KNOWLEDGE, ATTITUDE AND PREVENTIVE PRACTICES AGAINST OSTEOPOROSIS AMONG WOMEN OF REPRODUCTIVE AGE IN IBADAN NORTH EAST LOCAL GOVERNMENT AREA, IBADAN, OYO STATE, NIGERIA

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CERTIFICATION

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DEDICATION

This research is dedicated to God Almighty, the creator of all the earth and the giver of good gifts. Also to my husband, Mr Dipo Omoleye for his patience, support and words of encouragement throughout the period of this research work, God bless you.

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ABSTRACT

Osteoporosis remains the most common metabolic bone disorders affecting both male and female but with greater incidence among the female. However, it is being neglected as it competes for scarce healthcare resources for other diseases. As little attention is given to it, it is under diagnosed and under treated, and public awareness is almost non-existent in most African countries. It has been reported that bone gain occurs in young adults till the age of 30 years and so primary strategies should be aimed at young women as interventions could delay the onset of the disease. Therefore, this study was designed to investigate the knowledge, attitude, and preventive practices against osteoporosis among women of reproductive age in Ibadan North East Local Government Area, Oyo State.

The study was a descriptive cross-sectional survey using a validated semi-structured, interviewer-administered questionnaire to collect information on socio-demographic, knowledge, attitude, and preventive practice against osteoporosis. Three hundred and ninety-three women of reproductive age consented to participate in the study through a multi-stage sampling technique. A 31-point knowledge scale was used to assess the knowledge of osteoporosis and scores ≤ 10 was rated poor, while scores between 11 and 20 were rated fair and scores ≥ 21 was rated as good. The attitude was assessed on a 13-point scale, and scores ≤ 6 were categorised as negative while scores ≥ 6 were categorised as positive attitude. The practice was assessed on a 9-point scale, and scores ≤ 4 and scores ≥ 4 were categorised as poor and good practices respectively. Data collected was analysed using descriptive (frequency tables) and inferential statistics such as Chi-square with the level of significance set at $p < 0.05$.

The mean age of the respondents was 28.3 ± 9.2 years. Less than half of the respondents (48.0%) were between the ages of 15-26 years. About half (50.7%) were married. Most respondents had secondary school education (48.1%). Most of the respondents (58.0%) reported that their parents influence their health decision while 29.0% reported their partners as their influencers. Most respondents (61.0%) mentioned media (television and radio) as their source of information on osteoporosis. Less than half (46.0%) had poor knowledge of osteoporosis. Majority of the respondents (90.0%) had a positive attitude. There was a significant relationship between the knowledge and literacy level, age, income, and parity. A significant relationship was also found between income and attitude.

Few respondents reported that they were aware of the disease. Information on osteoporosis was mostly obtained from the media, this can be both incomplete and inadequate. Majority of the respondents mentioned their parents as their greatest influence in making health decisions, the success of osteoporosis prevention programs might, therefore, depend on the parents' acceptance. Women should be encouraged to eat healthily and cut down on soft-drink or carbonated water consumption as it imparts negatively on bone health. Health education, community-based programs and advocacy can be used to increase awareness and knowledge of the disease among women of reproductive age.

Keywords: Calcium intake, Vitamin D, Exercise, Bone health, Fractures

Word count: 484

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BMI: Body mass Index

DXA: Dual-energy X-ray absorptiometry

IOF: International Osteoporosis Foundation

LGA: Local Government Area

NIH: National Institute of Health

WHO: World Health Organisation

OPERATIONAL DEFINITION OF TERMS

- **Osteoporosis**: simply defined as bone fragility.

- **Women of reproductive age**: women between ages 15-49 years.

- **Osteo-preventive**: preventive practices against developing osteoporosis.

- **Edu-tainment**: resources that both entertain and educate the public.

- **Osteoblastic activity:** refers to the build -up of new bone cells.

- **Oteoclastic activity:** this refers to the body's process of breaking down bone in order to build it again

CHAPTER ONE
INTRODUCTION

1.1   Background to the study

Osteoporosis is a serious and increasing public health problem majorly affecting the female gender (Khuwaya, Nasir, & Mithani, 2005). A reduction in bone mass, increasing bone fragility, deterioration of the bone structure, characterises it with an ultimate increase in the risk of fracture (Habiba, Ahmad, & Hassan, 2002; Korsic, 2006; Sultan, Khan, Mushtaq, & Hassan, 2006). It is often regarded as a 'silent disease' because of its slow, steady yet often unnoticed progression through adulthood and older age as a result in the shift between the process of the formation of bone and resorption shifts in favour of resorption (Gorski, Chmielewski, & Zgoda, 2006). Osteoporosis is a global health problem and this is because the disease itself and the fractures resulting from it are the most important cause of mortality and morbidity. Also, because osteoporosis is a 'silent disease', it is crucial that necessary precautionary measures which include timely discovery of factors that increase the likelihood of having osteoporosis, educating the persons at risk on the means of prevention , as well as early and appropriate intervention, should be adopted (Juby & Davis, 2001; Yin-King & King-Fai, 2006).

Many authors have concluded that although behaviours are likely to change without a direct impact in knowledge, nevertheless, knowledge in itself is not enough to affect a revealing change in preventive behavioural practices (Wardle, Paramenter, & Waller, 2000; Worsley, 2002). Moreover, studies done earlier among female population reveal that their knowledge about osteoporosis is determinate (Eyigr, Karapolat, & Durmaz, 2008; Pande et al., 2005; Riaz et al., 2008; Terrio & Auld, 2002). This lack of comprehension as regards the grave consequences of osteoporosis, in addition to the poor knowledge of preventive behaviours implies that women are not likely to engage in any action to reduce their risk of developing osteoporosis. It is, therefore, necessary to identify the knowledge, attitude, and practices of women towards osteoporosis to develop strategies which will lead to the optimisation of their peak bone mass (Barzanji, Alamri, & Mohamed, 2015).

Some risk factors have been identified as contributing to the development of osteoporosis. These include female sex, progressing age, low BMI, menopause before age 45 years, null parity,

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breast feeding for prolonged duration, a diet low in calcium and Vitamin D, poor intestinal absorption of calcium, smoking, sedentary lifestyle (Habiba et al., 2002; National Institute of Health, 2000; Sultan et al., 2006). Despite osteoporosis being a frequent metabolic bone disease, it has gotten only minimal attention in many developing countries, the reasons for this include the opinion that osteoporosis is just a disease affecting developed countries only, the fundamental acceptance that osteoporosis is an inescapable part of old-age and the unavailability of epidemiological data amongst others. Improving knowledge is effective among different age groups of the female population (Hermandez-Rauda & Martinez-Garcia, 2004). Osteoporosis is regarded as a geriatric disease and as such a far hazard to individuals at the age when prevention is most productive and curable (Follin & Hansen, 2003). The prevention of osteoporosis in later life should begin decades before women experience menopause.

Ezeonu et al., (2018) recorded an osteoporosis prevalence of 36.4% among pregnant women attending antenatal clinic in a hospital located in Enugu State, Nigeria, this is quite higher than what was obtained in India (20.3%) (Ejaz, Mahmood, Qureshi, & Ali, 2012) and Pakistan (17.8%) (Sharma, Tandon, Mahagan, Kour, & Kumar, 2006). The prevalence of musculoskeletal disorders in a study carried out in the Uyo metropolis, South-South Nigeria was 20.1% with male versus female prevalence being 14.0% and 26.5% respectively (Ekpenyong, Udokang, Akpan, & Samson, 2012).

1.2   Statement of the problem

Osteoporosis is currently given little attention or neglected; it may be assumed to contend with other diseases for scarce healthcare resources. Its diagnosis and treatment is below standard, and professional training for health officers combined with public awareness is ineffective in many Africa countries. This results in preventive early death for people suffering as a result of hip fracture as they lose productivity which then leads to extended reliance on family members. Studies reveal that bone gain occurs in young adults till they are 30 years of age (Juby & Davis, 2001) therefore primary programs should be targeted at younger women as interventions can postpone the start of osteoporosis.

Osteoporosis is a serious health problem which affects about 200 million people worldwide (Vijayakumar & Busselberg, 2016). The mortality rate associated with osteoporotic fractures range between 15 to 30%, a similar rate to cancer and stroke (Cooper et al., 2011). Karus et al.,

(2013) reported that over 40% of women and 20% of men with osteoporosis are more likely to have an osteoporotic fracture in their lifetime.

In the United States, osteoporosis is a major health problem which affects more than 10 million adults (National Osteoporosis Foundation, 2002). Burge et al., (2007) estimated that by 2025, costs and annual fracture incidence would rise by almost 50%, with a greater than 87% rise for those aged 65 to 74 years. Osteoporosis related mortality and morbidity cost approximately $17 bilion in 2005 and also involved in an estimated 432,000 hospital admissions, 180,000 nursing home admissions as well as 2.5 million office visits in the United States (National Osteoporosis Foundation, 2010).

Fractures that occur as a result of osteoporosis result in chronic pain and disability which in turn affect the function and quality of life. The lifetime risk of any osteoporotic fracture is 40% to 50% for women and 13% to 22% for men (Johnell & Kanis, 2015).

However, studies on the topic among women of reproductive age in Nigeria are scarce.

1.3   Justification

Non-communicable diseases (NCDs) are fast becoming the most common antecedents of morbidity and mortality globally. These include diseases such as cancers, diabetes mellitus, cardiovascular diseases, respiratory diseases, and musculoskeletal disorders. The impact of these diseases constitute, in no small measure, social and economic burden on individuals, family and the state in sub-Saharan Africa countries including Nigeria.

Researchers have reported unhealthy behavioural practices and low level of knowledge about osteoporosis by the use of different tools for assessment, of which some were administered to young women, a group of importance (Chan, Kwong, Zang, & Wan, 2007; Werner, 2005). Prevention, therefore, is essential because osteoporosis is an incurable disease (Tung & Lee, 2006) and this can be initiated when the level of knowledge is identified.

In light of the above, this study will shed light into the knowledge, attitude, and preventive practices against osteoporosis among women of reproductive age in Ibadan North East LGA. This study will also contribute to the growing literature on osteoporosis in Nigeria, as there is little information on the health challenge in Nigeria.

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This study will add value to the field of health promotion and education on osteoporosis and a reference for future researchers in this field. The paucity of data and the dearth of information of osteoporosis will be bridged. The findings from this study will be useful for policy dialogue in particular focused attention on diagnosis, treatment, and management of osteoporosis at the various levels of care.

1.4   Research questions

1. What is the level of knowledge of the respondents about osteoporosis and its risk factors?
2. What is the attitude of the respondents regarding osteoporosis?
3. What are the preventive practices taken by the respondents against osteoporosis?

1.5   Broad objective

The broad objective of this study was to assess the knowledge, attitude, and preventive practices of osteoporosis among women of reproductive age in Ibadan North East Local Government Area, Ibadan, Oyo State, Nigeria.

1.6   Specific objectives

The specific objectives are to

1. Assess the level of knowledge of the respondents on osteoporosis
2. Determine the attitudes of the respondents relating to osteoporosis
3. Identify the preventive practices of the respondents against osteoporosis

1.7   Research hypotheses

The following null hypotheses were tested

H_01 There is no significant association between socio-demographic variables (age, occupation, level of literacy) and level of knowledge of osteoporosis among respondents.

H_02 There is no significant association between socio-demographic variables (age, occupation, level of literacy) and attitudes towards osteoporosis among respondents.

H_03 There is no significant association between socio-demographic variables (age, occupation, level of literacy) and preventive practices against osteoporosis among respondents.

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2.1   Concept of Osteoporosis

Osteoporosis, like other diseases, has a generic description and also a distinct definition by specialists in the field. In a play language, osteoporosis is defined as a 'disorder characterised by a unique loss of bone thickness'. The World Health Organisation (WHO) defines it as a 'systematic skeletal disease characterised by low bone density and micro architectural deterioration of bone tissue with a consequent increase in bone fragility'(WHO, 2003).

It is depicted by reduced bone mass and structural deterioration of bone tissue, which leads to escalated bone frailness and vulnerability to fractures following the slightest trauma. Since osteoporosis is a "silent disease," a lot of people are usually unaware of their state until they suffer a fracture as a result of the fragility of their bones. However, osteoporosis is a greatly preventable disease which can be achieved by optimising peak bone mass during growth of the skeletal structure, preserving, and maintaining bone mass during adulthood, and reducing bone loss with advancing age.

