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# Body Composition, Chronic Disease Risk and Physical Activity Levels of Urban and Rural Women in Selected Zimbabwean Communities

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**Abstract**

**Background:** Maintaining a physically active lifestyle helps to keep a healthy weight and lowers the risks of chronic diseases. The aim of this study was to determine and compare body composition, chronic disease risk and physical activity levels of rural and urban women in selected Zimbabwean communities.

**Method:** The study followed a descriptive, comparative, and cross sectional design. A sample size of 280 women aged 18 to 60 years volunteered to participate. Anthropometric variables, blood pressure, blood glucose and cholesterol were measured using standard protocols. The International Physical Activity Questionnaire (IPAQ) and a Nutritional Questionnaires were self-administered. Routine descriptive statistics, independent t-tests and Chi-square tests were used and the significance was set at $p \leq 0.05$.

**Results:** A significant difference between urban and rural women with regards to Body Mass Index (BMI) p=0.009 (mean difference 1.62; 95% CI), Waist-Hip Ratio (WHR) p=0.003 (mean difference 0.02; 95%CI) was noted. Regarding chronic disease risk, urban women were classified as high and very high risk compared to rural women, p=0.019. With regard to the IPAQ there were significant differences in the transport domain, p=0.046, domestic domain p=0.02 and leisure domain p=0.020 between urban and rural women.

**Conclusion:** The study indicated an increase in prevalence of overweight and obesity with increased chronic disease risk in urban women compared to rural women. Both urban and rural women showed high levels of physical activity.

**Keywords:** overweight, obesity, chronic diseases, physical activity, women

## 1. Introduction

It was not until the 20$^{th}$ century that the World Health Organisation (WHO) finally recognised obesity as a global epidemic (World Health Organization., 2017). In 2014, more than 1.9 billion adults, 18 years and older were overweight and 600 million were obese. Of these, 38% of men and 40% of women were overweight, while 11% of men and 15% of women were obese (Mendis, 2014). The problem of obesity is increasing in the developing world with more than 115 billion people suffering from related problems. Adediran, Akintunde, Edo, Opadijo, and Araoye (2012), reported that the prevalence of obesity is increasing rapidly in both developed and developing nations and it has reached epidemic proportions globally. The evidence suggests that the situation is likely to get worse (Adediran et al., 2012).

Overweight and obesity are well known to be an effect caused by energy imbalance and characterised by excessive accumulation of fat in the body (Benkeser, Biritwum, & Hill, 2012). Obesity is a problem-affecting people of all ages, ethnic backgrounds and socioeconomic status. Many people in developed and developing countries are dying from obesity associated diseases (Lokuruka, 2013; Lozano et al., 2013). However, many people still think that low-middle income countries suffer the effects of underweight, malnutrition, infections and are not affected by overweight and obesity (Akarolo-Anthony, Willett, Spiegelman, & Adebamowo, 2014). This may not be the case as the WHO in their estimations for 2010 in some Sub-Saharan African (SSA) countries highlighted that the prevalence of overweight and obesity was very high with the statistics exceeding 60% and 20% respectively for men, and 70% and 40% respectively for women (Leiba et al., 2013). According to Agyemang, Boatemaa, Agyemang Frempong, and de-Graft Aikins (2016), in the SSA in 2015 comparative to other African regions an overwhelming increase of overweight and obesity was recorded with the average prevalence rate of 21% as from 1990. Overweight and obesity are known risk conditions that are likely to influence continuing health difficulties including cardiovascular diseases (CVDs), high blood pressure, stroke, raised blood glucose and raised total blood cholesterol among others (Luciana et al., 2012).

In developing countries, changes in urban lifestyle that include a decrease in physical activity patterns and poor dietary choices are likely to lead to a high prevalence of overweight and obesity. Obesity is an excess body fat linked to metabolic risk factors such as raised blood pressure, raised blood glucose and raised total blood cholesterol (Go et al., 2014). These metabolic risk factors are the major cause of heart disease, kidney disease, stroke, blockage of arteries, amputation and blindness, (Inzucchi et al., 2015). High blood pressure and obesity among patients with raised blood glucose in developing countries are perhaps even more harmful than in high-income countries due to weak health systems, (World Health Organization., 2017).

