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# Evaluation of nutrition care to adult patients on HAART attending primary healthcare facilities in Mpumalanga

JF Schiever<sup>a\*</sup>, J Visser<sup>a</sup>, M van der Merwe<sup>b</sup> and DG Nel<sup>c</sup>

<sup>a</sup>Division of Human Nutrition, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa

<sup>b</sup>Nutrition Sub-Directorate, Department of Health, Mpumalanga Provincial Government, Nelspruit, South Africa

<sup>c</sup>Centre for Statistical Consultation, University of Stellenbosch, Cape Town, South Africa

\*Corresponding author, email: [janewebster@webmail.co.za](mailto:janewebster@webmail.co.za)



**Objectives:** This study aimed to evaluate nutrition care and nursing professional knowledge received by adults on highly active antiretroviral therapy attending primary health care (PHC) facilities

**Design:** Cross-sectional, descriptive study.

**Subjects and setting:** The study was conducted on 263 adults and 75 nursing professionals, recruited from 19 facilities in the Mbombela sub-district, Mpumalanga.

**Outcome measures:** Interviewer-administered questionnaires were completed for each patient. Nursing professionals completed a self-administered questionnaire. Assessment tools were completed for each facility.

**Results:** Some 41% of patients were either overweight or obese, and most females ( $n = 87$ ; 51.8%) had a BMI  $\geq 25$  kg/m<sup>2</sup>. Based on waist circumference, 52.7% ( $n = 88$ ) of females and 8.4% ( $n = 8$ ) of males showed increased risk of cardiovascular disease. Although nurses were aware of a nutrition supplementation programme, knowledge of national nutrition guidelines was inadequate. Clinical judgement, rather than eligibility criteria, was used to identify suitable patients, with 13.3% ( $n = 35$ ) receiving supplementation whereas only 4.9% ( $n = 13$ ) qualified. Facilities generally had sufficient equipment and fair storage conditions, but stock shortages of nutrition supplements were problematic.

**Conclusions:** Whilst certain positive findings emerged, nutrition care could be improved, largely through adequate training and support to professional nurses. Training should focus on correct execution of assessment measurements and appropriate nutritional counselling, emphasising balanced eating, food security and prevention of over-nutrition. Nurses should be familiarised with national nutrition guidelines and have access to a constant nutrition supplementation supply. Improved monitoring and evaluation of nutrition care to adults on treatment at PHC facilities is needed.

**Keywords:** HAART, HIV, nutrition care, primary health care

## Introduction

Since the start of the acquired immunodeficiency syndrome (AIDS) epidemic in the early 1980s, approximately 78 million people have become infected with the human immunodeficiency virus (HIV) and an estimated 39 million lives have been lost due to AIDS-related illnesses.<sup>1</sup> Although South Africa (SA) has the highest number of persons living with HIV infection, the provision of antiretroviral therapy (ART) is rapidly expanding.<sup>2</sup> Treatment of HIV is improving and transforming the disease from a terminal illness to a manageable chronic condition.<sup>3</sup> Improved access to ART has seen the global life expectancy for people living with HIV/AIDS (PLWHA) increase from 36 years to 55 years.<sup>4</sup> Mpumalanga is the province with the second highest HIV burden in the country, as an estimated 21.8% of the population aged between 15 and 49 years are HIV-positive.<sup>5</sup> The majority of these patients access care from primary healthcare (PHC) facilities.<sup>6</sup>

The relationship between HIV and nutrition is complex, as HIV infection may result in weight loss and concomitant undernutrition, especially without ART commencement. The inability to maintain a healthy weight may be due to numerous factors, namely problems with ingestion, absorption, digestion, metabolism and nutrient use. These side effects are attributed to either the HIV infection itself, or the unwanted side effects of ART.<sup>7</sup> These nutritional-related side effects and drug–nutrient interactions can negatively influence nutritional status, resulting in various gastrointestinal, central nervous system and dermatological symptoms. Antiretroviral therapy is also often associated with

longer-term complications, such as lipodystrophy development, metabolic abnormalities and over-nutrition. In SA, in this new ART era, it would therefore appear that both under- and over-nutrition in HIV-positive individuals potentially pose a significant problem.