Osteoporosis is a disease which causes bone density and quality to reduce. It has no symptoms until a fracture occurs(Chan et al., 2007; Mc Lendon & Woodis, 2014; Yang et al., 2010). It is the most prevalent disease of the bone which affects both male and female, but principally affects the female gender as a result of rapid bone loss as a result of menopause (National Institute of Health, 2000). Instructional programmes can increase knowledge and awareness about osteoporosis and its debilitating outcome since the risk factors are controllable and hinge on behaviour (Chan et al., 2007). It has become evident however that it is difficult to achieve changes in behaviour and beliefs (McLeod & Johnson, 2011; Piaseu, Schepp, & Belza, 2002; Shanthi, McLeod, Kennedy, & McLeod, 2008).

Osteoporosis is recognised as a major public health problem affecting millions of people globally (Vijayakumar & Busselberg, 2016). It is characterised by multifactorial aetiology and also one of the most common metabolic bone diseases worldwide. The increasing occurrence of osteoporotic fractures along with the lack of knowledge about the disease is continuously increasing the burden on both the health sector and the general population. Globally,

Osteoporosis results in more than 8.9 million fractures every 3 seconds and it affects both genders although females are at higher risk of developing it (Spencer, 2007). Despite its high morbidity rate, it is perceived as a disease affecting the old only and thus a far threat to those at the age-group where behaviour that can prevent it is most beneficial.

Furthermore, there is an insufficiency of data on osteoporosis in Africa as it is widely believed to be uncommon in the non-Caucasian population. Chan & Ko (2006) reported that there is a higher menace of women suffering from an osteoporosis-related fracture than the combined risk of cancer of the endometrium, ovary and breast. This fact was also supported by Anderson, Chad, & Spink (2005), who expressed that although either sex can be affected, over 80.0% of women have osteoporosis. Osteoporosis fracture leads to loss of independence, reduced physical activity and ultimately reduction in the quality of life of the affected individual. The lack of quality health care and rapid & effective diagnosis in developing countries including Nigeria can prevent the early identification of the symptoms. Furthermore, many young women prefer taking sodas and junk foods – a poor eating habit which makes them susceptible to diseases instead of foods containing fruits, vegetables and calcium.

Women experience bone loss after menopause and because they live longer than men, more than 75.0% of all hip fractures are presented in women. Some researchers have reported a 2:1 hip fracture between women and men respectively occurring over the age of 65 (Cummings & Melton, 2002). Premature menopause, primary or secondary amenorrhea, hyperthyroidism are other hormonal factors that increase the risk of fracture.

It is appraised that up to 40.0% of the total bone mass is lost after menopause (Anderson et al., 2005). The hormone oestrogen has a major role to play in reducing bone loss in women in three major ways:

- by promoting absorption of calcium by the kidneys.

- by increasing the absorption of calcium by the intestines.

- by reducing the osteoclastic activity and increasing the number of vitamin D receptors on osteoblasts.

Research suggests that osteoblastic activity is promoted by the oestrogen hormone, which in turn increase the growth of new bone and cause the thyroid gland to produce calcitonin which

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provides more protection at the cellular level. The absence of oestrogen as a result of the cessation of ovarian function distorts the skeletal homeostasis which results in a net loss of bone density in postmenopausal women (Maher, Salmond, & Pellino, 2002).

2.1.1 Types of osteoporosis

- Primary (age-related postmenopausal): The main mechanism for age-related bone loss is an imbalance as a result of the ageing osteoblast. This can be further classified into;

  - Type 1: Post-menopausal osteoporosis, this occurs mostly in women some 15-20 years after menopause. It affects mostly trabecular bone which increases the patient's susceptibility to vertebral compression fractures.

  - Type 2: Senile osteoporosis, occurs in both men and women who are over the age of 70 years with a female to male ratio of 2:1. It affects the trabecular bone equally, thereby predisposing patients to femoral neck fractures. In type 1, oestrogen deficiency has a major role while in type 2, ageing and calcium deficiency for a long time are responsible.

- Secondary osteoporosis: the causes include but not restricted to alcohol and cigarette consumption, systemic illnesses, medications such as glucocorticoids and gastrointestinal disorders.

2.1.2 Prevalence of osteoporosis- Global, Africa and Nigeria

Osteoporosis is a highly preventable disease by optimising peak bone mass during skeletal growth, preserving bone mass during adulthood, and minimising bone loss with advancing age. Thus, adolescents and young adults are strongly urged to embrace healthy lifestyle behaviours for an excellent skeletal health which can be achieved by increasing the level of weight-bearing exercise, adequate dietary calcium and vitamin D intake, good nutrition and maintaining adequate body mass index, cessation of smoking, moderate alcohol, caffeine, and intake of sodium.

The incidence of osteoporosis is best measured indirectly, as the incidence of fractures attributed to the condition, while prevalence is best measured by the frequency of reduced BMD (Bone Mineral Density) or numbers of those with vertebral deformity. The prevalence of osteoporosis

in less developed and developing countries is not clear, as there are few studies in these populations.

A common tenet is that African women tend to have a higher bone mineral density (BMD) than females of other cultures or backgrounds. However, this unverifiable statistic is quickly changing as conscious females keep a watchful eye on their weight by impacting positively on their bone health thereby decreasing their risk of contracting bone diseases. African women are now being affected as a result of urbanisation and development.

A study conducted by Ale, Ogbera, Ebili, Adeyemo, & Afe (2018) showed that the prevalence of osteoporosis among hyperthyroid patients was 45.0%, which is quite high. This indicated that osteoporosis was quite a common occurrence in thyrotoxicosis among Nigerian patients with hyperthyroidism. A similar study conducted on the prevalence of osteoporosis among older patients at a geriatric centre in Nigeria showed the prevalence to be 56.9% (Alonge et al., 2017).

Osteoporosis remains an understudied disease in Nigeria mainly because dual-energy X-ray absorptiometry which is the gold standard for determining Bone Mass Density (BMD), cannot be easily accessed.

2.2   Knowledge of osteoporosis among women

Evidence suggests that knowledge of osteoporosis is a contributing factor to undertaking behaviours that prevent it, though there exists no distinct relationship between them. Various results gotten from cross-sectional studies showed whether there was a relationship between levels of osteoporosis knowledge and osteoporosis preventive behaviour (Terrio & Auld, 2002; Wallace, 2002). There have been some prospective studies which demonstrated increase in knowledge of osteoporosis and resultant improvements in osteoporosis preventive behaviour (Brecher et al., 2002; Curry, Hogstel, Davis, & Frable, 2002) while other studies have demonstrated changes in knowledge only but not behaviour (Blalock et al., 2000; Sedlak, Doheny, & Jones, 2000).

Research has demonstrated a relationship between osteoporosis knowledge and behaviour, for instance, the causal analysis was used to prove that osteoporosis knowledge was an important factor to improving exercise and calcium intake behaviour (Piaseu et al., 2002).

In another study, Etemadifar et al (2013) found that Iranian women with a higher educational level have significantly higher knowledge about osteoporosis compared to women with a lower level of education but that this knowledge does not virtually translate to preventive practices. Another study conducted by Hurst & Wham (2007) to assess the attitude and knowledge of osteoporosis risk prevention on different age groups of women in New Zealand showed that knowledge about osteoporosis increase with increasing age and that there was also a significant difference in mean scores by age group. Moreover, the study showed that the younger women (20-29 years) had the lowest level of knowledge while the older women (40-49 years) had the highest.

A similar study by Aylin & Merdiye (2011) had results which showed that women who had higher income had a corresponding OKT (Osteoporosis Knowledge Test) scores. Also revealed by their study is the influence that educational level had on the knowledge of women as women who were university graduates had a high level of knowledge of osteoporosis. Other studies have also established the relationship between level of education and knowledge of osteoporosis that as educational level increase, knowledge increase as well (Pande et al., 2005).

2.2.1 Sources of information

A study by El-Masry, Elkhawaga, El-Gilany, & Alam (2018) revealed that the most frequent source of knowledge about osteoporosis among the women studied was TV and radio while the least was journals and newspapers. A reason for this might be the fact that TV & radio are both easily accessible and are edu-tertainment tools also. They are also considered cheap popular media for the different educational levels. In another study, doctors were found to be the main source of information (Ahmadieh, Basho, Chelade, Al Mallah, & Dakour, 2018) which is in variance with a study by Al-Muraikhi et al., (2017) who revealed that television and magazines were the main sources of information.

2.2.2 Risk factors of osteoporosis

These can be classified as either modifiable or non-modifiable.

2.2.2.1 Modifiable risk factors

- **Parity and menopause**: Although there are conflicting interests between the relationship between menopausal status and osteoporosis development (Hyassat, Alyan, Jaddou, &

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Al, 2017; Sharmai, Millani, Alizadeh, & Al, 2008), significant correlations was found between years of menstruation, menopausal status and parity (Sharmai et al., 2008). It was found out that at every BMD sites, women considered to be living in absolute poverty had the lowest BMD (Maddah, Sharami, & Karandish, 2011).

- **Socioeconomic status**: Osteoporosis was considerably prevalent in a study among women of low socio-economic status compared with those in urban areas(Maddah et al., 2011).

- **Nutrition:** It is important to pay extra attention to preventive factors at a younger age as not doing so may lead to decrease in bone loss in later years. It has been reported that Vitamin B12 and high soft drink intake are major causes of osteoporosis in otherwise healthy women(Hammad & Benajiba, 2017; Qussif, Oumghar, Sbai, & Al, 2012). However, sunlight is abundant in Nigeria, the extent of sunlight exposure and its influence on vitamin D levels is determined primarily by clothing style and dressing.

2.2.2.2 Non-modifiable risk factors

- **Genetics**: Osteoporosis is a condition caused by both environmental factor and gene interaction in about 30% and 70%, respectively (Al Saleh, Sayed, Monsef, & Al, 2016; El Maataoui, Benghabrite, El Maghraoui, & Al, 2015; Hammad & Benajiba, 2017; Mahran, Hussein, & Farouk, 2011; Sadat-Ali, Almowen, AlOmar, & Al, 2012).

- **Age:** Advanced age has been identified as an important risk factor of osteoporosis and decreased BMI (NIH, 2001).

- **Gender:** Women experience rapid bone loss at a younger age compared to men. Females above the age of 50 experience a 4 fold higher rate of osteoporosis compared with men (Alswat, 2015).

- **Heredity**: A history of osteoporosis in the family was found to be a risk factor for developing osteoporosis and also for postmenopausal low BMD (Goodarzizadeh, Shahrjerdi, Najafi, & Al, 2013).

2.3   Attitude towards osteoporosis among women

Attitude can be modified by an increase in knowledge levels. Attitude is subjective to individuals and would determine to a large extent their practices towards osteoporosis- either preventive or pre-disposing.

Hurst & Wham (2007) in a study carried out reported that there was a high level of health motivation and a drift towards increasing participation in preventive health care with increasing age. It is worthy of note that although the increase in knowledge was significant with advancing age, perceptions of individual susceptibility and seriousness of osteoporosis were not affected. In another study conducted by Al-Muraikhi, Chehab, Said, & Selim (2017), the results revealed a low susceptibility to osteoporosis consistent with the result of a similar study conducted in New Zealand (Hurst & Wham, 2007) and Taiwan (Yin & Huang, 2003). An explanation of this might be attributed to the absence of symptoms and a low level of knowledge of these symptoms among women. Another reason might be the erroneous belief that osteoporosis affects only older women as revealed in a study by Pichowski, Nickols- Richardson, Clymer, & Roberto (2010) which imparts on their attitude towards the disease.

2.4   Preventive practices against osteoporosis

Bone density diminishes with age; unique regard should be given to preventing the disease at a younger age. Prevention of osteoporosis can be initiated at any age. Although 40 to 45% of bone mass is acquired in early adulthood, prevention is, therefore, the most effective if it starts during childhood and adolescence. Additionally, if people develop and consciously follow through with lifestyles that support strong bones when they are younger, the likelihood that they will have healthy bones through their lives is increased. Measures, such as high calcium diet and exercise among adolescents, have been very productive in preventing osteoporosis, particularly among women.