Chronic diseases cause increasing numbers of deaths worldwide. Currently, chronic diseases represent 43% of the global burden of disease which indicates an emerging epidemic, as deaths as a result of chronic diseases are predicted to rise between 60% and 70% of all deaths by 2020 (Abegunde, Mathers, Adam, Ortegon, & Strong, 2007). According to Kengene and Mayosi (2012), the common chronic diseases are heart disease, stroke, cancer, chronic respiratory diseases, type 2 diabetes, mental disorders, vision and hearing impairment, oral disease, bone and joint disorders and genetic disorders. These diseases also refered to as chronic illnesses, non-communicable diseases (NCDs) and/or degenerative diseases. The most important modifiable risk factors of chronic diseases include unhealthy diet and excessive energy intake, physical inactivity and tobacco use. These causes are expressed through the intermediate risk factors of raised blood pressure, raised blood glucose levels, abnormal blood lipids and overweight and obesity (Kengene & Mayosi, 2012). While individuals understand that risk factors contribute to chronic diseases, market research indicates they aren't motivated to take preventive measures as most don't consider themselves at risk until they are older (Neeland et al., 2012). It is vitally important that the impending chronic disease epidemic is recognised, understood and acted upon urgently. The SSA region is facing a healthcare tipping point. According to Naik and Kaneda (2015), over the next 15 years chronic diseases like cancer, heart disease, and kidney failure will become the major killers and by 2030 they will account for 42% of all deaths in the SSA region, which is an increase of 25% from the current figures.

According to Doku, Neupane, and Doku (2012), urban women gain more weight as they engage in less physical activity than rural women who are mostly engaged in agricultural and other physical activities on a daily basis. Physical activity is of vital importance for the prevention and treatment of a number of chronic conditions ranging from depression, obesity and poor health in general. For community health campaigns, physical activity is crucial in most middle-and upper-income countries and is associated with voluntary, leisure-time exercises done to promote cardio-respiratory fitness (Bauman et al., 2012).

Increasingly, research has proven that regular exercise and good nutrition are critical to sustained good health. According to the Lee et al. (2012), insufficient physical activity is one of the leading risk factors for global mortality and is on the rise in many countries, adding to the burden of NCDs and affecting general health worldwide. Insufficiently active people have a 20% to 30% increased risk of death compared to sufficiently active people. According to Mendis (2014), physical inactivity contributes to 3.2 million deaths and 69.3 million disability-adjusted life years (DALYs) each year. Physically active persons on the other hand have lower rates of coronary heart disease, high blood pressure, stroke, diabetes, colon and breast cancer, and depression. Physical inactivity among children and adults seems to persist and this makes physical inactivity among young people a high risk factor for CVDs, cancer and osteoporosis in adults (Hardman & Stensel, 2009). It has been estimated that physical inactivity levels could be reduced by 31% through improved environmental interventions, including pedestrian and bicycle friendly urban land use and transport, leisure and workplace facilities, and policies that support more active lifestyle (Kohl 3rd et al., 2012).

The levels of overweight and obesity have been shown to be increasing in low-income countries especially among women. There is very limited data on overweight and obesity, chronic disease risk and physical activity, making it difficult to make informed public health decisions by the Zimbabwean government for it to develop policies and appropriate interventions. The aim of this study were to determine and compare body composition, chronic disease risk and physical activity levels among urban and rural women in Zimbabwe communities.

## 2. Methods

### *2.1 Study Design and Participant Recruitment*

The study used a descriptive, comparative, and cross sectional design. A total sample of (n=280) was recruited. The sample consisted of (n=140 women) urban residents from Bulawayo Metropolitan Province and (n=140 women) from rural residents from Matabeleland North Province. These two provinces were conveniently sampled from the ten provinces of Zimbabwe and randomly selected Ward 27 in Mzilikazi district (urban) and Ward 20 in Bubi district (rural). The participants were selected systematically from identified households in the Wards. The inclusion criteria used to participate in this study specified that: the women should be of the black ethnic group and Zimbabwean. All the women were between the ages of 18- 60 years.

The University of Kwa-Zulu Natal Biomedical Research Ethics Committee provided the ethical clearance (REF: BE380/15). Provided information on all procedures associated with participation in the study including an information sheet explaining on issues on voluntary participation, anonymity, withdrawal and storage of their data to participants. The participants completed a written consent provided before participating in the study. Participants did all the procedures of study at their respective homes.