Nutrition care is multifactorial and a comprehensive evaluation of these interrelated factors is required. The Framework for Implementing Nutrition Interventions for People Living with TB, HIV and AIDS (South African Department of Health [DoH]) describes the nutrition care process in detail and considers it an important part of the ‘package of care’ to HIV-positive adults.<sup>6</sup> Key components include adequate nutritional screening and assessment, nutrition education, targeted nutritional supplements, supplementary/replacement and therapeutic feeding and home/community nutrition support through mechanisms such as home/community care and non-governmental organisations.<sup>6</sup>

Studies investigating a combination of key factors, including the implementation of nutrition care to patients on ART, nursing professionals’ knowledge, and the current nutritional status of ART-receiving adults at clinics in this area, are, to the authors’ knowledge, lacking. An investigation into the current implementation of nutrition care and the nutritional supplementation programme is crucial as such data will provide useful information to improve the nutritional status, health and well-being of South African HIV-infected adults on lifelong highly active antiretroviral therapy (HAART) in the future. This study therefore aimed to evaluate the nutrition care received by adult

HAART patients attending PHC facilities in the Mbombela sub-district of Mpumalanga province, encompassing the objectives of current nutritional status, nutrition care knowledge and implementation thereof.

## Methods

### Study population

This cross-sectional, descriptive study included both adult HAART patients and nurses employed at 19 selected PHC facilities in the Mbombela sub-district, in Ehlanzeni district, Mpumalanga. All facilities in the northern part of Mbombela were included in the study.<sup>8</sup>

Non-random sampling was utilised to select the sample of adult HAART patients, with the number of patients selected proportional to the number of patients on HAART at a particular PHC facility. Patients were included if they were older than 18 years, HIV-positive and currently receiving HAART (regardless of length of time on treatment), competent to give informed consent, understood either English or siSwati and present at the facility at the time of data collection. Patients who were pregnant at the time of data collection were excluded.

All nursing professionals employed at the selected PHC facility, and present during the data collection period, were included in the study after giving their written informed consent. Nursing professionals were included regardless of professional categories, age or home language. Two nutritionists employed at two of the PHC facilities were excluded from this study.

A representative sample size for each of the 19 clinics was calculated according to provincial DoH statistics on the number of adults receiving ART per clinic. The error percentage (Cp) selected was 6, giving a total sample size of 263 patients. A total of 75 nurses were eligible and willing to take part in the study.

### Data collection

The researcher was assisted during data collection by a registered nutritionist who was comprehensively trained in the project logistics. As both the researcher and assistant knew the facilities included, a reasonable strategy was employed whereby the nutritional assessment of the patient was performed, followed by the assessment tool for PHC facilities and the self-administered questionnaires (nurses), during quieter periods.

### Nutrition status assessment (patients)

The assessment consisted of five sections, namely (A) socio-demographic information; (B) clinical signs and symptoms, dietary information and nutrition care received at the facility; (C) medical information from the patient's file (length of time on ART, current HAART regimen, co-morbidities and recent weight changes); (D) adequacy of note taking in patient file by nursing staff; and (E) anthropometrical measurements (height, weight, mid-upper arm circumference [MUAC] and waist circumference [WC]). These measurements were in line with those included in the nutrition supplementation programme guidelines (NNSPG). The trained research assistant conducted all the interview-administered questionnaires in a standardised manner, and was able to communicate in both siSwati and English.

Measurements were taken using standardised procedures and techniques, using the same equipment and units of measurement for each participant.<sup>9,10</sup> The weight (electronic scale: D-QUIP Personal Electronic Scale, Beijing, China) and height (stadiometer:

HS, Scales 2000, Manaba, South Africa) of each patient was measured. The scale was calibrated and checked with a known weight (5 kg) on a daily basis before any study patients were weighed.<sup>9,10</sup> BMI was calculated as weight divided by height squared ( $\text{kg}/\text{m}^2$ ), and participants were classified according to the World Health Organization (WHO) classification of BMI.<sup>11</sup> Mid-upper arm circumference (MUAC) was measured using an adult MUAC tape and classifications used in accordance with the National Nutrition Supplementation Programme Guidelines (NNSPG) to identify at-risk and malnourished adults.<sup>12</sup> Waist circumference was measured using a non-stretchable tape measure and participants were classified according to the WHO cut-off points.<sup>13</sup>

### Self-administered questionnaire

A self-administered questionnaire was used to assess the knowledge of nursing professionals. This questionnaire was developed in English, as the training and working environment of these professionals resulted in proficiency in the language. Questions were based in part on 'The South African Supplementary Feeding Guidelines for At-Risk and Malnourished Children and Adults'<sup>12</sup> and included both open- and closed-ended questions. The questionnaire had a total of 34 questions divided into four sections, namely biographical information; additional nutrition training, background clinic information and perceptions of a healthy weight for patients; knowledge and confidence in using MUAC and BMI; and lastly knowledge of nutrition supplementation. Professional nurses completed the questionnaire in either an individual or group setting. When a group setting was utilised, the researcher/research assistant was present, and no communication between nurses was permitted. In some cases, when professional nurses were busy and unable to complete the questionnaire immediately, the signed consent form was completed but the questionnaire was left at the facility for completion and was collected at a later date.

