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ORIGINAL PAPER

# Socio-demographic, exercise, and anthropometric profiles of adults participating in fitness exercise programs in Vhembe district, Limpopo province, South Africa

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## Abstract

**Introduction** Adults in Vhembe district participate in fitness exercise programs for optimal health. However, the nutritional profiles of these participants remain unknown.

**Aim:** To assess the socio-demography, calculate BMI and measure WC of adults participating in fitness exercise programs around Vhembe district, Limpopo Province.

**Method**: A cross–sectional study design was conducted to assess socio-demographic and anthropometric profiles of 112 adults participating in fitness exercise programs around Vhembe district, Limpopo Province. Ethical clearance was obtained from TREC and written consent by the participants. Socio-demographic profile included, for example, age, education status, duration and frequency of training. Anthropometry included weight and height to calculate BMI, and waist circumference. Data were analyzed using SPSS (v29). The Chi-square test, with a p-value of <0.05, was used to determine the association among variables.

**Results:** Males were aged 36.3±9.3 and females 32.1±8.7 years; training three times per week for two hours in aerobics and bodybuilding programs. Most participants had bachelor's degrees (males, 35.5%; females, 29.8%) and diplomas (males, 32.3%; females, 27.7%). Unemployment was higher (57.4%) among females compared to males (38.5%). Aerobic participants were overweight (males, 27.8±4.7; females 28.8±4.8 kg/m²) whereas those in bodybuilding were obese (31.0±16.9, males and 37.5±0.0 kg/m², females). Participants in both programs had optimal waist circumferences (<102 cm, males and <88 cm, females). Anthropometry was associated (p<0.05) to demography among the aerobic exercise participants.

**Conclusion**: Participants trained once per day, three times a week for two hours. The majority had higher education qualifications, however, unemployed. Participants were overweight with acceptable waist circumference values

**Keywords:** demography, anthropometry, exercise, aerobics, bodybuilding

## Introduction

Anthropometry is one of the other parameters used to determine the nutritional status of an individual[1]. The technique involves a methodical measurement of the body's physical attributes and provides crucial details about body size, health, and shape[2,3] crucial as diagnostic standards for obesity[4]. Physical activity in the form of exercise improves anthropometric components such as weight and

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body composition[5,6,7], reduces body fat, serum lipids, maintains blood pressure and glucose within acceptable standards, and maintains nutritional status[8]. Sociodemographic profile, on the other hand, is viewed as another aspect having an impact on health outcomes and life expectancy[9]. Some of these medical and socio demographic aspects are recorded as major population health concerns in Limpopo province[10]. Residences of this province are urged to participate in Fitness Exercise Programs (FEP) possibly to maintain optimal health status including anthropometry. Currently, the demographic and exercise profiles of these residences are reported in the Limpopo Socioeconomic Review and Outlook (SRO) (2018/2019) and South Africa's Disease Burden of Physical Inactivity[10,11] reports respectively.

According to SRO report, Vhembe is the third highest district in Limpopo province with unemployment rate and second highest (52%) below poverty lines[10]. Additionally, the life expectancy between males and females was projected to increase from 56.4 and 62.8 to 58.6 and 65 years between 2016 and 2021 respectively. On the other hand, report by Patricios and Saggers[11] showed that males from the rural provinces such as Mpumalanga and Limpopo participated in physical activity programs and were more physically fit compared to females. It is possible that a portion of these physically fit men reported from Limpopo province by the latter researchers could be emanating from the Vhembe district. However, precisely the developments around the sociodemographic, anthropometric and exercise profiles of adult population in Limpopo province, particularly Vhembe district, remain unknown. In this district, several adults were observed participating in FEP for recreational purposes[12] with lack or absence of guidance from sport and health practitioners.

The researchers, therefore, aimed at investigating these parameters (demographic, exercise, BMI and WC profiles) to highlight the importance of maintaining optimal health while engaging in exercise. Findings may, therefore, serve as baseline record upon which guidance or interventions towards exercise and optimal health standards are constructed. At the national level, the current research contributes towards achieving the prevention or reduction of non-communicable diseases (diabetes mellitus and cardiovascular diseases) and improving mental health. The latter, therefore, contribute to the achieving sustainable development goal number three "Achieving good health and well-being" with a specific focus on subgoal three point four (3.4) "Reduce mortality from non-communicable disease and promote mental health". Health practitioners, researchers and the community at large might find the content of this research quite interesting.