Calcium plays a major role in bone formation. Bones and teeth make up more than 99% of the body's calcium (Boskey, 2007). Since calcium is important for bone structure, it is imperative that the diet is adequate in dietary calcium for adequate bone health. Recommendations are 1300 mg of calcium for youths between the ages of 9-18 years and 1000 mg for adults 19-50 years (Ross, Taylor, Yatkine, & Del Valle, 2011). Approximately 78%-90% of women over age 20 are

not meeting calcium recommendations (NIH, 2000).Vitamin D also plays a role in ensuring adequate calcium absorption. Inadequate vitamin D intake can lead to poor absorption rates of calcium (Heaney, 2000). Research primarily focuses on calcium intake as an outcome measure of osteoporosis education interventions; few studies examine vitamin D in this context. The relationship between vitamin D and osteoporosis-related falls and fractures has been studied in detail and adequate vitamin D intakes have been shown to decrease fall and fracture rates (Hosseini & Hosseini, 2008).

Alshammari (2014) reported low practice scores of osteoporosis in a study conducted among Saudi Arabian women. The study revealed that only 42.8% of the women exercised. The reason for this might be associated with lifestyle, age & occupation. Lack of available time as a result of one's occupation is a reason for the short duration of the exercise. This present study also seeks to find an association between socio demographic factors- age, occupation, economic status, educational level, and preventive practices.

Another study by Khan, Sarriff, Khan, & Mallhi (2014) reported no significant difference between educational level and physical activities towards osteoporosis prevention while a study by Kim, Lee, Shin, & Park (2015) showed a significant relationship between household income and practices. The study revealed that a low level of household income was associated with low practices towards osteoporosis prevention.

Results of a study conducted by Umay, Tamkan, & Gundogdu (2011) also noted that low-income status, low social status had an effect on bone mineral density negatively. In another similar study, the findings showed that 87.7% of teachers – an educated population consumed milk and its products and this is explained as related to the high socio-economic and educational levels of the teachers. The study revealed that women with high social status had access to calcium more easily (Teezcan, Subasn, & Altintas, 2002). This might imply that women with high social status, high educational level and higher monthly income had better access to calcium sources easily which affects their nourishment accordingly.

A study conducted by Rafraf, Bazyun, & Afsharnia (2009) also reported a significant association between calcium intake and educational level of women, this may be indicative of the fact that higher education levels might be associated with a healthier diet. Furthermore, higher educational level results in higher income, therefore, better sources of calcium- milk and its

products. This might imply that women with a low educational level are likely to be more at risk of developing osteoporosis than others and therefore, attention should be focused on increasing women's literacy in the country.

2.4.1 Nutrition and osteoporosis

Our bone requires a lot of nutrients to develop and be healthy, these include calcium, phosphorus, zinc, copper, vitamins D, K, A and C and also protein. The two most crucial nutrients for bone health include calcium and vitamin D and they are gotten from the consumption of foods such as milk, vegetables and fish oils. It is necessary to take in enough calcium during growth as this helps to build a high peak bone mass as it is hereditary possible for them. This window of opportunity remains exclusive for women till their thirties. Vitamin D plays a role in calcium absorption, it is therefore important that foods rich in vitamin D such as milk and other fortified foods are consumed. Alcohol imparts negatively on bone health as it leads to malnourishment which in turn affects bone health as a result of reduction in calcium absorption.

Research by both national and international groups has recently shown that the recommended calcium intake for adolescents (10-13 years) is 1,300 mg while for adults (19-50 years) is 1,000 mg, and 1,200 mg daily for older adults (>50 years) and questions on these were included to reflect the endorsement for increased calcium intake (International Osteoporosis Foundation, 2012). The best sources of calcium include milk and dairy products, fish and dark green vegetables.

Vitamin D plays an important role in bone health and a deficiency of it results in osteoporosis and osteopenia, muscle weakness and osteomalacia and also increases the risk of fracture (Holick, 2007).Vitamin D2 is gotten from diet while vitamin D3 is gotten from sunlight. It helps in calcium absorption, influences calcium homeostasis, and also bone development and maintenance (Toon, 2005). Supplementation is needed to achieve the recommended level of 800 IU vitamin D per day as the naturally occurring food sources of vitamin D are not commonly consumed foods or contain small amounts of vitamin D. Vitamin D insufficiency is not limited to exposure to sun but also affected by intake. The season, latitude, time of day, and the amount of ultraviolet rays (UVB) from the sun are factors affecting the rate of vitamin D absorption. Therefore, the level of Vitamin D present in the body is sustained by exposure to sunlight in

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addition to dietary input. The majority of vitamin D is from the sun while the rest is gotten from foods such as oily fish, eggs and fortified foods (Holick, 2004).

2.4.2 Oestrogen and osteoporosis

Menopause is a great risk factor for the development of osteoporosis in women, this is because of the rapid drop of the hormone-oestrogen. The hormone is important as it helps in maintain the balance between bone loss and formation of new bone. During menopause, because of the absence of oestrogen, cells that are liable for breaking down old bone- Osteoclasts are produced while Osteoblasts are destroyed. This disrupts the balance between bone resorption and bone formation which ultimately results in bone loss (Heaney, 2000).

2.4.3 Exercise and osteoporosis

It has been suggested that moderate to high-intensity weight-bearing activities such as running, weightlifting is more beneficial in developing optimal bone health than low-intensity non-weight bearing activities- swimming. There is a relationship between muscle mass and skeletal mass in people that exercise. This process occurs during exercise by stimulating osteogenesis which maintains and ultimately increase bone mineral density which improves bone density. Exercise has been demonstrated to benefit bone health at every age and the current recommendations for exercise so as to build and maintain bones is 150 minutes of moderate exercise as well as muscle strengthening activities every week (World Health Organization, 2010).

2.5 Theoretical framework

The Theory of Reasoned Action was developed by Ajzen and Fishbein (1980) to explain human behaviour that is under 'voluntary' control. The assumption is that individuals will make decisions in well-defined circumstances.

Subjective norms relate to individual perception and also what other people think they should do (normative beliefs) and by an individual's motivation to comply with those other people's wishes. The theory predicts that a person will likely adopt, maintain or change behaviour if they believe the behaviour will benefit their health, is socially desirable and feels the pressure to behave in that way.

Attitude towards osteoporosis

Expectancies

- Prevention of osteoporosis
- Screening for osteoporosis for early detection
- Advice and recommendation from health workers

External factors

- Demographic: age, literacy level, socioeconomic status
- Reference groups: peers, partner, information from health workers, sufferers
- Knowledge about the disease
- Motivation to comply
- Individual personality

Behavioural intention

Likely to engage in osteopreventive practices

Subjective norms

- Approval of others (significant other)
- Belief that prevention is less expensive
- Advice from others
- Peer influence
- Information from physicians

Behaviour

Osteopreventive practices likely to be practiced

Figure 2.1: The Theory of Reasoned Action as applied to the study

CHAPTER THREE

METHODOLOGY

3.1   Study design

The study was a descriptive cross-sectional survey.

3.2   Study area

The study location was Ibadan North East Local Government Area (LGA), Ibadan, Oyo State, Nigeria. Ibadan North East LGA has its administrative headquarters located in Old Army Barracks, Iwo road, Ibadan. It was created from the defunct Ibadan Municipal Government in 1991.The Local Government area has common boundaries with Egbeda and Ona-Ara LGA in the East, Ibadan North LGA in the west, Lagelu and Akinyele LGA in the North and Ibadan South-East LGA in the south. Ibadan North East LGA is subdivided into 12 functioning wards headed by 12 elected councillors. The Local Government has multi-ethnic tribes. Though predominantly Yoruba; other tribes include the Igbo, Urhobo, Itsekiri, Ijaw, Hausa etc.

The area is a major commercial town and this is evident by the number of shops and businesses scattered around the area. The location is mostly characterised by old houses, lack of basic amenities and unplanned housing pattern.

The communities in the LGA are grouped or divided into various political wards for ease of administration. There are 12 political wards in the LGA namely:

Ward 1- Odo-Osun, Labiran

Ward 2- Ogbori Efon, Ita-Badi, Oranyan, Beyerinka

Ward 3- Kosodo, Labo, Alafara

Ward 4- Adekile, Aremo, Orita Aperin

Ward 5- Labiran Aderogba

Ward 6- Oje Aderogba, Alafara

Ward 7- Oke-Offa, Atipe, Oja Igbo, Aremo Alafara

Ward 8- Ode Aje, Padi, Alase, Aremo Ajibola

Ward 9- Koloko, Agugu, Oke Ibadan, Idi-obi

Ward 10- Oje Irefin, Ita Akinloye, Baba sale

Ward 11- Iwo road, Abayomi, Basorun, Idi-Ape

Ward 12- Agodi Gate, Oluyoro, Gbenla, Oke-Adu, Aromolaran, Onipepeye

3.3   Study variables

The independent variables consist of the socio-demographic characteristics of the respondents which include age, occupation, ethnicity, marital status, educational level, average monthly income, and the number of children.

The dependent variables are the knowledge of osteoporosis, attitudes towards osteoporosis, and preventive practices against osteoporosis.

3.4   Study population

The study population consisted of women of reproductive age (women within 15-49 years' age bracket). The women are identified as a key population for this study because they are more inclined to developing osteoporosis as compared to males.

3.5   Sample size

The Sample size for this study was estimated from the Leslie Kish's formula (Kish, 1965) for single proportion which is as follows:

$$N = \frac{Z^2pq}{d^2}$$

N= Minimum sample size

Z= Standard normal deviation set at 1.96 normal interval

p= Proportion estimated to be obtained in the target population (prevalence of osteoporosis among women of reproductive age in Nigeria given as 36.4% (Ezeonu et al., 2018).

q= Proportions that does not have the characteristics being investigated

q=1-p

q= 1 – 0.364 = 0.636

d= Degree of accuracy set at 0.05 (precision set at 5% significance)

Therefore, the sample size N= $\underline{(1.96)^2 \times 0.364 \times 0.636}$

$$0.05^2$$

N= $\underline{0.889}$

0.0025

N= 355

A non-response rate of 10% of 377 = 37.7

Therefore, 38 was added to the sample size calculated to make the sample size 393 in order to address issues of incomplete response.

3.6 Sampling technique

Multistage sampling technique was adopted to select eligible respondents by:

Stage 1: A simple random sampling was done among the 12 political wards in the LGA to select 50% of the political wards for the study, giving a total of 6 wards selected.

Stage 2: Two communities were picked in each of the 6 wards through random sampling.

Stage 3: Enumeration of the houses in the selected communities.

Stage 4: Systematic sampling was done to select from the houses in the communities using a predetermined 'k' interval (to avoid bias) K=15

Stage 5: Respondents who fulfil the inclusion criteria were randomly selected from the households to participate in the study.

Table 3.1: Number of respondents selected in each community

Ward	Community	Total number of respondents
1	Odo-Osun	32
	Labiran	34
4	Adekile	30
	Orita Aperin	30
7	Oke-Offa	33
	Aremo	33
9	Oke Ibadan	38
	Idi-obi	33
11	Iwo road	30
	Basorun	37
12	Agodi Gate	30
	Oluyoro	33

3.7   Inclusion criteria

Women within the reproductive age (15-49 years) and who were willing to participate in the study were included.

3.8   Exclusion criteria

Women who did not give their consent and those outside the defined age group. Women of reproductive age who were sick were excluded and women who were not resident of the communities in the LGA were also excluded.

3.9   Instrument for data collection

Quantitative data were collected with the aid of a semi-structured, interviewer-administered questionnaire. The questionnaire was developed based on the research objectives and review of literature on the topic. The questionnaire was structured and divided into sections based on the objectives of the study as follows:

Section A: Socio-demographic characteristics

Section B: Knowledge of osteoporosis

Section C: Attitude towards osteoporosis

Section D: Preventive practices against osteoporosis

The respondents' level of osteoporosis knowledge was assessed using an adapted validated questionnaire which is the revised version of the original tool- Osteoporosis Knowledge Assessment Test (OKAT). It was developed by Gendler and co-authors (Gendler et al., 2015). In addition, the attitude of these women to osteoporosis was assessed after extensive literature search on the subject and questions formulated. This information was also documented. This study also elicited information regarding preventive practices against developing osteoporosis amongst women.