### Assessment of PHC facility

This tool was designed by the researcher and aimed to assess the adequacy of the following: anthropometric equipment/material, food commodities, and relevant documentation/policies/materials and tools. It consisted of approximately 30 questions (yes/no and multiple choice) and was completed by the researcher and research assistant.

### Pilot study

To ensure content validity, two external experts assessed both questionnaires (patients' and nurses'), as well as the PHC facility assessment tool. A pilot study (to assess face validity and relevant procedures) was conducted at Zwelisha, a similar PHC facility in close proximity to those included in the main study, two weeks before the commencement of the study. All tools for data collection were included in the pilot study. Necessary changes were made to the tools based on feedback from the pilot study. Data obtained from the pilot study were not included in the main study.

### Ethics considerations

Ethics approval was obtained from the Health Research Ethics Committee (HREC) of the Faculty of Medicine and Health Sciences, University of Stellenbosch (ethics approval number: S14/04/076). The study was furthermore approved by the Mpumalanga Provincial Health Research Committee. Participation was voluntary and all participants were required to give written informed consent (in their language of choice) prior to data collection. The privacy of patients was ensured by making use of a private data-collection area, as well as using an anonymous approach.

### Data analysis

Data were captured using Microsoft Excel® version 2013 (Microsoft Corp, Redmond, WA, USA) and analysed using STATISTICA version 12 (www.statsoft.com, 2014). Summary statistics were used to describe data. Results were expressed as mean  $\pm$  standard deviation. Descriptive statistics were used to describe the knowledge and implementation of nutrition care (assessment and intervention, including supplementation), as well as the nutritional status of HAART-receiving patients. The relationships between gender and weight, gender and BMI, gender and waist circumference and CVD risk were assessed using ANOVA. A *p*-value of  $< 0.05$  represented statistical significance and 95% confidence intervals were used to describe the estimation of unknown parameters.

### Results

A representative sample of 263 adult patients on HAART and 75 nursing professionals from the 19 PHC facilities in Mbombela, Mpumalanga were included in the study. Data collection occurred over a period of 11 weeks in 2014. Demographic details of the study population are shown in Table 1.

#### Nutrition status assessment (patients)

The majority of participants ( $n = 165$ ; 62.7%) had an education level of Grade 10 and lower, and only 3% ( $n = 9$ ) had a tertiary education (a diploma/degree). Some 43% of participants were unemployed and seeking work ( $n = 112$ ) and just over half of the participants ( $n = 135$ ; 51.3%), were receiving a social grant. The majority of participants earned a monthly household income of between R501 and R3000 ( $n = 186$ ; 70.7%) whilst 11% ( $n = 29$ ) reported their monthly household income to be 'none'. Household food security was assessed simply by asking participants, 'Does everyone in your household always have enough safe and healthy food to eat?'. Slightly more than half of the patients ( $n = 144$ ; 54.8%) reported being food secure.

The majority ( $n = 176$ ; 67.2%) of the 262 participants were taking a fixed-dose combination (FDC) ART (tenofovir + emtricitabine + efavirenz). The length of time on HAART ( $n = 258$ ) ranged from 5 months to 9 years and 5 months (113 months), with an average of 2 years and 4 months (28 months) (SD 20.20). The majority of participants ( $n = 118$ ; 71.5%) did not have any diagnosed comorbidities, such as active tuberculosis (TB), hypertension, diabetes mellitus (DM) or asthma.

The majority of participants reported eating fruits ( $n = 152$ ; 57.8%) and vegetables ( $n = 190$ ; 72.2%) 2–3 times a week. Most patients reported having received nutrition counselling from the clinic ( $n = 161$ ; 61.9%). The most common themes that emerged during counselling were increasing fruit and vegetables ( $n = 145$ ), decreasing fat ( $n = 40$ ), decreasing salt, and avoiding alcohol (Figure 1). Other responses included more vague answers such as 'to eat healthily'.