### *2.2 Data Collection Protocols*

#### 2.2.1 Anthropometric Measurements

Anthropometric variables were body mass, height, waist circumference (WC), hip circumference (HC). Measurements of body mass (to the nearest 0.1 kg) measured using a SECA electronic scale, height (to the nearest 0.1 cm) using a SECA stadiometer (SECA Deutschland Medical scales and measuring systems, Hamburg, Germany), and girths (to the nearest 0.1 cm) using a CESCOF steel tape. The measurements done followed the protocols described by the International Society for the Advancement of Kinanthropometry (ISAK) (Marfell-Jones et al., 2006). Body mass index (BMI) was derived from body mass and height measurements, while waist-to-hip ratio (WHR) resulted from the two girths measurements and calculated as, BMI = Body mass/height$^2$ and WHR = waist girth/hip girth.

Overall obesity was assessed using BMI <18.5kg/m$^2$ defined underweight, BMI <25 kg/m$^2$ normal, BMI ≥ 25 kg/m$^2$ overweight, BMI ≥ 30 kg/m$^2$ obese. For abdominal adiposity WHR> 0.80 high risk, WC ≥80 cm increased risk, WC ≥ 88cm high-risk abdominal adiposity.

#### 2.2.2 Metabolic Risk Measurements

Blood pressure was measured using the HI-CARE deluxe statoscope Rappaport type and HI-CARE sphygmomanometer and measurements divided into six categories. Optimal <120/80 mmHg, normal 120/80 mmHg, pre-raised blood pressure 120/80 to 139/89 mmHg, high blood pressure Stage 1 140/90 to 159/99 mmHg, high blood pressure Stage 2 160/100 mmHg and high blood pressure Crisis >180/110 mmHg. Blood glucose and cholesterol were measured using Accutrend Plus digital meter GCTL- mmol/l (Roche, Mannheim, Germany). Fasting blood glucose test done. Fasting blood glucose categories, normal 5.6 mmol/l, Pre-raised blood glucose 5.6- 6.9 mmol/l, and raised blood glucose >7 mmol/l. Blood cholesterol measurements were classified as: > 6.2 mmol/l – high, 5.2- 6.2 mmol/l- borderline high, 3.9- 5.2mmol/l – desirable (Flora Pro-Active Health Care Professionals).

#### 2.2.3 Questionnaires

Two validated questionnaires were used, The International Physical Activity Questionnaire (IPAQ) and The Nutrition Risk Questionnaire. All the questionnaires were self-administered. The IPAQ concentrated on four domains, which were; Job related, Transportation, Domestic and Leisure. These domains determined physical activity levels of participants by calculating the total metabolic equivalent-minutes per week (total METs min/wk). The METs were further used to categorize the participants according to total physical activity, that is, low < 600 METs min/wk, moderate > 600 METs min/wk and high > 1500 METs min/wk. The nutrition risk questionnaire categorised, energy (kilocalories), carbohydrates (grams), proteins (grams) and fat (grams) consumption, calculated and rated to recommend servings for participants adapted from the dietary website (www.dietaryguidelines.gov).

### *2.3 Statistical Analysis*

Data was captured using the Microsoft Excel 2010 and Statistical Package for Social Sciences (SPSS- version 22) used to conduct data analysis. Descriptive statistics including means and standard deviations used. The Chi-square goodness-of-fit-test, a univariate test used on categorical variables to test response options. For the comparison of the independent groups on cases, used was the independent sample t-test and the Chi-square test of independence used was for cross tabulations. Statistical significance was set at p≤0.05.

## 3. Results

The sample comprised of 280 participants, rural women (n=140) and urban women (n=140). The average age for rural women 35.67yrs (±10.42) and for urban women 34.67yrs (±10.58).