3.10   Validity of the instrument

The validity of the instrument was ensured through the development of a draft instrument in which extensive literature were reviewed appropriately. A tool was adapted for use in the study-Osteoporosis Knowledge Assessment Tool (OKAT). The instrument was also scrutinized by the project supervisor and construct validity was ensured by making sure variables in the theoretical framework were represented in the instrument. Input from independent peers was accepted, corrections and suggestions were made in the instrument before it was administered to the respondents.

3.11   Reliability of the instrument

The instrument for the study was pre-tested among women in reproductive age living in Ibadan North West LGA, the LGA has similar characteristics with the study area. The instrument was pretested among 40 women of reproductive age, collected, cleaned, coded and entered for analysis. The result of the pre-tested instrument showed a Cronbach Alpha correlation coefficient of 0.703.

3.12   Data collection procedure

 Some questionnaires were translated to the native language- Yoruba Language for better understanding by members of the community. The communities (two in each ward) were randomly selected from a total of six wards. The predetermined value (K) was used in selecting

the target population by enumerating houses in each community. The women in the selected house who indicated interest were picked by balloting where they were more than three in number. The data was collected by the researcher with the support of two Research Assistants (RAs) who were trained by the researcher on the ethical conduct of research, administration of the questionnaire, the respect for privacy and the content of the instrument before to the time of data collection. The informed consent forms (attached to the questionnaires) were distributed to the respondents and after they had been given adequate information about the study, the researcher read the questions and filled them on behalf of the respondents based on their responses. Those who insisted on filling it themselves were allowed after explanation of each section and clarification. After the questionnaires had been filled, the researcher checked for completeness and errors before leaving the field. A total of 393 questionnaires were administered to eligible respondents and the data collection process took place for fourteen days.

3.13 Data management and analysis

All questionnaires were serially numbered for easy entry and recall, coded according to a guide and then transferred into SPSS (version 23) for data analysis. A coding guide was developed to code the questionnaires for entry for analysis. Knowledge questions were categorised as poor, fair or good based on the number of question items. The total score would have a maximum of 31 if all the statements were correctly answered. Attitude to osteoporosis was categorised as either positive or negative.

Descriptive statistics such as mean, standard deviation, percentages and inferential statistics such as Chi-square test statistic were conducted to evaluate the hypotheses and investigate the association between the proportions in the study among the respondents. The results obtained from the analysis were summarised and presented in tables and charts. Respondents' knowledge of osteoporosis was categorised into knowledge of risk factors, knowledge of exercise and knowledge of nutrition and was measured on a 31-point knowledge scale. Knowledge Score (KS) of ≤10 was rated poor, KS of 11-20 was rated fair knowledge, and KS ≥21 was rated as good knowledge.

To assess the respondents' attitude towards osteoporosis, questions were asked after literature review based on the theoretical framework was adopted. The attitude was measured on a 13-point scale, with scores ≤ 6 and >6 regarded as poor and good respectively. The preventive

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practices engaged in by the respondents were also assessed on a 9-point scale and scores ≤ 4 categorized as poor while scores >4 were regarded as good practice.

Chi-square test statistic was conducted to investigate the association between socio-demographic characteristics and knowledge on osteoporosis, the attitude of respondents and preventive practices of respondents.

3.14   Ethical considerations

Ethics approval was obtained from the Oyo State Research Ethical Review Committee, Ministry of Health, Ibadan prior to the commencement of the study (AD/13/479/1388). Informed consent was also sought from the respondents before administering the questionnaire.

Confidentiality: The confidentiality of the respondents was protected as there was no request for names and personal addresses, instead, numbers were assigned to each questionnaire. Confidentiality of each participant was maximally maintained during and after the collection of their information.

Informed Consent: A written informed consent was obtained from the respondents through appended signature. The information gathered was stored in the computer package by the principal researcher, copies of the filled instrument were kept for safety, and unauthorized access was prohibited and the questionnaires safely kept. Written informed consent was obtained from the respondents before administration of the questionnaire.

Beneficence: There was no direct benefit from this study, but this study would help in developing preventive strategies and recommendations for the prevention of osteoporosis among women.

Non-maleficence: The study did not involve any risk as it did not involve the use of any invasive material. There was no harm to the respondents who chose to participate.

Voluntariness: The respondents had the right to either participate or not in the study. The right of a potential respondent to decline or withdraw from the study at any time was not infringed upon.

Translation of protocol to the local language: The questionnaire was translated to the local language- Yoruba, this is because of the varying levels of literacy of the respondents. This was

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done by a linguistic expert that is vast in both languages to ascertain the accuracy of the translation.

Dissemination of findings: The final outcome of the study and recommendations would be communicated appropriately to all stakeholders at the conclusion of the study including the community members and also considered for publication in journals.

CHAPTER FOUR

RESULTS

4.1   Socio-demographic characteristics of respondents

The total population of respondents were enrolled in the study was 393. Information on the socio-demographic characteristics of respondents are highlighted on Table 4.1 below. Classifying the age record into groups, respondents (47.8%) were within the age range of 15 – 26 years; while about one-third (33.4%) were within the 27 – 38 years age range. About half of the respondents were married (50.7%), and 48.0% were single. Most respondents (45.8%) engaged in trading, while 9.1% were civil servants. Most respondents (45.8%) engaged in trading and 31.6% were unemployed. Majority of the respondents were from the Yoruba ethnic group (89.5%), while 8.7% were from the Igbo ethnic group.

Some of the study respondents (48.1%) had no child as at the time of the study, while 24.0% had more than 4 children. The majority (77.6%) were members of a nuclear family setting, while 22.0% were from an extended family setting. Few of the study respondents (7.1%) reported having a family member who had been affected by osteoporosis, out of this proportion, 57.1% reported their grandparents suffered from the disease, about 21.4% reported they had aunts who were affected, 14.3% reported their mothers were affected, while the rest reported their father and brother suffered from the disease (3.6% each). More than half of the respondents (58.0%) reported their parents influence their health decision - either the father or mother; 29.0% reported their partners were responsible for influencing their health decision, 6.9% indicated they are solely responsible for their health decisions, while 6.1% indicated other persons had influenced their health decisions. The mean age of the respondents was 28.3±9.2 years (Table 4.1)

Table 4.1 Socio-demographic characteristics of respondents   (N=393)

Demographic variable	n	%
Age (in years)		
15-26 years	188	47.8
27-38 years	131	33.4
39-49 years	74	18.8
Marital status		
Single	188	47.7
Married	199	50.7
Divorced	1	0.3
Separated	5	1.3
Occupation		
Civil servant	36	9.1
Artisan	53	13.5
Petty Trader	180	45.8
Unemployed	124	31.6
Ethnicity		
Yoruba	352	89.5
Igbo	34	8.7
Hausa	3	0.8
Others (Nupe. Igala)	4	1.0
Number of children		
None	189	48.1
1	24	6.1
2-4	85	21.6
>4	95	24.2
Type of family		
Nuclear	305	77.6
Extended	88	22.4
Family history of osteoporosis		
Yes	28	7.1
No	365	92.9
Relationship with affected member (n=28)		
Grandparent	16	57.1
Aunt	6	21.4
Mother	4	14.3
Father	1	3.6
Brother	1	3.6
Person who influences health decision		
Parents (Father/Mother)	228	58.0
Partner	114	29.0
Self	27	6.9
Others (Siblings, friends, religious leader)	24	6.1

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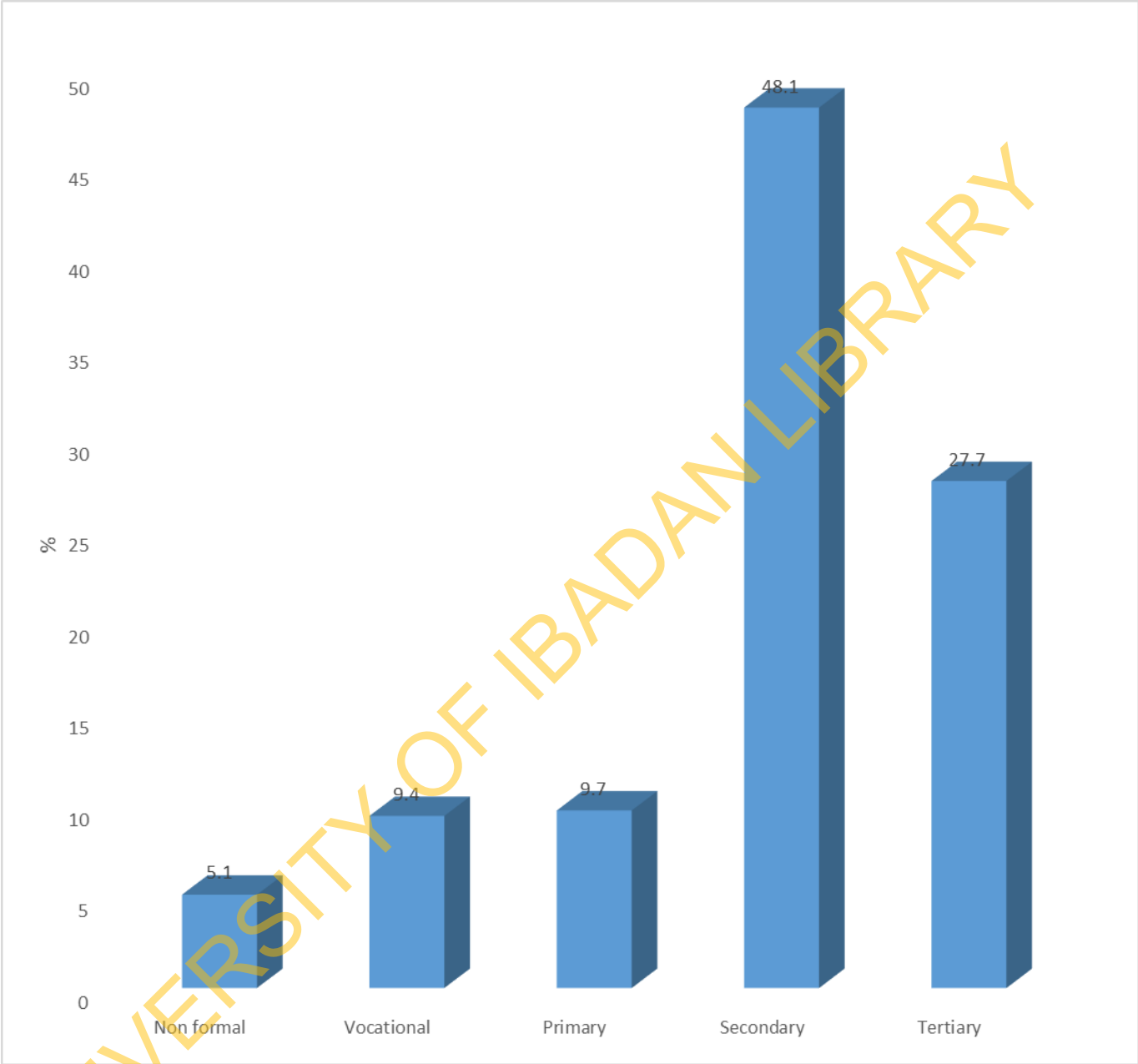
Figure 4.1: Respondents' level of education
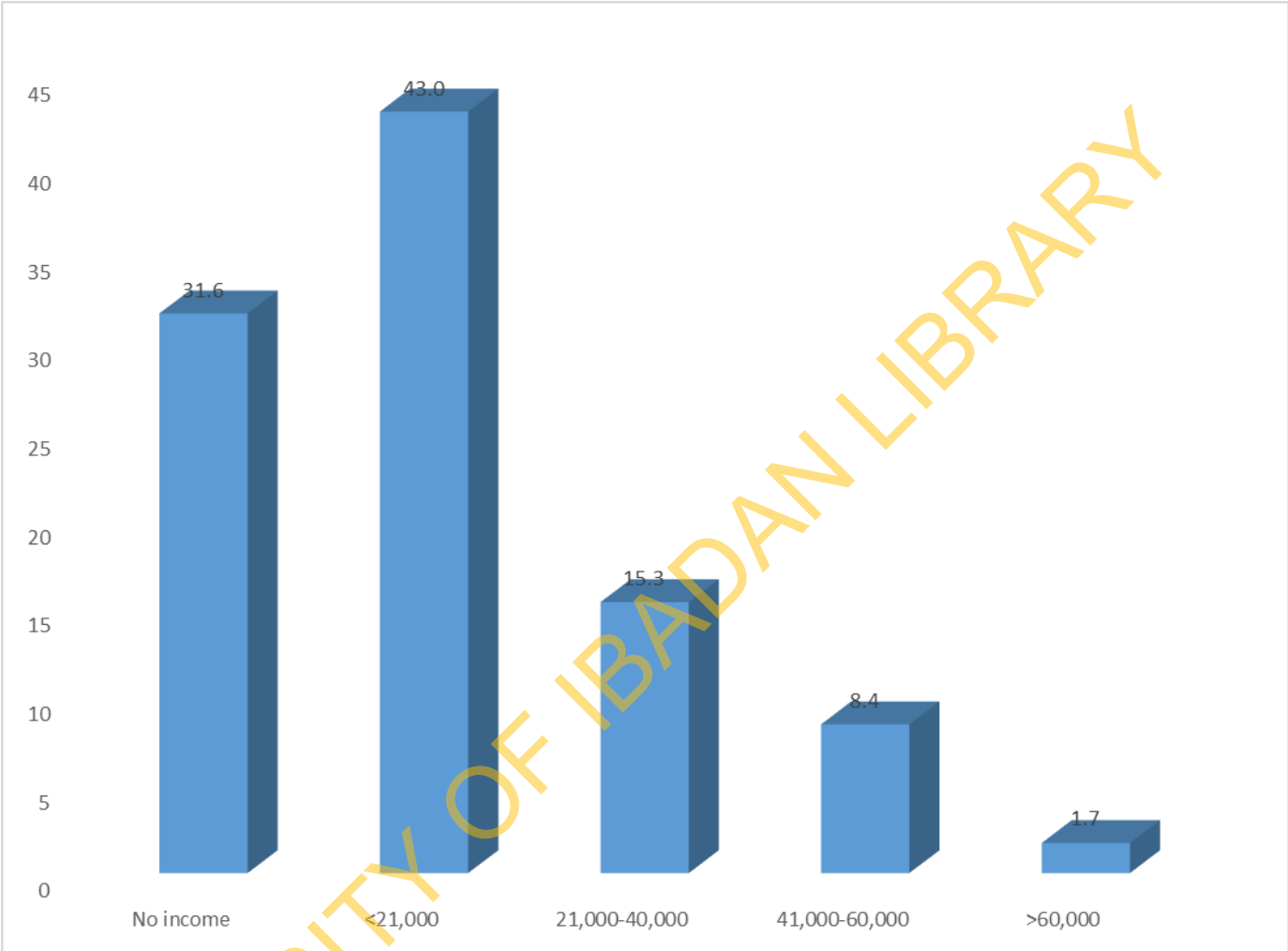
Figure 4.2: Respondents' level of monthly income