**Table 1:** Demographic data of study population

Participants	Females (n; %)	Males (n; %)	Age (mean; SD)
Patients	168 (64%)	95 (36%)	40.2 years (SD 11.62)
Nurses	57 (76%)	18 (24%)	39.6 years (SD 8.9)

Patients were asked to give suggestions for improving the nutrition care and service rendered at the PHC facility. Responses ranged from 'giving more nutrition education/information/nutrition classes' ( $n = 101$ ; 62.3%) as the most common suggestion, to 'issuing of more nutrition supplements/food parcels/healthy food or a 'special grant' ( $n = 36$ ; 22.2%) and 'improving on community nutrition projects such as food gardens' ( $n = 13$ ; 8.0%).

The patients' weight at their last visit was documented in the file for the majority of participants ( $n = 186$ ; 70.7%). Height ( $n = 16$ ; 6.1%) and BMI ( $n = 12$ ; 4.6%) were rarely recorded in the patient file by nursing staff. A total of 41% of patients ( $n = 109$ ) were overweight or obese (BMI  $\geq 25$ ). Female participants generally weighed more than males (females: mean weight of 66.96 kg, SD 15.52; males: mean weight 63.7 kg, SD 9.92). Females also had a significantly higher mean BMI (26.2 kg/m<sup>2</sup>, SD  $\pm 5.71$ ) than males (22.8 kg/m<sup>2</sup>, SD  $\pm 3.32$ ) ( $p < 0.05$ ). Based on waist circumference, 53.3% ( $n = 88$ ) of females and 8% ( $n = 8$ ) of males were at increased risk of cardiovascular disease (CVD) (Figure 2). According to MUAC measurements, only 22 participants (8%) were moderately malnourished, and no participants were found to be severely malnourished.

#### Self-administered questionnaire (nursing professionals)

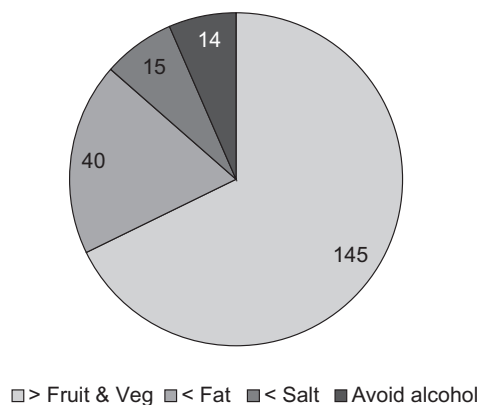
The majority of nurses were professional nurses ( $n = 56$ ; 74.7%) and had a college diploma/degree ( $n = 51$ ; 70%). Most nurses ( $n = 40$ ; 53%) consulted adult patients on ART 'every day' or 'a few times a week'.

Just over a third of participants calculated BMI correctly from a given weight and height ( $n = 29$ ; 38.7%), while 23 participants (30.7%) reported that although they knew how to calculate BMI they could not, because they did not have a calculator or BMI chart/wheel available. Forty-six participants (62.2%) reported having used an adult MUAC tape before; however, fewer than half ( $n = 36$ ; 48.6%) felt confident using it.

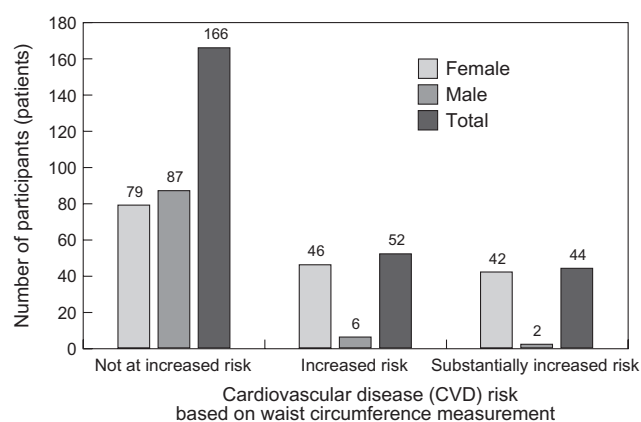
Although nurses were aware of a nutrition supplementation programme (NSP) ( $n = 54$ ; 74%), knowledge of the NNSPG was inadequate. This inadequacy largely resulted from insufficient knowledge on available stock, entry and exit criteria, aim of the NSP, and discrepancies relating to recording of patients' information and the type and quantity of available supplements. Clinical judgement, rather than eligibility criteria, was used to identify patients qualifying for supplementation, with 13.3% ( $n = 35$ ) of patients receiving nutrition supplementation, whilst only 4.9% ( $n = 13$ ) qualified (Figure 3). Nutrition supplementation practices therefore differed from the NNSPG recommendations.