*Exercise recommendations*

Exercise is a systematic process of preparing for a certain physical goal[13]. Benefits related to exercise include increased strength, build self-esteem and increases athletic performance[14], loss of body fat, improved mood, and decreased risk of chronic diseases such as diabetes mellitus and heart diseases[15]. For the non-athletic population, a minimum of 150–300 minutes per week of moderate aerobic exercise or 75–150 minutes per week of intense aerobic exercise or a combination of both is regarded sufficient[16]. Additionally, the American College of Sports Medicine[17] advises individuals to participate 2 – 3 times a week in exercise programs. On the other hand, guidelines by the World Health Organization (WHO)[18] on physical activity and sedentary behavior encourages physical activity for 150 – 300 minutes throughout the week. For non-athletic adult South Africans, exercise guidelines used are included within the South African Food Based Dietary guideline, as "Be active"[19,20]. These guidelines were created for recreational purposes. There remain, therefore, a need for participants to develop appropriate exercise schedules that are contextualized or personalized using sport nutrition practitioners or coaches.

## Methods

Researchers undertook a cross–sectional study design to assess the anthropometric status of 112 adults engaging in FEP in gymnasiums (gyms) around Vhembe district, Limpopo province. Four

main gyms available in the district were used to recruit participants in aerobic fitness dance and fitness bodybuilding programs.

During the recruitment, participants were provided with information sheet explaining the aim, objectives and entire data collection method two weeks before data collection. Ethical clearance was obtained from the Turfloop Research Ethics Committee (TREC/346/2022: PG) while consent to participate was obtained in a written form by the participants.

The socio-demographic profile of the participants included, for example, age, gender, education level and employment status while the exercise profile covered type of exercise program, and the frequency of training. Measurements of anthropometric variables included the weight and height to calculate body mass index (BMI), and waist circumference (WC). Standards stipulated by Lee & Nieman[21] were followed during the measurements of anthropometric variables. The BMI was then calculated by dividing the weight in kilograms by the height in meters square. The WHO[22] BMI and WC classifications were used to interpret the results.

The anthropometric data were loaded on to the Statistical Package for Social Sciences (SPSS) program (version 28) for analysis. Descriptive statistics (percentages, mean and standard deviation [±SD]) were used to report the findings. Chi-square test was used to determine the association tests between the demography, exercise and anthropometric profiles. A probability value ($P$) of $\leq 0.05$ was a criterion on which variables were considered significant.

## Results

The characteristics of participants as summarized in **Table 1** show that males (58%, n=65) dominated over females (42%, n=47) with the majority classified as young adults (36.1±8.7, males & 31.6±10.8 yrs.). Most males had bachelor's degree (35.4%, n=23) and diplomas (32.3%, n=21) compared to females. About 20% (n=13) and 29% (n=14) of males and females had grade 12 qualification respectively. Only a few males (9.2%, n=6) and females (6.4%, n=3) studied up to grade 10 qualification. However, most males were employed (n=25; 38.5%) compared to most females who were unemployed (n=27; 57.4%) and employed (n=14; 29.8%). Of those employed males and females, a few (n=18; 27.7% and n=6; 12.8%) were self-employed.

**Table 1.** Characteristics of participants

| **Gender** | **Exercise program** | **N (112)** | **Age (M±SD)** |
|---|---|---|---|
| Males | Aerobic dance | 52 (46%) | 37.5±13.7 |
| Females | Aerobics dance | 46 (41%) | 32.3±10.8 |
| Male | Fitness Bodybuilders | 13(12%) | 34.7±3.8 |
| Females | Fitness Bodybuilders | 1(1.0%) | 31.0±0.0 |
| **Gender** | **Education level** | **N (112)** | **Percentage (%)** |
| Males | High school | 6 | 9.2 |
| | Matric | 13 | 20.0 |
| | Diploma | 21 | 32.3 |
| | Degree | 23 | 35.4 |
| | Other (postgraduate) | 2 | 3.1 |
| Females | High school | 3 | 6.4 |
| | Matric | 14 | 29.8 |
| | Diploma | 13 | 27.7 |
| | Degree | 14 | 29.8 |
| | Other (postgraduate) | 3 | 6.4 |
| **Gender** | **Employment status** | **N (112)** | **Percentage (%)** |
| Males | Employed | 25 | 38.5 |

| | | | |
|---|---|---|---|
| | Unemployed | 22 | 33.8 |
| | Self employed | 18 | 27.7 |
| Females | Employed | 14 | 29.8 |
| | Unemployed | 27 | 57.4 |
| | Self employed | 06 | 12.8 |

**Table 2** shows that males were involved in FEP for 2 years compared to a year (1.7±1.0 yrs.) for females exercising for an hour per day. However, aerobic dance participants exercised for average of three hours per week while male fitness bodybuilders exercised longer (3.8±1.0 times). Participants spent on average two hours during their exercise.