4.2   Awareness of osteoporosis

Finding show that most respondents, 64.6% indicated having heard about osteoporosis. The most common sources of information reported by the respondents were television/radio (60.7%), friend & family member (15.7%), health worker (13.4%), newspaper/magazine (4.3%), internet (3.9%) (Table 4.2).

Table 4.2: Awareness and source of information on osteoporosis

<div align="right">(N=393)</div>

Variable	n	%
Awareness of osteoporosis		
Aware	254	64.6
Unaware	139	35.4
Source of information		
Television/Radio	158	60.7
Newspaper/Magazines	11	4.3
Health worker	34	13.4
Friend and family member	40	15.7
Internet	10	3.9
Others (School, Patent Medicine Vendor, Seminar)	5	2.0

4.3 Overall knowledge of osteoporosis

The overall knowledge score derived from the three subcategories- risk factor, exercise and nutrition – were categorised, and shown in Figure 4.4. It was found that almost half (45.8%) had a poor knowledge of osteoporosis and more than half (52.0%) had a fair knowledge of osteoporosis (Figure 4.3).
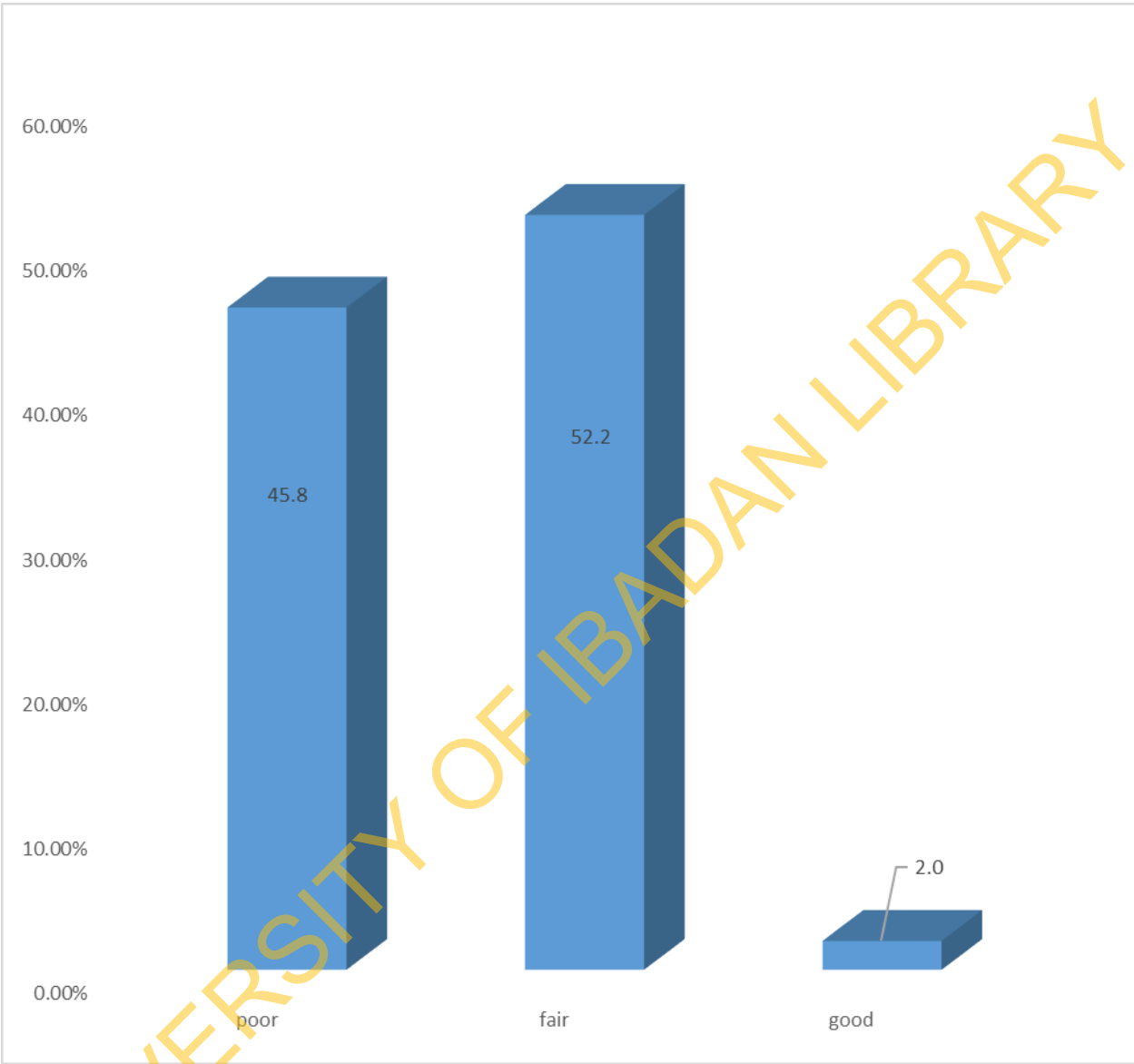
Figure 4.3: Respondents' overall knowledge of osteoporosis

4.4   Knowledge of risk factors of osteoporosis

Some of the risk factors for osteoporosis suggested by the respondents are eating foods low in dairy products (72.4%), having parent/grandparent with osteoporosis (72.8%), being an elderly woman (77.2%), eating disorder (75.6%), daily consumption of 2 or more bottles of alcoholic drinks (71.7%) and daily smoking practices (70.9%).

Other responses included whether being an African is not a risk factor for osteoporosis (59.1%), taking steroids for a long period of time could predispose a woman to osteoporosis (55.9%); some of the respondents correctly responded that surgical removal of ovaries could predispose them to osteoporosis (35.0%) while only about 25.0% correctly indicated that being overweight was not a risk factor for a woman to be affected by osteoporosis (Table 4.3).

About a third of the respondents had a good knowledge of risk factors (39.7%) while 33.1% of the respondents had fair knowledge as seen in Figure 4.4.

Table 4.3: Knowledge of risk factors   **(N=393)**

Variable	Yes n (%)	No n (%)
Eating a diet low in dairy products likely to cause osteoporosis	184 (72.4)*	70 (27.6)
Menopause increase likelihood of having osteoporosis	147 (57.9)*	107 (42.1)
Having parent/grandparent with osteoporosis increase one's chance	185 (72.8)*	69 (27.2)
Being an African makes one at risk of getting osteoporosis	150 (59.1)	104 (40.9)*
Being an elderly woman increase the chance of having osteoporosis	196 (77.2)*	58 (22.8)
Surgical removal of ovaries predisposes one to osteoporosis	89 (35.0)*	165 (65.0)
Prolonged use of steroids increases the likelihood of having osteoporosis	142 (55.9)*	112 (44.1)
Being overweight is a risk factor for osteoporosis	63 (24.8)	191 (75.2)*
Having eating disorder is a risk factor for osteoporosis	192 (75.6)*	62 (24.4)
Daily consumption of 2 or more bottles of alcoholic drinks is a risk factor for osteoporosis	182 (71.7)*	72 (28.3)
Daily smoking of cigarettes is a risk factor of osteoporosis	180 (70.9)*	74 (29.1)

*Correct response

4.5 Knowledge of physical exercise in relation to osteoporosis

Findings about the level of knowledge of the respondents about physical exercises as a preventive strategy for osteoporosis showed that jogging was the most commonly recognised form of exercise to reduce chances of osteoporosis (67.7%); about 44.1% showed they had a correct knowledge about walking briskly as a protective factor; 40.9% correctly indicated that aerobic dancing could help reduce chances of osteoporosis. More than a third correctly responded that although exercise must be hard enough, talking should still be possible to prevent osteoporosis (37.4%) while 30.7% had correct knowledge on the importance of lifting weights towards reducing osteoporosis. Few respondents had a correct knowledge on the recommended number of days to engage in exercises (17.3%) (Table 4.4). The majority of the respondents (72.0%) had poor knowledge while only a few (1.3%) had a good knowledge on some physical exercises that could prevent osteoporosis (Figure 4.4).

Table 4.4: Knowledge of physical exercise in relation to osteoporosis   **N=393**

Variable	Yes n (%)	No n (%)
The number of days in a week when one needs to exercise at least to strengthen one's bones		
2 days	120 (47.2)	134 (52.8)
4 days	90 (35.4)	164 (64.6)
5 days*	44 (17.3)	210 (82.7)
Exercise must be hard enough to make breathing		
Fast but talking is impossible	159 (62.6)	95 (24.2)
Fast but talking is possible*	95 (37.4)	159 (62.6)
One of the following activity is the best way to reduce a person's chance of getting osteoporosis		
Swimming	71 (28.0)	183 (53.5)
Walking briskly*	112 (44.1)	142 (55.9)
Stretching	70 (27.6)	184 (72.4)
One of the following activity is the best way to reduce a person's chance of getting osteoporosis		
Bicycling	118 (46.5)	136 (53.5)
Cooking	53 (20.9)	201 (79.1)
Lifting weight*	78 (30.7)	176 (69.3)
One of the following activity is the best way to reduce a person's chance of getting osteoporosis		
Jogging*	172 (67.7)	82 (32.2)
Sweeping	53 (20.9)	201 (79.1)
Sitting	24 (9.4)	230 (90.6)
One of the following activity is the best way to reduce a person's chance of getting osteoporosis		
Washing clothes	94 (37.0)	160 (63.0)
Aerobic dancing*	104 (40.9)	150 (59.1)
Boxing	60 (23.6)	194 (76.4)

*Correct response

4.6 Knowledge of calcium intake (Nutrition)

Knowledge of the respondents on the nutritional practices protective of osteoporosis was also enquired from the study. Findings on best sources of calcium showed that 43.7% corrected indicated cheese as a good source, 48.0% correctly remarked Titus fish as an excellent source, and about half of the respondents were correct as regards kale as a source of calcium (49.6%), 46.1% correctly acknowledged yoghurt as one of the best sources of calcium, while only 23.3% correctly indicated ice-cream as best source of calcium.