Table 1. Anthropometric descriptive and comparative statistics for rural and urban women

| Variable (unit) | Rural (n=140) | | | Urban (n=140) | | | |
|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Mean (±SD) | Minimum | Maximum | Mean (±SD) | P-Value |
| Height (m) | 1.50 | 1.81 | 1.62 (0.04) | 1.49 | 1.78 | 1.62 (0.05) | 0.739 |
| Weight (kg) | 41.40 | 122.10 | 66.58 (13.73) | 40.60 | 152.40 | 71.18 (15.22) | 0.008* |
| BMI (kg/m²) | 15.39 | 46.52 | 25.29 (5.14) | 16.32 | 48.10 | 26.91 (5.20) | 0.009* |
| Waist (cm) | 61.00 | 120.70 | 66.58 (13.73) | 62.00 | 143.50 | 77.91 (10.70) | 0.0005* |
| Hip (cm) | 79.00 | 138.80 | 98.79 (11.29) | 78.00 | 169.00 | 103.03 (12.43) | 0.003* |
| WHR | 0.64 | 1.06 | 0.78 (0.06) | 0.64 | 1.06 | 0.80 (0.06) | 0.041* |

*Note*. *significance p≤ 0.05; SD=Standard Deviation.

As shown in the Table 1, the average height for the rural women was 1.62m (±0.04) almost the same as that of the urban women 1.62±0.05m. The urban women had an average weight of 77.18kg (±15.22), while the rural women weighed an average of 66.58±13.73kg. The average BMI for urban women was 26.91kg/m² (±5.20) and for the rural women 25.29kg/m² (±5.14). The urban women had an average of 82.99cm (±11.92) while the rural women had 77.91cm (±10.70) for the waist circumference. The average for the WHR for urban women was 0.80 (±0.06) and for rural women 0.78 (±0.06).

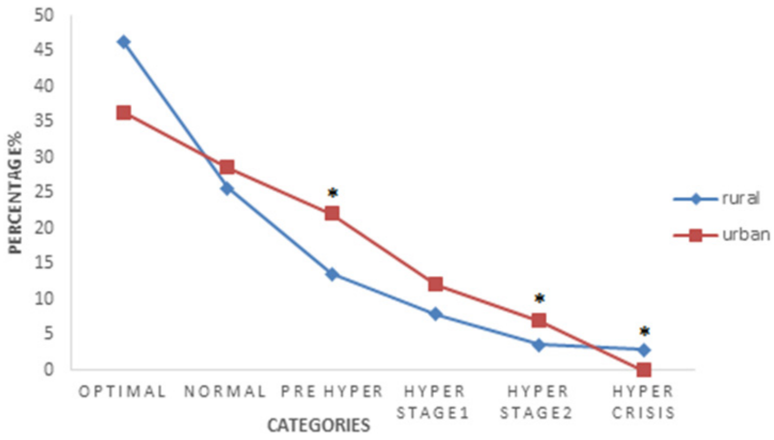
Regarding weight, a significant difference was noted p=0.008 with urban women weighing more than rural women. Furthermore, there was a significant difference between BMI and location (rural and urban) women p=0.009. Urban women had a higher BMI compared to rural women. The urban women compared to rural women also had a higher WC (p=0.0005). There was a significant difference with location and WHR, p=0.041, urban women showed a higher WHR compared to the rural women.

Table 2. Metabolic risk measurements descriptive and comparative statistics for rural and urban women

| Variable (unit) | Rural (n=140) | | | Urban (n=140) | | | |
|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Mean (±SD) | Minimum | Maximum | Mean (±SD) | P-Value |
| Blood-glucose (mmol/l) | 1.30 | 14.00 | 4.72 (1.44) | 2.70 | 8.40 | 4.68 (1.07) | 0.840 |
| Blood-cholesterol (mmol/l) | 3.10 | 7.40 | 4.42 (0.72) | 2.40 | 6.80 | 4.71 (0.89) | 0.003* |

*Note*. *significance p≤ 0.05; SD=Standard Deviation.