Most nursing participants ( $n = 44$ ; 58.7%) reported that healthy eating counselling is provided to only some patients, with this advice mostly based on 'general knowledge' ( $n = 49$ ; 66.2%). The majority ( $n = 68$ ; 90.7%) felt confident giving nutrition counselling to HIV-positive adult patients, and all participants reiterated the importance of informing patients with regard to eating a healthy diet when receiving nutrition supplementation.

Suggestions given on how to improve the nutrition care received by patients at the PHC facility are summarised in Table 2. Some nursing participants marked more than one suggestion.



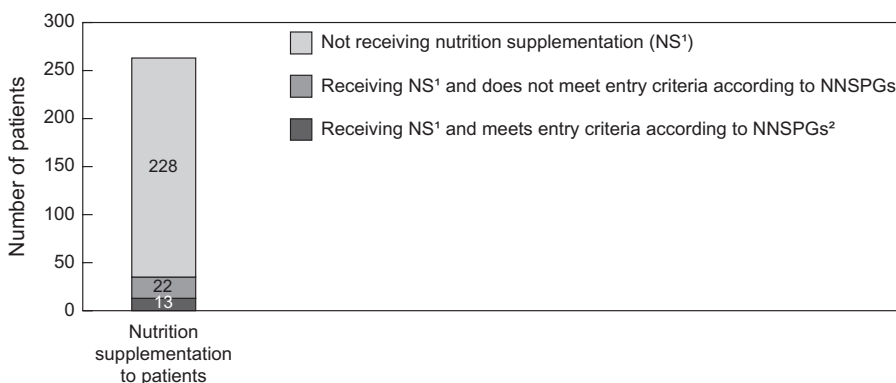
**Figure 1:** Most commonly received information from nutrition counselling.



**Figure 2:** CVD risk based on waist circumference measurements.

**Assessment of PHC facility**

PHC facilities generally had sufficient equipment available and storage conditions were fair, but stock shortages of nutrition supplements posed a major problem. The majority of PHC facilities had a nutrition supplementation register ( $n = 14$ ; 73.7%), but other nutrition-based resources (such as the South African Food Based Dietary Guidelines [SAFBDGs]), counselling cards and educational pamphlets/posters) were not readily available. Most patients (76%) and nursing professionals (69%) rated the nutrition care received/provided as ‘good’ or ‘excellent’.



1 NS: nutrition supplementation  
 2 NNSPG: national nutrition supplementation programme guidelines (entry criteria to receive NS: BMI<18.5)

**Figure 3:** Comparison of nutrition supplementation practices to national guidelines.

**Discussion**

This study investigated the nutrition care received by adult patients on HAART attending PHC facilities in Mbombela sub-district, Mpumalanga, with the intention of providing baseline information to improve the nutritional status, health and well-being of South African HIV-infected adults on lifelong HAART. The main findings of this study were that a large percentage of patients (particularly female patients) are overweight or obese, potentially negatively affecting health and increasing the risk of non-communicable diseases (NCDs) in this population.

Although the nursing staff were generally aware of the NNSPG, knowledge of specific supplementation criteria appeared to be insufficient, which resulted in poor compliance in the implementation of the nutrition programme. Contributing factors appeared to be poor calculation of BMI, reliance on ‘clinical judgement’, inconsistent supply of nutrition supplementation stock, and lack of guideline documentation. More patients were receiving nutrition supplementation than those who were eligible according to the guidelines. Nursing professionals expressed confidence in nutrition-related topics, but this did not match their actual knowledge. Nevertheless, the majority of patients and professional nurses rated the nutrition care received/provided as ‘good’ or ‘excellent’.

In this study, severe acute malnutrition was found to be uncommon, with only one participant presenting with a BMI < 16. From the mid-upper arm circumference (MUAC) measurements taken, no participants were classified as severely malnourished. A possible explanation for the low prevalence of severe acute malnutrition may be that this study focused on clinically stable, HAART patients, compliant with treatment and attending a PHC facility for chronic care. The picture might have been different if investigating alternative patient groups, such as those hospitalised, not willing to start or defaulting on ART or other at-risk groups such as substance abusers, migrant or sex workers and refugees.<sup>14</sup> Understandably, pre-2004 and in the early stages of the South African ART rollout, a greater prevalence of under-nutrition among South African HIV-positive individuals existed.