**Table 2.** Exercise profile of participants

| Program | Gender | Years involved | Frequency of exercise | | Duration during exercise |
|---|---|---|---|---|---|
| | | | per day | week | |
| **Aerobics** | Males | 2.5±1.6 | 1.3±0.6 | 3.2±0.8 | 2.0±0.6 |
| | Females | 1.7±1.0 | 1.2±0.4 | 3.1±1.0 | 1.6±0.5 |
| **Bodybuilding** | Males | 2.8±1.7 | 1.1±0.3 | 3.8±1.0 | 2.1±0.8 |
| | Females | 1.0±0.0 | 1.1±0.1 | 3.0±0.1 | 1.0±0.3 |

The BMI values of the participants are reported in **Table 3**. According to this table, aerobic dance participants were overweight (males, 27.8±4.7; females 28.8±4.8 kg/m²) while those in fitness bodybuilding program were classified obese (≥30 kg/m²).

**Table 3.** Participants' BMI values

| Program | Gender | Weight (kg) | Height (m) | BMI (kg/m$^2$) |
|---|---|---|---|---|
| **Aerobic fitness** | Males | 81.3±17.1 | 1.73±0.06 | 27.8±4.7 |
| | Females | 73.4±18.2 | 1.61±0.11 | 28.8±4.8 |
| **Bodybuilding** | Males | 93.9±13.3 | 1.74±0.08 | 31.0±16.9 |
| | Females | 102.3±0.0 | 1.65±0.0 | 37.5±0.0 |

**Table 4** shows that majority of the participants in the aerobic dance program had optimal WC classifications (<102 cm, males and <88 cm, females). Only females in the fitness bodybuilding program had WC values above acceptable standards. However, there were a few males who presented with WC above (108.8±6.6 cm) the normal standards in fitness bodybuilding program.

**Table 4.** Participants' WC values

| Program | Gender | Min | Max | Mean±SD (kg/m$^2$) |
|---|---|---|---|---|
| **Aerobic fitness** | Males | 70.0 | 120.0 | 93.2±12.2 |
| | Females | 69.0 | 129.0 | 89.7±12.8 |
| **Bodybuilding** | Males | 84.0 | 121.0 | 101.9±10.3 |
| | Females | 104.0 | 104.0 | 104.0±0.0 |

**Table 5** below shows a significant association between BMI with age (p<0.01), marital status (p=0.010) and frequency of training per day (p=0.044) of aerobic dance participants. Similarly, there was correlation between the WC with age (p<0.01) of aerobic dance participants.

**Table 5.** Correlation

| Exercise Program | Age | Gender | Educational level | Employment status | Marital status | Years involved in exercise | Exercise frequency per day | Exercise frequency per week | Duration of exercise |
|---|---|---|---|---|---|---|---|---|---|
| **BMI and Demography** | | | | | | | | | |
| **Aerobic Dance** | <0.01 | 0.794 | 0.589 | 0.181 | 0.010 | 0.239 | 0.044 | 0.138 | 0.773 |
| **Fitness Bodybuilding** | 0.240 | 0.611 | 0.916 | 0.233 | 0.621 | 0.082 | 0.675 | 0.600 | 0.298 |
| **Waist circumference and demography** | | | | | | | | | |
| **Aerobic Dance** | <0.01 | 0.405 | 0.413 | 0.120 | 0.411 | 0.337 | 0.301 | 0.650 | 0.447 |
| **Fitness Bodybuilding** | 0.358 | 0.173 | 0.767 | 0.345 | 0.368 | 0.170 | 0.448 | 0.414 | 0.420 |

## Discussion

The aim of the study was to determine the sociodemographic, exercise and anthropometric profiles of adults engaging in fitness exercise programs around Vhembe district, Limpopo province to determine health status of participants. This study was, to some extent, important to understand part of human population in Vhembe district to identify health related problems (through anthropometry) thus informing policy makers on intervention strategies[23]. This study found that participants were young adults who engaged in FEP for average of two years, exercising three times per week for an hour. Most participants were males engaging in aerobic fitness dance and bodybuilding fitness program. These training programs are cardiovascular exercises of low intensity performed for stronger muscles in the presence of oxygen[24].

These participants were classified overweight by BMI with acceptable WC values. More males in the current study attended the fitness exercise programs at various gyms compared to females. Another study by Aristides et al. found similar results of males and females attending gyms more frequent than their counterparts in rural areas of Portugal[25]. Our results are somewhat unusual as females are generally known to be more concerned of their body weights than males[6], thus engaging in intervention programs such as exercise. Generally, females in the Vhembe district are statistically higher, contributing 54% of the total population than males (46%). However, we suspect that a lesser number of females participating in FEP may partly be contributed by some household commitments of these women as 51% of the households in the Vhembe district are women headed[26]. The socioeconomic status of females (unemployment, 57.4%) in the current study could also explain the reason for a few females affiliating to the gyms as funds might be dedicated to basic household needs[9]. The current results contradict those reported by the International Health, Racquet

& Sports club Association (IHRSA)[27], which found that just above half (51%) of participants at the gym were females.