Less than half of the respondents (46.9%) were correct about the recommended amount of calcium for an adult while very few (9.1%) correctly remarked the recommended quantity of milk for adults. Less than half (42.5%) righty indicated the clinical reason for taking calcium supplement and more than half (56.7%) correctly indicated the vitamin required for the absorption of calcium in the body correctly.

More than half (53.5%) had correct knowledge about the best natural source of vitamin D and 23.2% correctly indicated the best food source of Vitamin required for calcium absorption. Few of the respondents (8.0%) were right regarding the recommended amount of vitamin for a 50-year-old adult while some respondents (15.4%) had correct knowledge on the best time an individual can build strong bones and about half, (50.8%) indicated the method of diagnosing osteoporosis correctly (Table 4.5).

Majority of the respondents had poor knowledge of nutrition (60.8%) while only a few (0.8%) had good knowledge as shown in Figure 4.4

Table 4.5a: Knowledge of calcium intake (Nutrition) (N=393)

Variable	Yes n (%)	No n (%)
One of these is the best source of calcium		
Apple	71 (28.0)	183 (72.0)
Cheese*	111 (43.7)	143 (56.3)
Cucumber	73 (28.7)	181 (71.3)
One of the following is the best source of calcium		
Butter	60 (23.6)	194 (76.4)
Turkey	74 (29.1)	180 (70.9)
Titus fish*	122 (48.0)	132 (52.0)
One of the following is the best source of calcium		
Chicken	70 (27.6)	184 (72.4)
Kale*	126 (49.6)	128 (32.6)
Grapes	58 (22.8)	196 (77.2)
One of the following is the best source of calcium		
Yoghurt*	117 (46.1)	137 (53.9)
Banana	90 (35.4)	164 (64.6)
Cabbage	51 (20.1)	203 (79.9)
One of these is the best source of calcium		
Ice-cream*	59 (23.3)	195 (76.7)
Pineapple	106 (41.7)	148 (58.3)
Carrot	29 (11.4)	163 (88.6)
The recommended amount of calcium for an adult		
1000-1200mg*	119 (46.9)	135 (53.1)
400-600mg	106 (41.7)	148 (58.3)
1400-1700mg	29 (11.4)	225 (88.6)
Amount of milk an adult should drink to meet the recommended calcium intake		
1 glass daily	142 (55.9)	112 (44.1)
2 glasses daily	94 (37.0)	160 (63.0)
3 or more glasses*	23 (9.1)	231 (90.9)
The best reason for taking calcium supplement		
Not getting enough calcium from diet*	108 (42.5)	146 (57.5)
Difficulty in sleeping properly	51 (20.1)	203 (79.9)
For increased growth	99 (39.0)	155 (61.0)
Vitamin required for absorption of calcium		
Vitamin A	67 (26.4)	187 (73.6)
Vitamin B	39 (15.4)	215 (84.6)
Vitamin D*	144 (56.7)	110 (43.3)
Best natural source of vitamin D		
Carrot	57 (22.4)	197 (76.8)
Orange	65 (25.6)	189 (74.4)
Sunlight*	136 (53.5)	118 (46.5)

Table 4.4.b: Knowledge of calcium intake (Nutrition)   (N=393)

Variable	Yes	No
	n (%)	n (%)
Best food source of the vitamin required for the absorption of calcium		
salmon*	59 (23.2)	195 (76.8)
Cheese	130 (51.2)	124 (48.8)
Spinach	63 (24.8)	191 (75.2)
The recommended amount of vitamin D for an adult of 50 years old and older		
200-400IU daily	138 (54.3)	116 (45.7)
400-800IU daily	93 (36.6)	161 (63.4)
800-1000IU daily*	21 (8.3)	233 (91.7)
Best time to build strong bones		
Childhood	201 (79.1)	53 (20.9)
Adolescence*	39 (15.4)	215 (84.6)
Young adulthood	15 (5.9)	239 (94.1)
Method of diagnosing osteoporosis		
Blood test	56 (22.0)	198 (78.0)
DXA scan*	129 (50.8)	125 (49.2)
Symptoms	69 (27.2)	185 (72.8)

*Correct response
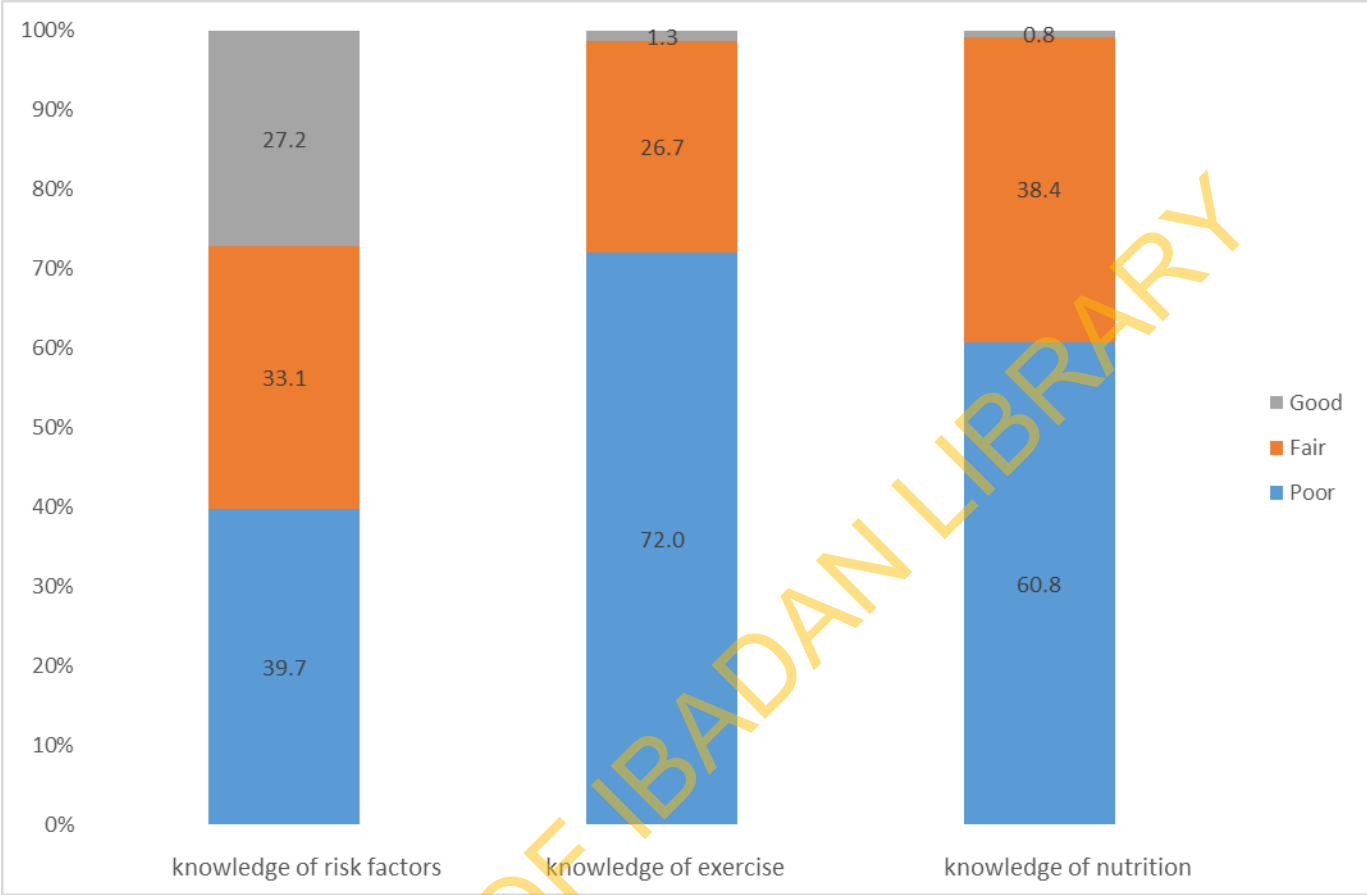
Figure 4.4: Respondents' knowledge of osteoporosis

4.7 Attitude of respondents towards osteoporosis

The majority of the respondents (91.1%) are positively disposed to the notion that they consume foods rich in calcium. Most, 73.3% are of the opinion that alcohol could affect their bone health. Majority (88.8%) responded they were comfortable with exercising (Table 4.6). Slightly above half of the respondents (52.4%) showed a positive thinking that osteoporosis can be prevented.

Most respondents (64.4%) indicated that their partners can influence their opinions towards taking steps to prevent osteoporosis. Majority (83.0%) were willing to seek for information about their health while 70.5% responded they were not against screening for osteoporosis. Almost all the respondents (87.5%) believed they would be able to prevent osteoporosis if they had access to important information and up to 80.2% had the understanding that osteoporosis does not only affect the wealthy.

More than half of the respondents (55.7%) affirmed that their will to engage in exercises could be influenced by opinion of their friends. About fifty-four percent indicated their willingness to exercise or perform physical activities was based on the opinion of their partners. Also, 54.5% of the respondents affirmed they would engage in preventive practices if their partner approves of it.

Overall, the attitude index was derived from the attitude scale showed that 90.0% of the respondents had a positive attitude towards prevention of osteoporosis, while just 10% had a negative attitude. The mean attitudinal score for the respondents was 9.09±1.9 (Table 4.6).

Table 4.6: Attitude level of respondents (N=393)

Variable	Yes n (%)	No n (%)
I consume foods rich in calcium*	358 (91.1)	35 (8.9)
I do not take alcohol as it can affect my bone health*	288 (73.3)	105 (26.7)
I'm comfortable with exercising*	349 (88.8)	44 (11.2)
I think osteoporosis can be prevented*	206 (52.4)	187 (47.6)
I can be influenced by opinion of my partner in preventing osteoporosis*	253 (64.4)	140 (35.6)
I will engage in preventive practices against osteoporosis only if my partner approves*	204 (51.9)	189 (48.1)
I find it important to seek information about my health*	326 (83.0)	67 (17.0)
I'm against screening for osteoporosis	277 (70.5)	116 (29.5)
I would be able to prevent osteoporosis if I have access to relevant information*	344 (87.5)	49 (12.5)
I feel osteoporosis only affect the wealthy	315 (80.2)	78 (19.8)
My will to exercise is influenced by the opinion of my friends*	219 (55.7)	174 (44.3)
My will to exercise is based on the opinion of my partner*	211 (53.7)	182 (46.3)
I will engage in preventive practices only if my partner approves*	214 (54.5)	179 (45.5)

*Correct response

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4.8   Preventive practice of respondents against osteoporosis

Common preventive practices adopted by the respondents were presented in Table 4.7. Findings showed that none of the respondents had ever been screened for osteoporosis. The majority of the respondents (84.7%) showed a good practice towards weekly consumption of alcohol as they do not consume alcohol. Most respondents (77.1%) also had good practice towards consumption of milk daily and 80.9% appropriately undergo exposure to 30 minutes of sunlight per day at least three times a week. In all, 76.8% eat sardine fish weekly while 67.4% consumed nuts weekly. The majority of the respondents (89.3%) reported engaging in daily short distance walk, 80.2% affirmed engaging in jogging exercises weekly and 84.2% reported performing aerobic dancing or exercise.

On aggregate, the preventive practice index showed that 88.0% of the respondents reported good practices towards preventing themselves from osteoporosis. The mean practice score was 6.42±1.6.