It was of concern that a combined total of more than 40% of adults on HAART were found to be overweight or obese in this study, although this concurred with similar studies that found 58%<sup>15</sup> and 67%<sup>16</sup> of South African adults on HAART to be overweight or obese. Furthermore, the South African National

**Table 2:** Suggestions to improve nutrition care

Response	Number of participants (n)
Improve training, on the nutrition care to adult patients with HIV, for nursing staff	48
Create posts at PHC facilities for a nutrition expert (dietitian/nutritionist)	30
Purchase more equipment (such as scales)	22
Employ more nursing professionals at PHC facilities	20
Have sufficient stock of nutrition supplements	1

Health and Nutrition Examination Survey (SANHANES-1) study<sup>17</sup> and South Africa Demographic and Health Survey 2016 key indicator reports have both reported a high prevalence of overweight and obesity in the general South African population. Although weight loss and underweight are independently associated with increased risk of disability and death,<sup>18</sup> this study suggests that many patients, especially females, who are clinically stable and on lifelong HAART, are at greater risk of overweight and obesity than severe malnutrition. This is consistent with other studies that found obesity to be more prevalent than wasting in patients on lifelong HAART<sup>16,19,20</sup> and non-white females to be at greater risk.<sup>19,20</sup> Previous South African studies<sup>15,16</sup> have reported weight gain following the initiation of ART, particularly in African females, and possible reasons proposed for this include the stigma of weight loss, thinness being associated with HIV and/or TB infection and poor health, cultural norms regarding what is considered to be ideal body size, and the belief that 'bigger is better'.<sup>15,21</sup> This perception is also consistent with other studies,<sup>15</sup> where the desire has been reported for HIV-positive individuals to achieve and maintain what is considered to be a 'healthy' overweight body size.

Findings relating to an increased risk of metabolic complications and CVD, based on waist circumference ( $\geq 102$  cm for men and  $\geq 88$  cm for women), were comparable between this study and the SANHANES-1 report, with 52.7% vs. 51.1% females and 8.4% vs. 8.0% males found to be at an increased risk of metabolic complications and CVD in this study and SANHANES-1<sup>17</sup> respectively. Owing to effective HAART, persons living with HIV are living longer and are at a greater risk of developing an array of non-communicable diseases (NCDs), including CVD, DM, chronic lung disease and some types of cancers.<sup>22</sup> The effective integration of interventions such as nutrition assessment, dietary counselling and support, healthy lifestyle promotion, monitoring of blood pressure, blood glucose and, where available, cholesterol, as part of HIV care, can provide opportunities for reducing the risks of NCDs among people living with HIV.<sup>22</sup>

It appeared that high levels of unemployment (43%) and food insecurity (45%), often found in HIV-affected communities,<sup>23,24</sup> might exist in this study population, although food security was not examined in detail. The seemingly high levels of unemployment and food insecurity were not unexpected, since the vicious, intertwined cycle between food insecurity and HIV/AIDS<sup>25</sup> is well known. According to the International Labour Organization,<sup>26</sup> SA has had a consistently, exceptionally high level of unemployment of approximately 25% since 2010. Furthermore, income is low and is used to support unemployed family members, so a considerable percentage of household

income is spent on food. Similarly, SANHANES-1<sup>17</sup> reported high levels of food insecurity in the South African population and found 60.7% of African households were food insecure. These high levels of unemployment and food insecurity may complicate nutrition supplementation since the wording from the NNSPG that 'supplementary feeding becomes necessary whenever individuals cannot meet or are deficient in terms of micronutrients and energy requirements'<sup>12</sup> may be interpreted by some nursing professionals to include the many patients who do not always have sufficient food.

The majority of patients consumed fruits and vegetables two to three times a week. Dietary intake of fruit and vegetables, although less than the recommended intake by the WHO<sup>27</sup> of five portions of fruit and vegetables a day, are not dissimilar from habitual intakes found among the general South African population of African ethnicity.<sup>17</sup> The SA DoH advocates for an increased consumption of fruit and vegetables through the food-based dietary guideline: 'Eat plenty of vegetables and fruit every day.' However, achieving this goal appears to be challenging.<sup>28</sup> When there is household food insecurity, the likelihood of being able to purchase multiple servings of fruit or vegetables every day is poor, although encouraging value-for-money, nutritious balanced meals and including fruits and vegetables as regularly as possible are important components of medical nutrition therapy in the context of HIV and should continue to be encouraged.<sup>7</sup>

An important finding of this study was that the majority of the patients ( $n = 101$ ; 62.3%) expressed a need for more nutrition education, while fewer wanted nutrition supplementation. In fact, the majority of patients believe that by giving more nutrition information, the quality of nutrition care could be improved. This is encouraging and provides nursing staff and other health workers with insights regarding health promotion and/or healthy eating activities and related educational priorities. Patients appear to have a keen interest in nutrition and a readiness to learn more about the role of nutrition in health, and deserve high-quality, relevant nutrition counselling.