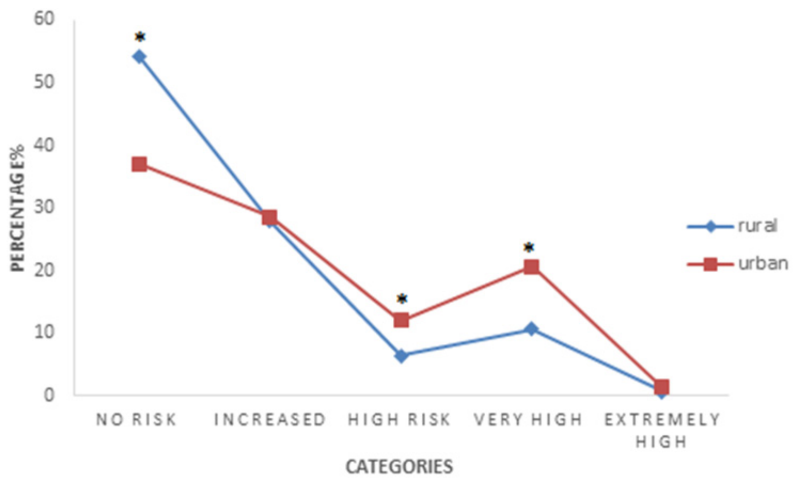
As shown in Table 2, the mean for blood glucose of the rural women was 4.72±1.44mmol/l and that of urban women was 4.68±1.07mmol/l. The minimum blood glucose was 1.30mmol/l, maximum was 14.00mmol/l among the rural women. The urban women had a minimum of 2.70mmol/l, maximum of 8.40mmol/l. There was no significant difference shown in the study for blood glucose between urban and rural women. Blood cholesterol tests showed an average of 4.72±0.89mmol/l for urban women and 4.42±0.78mmol/l for rural women. A significant difference on blood cholesterol p=0.003 was noted between urban and rural women.




*Note.* * significant p≤0.05

Figure 1. Blood Pressure

As shown in Figure 1, blood pressure of rural women; 46.4% - optimal; 25.7% - normal; 13.6% - pre-hypertensive; 7.9% - hypertensive stage; 3.6% -hypertensive stage 2 and 2.9% -hypertensive crisis. Urban women; 36.4% - optimal; 28.6% - normal; 22.1% - pre-hypertensive; 12.1% - hypertensive stage; 0.7% - hypertensive stage 2 and 0% -hypertensive crisis. There was a significant difference between location (urban and rural) and blood pressure p=0.025. More than expected of the rural participants were at high blood pressure stage 2 or hypertensive crisis stage, while more than expected of the urban respondents are pre-hypertensive.




*Note.* * significant p≤0.05

Figure 2. Chronic disease risk

As shown in Figure 2, chronic disease risk for rural women 54.3% were not at risk, 27.9% were at increased risk, 6.4% high, 10.7% very high, 0.7% extremely high. Urban women 37.1% were not at risk, 28.6% were at increased risk, 12.1% high-risk, 20.7% very high-risk and 1.4% extremely high. There is a significant difference between chronic disease risk and location, p=0.019. More than expected of rural women were not at risk while more than expected for urban women were at high or very high risk.

Table 3. IPAQ descriptive and comparative statistics for rural and urban groups

| Variable (unit) | Rural (n=140) | | | Urban (n=140) | | | |
|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Mean (±SD) | Minimum | Maximum | Mean (±SD) | P-Value |
| IPAQ-Transport (METs) | 0 | 8208 | 1417.01 (1583.42) | 0 | 8316 | 1058.96 (1404.43) | 0.046* |
| IPAQ-Work (METs) | 0 | 38556 | 2119.30 (5299.2) | 0 | 28500 | 3000.95 (4511.48) | 0.135 |
| IPAQ-Domestic (METs) | 210 | 27720 | 4865.88 (4718.98) | 90 | 2 6520 | 3348.23 (3259.68) | 0.002* |
| IPAQ-Leisure (METs) | 0 | 6792 | 427.51 (886.66) | 0 | 19 998 | 895.47 (2180.12) | 0.020* |
| IPAQ-Total | 210 | 42504 | 8826.66 (7739.31) | 90 | 55488 | 8303 (7798.37) | 0.573 |

*Note*. *significance p≤ 0.05; SD=Standard Deviation.

As shown in Table 3, there was a significant difference between urban women and rural women in physical activity levels in the transport, domestic and leisure domains. On the transport domain rural women had an average of 1417.01METs min/wk which was significantly higher than urban women 1058.96METs min/wk, p=0.046. There was a significant difference between urban and rural women on the domestic domain p=0.002. The leisure domain indicated an average of 895.47METs min/wk (±2180.12) for urban women which was significantly higher than rural women 427.51METs min/week (± 886.66), p=0.020.