Table 4.7: Common preventive practices against osteoporosis   (N=393)

Variable	Yes n (%)	No n (%)
Consume alcohol weekly	60 (15.3)*	333 (84.7)
Screening for osteoporosis	0	393(100)*
Consumption of milk daily	303 (77.1)*	90 (22.9)
Exposure to sunlight three times weekly	318 (80.9)*	75 (19.1)
Consumption of sardine fish weekly	302 (76.8)*	91 (23.2)
Consumption of nuts weekly	265 (67.4)*	128 (32.6)
Short distance walk daily	351 (89.3)*	42 (10.7)
Perform jogging exercise weekly	315 (80.2)*	78 (19.8)
Perform aerobic dancing	331 (84.2)*	62 (15.8)

*correct response

4.9   Test of Hypotheses

4.9.1   Hypothesis 1: There is no significant association between socio-demographic variables and the level of knowledge among respondents

The socio-demographic variables found to be associated with respondents' level of knowledge, and these include the age of respondents, number of children, occupation, level of education, and monthly income.

P-value is less than 0.05 for the association between the level of knowledge and age, occupation, parity, level of education as well as income level. Hence, the researcher rejects the null hypothesis.

Table 4.8: Factors associated with knowledge level of osteoporosis

Demographic variables	Poor Knowledge	Good Knowledge	Chi-square value	Df	p-value
Age (years)					
15 – 26	108 (57.4)	80 (42.6)	19.77	2	0.001
27 – 38	47 (35.9)	84 (64.1)			
39 – 49	25 (33.8)	49 (66.2)			
Occupation					
Unemployed	76 (61.3)	48 (38.7)	22.60	3	0.001
Civil Servant	10 (27.8)	26 (72.2)			
Artisan	27 (50.9)	26 (49.1)			
Petty Trader	67 (37.2)	113 (62.8)			
Number of children					
None	108 (57.1)	81 (42.9)	20.26	3	0.001
1	7 (29.2)	17 (70.8)			
2 – 4	34 (40.0)	51 (60.0)			
> 4	31 (32.6)	64 (67.4)			
Level of education					
Non-formal/Vocational	21 (36.8)	36 (63.2)	14.53	3	0.002
Primary	18 (47.4)	20 (52.6)			
Secondary	104 (55.0)	85 (45.0)			
Tertiary	37 (33.9)	72 (66.1)			
Monthly income					
No income	77 (62.1)	47 (37.9)	29.98	3	0.001
< N21,000	76 (45.0)	93 (55.0)			
N21,000 – N40,000	20 (33.3)	40 (66.7)			
≥ N41,000	7 (17.5)	33 (82.5)			

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4.9.2 Hypothesis 2: There is no significant association between socio-demographic variables and attitudes towards osteoporosis among respondents

Among the socio-demographic factors tested with attitude level of the respondents toward osteoporosis, monthly income was significantly associated with attitude towards osteoporosis (p value=0.003). Hence, the researcher rejects the null hypothesis.

Table 4.9: Factors associated with the attitude towards osteoporosis

Demographic variable	Negative Attitude	Positive Attitude	Chi-square Value	df	p-value
Age (in years)					
15 – 26	16 (8.5)	172 (91.5)	2.53	2	0.283
27 – 38	12 (9.2)	119 (90.8)			
39 – 49	11 (14.9)	63 (85.1)			
Occupation					
Unemployed	10 (8.1)	114 (91.9)	1.23	3	0.746
Civil Servant	5 (13.9)	31 (86.1)			
Artisan	6 (11.3)	47 (88.7)			
Petty Trader	18 (10)	162 (90)			
Level of education					
Non-formal/Vocational	5 (8.8)	52 (91.2)	1.22*	3	0.813
Primary	3 (7.9)	35 (92.1)			
Secondary	22 (11.6)	167 (88.4)			
Tertiary	9 (8.3)	100 (91.7)			
Monthly income					
No income	10 (8.1)	114 (91.9)	14.18*	3	0.003
< N21,000	16 (9.5)	153 (90.5)			
N21,000 – N40,000	13 (21.7)	47 (78.3)			
≥ N41,000	0	40 (100)			

*Fisher's exact test

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4.9.3 Hypothesis 3: There is no significant association between socio-demographic variables and preventive practices against osteoporosis among respondents

None of the socio-demographic factors was found to be associated with practising preventive measures towards osteoporosis by the respondents. Therefore, the researcher fails to reject the null hypothesis.

Table 4.10: Factors associated with preventive practices towards osteoporosis

Socio-demographic variables	Bad Practice	Good Practice	Chi-square Value	df	p-value
Age (in years)					
15 – 26	28 (14.9)	160 (85.1)	4.46 *	2	0.098
27 – 38	16 (12.2)	115 (87.8)			
39 – 49	4 (5.4)	70 (94.6)			
Occupation					
Unemployed	20 (16.1)	104 (83.9)	3.19	3	0.363
Civil Servant	5 (13.9)	31 (86.1)			
Artisan	6 (11.3)	47 (88.7)			
Petty Trader	17 (9.4)	163 (90.6)			
Level of education					
Non-formal/Vocational	7 (12.3)	50 (87.7)	1.23 *	3	0.800
Primary	3 (7.9)	35 (92.1)			
Secondary	26 (13.8)	163 (86.2)			
Tertiary	12 (11)	97 (89)			
Monthly income					
No income	21 (16.9)	103 (83.1)	6.40 *	3	0.088
< N21,000	20 (11.8)	149 (88.2)			
N21,000 – N40,000	6 (10)	54 (90)			
≥ N41,000	1 (2.5)	39 (9.5)			

*Fisher's exact test

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1   Discussion

5.1.1   Socio-demographic characteristics

Findings from this study showed that the respondents within 15-26 years' age bracket are more than the others. This is similar to a study conducted by Ezeonu et al. (2018) where it was reported that majority of the respondents were below 30 years of age. The common occupation was trading; this could be explained by the fact that the area is a very busy and a major route for travellers and commuters passing through the state to other parts of the country. About half of the respondents were married while the remaining were either single or divorced as against a study conducted among Bahrain women whose result revealed a large percentage of the respondents as married. This could be as a result of the difference in cultural backgrounds as women in the latter country get married early.

Majority of the respondents were Yoruba, and this can be as a result of the fact that the study was conducted in the south-western part of the country. Majority of the respondents had a secondary school education followed by those who had attained a tertiary level of education. This is in contrast with a study conducted among women in New Zealand whose result showed that majority of the respondents had a university degree.

 Three-quarter of the respondents reported that they were aware of the disease, this is consistent with the result of the study conducted by Alamri et al. (2015) in Saudi-Arabia in which the majority of the respondents were also aware of the disease. More than half of the respondents who were aware of the disease reported their source of information as the mass media- television and radio which is in agreement with a study by Gayathripriya, Sanad, & Awadhalla (2017).

Socio-demographic characteristics such as age and level of education revealed in this study are very important in the design and implementation of educational programs targeted at different populations. They are useful for guiding the selection of educational methods, strategies, and educational aids for implementing interventions relating to the prevention of osteoporosis among

the study population. The characteristics should, therefore, be taken into consideration during the design and execution of any intervention.

5.1.2 Knowledge of osteoporosis

Overall, the majority had a poor knowledge with only a minority of the respondents having good knowledge. This is in contrast to a study by Gayathripriya and colleagues (2017) where more than half of the respondents had good knowledge of osteoporosis. Furthermore, the result of the study showed that only about a third of the respondents had good knowledge of risk factors, and very few had good knowledge of exercise and nutritional practices as regards osteoporosis respectively. This is also in contrast with studies by Khan et al. (2014 and Puttapitakpong et al. (2014) in which high levels of knowledge about the disease was recorded, this could be as a result of the high level of education of the respondents in each study.

The result of this study revealed a significant association between parity and knowledge levels, this might be as a result of an increase in knowledge as a result of successive births. In the present study, education was significantly associated with the level of knowledge which is consistent with the study conducted among Bahrain women (Gayathripriya et al., 2017). This can be explained as a result of greater exposure and access to health-related information as the level of education increases as revealed by Etemadifar et al. (2013). This is however in contrast to some studies which did not reveal a significant association between education and knowledge level (Gemalmaz & Oge, 2008; Hurst & Wham, 2007).

It was also revealed that there was an association between income and knowledge level, this might be because economic conditions enable the respondents to better develop their health behaviours and access health information easily in order to make informed decisions (Aylin & Merdiye, 2011).

Previous studies have found an association between age and knowledge (Alamri et al., 2015). This study also revealed an association between age and level of knowledge. This is in contrast to the findings of Gayathripriya and colleagues (2017); this could be because the major source of information in this study as regards the disease is the mass media which is readily available to most women in the younger age group.

5.1.3 Attitude towards osteoporosis

The present study revealed that majority of the respondents had a positive attitude towards osteoporosis. This is similar to the finding of a study conducted in Saudi-Arabia which reported a positive attitude of the respondents (Alshammari, 2014). Majority of the respondents reported that they were not comfortable with alcohol intake as it could affect their health generally while more than half mentioned that they were comfortable with exercising even if it involves them walking. In accordance with the framework used for the study, more than a third of the respondents opined that their partners could influence their choice in the prevention of osteoporosis.

A high percentage of the respondents had a positive attitude in seeking for information as regards their health while more than a third believed they would be able to conveniently prevent osteoporosis only if they had access to relevant information. Majority of the respondents also correctly reported that osteoporosis does not affect the wealthy alone, this is important as it is a precursor to the preventive practices that would be accomplished by them. In relation to the statement seeking to know the influence of significant others in influencing their attitude towards osteoporosis, about half of the respondents indicated that their will to engage in exercises cannot be influenced by their friends. This is also applicable to a little more than half of the respondents who mentioned that their partners would have no influence over their will to engage in activities-exercise to prevent osteoporosis.

More than half of the respondents affirmed that they would engage in preventive practices even if there is disapproval from their significant others while majority of the respondents have no reservations to screening for osteoporosis which is not surprising as the disease itself is asymptomatic in early stages and therefore raises a lot of concerns to an individual's health.

Findings from this research show a statistically significant relationship between attitude and income level of respondents, this is in contrast with the results of a study conducted in Malaysia in which monthly income was significantly associated with attitude (Lim, Ali, & Yusof, 2017).

As a result of the framework used, there is a dearth of studies to support this part of the study hence; this research has helped to bridge a gap by adding its quota to the growing body of knowledge in this area especially in Nigeria.

5.1.4 Preventive practices against osteoporosis

Previous studies have associated socio-demographic variables with preventive practices (Lim et al., 2017). In the present study, it was found out that none of the respondents had ever undergone screening for osteoporosis in a health facility before, this might be because osteoporosis remains an unexplored terrain in Nigeria as the gold standard for determining BMD, dual-energy X-ray absorptiometry is not easily accessible in the country.

More than half of the respondents do not take alcohol, this could be attributed to the religious inclination and the fact that socially, alcohol intake by women is usually not a welcome development. Majority of the respondents consume milk and dairy products. This could be explained as the products are easily accessible in the community. Almost all of the respondents mentioned that they are usually exposed to sunlight daily, this is not surprising as the majority of the respondents were traders who sold their wares in kiosks and in the open where the rays of the sun are usually inhibited. This is,, however, good practice as sunlight is an important source of vitamin D (Hurst & Wham, 2007). More than half of the respondents consumed sardine fish, a major source of calcium weekly while a little more than half ate nuts weekly.

As regards the effects of weight-bearing activity-jogging, running etc. on bone physiology, majority of the respondents knew the need to walk at least daily in order to strengthen their bone health, but the practice was not significant with any socio-demographic variable. This is in variance with a study by Lim and colleagues (2017) in which level of education was significant with a weight-bearing activity but is in accordance with (Khan et al., 2014) whose result showed no significant association between level of education and practices preventive of osteoporosis. More than half of the respondents also reported performing jogging exercises and aerobic dancing as forms of weight-bearing exercises to improve their bone health. These figures are higher than what was reported by (Gayathripriya et al., 2017).

5.1.5 Implications of findings for Health Promotion and Education

The findings of this present study provide important information on the knowledge, attitude and preventive practices of osteoporosis among women of reproductive age in Ibadan North-East Area of Oyo state. The result also has several implications for planning, implementation and development of health promotion and education on osteoporosis.

