correlations between nutrition knowledge and attitudes, nutrition knowledge and beliefs, and nutrition attitudes and beliefs were statistically significant only among rural adults, while the correlation of nutrition knowledge, attitudes and beliefs with nutrition practices was not significant. In contrast to our finding, Jeinie and co-authors found no correlation between nutritional knowledge and attitudes in urban and rural students; however, they did find significant correlations between nutrition knowledge and practices and nutrition attitudes and practices only among urban students but not rural students.<sup>6</sup> Another study by Kigaru and co-authors found that nutrition knowledge is not correlated with nutrition practices, but nutrition attitudes are associated with nutrition practices among primary school students in urban areas in Kenya.<sup>34</sup> Furthermore, another study in rural areas of China concluded that nutrition knowledge was not significantly associated with eating behaviour.<sup>36</sup>

Various studies have reported the importance of income and education on dietary intake. People with low-income and low-education levels are more likely to eat an unhealthy diet.<sup>37,38</sup> Although the income level of rural participants in the current study was significantly higher than that of urban adults, the overall income level remains low in both urban and rural areas where the communities are characterised by poverty. This may also be the reason that nutrition knowledge, attitudes and beliefs were not correlated with healthy nutrition practices. The close link between socioeconomic status and ability to consume a healthy diet highlights the importance of designing nutrition education interventions that can help low-resourced communities to translate their nutrition knowledge, attitudes and beliefs into healthy nutrition practices.

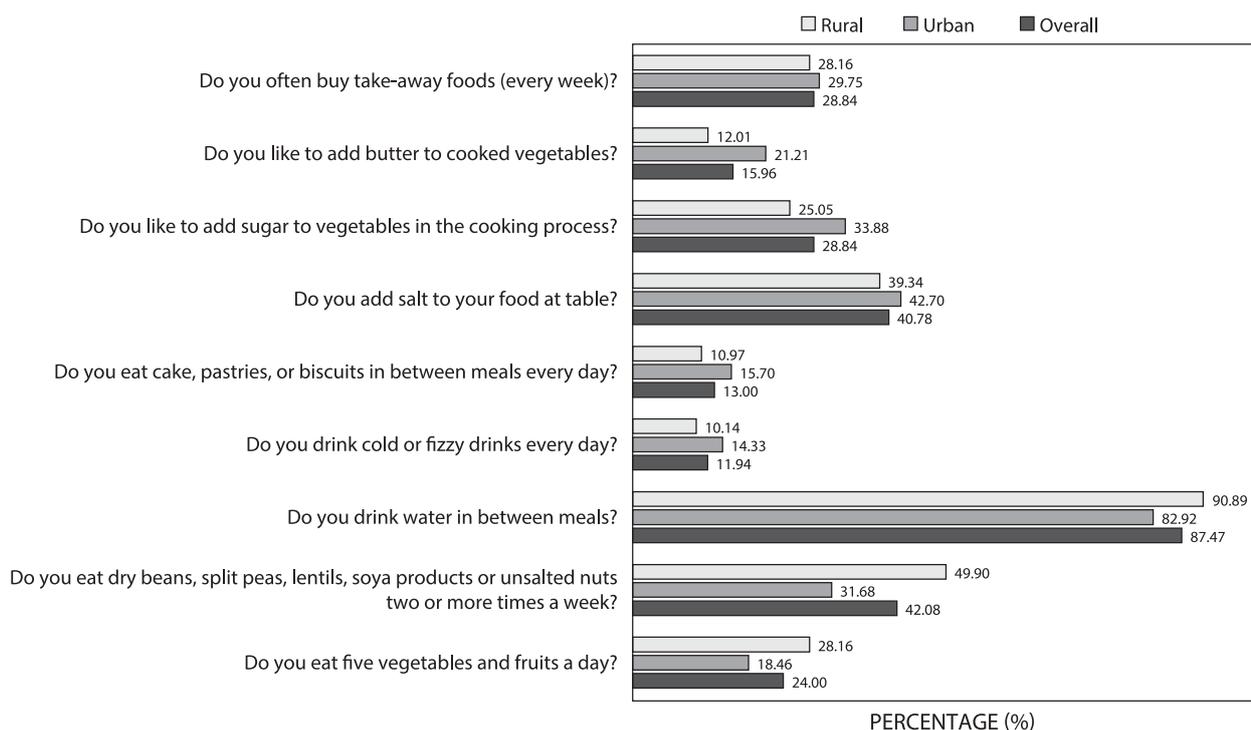


Figure 4: Responses of participants to statements representing nutrition practices.

Table 2: Correlations between nutrition knowledge, attitudes, beliefs and practices

NKABP domains	Overall	<i>p</i> -value*	Urban	<i>p</i> -value*	Rural	<i>p</i> -value*
Nutrition knowledge and attitudes	0.25	1.187e-13	0.11	0.03122	0.27	1.18e-09
Nutrition knowledge and beliefs	0.19	2.454e-08	0.15	0.003883	0.16	0.0004825
Nutrition attitudes and beliefs	0.36	< 2.2e-16	0.11	0.03502	0.38	< 2.2e-16
Nutrition knowledge and practices	0.04	0.2806	-0.04	0.4659	0.12	0.00708
Nutrition attitudes and practices	-0.00086	0.9799	0.12	0.02056	-0.01	0.7721
Nutrition beliefs and practices	0.03	0.4018	0.09	0.08459	0.01	0.8299

\**p*-value < 0.002 is significant.

Strengths of the current study include the large sample size, which included both urban and rural participants from the Free State province, and the fact that we have adjusted our analysis for multiple comparisons to control for type one error. However, we acknowledge that the results may be skewed towards women and those with low education and income levels. Furthermore, we have compiled our own cut-off points for NKABP categories, due to the lack of cut-off levels in comparison studies undertaken in South Africa.

### Conclusion and recommendation

Our findings showed that adults in rural areas have better nutrition knowledge, attitudes and beliefs than those in an urban area. Although there were significant positive correlations between nutrition knowledge, attitudes and beliefs among rural adults, these constructs were not correlated with nutrition practices among both rural and urban adults. These findings confirm that better nutrition knowledge, attitudes and beliefs do not necessarily lead to better nutrition practices. Future nutrition education interventions are required to consider the socioeconomic status of people and include behaviour change strategies to translate nutrition-related knowledge, attitudes and beliefs into practices.

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