Weighing, nutritional supplementation and nutrition counselling are nutrition services most frequently offered at PHC facilities. According to nursing professionals, height, BMI and MUAC measurements are not frequently performed. This information mirrored actual findings from patients' files, where over 93% of patients had never had their height taken and recorded in their files, despite all except three of the PHC facilities having a stadiometer available. The taking of height measurements is problematic and appears to be a common problem at almost all PHC facilities. The lack of correct calculation and recording of BMI is also of concern. Owing to insufficient height measurements, fewer than 5% of participants had a BMI documented in their file, and approximately half of these were incorrectly calculated. This poor understanding of BMI is also evident from the nurses' questionnaire, as only just over a third of participants could correctly calculate the BMI from a given weight and height. The BMI charts available at PHC facilities at the time of the study may have contributed to errors in BMI calculation. For the latter, the charts had height in inches and weight in pounds as the main axes (height in centimetres and weight in kilograms were also included, but in a much smaller font that was often missed), and colours for the different weight categories (obese, overweight, normal, and underweight) are not consistent.

Awareness of an NSP was good, although nurses were generally unaware of the NNSPG.<sup>12</sup> Lack of awareness of the guidelines is understandable, as the guidelines have not yet been formally introduced. This provides evidence that although the SA DoH expects the NNSPG to be followed, nutrition supplementation was not implemented in a standardised manner, but rather through nursing professionals using their own initiative and 'clinical judgement'. Most nurses were unable to correctly identify the entry or exit criteria, or the aim of the programme, highlighting the need for increased awareness of the programme details. Formal training on the guidelines needs to be conducted so that nursing staff are familiar with the NNSPG and the SA DoH goal of having patients enter and exit the nutrition supplementation programme in an objective, standardised manner, regardless of which PHC facility they attended.

One of the study's key findings was that more patients were receiving nutrition supplements (13.3%) than met the entry criteria (4.9%), that is, having a BMI < 18.5 according to the NNSPG. Of this sub-group that received supplementation (13.3%), four of the individuals had a BMI > 25, whilst only three participants actually qualified for supplementation with a BMI of < 18.5. This equates to some individuals who qualified for supplementation not receiving this additional support, whilst other ineligible participants did. There is often a perception that being overweight is 'healthy' for HIV-positive individuals, combined with a belief that nutrition supplements are better than food. This may increase the likelihood of patients who do meet entry criteria receiving supplementation. Additional contributors to over-issuing of nutrition supplements in a minority of cases may possibly be a perception that those who cannot afford food should be provided with nutrition supplements (more as a food aid).

Although 90% of nurses felt confident in giving nutrition counselling to HIV-positive adults on HAART, a concerning study finding was that the nurses indicated that their counselling is based on general knowledge, rather than recognised guidelines. Improved training on nutrition care of adult patients with HIV for nursing staff is considered by the majority of nursing professionals to be the best way the quality of nutrition care could be improved, and provides a key opportunity for action. These findings were similar to those of the Landscape Analysis,<sup>29</sup> where 30.7% of health workers indicated the need for nutrition and HIV-related training.

A concerning study finding was the inconsistent supply of nutritional supplements. Results from the nurses' questionnaire showed that stock availability dictated for 19% of nurses the quantity, and for 59% the type of nutritional supplements issued. At the time of the PHC facility assessment, stock availability was minimal or non-existent at most facilities and some of the nutrition supplements available at facilities had expired. A recent study<sup>30</sup> evaluating certain aspects of the nutrition therapeutic programme offered to HIV-positive women in the Western Cape reported similar problems with stock shortages, and 21.9% of health workers interviewed during the Landscape Analysis<sup>29</sup> complained of nutritional supplementation stock shortages for children. Shortages in supplementation stock pose a major barrier to implementing the NSP effectively. Improved channels of communication between PHC facilities requiring nutritional supplements and the district office ordering and delivering the supplements is required to maintain a constant supply.

It was encouraging that the majority of patients and nursing professionals rated the nutrition care received/provided at the facility as 'good' or 'excellent'. This was a positive finding and, although this can be considered a satisfactory outcome, a more extensive look into other aspects relating to nutrition care shows there is room for improvement. In agreement with findings from the Landscape Analysis,<sup>29</sup> the main suggestions for improving nutrition care to patients are employing more nutrition experts at PHC facility level and improved nutrition training of healthcare staff.