Four categories were presented in the nutrition questionnaire (energy (kcals), carbohydrates (g), proteins (g), and fats (g) consumption per day. As shown in Table 4, an average of 2187.73kcals per day was presented for urban women and 2020.42kcals per day for rural women. A significant difference between energy consumption and location was indicated, p=0.0005. There was a significant difference in protein consumption between the two groups p=0.007. Urban women indicated high fats consumption compared to rural women and a significant difference was noted, p=0.0005.

Table 4. Nutrition Questionnaire descriptive and comparative statistics for rural and urban groups

| Variable (unit) | Rural (n=140) | | | Urban (n=140) | | | |
|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Mean (±SD) | Minimum | Maximum | Mean (±SD) | P-Value |
| NRQ Energy (kcals) | 1248 | 2955 | 2020.42(292.90) | 1718 | 3184 | 2187.73 (242.93) | 0.0005* |
| NRQ Proteins (g) | 55 | 138 | 86.87(15.03) | 43 | 138 | 91.73 (14.73) | 0.007* |
| NRQ Fats (g) | 5 | 93 | 52.44 (16.34) | 33 | 108 | 62.99 (13.64) | 0.0005* |
| NRQ Carbs (g) | 180 | 372 | 252.53 (28.54) | 206 | 414 | 256.92 (30.98) | 0.218 |

*Note*. *significance p≤ 0.05; SD=Standard Deviation.

## 4. Discussion

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Once considered a problem only in high-income countries, overweight and obesity are now extremely rising in most urban settings in low- and middle-income countries (World Health Organisation, 2016). In most African countries the risk of overweight and obesity is on the rise especially in urban populations than in rural populations and this has been associated with urbanization (Kandala & Stranges, 2014). The study results indicated a significant difference between weight and location (urban and rural), with urban women weighing more than rural women 71.19kg (±15.23) vs 66.58kg (±13.73) respectively. In the same sample, the urban women had a significantly higher BMI than the rural women. In a study done in Zimbabwe by Mathe and Brodie (2010), findings indicated that, the men and women from urban low density areas were overweight (BMI>25kg/m²). In another study done in Tanzania, the prevalence of overweight was highest in urban Dares Salaam than rural

Handeni and Monduli (Njelekela et al., 2002). Silva-Matos et al. (2011), in Mozambique reported the prevalence of overweight individuals as 30.1% and 10.2% for urban and rural areas respectively.

Furthermore, in a survey done by Christensen et al. (2008) among rural and urban residents in Kenya, they reported a 2-3-fold difference in percentage among urban and rural residents for overweight and obesity with almost 40% and16% compared to 16% versus 5% respectively. On the other hand the prevalence of overweight and obesity among urban and rural participants found in our study follow the same pattern as found in neighbouring country, South Africa, the study done reported similar trends where the prevalence of overweight and obesity was higher in urban than in rural areas (Cois & Day, 2015). In North Africa in a study published in 2014 reported similar trends where the prevalence of overweight and obesity was higher in females and urban people when compared to rural dwellers (Toselli et al., 2014). In another study done by Mudie et al. (2018) in Malawi comparable findings were presented where the urban population had a higher prevalence of overweight and obesity compared to the rural population.

The study results showed a significantly higher total energy, protein and fat consumption among urban women as compared to the rural women. A dietary intake high in calories and fat has been implicated with the increase of overweight and obesity (Benkeser et al., 2012). Mbochi, Kuria, Kimiywe, Ochola, and Steyn (2012) in their study confirmed that dietary intake was correlated with BMI, as women with highest protein and fat consumption indicated the highest mean BMI. Mokhtar et al. (2001) in a study in Tunisia and Morocco reported that a dietary intake high in calories and macronutrients was highest among obese women than in normal weight women. Tunisian women reported a high fat intake of 31% while high carbohydrate intake 65-67% was high among women in Morocco. Although comparative findings in the studies show similar trends of higher BMI among urban women when compared to rural women, the average BMI of the rural women in this study was 25.29± 5.23kg/m$^2$, categorizing them as overweight. This could mean that the rural lifestyle may be changing and becoming similar to an urban lifestyle (high consumption of processed foods and decrease in physical activity patterns). This could be due to movement between urban and rural areas in the country. Peer et al. (2014) suggested that owing to the frequency of rural-urban migration, changes in lifestyle behaviours that include change in dietary intake and physical activity patterns could be contributing to overweight and obesity prevalence that is occurring in SSA rural populations.