The ages of the participants were also investigated in the current study and found that male and female adults engaged in FEP in Vhembe district were aged 36.3±9.3 and 32.1±8.7 years respectively. These age groups are within the majority (51%) of those contributing to the total population in Vhembe district[26]. These ages are, however, slightly higher to those reported by statistics SA (15 – 34 years) that contribute to the majority of the population in Limpopo[28]. The results of the current study are comparable to those of older adults (41.0 years) reported for physical activity engagement among participants by Renner (2019)[29].

Participants in the current study exercised three times per week for one to two hours daily. The latter is supported by the American College of Sports Medicine[30] recommending frequency of exercise per week at two to three times per week for healthy adults. The participants in our study adhered to both the South African Food Based Dietary guideline which states "Be active"[19] and Physical Activity Policy[20] as used to guide or motivate adults to engage in exercise. Lastly, participants in the current study may have adopted other exercise guidelines stated by the WHO on sedentary behaviour[18]. One example of these principles is that which encourages physical activity for 150 – 300 minutes spread throughout the week. This roughly works to about 20 – 45 minutes in four to five days. In all these fitness exercise guidelines, the current group fairly adheres.

In terms of anthropometry, the majority (60.7%) of the participants had overweight BMI. It is possible that this BMI status may have served as a motivating factor for these adults to participate and continue exercising. The latter is found elsewhere in the literature as suggested in one study[6]. For some, the level of the participants' education might have also conscientized them of the risks related to overweight. These results are somewhat similar to those by Pienaar et al.[31] who found that 48% of their participants were either overweight or obese. In another study by Uchai et al.[32], the majority of the participants were also obese. This is a concern as overweight and obesity is a public health problem that requires immediate multidisciplinary interventions[8]. However, BMI should be interpreted with great caution[1] especially for participants in the bodybuilding (competitive) programs as the aim of the participants is to develop increased muscle structure[33]. Although the practices of ergogenic substances among the current exercise participants was beyond the scope of this research as exercises were for recreation, it should be highlighted that, it is a common practice among bodybuilders[34]. This practice greatly influences body weight among athletes, particularly those aiming for improved physique.

The WC of the most participants was within acceptable standards which implies reduced risk for development of diabetes mellitus, cardiovascular diseases and improved quality of life[35]. These results are congruent to those by Shozi et al.[36] who found that a few (5%) of females had higher than normal values of WC. Another study done by Armstrong et al.[37] found that aerobic exercise program decreased WC by 3.2 cm among participants. These results suggest that exercise has a positive contribution towards maintaining the WC within acceptable standards[38].

Lastly, the current study found correlations between anthropometric variables (BMI and WC) with some demographic variables such as age of participants especially in the aerobic dance program. A cohort study investigating changes in body mass index by age, gender, and socio-economic status among a cohort of Norwegian men (n=581) and women (588) showed that minimal influence of socio-economic status on changes in BMI over time[39]. In another cross-sectional study investigating the correlation between BMI and age at menarche, no significant association (p=0.458) was found among Jatinangor female adolescents[40]. Although studies show insignificant association between BMI and some demographic variables, it is, however, important to understand the association between these variables to estimate health risks that are likely to exist[41].

## Conclusion

The study was aimed at determining the demographic profile and anthropometric status of adults participating in fitness exercise programs around Vhembe district, Limpopo Province. Participants were classified as older adults and have been engaging in FEP for an average of two years, training three times per week for an hour. Males dominated and mostly engaged in aerobic dance and fitness bodybuilding program.

Most of the participants were overweight. However, participants had WC values that are within acceptable standards. Overweight is a risk for cardiovascular conditions such as high blood pressure and myocardial infarction. Therefore, intervention in the form of nutrition education, meal plans and exercise programs that need to be followed could be of importance in this case. Body composition and dietary intake study using the same participants is warranted to validate these BMI results and associated outcomes with intake respectively.

Lastly, involvement of other sport practitioners such as biokineticists may be important to determine the impact of these exercise programs on the health status of the participants.

A few number of gyms in the Vhembe district resulted in a small number of participants used in this study. Another limitation was the time allocated two years to complete this study as this was part of the master's degree program.

## Conflict of interest

The authors declared no conflict of interest regarding this article.

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## Open Access



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