Limitations of the study include the non-random sampling strategy and the greater number of female patients who participated in the study. Employed participants (patients) were less likely to participate due to time constraints, which could also have influenced the results. Co-morbidities were assessed on the basis of a prior diagnosis or current medication use, which could perhaps have overlooked individuals who were not yet formally diagnosed.

Recommendations for current practice include developing a core package on nutrition interventions for PLWHA, improving coordination of various programmes aimed at improving nutrition care, maintaining an uninterrupted supply of supplementation stock and standard nutritional supplementation guidelines, and improving documentation relating to the NSP. We strongly recommend the employment of nutrition professionals at PHC facility level, and improved nutrition training of healthcare staff, as was recommended in the Landscape Analysis study.<sup>29</sup> Although training of staff is challenging, given staff shortages and financial implications it would be prudent to incorporate continuous training, which could include in-service/on-the-job training, as well as mentoring and support by nutritional professionals. It is also advisable that overweight and obese HAART patients, especially females, be identified at an early stage. Although not all facilities currently have computer access, the province is working towards implementation of E-health and electronic files at PHC level. In situations where computers are available, it may be prudent to add a BMI calculator in Microsoft Excel®, which would be programmed to auto-calculate functionality and WHO classification, and auto-calculate both under- and overweight, and a healthy body weight range. The age-specific BMI wheels are currently used as the 'official' tool for BMI calculation and interpretation.

Recommendations for future research include evaluating the efficacy of various nutrition-based interventions for adults on HAART, as well as interventions to reduce overweight/obesity and strengthen food security in this population. It is important that these standardised nutrition supplementation guidelines are correctly implemented and, if need be, a provincial audit should be conducted to distinguish between the need for food security support due to limited resources versus nutritional supplementation for HIV-related malnutrition. Furthermore, the design of an innovative nutrition training package for nursing professionals and assessing the role of micronutrient supplementation in HAART patients may also be prudent.

## Conclusion

Findings from this study indicate that although certain aspects of nutrition care provided to adult patients on HAART attending PHC facilities were good, there was room for improvement. Care could be improved through training of and support to

professional nurses, focusing particularly on BMI and nutrition counselling to encourage the consumption of appropriate portions of balanced meals and promote household food security. Counselling should be guided by recognised guidelines and should focus on preventing over-nutrition and associated co-morbidities. Nurses should be familiarised with the NNSPG through formal training and have a constant nutrition supplement supply.

The Mpumalanga Department of Health has, in part based on the findings of this study, implemented a provincial nutrition supplementation protocol and supplementation register, encompassing a comprehensive approach through nutrition screening, assessment, counselling and support of individuals. Nutrition supplementation is targeted at undernourished individuals and not based on medical conditions (such as HIV status); although the past practice of providing supplements to perceived 'needy' and 'poor' individuals is difficult to overcome. Individuals affected by food insecurity and hunger, in the absence of under-nutrition, should be excluded from the criteria for nutritional supplementation, but be referred to appropriate social support services, in addition to health structures such as the ward-based outreach teams. Individuals affected by food insecurity and hunger – in the absence of undernutrition – are therefore excluded from the criteria for supplementation, but referred to appropriate social support structures such as the Departments of Home Affairs and Social Development and the South African Social Security Agency. The linkages between different stakeholders therefore require further strengthening. The monitoring and evaluation of nutrition care to individuals, including adult HAART patients, also need to be strengthened.

## Abbreviations

AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
BMI	Body mass index
CVD	Cardiovascular disease
DM	Diabetes mellitus
DoH	Department of Health
FDC	Fixed dose combination [tenofovir + emtricitabine + efavirenz (TDF + FTC + EFV) (Atripla or equivalent)]
HAART	Highly active antiretroviral therapy
HIV	Human immunodeficiency virus
HREC	Health Research Ethics Committee
MS	Microsoft
MUAC	Mid-upper arm circumference
NCD	Non-communicable disease
NNSPG	National Nutrition Supplementation Programme Guidelines
NSP	Nutrition supplementation programme
PHC	Primary health care (facility) (Also referred to as 'clinic')
PLWHA	People living with HIV/AIDS
SA	South Africa

SAFBGDs	South African food-based dietary guidelines
SANHANES-1	South African National Health and Nutrition Examination Survey
SD	Standard deviation
TB	Tuberculosis
WHO	World Health Organization

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## ORCID

J Visser  <http://orcid.org/0000-0002-4844-9275>

DG Nel  <http://orcid.org/0000-0003-0998-3405>

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