According to Bos and Agyemang (2013), the numbers of people with raised blood glucose are expected to rise due to the rising levels of urbanization and life expectancy. Findings in the study show that most of the subjects fall in the normal range of blood glucose. There was no significant difference between urban women with an average of 4.68mmol/l (±1.07) and rural women with 4.72mmol/l (±1.44) in this study. Zimbabwe is rated as one of highest countries for raised blood glucose prevalence (V. N. Mbanya, Kengne, Mbanya, & Akhtar, 2015), however, in this study the results did not show any prevalence of raised blood glucose. Contrary findings to our study were noted with the ones in a systematic review conducted on raised blood glucose in SSA 1999-2011 by (Hallal et al., 2012), where a very high prevalence (>10%) of raised blood glucose was recorded in Zimbabwe and low to medium prevalence (<7%) recorded in other SSA countries.

Total blood cholesterol between the two groups in this study showed that most of the study population fall under the desirable category with an average of 4.71mmol/l (±0.89) for urban women and 4.42mmol/l (±0.72) for rural women. Total blood cholesterol results indicated a significant difference between locations with urban women having high levels of total blood cholesterol compared to rural women. A study conducted in Angola on 615 participants indicated that 45% of the sample had raised blood pressure, 11% had hypercholesterolemia, 50% had low high-density lipoprotein-cholesterol (HDL-C) and 10.6% had hypertriglyceridemia. In a study done in Benin on cardio-metabolic risk factors, findings showed that low HDL-C observed was in more than 25% of participants. It was further observed that low HDL-C was associated with more abdominal obesity in men and women and with more insulin resistance in women.

It has been suggested that the prevalence of CVDs and hypertension is increasing rapidly in SSA (Lackland & Weber, 2015). According to Goverwa et al. (2014) in Zimbabwe, Matabeleland North province hypertension was the commonest chronic NCD. In 2011, an estimated 46% of the chronic NCDs among patients seen at out-patient department had hypertension. The present study indicated 13.6% and 14.4% for pre-hypertensive and hypertensive stages respectively for rural participants. The urban participants on the other hand showed 21.1% and 12.9% pre-hypertensive and hypertensive stages respectively. Findings show a significant difference between location (urban and rural) and blood pressure. This result was unexpected as more of the rural respondents were at hypertensive stage 2 or hypertensive crisis stage compared to the urban participants who more were at pre-hypertensive stage. In another study in Zimbabwe, by Mungati et al. (2014), indicated that raised blood pressure was found to be associated with obese patients as they were more likely to be hypertensive than non-obese patients. In a study conducted by (Eric et al., 2015) in South Africa Limpopo Province, obesity was found to be associated with raised blood pressure and similar trends were reported elsewhere in South Africa and India,(Thankappan et al., 2010).

According to Steffen et al. (2015), measurements of excess body fat, both general and abdominal captured by BMI,WC and WHR are each proven to provide different information about health risks influenced by overweight and obesity. Lu et al. (2014) study findings showed that high BMI (overweight and obesity) was associated with a significantly increased risk of coronary heart disease and stroke. In the study WC, WHR and BMI were used to assess the risk for chronic diseases amongst the participants. A significant difference in WC between urban and rural women was reported in this study, with urban women having a higher WC measurements compared to the rural women. In addition, for WHR a significant difference was reported, urban women reporting a higher measurement than the rural women. Mathe and Brodie (2010), indicated that the urban women living in Harare had a high WC indicating an increased risk of CVDs (WC>80cm).

Abdominal obesity or increased WHR puts one at particularly high risk for CVDs. A study conducted on women in Mozambique showed that the average WC for urban women was significantly higher than in rural women (Gomes, et al., 2010). A study conducted in Congo reported that an increase in abdominal fat proved to be an important risk factor for heart failure among adults (Longo-Mbenza, Nkondi Nsenga, & Vangu Ngoma, 2007). The results of the present study showed increased chronic disease risk for the whole sample, that is, 28.2% were at increased risk, and 15.7% at very high risk. Urban women were at a high risk 12.1% and very high risk 20.7% compared to rural women where 6.4% were at high risk and 10.7% were at very high risk. A significant difference was noted between urban women and rural women. Longitudinal studies show that the correlation between obesity and fatal CVDs is strongest in women with very high intra-abdominal fat, (Fogelholm, 2010). Data on prevalence of chronic disease risk is very scanty on Zimbabwean population. The little available on chronic disease morbidity and mortality was mostly biased towards the clinical cohorts.

Regular physical activity is proven to help prevent and treat chronic diseases such as heart disease, stroke, diabetes and breast and colon cancer, (Hall, Thomsen, Henriksen, & Lohse, 2011). Physical activity in most SSA countries is part of daily living in the form of walking, searching for water and gathering food, (Steyn, 2010). In most rural populations in developing countries physical activity is higher compared to urban populations as walking is a means of transport and agricultural activities their major employment (J. C. Mbanya, Assah, Saji, & Atanga, 2014). The IPAQ measured the physical activity levels of the participants. The results showed total physical activity for urban women was 8302.99 total METs min/wk and for rural women 8826.66 total METs min/wk. Both urban and rural women were in the moderate category according to their average total physical activity. There was no significant difference on total physical activity (METs min/wk) between urban and rural women. When analysing the IPAQ domains specific METs score were significant among three of the four domains between urban and rural women, namely; transport, domestic and leisure. The rural women had higher METs min/wk in transport and domestic domains compared to urban women. Leisure METs min/wk were higher for urban women compared to rural women.

The findings supports the trend that has been shown by most studies that rural dwellers in the country travel significantly longer distances to access places (medical health centres, water points, ploughing fields and transport among other things), compared to urban areas where all these are easily accessible and leisure facilities are available. In line with the study similar trends indicated moderate to high levels of physical activity for both urban and rural participants in a study done in Malawi (Mudie et al., 2018). A study conducted by Dabrowska, Hazra, Guo, DeWitt, and Rainnie (2015) on Polish women reported a moderate physical activity level for most midlife women in the domestic and gardening domain, active transportation and leisure-time domain, and a significant correlation between physical activity, age and education with BMI. In a study done in Cameroon by Assah, Mbanya, Ekelund, Wareham, and Brage (2015) on physical activity using combined heart rate and movement sensing over seven continuous days with a sample of 544 participants reported that rural dwellers were significantly more active than their urban counterparts. The findings of this study differ with the studies conducted in other countries on physical activity levels in urban populations. Most studies' results indicate low physical activity levels and sedentary lifestyle in urban areas. This can be accredited to the fact that physical activity levels differ between populations and as such making it harder to standardize and measure across different countries (Hu et al., 2004). Published data for reference and comparison on physical activity among adults in the Zimbabwean population was inaccessible.

## 5. Conclusion

The study results indicated a significant difference between numerous variables measures and the location (urban and rural) for the women. Urban women weighed more and had a higher BMI than rural women. This correlated with the significantly higher total energy, protein and fat consumption among urban women when compared to the rural women. Similarly urban women had higher total blood cholesterol readings when compared to the rural women. The rural women however showed an unexpectedly higher prevalence of raised blood pressure when compared to urban women. Furthermore, rural women had marginally higher physical activity levels as determined by the IPAQ, although both groups of women were moderately active. Lifestyle changes occurring in the country due to urbanization may be the causes of the differences reported between the two groups.

During the course of the study literature on health-related behaviours in the country proved to be very limited information concerning the general population. This has made it difficult for the Zimbabwean government to make informed public health decisions through policy formulation and appropriate interventions. The primary results from the study can increase the baseline knowledge on health-related behaviours among the general population in Zimbabwe. Further studies are encouraged on health-related behaviours among women, men and children to confirm the impact and assist to combat a health crisis in Zimbabwe. Interventional studies are also recommended to improve physical activity and decrease chronic disease risk in these populations.

## 6. Limitations

The main limitation was that the study was done in residential category (high density). Additionally all three residential categories (high, middle and low density) could have been sampled. Participants were requested in the previous evening not to eat anything in morning before they could participate in the study, for fasting blood glucose and cholesterol tests but it was difficult to measure adherence to this request.

## 7. Strengths

The study had a large sample for both urban and rural participants. The study is the first in the country to address the health-related behaviours among women in both urban and rural communities in Zimbabwe. The study results will help increase the literature on health concerns in the country.

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None

**Competing Interests Statement**

The authors declare that there are no competing or potential conflicts of interest.

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