The study established a low level of knowledge of osteoporosis among the respondents as gaps that should be addressed so as to reduce the negative consequence of osteoporosis on the individual's quality of life.

Public Enlightenment

The public should be well informed on the disease and its aetiology by professionals in the field. The health officials should themselves be up to date on current happenings in the medical field so that they would be able to properly diagnose and treat the early symptoms of the disease. In planning health education programs for the prevention of osteoporosis, the health professionals should lay emphasis on the different risk factors of osteoporosis and the importance of calcium intake and practice of weight-bearing exercises.

Community-based health programs should be implemented with the aim of reaching every individual with the correct information which should be based mainly on prevention strategies that are needed for making informed health decisions. These can be achieved with the use of jingles, posters, which are both educating and entertaining at the same time to reinforce the message being communicated. Health personnel need to play an effective role as an accurate source of knowledge on osteoporosis as the information gotten from the mass media could be erroneous and misleading.

Advocacy

This is in creating urgency and developing strategies to promote screening of osteoporosis, especially among pre-menopausal women. The gold-standard for screening which is the Dual-X-ray absorptiometry machine is still largely unavailable in Nigeria. Therefore, there is the need to make concerted efforts and partnership with resources internally and externally to make this available in the country. Collaboration at all levels of the health sector with the government, community members, Primary Healthcare Centres (PHCs) and individuals is important.

5.2 Conclusion

Generally, the knowledge of the disease in terms of exercise and nutrition that can prevent it among respondents in the community is poor, although a few had knowledge of risk factors. Few respondents reported they were aware of the disease. Information on osteoporosis was mostly obtained from the media, this can be both incomplete and inadequate. Majority of the

respondents mentioned their parents as their greatest influence in making health decisions, the success of osteoporosis prevention programs might, therefore, depend on the parents' acceptance. With respect to attitude, most of the respondents indicated that they could not be subjected entirely to the opinions of their significant others in preventing osteoporosis. Hence, special attention should be given to the individuals to reinforce their belief in themselves in making well informed decisions as regards their health when presented with choices.

As women are highly industrious and enterprising, in order for the daily RDI of both calcium and vitamin D to be met, it is imperative that there is fortification of some common foods-salt or groundnut oil with it so that in the long run, there would be a population of vibrant and healthy women who will directly impact positively on the economy of the country at large.

5.3   Recommendations

Based on the findings from this study, the following recommendations are made:

1. Use of the mass media such as television and radio, as this was found to be the greatest source of information to communicate to a large audience on osteoporosis in order to increase its awareness and knowledge in the public
2. Inform and encourage women to eat healthily and cut down on soft-drink or carbonated water consumption as it imparts negatively on bone health.
3. Greater focus on the disease as the crux of health talks and presentations.
4. In older persons, who are particularly at risk of fragility fractures, the prevention of falls and the maintenance of an adequate vitamin D status are necessary.

5.4   Suggestions for further study

1. There is a need to carry out a similar study among women of reproductive age in a similar state in Nigeria in order to compare data and proffer effective solutions which would be more generalisable.
2. Further research is also needed which would include the screening of the women to ascertain their bone density levels as this was the concern of many. This would better drive home the importance of a timely check as part of preventive strategies.

REFERENCES

Ahmadieh, H., Basho, A., Chelade, A., Al Mallah, A., and Dakour, A. 2018. Perception of peri-menopausal and postmenopausal Lebanese women on osteoporosis: A cross-sectional study. *Journal of Clinical & Translational Endocrinology*, 20–24.

Ajzen, I.,and Fishbein, M. 1980. *Understanding attitudes and predicting social behaviour*. Eaglewood Cliffs, NJ: Prentice-Hall.

Al-Muraikhi, H., Chehab, M. A., Said, H.,and Selim, N. 2017. Assessing health beliefs about osteoporosis among women attending primary health care centres in Qatar. *Journal of Taibah University Medical Sciences*, *12*:349–355.

Al Saleh, J., Sayed, M. E. L., Monsef, N., and Al, E. 2016. The prevalence and the determinants of musculoskeleal diseases in Emiratis attending primary health care clinics in Dubai. *Oman Med J*, *31:*117–123.

Alamri, F. A., Saeedi, M. Y., Mohamed, A., Barzanii, A., Aldayel, M., and Ibrahim, A. K. 2015. Knowledge, Attitude, And practice of osteoporosis among Saudis: A community-Based study. *Journal of the Egyptian Public Health Association*, *90*: 171–177. https://doi.org/10.1097/01.EPX.0000475735.83732.fc

Ale, A. O., Ogbera, A. O., Ebili, H. O., Adeyemo, O. L., and Afe, T. O. 2018. Prevalence, Predictive Factors, and Characteristics of Osteoporosis in Hyperthyroid Patients. *International Journal of Endocrinology*, *2018*, 1–7. https://doi.org/10.1155/2018/3540256

Alonge, T. O., Adebusoye, L. A., Ogunbode, A. M., Olowookere, O. O., Ladipo, M. M. A., Balogun, W. O. and Okoje-Adesomoju, V. 2017. Factors associated with osteoporosis among older patients at the geriatric centre in Nigeria: A cross-sectional study. *South African Family Practice*, *59*:87–93. https://doi.org/10.1080/20786190.2016.1272248

Alshammari, K. 2014. Women knowledge, attitude and practices about osteoporosis prevention in Riyadh Saudi Arabia. *World J Med Sci*, *11*:422–431.

Alswat, K. A. 2015. Gender Disparities in Osteoporosis. *J. Clin.Med.Res*, *9*, 382–387.

Anderson, K., Chad, K. and Spink, K. 2005. Osteoporosis knowledge, beliefs and practices among adolescent females. *Journal of Adolescent Health*, *36*: 305–312.

Aylin, O. and Merdiye, S. 2011. Evaluation of knowledge of osteoporosis and self-efficacy perception of female orthopaedic patients in Turkey. *Journal of Nursing and Healthcare of Chronic Illness*, *3*:319–328.

Barzanji, A. ., Alamri, F. and Mohamed, A. 2015. Osteoporosis: A study of knowledge, attitude and practice among adults in Riyadh, Saudi Arabia. *J. Community Health Assoc*, *90*:171–177.

Blalock, S. J., Currey, S. S., DeVellis, R. F., DeVellis, B. M., Giorgino, K. B., Anderson, J. J. and Gold, D. T. 2000. Effects of educational materials concerning osteoporosis on women's knowledge, beliefs, and behaviour. *Am J Health Promot*, *14*:161–169.

Boskey, A. L. 2007. Mineralization of bones and teeth. *Elements*, *3*(6): 385–391.

Brecher, L. S., Pomerantz, S. C., Sydner, B. A., Janora, D. M., Klotzbach-shimomura, K. M. and Cavalieri, T. A. 2002. Osteoporosis prevention project: a model multidisciplinary educational intervention. *J Am Osteopath Assoc*, 102:327–335.

Burge, R., Dawson-Hughes, B., Solomon, D,H., Wong, J,B., King, A. and Tosteson, A. 2007. Incidence and economic burden of osteoporosis-related fractures in the united states, 2005-2025. *J Bon Miner Res.* 22: 464-475

Chan, M. F., Kwong, W. S., Zang, Y. L. and Wan, P. Y. 2007. Evaluation of an osteoporosis prevention education program for young adults. *J Adv Nurs*, *57*: 270–285.

Chan, M. and Ko, C. 2006. Osteoporosis prevention education for women. *Journal of Advanced Nursing*, *54*(2): 159–170.

Cooper,C., Cole, Z.A., Holroyd, C.R .,Earl, S.C., Harvey, N.C., Dennison, E.M., Melton, L,J., Cummings, C,R., Kanis, J,A and IOF CSA Working Group on Fracture Epidemiology. 2011. Secular trends in the incidence of hip and other osteoporotic fractures. *Osteoporos.Int.* 22(5):1277-1288

Cummings, S. and Melton, I. 2002. Epidemiology and outcomes of osteoporotic fractures. *Lancet*, *359*: 1761–1767.

Curry, L. C., Hogstel, M. O., Davis, G. C. and Frable, P. S. 2002. Population-based osteoporosis education for older women. *Public Health Nurs*, *19*:460–469.

Ejaz, S., Mahmood, A., Qureshi, M.and Ali, M. 2012. Prevalence of osteoporosis and osteopenia among pakistani pre and post menopausal women. *J Dent Med Sci*, *2*:7.

Ekpenyong, C. E., Udokang, N. E., Akpan, E. E. and Samson, T. K. 2012. Double Burden , Non-Communicable Diseases And Risk Factors Evaluation In Sub-Saharan Africa : The Nigerian Experience . *European Journal of Sustainable Development*, *1*: 249–270.

El-Masry, R., Elkhawaga, G., El-Gilany, A.-H. and Alam, R. R. 2018. Knowledge and health beliefs of elderly women toward osteoporosis in Mansoura, Egypt. *Progress in Medical Sciences*, *2*: 27–33.

El Maataoui, A., Benghabrite, A., El Maghraoui, A. and Al, E. 2015. Relationship between Sex hormones, bone mineral density and bone turnover markers in healthy Moroccsn men: a cross-sectional study. *Pan. Afr Med J*, *22*.

Etemadifar, M. R., Nourian, S.-M., Mahboobe, F.-E., Hamidreza, S., Mohsen, N. and Abolghasem, Z. 2013. Relationship of knowledge about osteoporosis with education level and life habits. *World J Orthop*, *4*: 139–143.

Eyigr, S., Karapolat, H. and Durmaz, B. 2008. Medical Students knowledge of osteoporosis in Ege University Faculty of Medicine. *Rheumatism*, *23*:77–81.

Ezeonu, P. O., Agwu, U. M., Ajah, L. O., Dimejesi, I. B. O., Ogbonnaya, L. U., Umeora, O. U. J. and Omoh, R. C. 2018. Osteoporosis among antenatal women in South-East Nigeria. *Nigerian Journal of Clinical Practice*, *20*: 1522–1526.

Follin, S. and Hansen, I. 2003. Current approaches to the prevention and treatment of postmenopausal osteoporosis. *American Journal of Health-System Pharmacology*, *60*: 883–901.

Gayathripriya, N., Sanad, H. M. and Awadhalla, M. H. 2017. *Knowledge on Osteoporosis prevention among Bahraini women : A cross sectional study*. 397–403.

Gemalmaz, A. and Oge, A. 2008. Knowledge and awareness about osteoporosis and its related factors among rural Turkish women. *Clinical Rheumatology*, *27*(6): 723–728. https://doi.org/10.1007/s10067-007-0777-9

Gendler, P. E., Coviak, C. P., Martin, J. T., Kim, K. K., Danjers, K. J., Barclay, J. M. and Sanchez, A. T. 2015. Revision of the Osteoporosis Knowledge Test: Reliability and Validity. *Western Journal of Nursing Research*, *37*(12): 1623–1643.

Goodarzizadeh, N., Shahrjerdi, A., Najafi, M. and Al, E. 2013. Effect of diet and lifestyle habits on bone densuty in postmenopausal women. *J. Pharm Res*, *6*: 309–312.

Gorski, R., Chmielewski, D. and Zgoda, M. 2006. The evaluation of social awareness of Osteoporosis: based on the aimed questionnaire. *Ortop Traumatol Rehabil*, *8*:32-36

Habiba, U., Ahmad, S. and Hassan, L. 2002. Predisposition to Osteoporosis in Postmenopausal women. *J Coll Physiciana Surg Pak*, *12* :297- 301.

Hammad, L. F. and Benajiba, N. 2017. Lifestyle factors influencng bone health in young adult women in Saudi Arabia. *Afr. Health. Sci*, *17*: 524–531.

Heaney, R. P. 2000. Peak bone mass. *Osteoporosis International*.

Hermandez-Rauda, R. and Martinez-Garcia, S. 2004. Osteoporosis-related life habit and knowledge about osteoporosis among women in el Salvador: a cross sectional study. *BMC Musculoskeletal Disorders*, *5*:29- 46.

Holick, M. 2004. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *American Journal of Clinical Nutrition*, *80*:1678S-1688S.

Holick, M. 2007. Vitamin D deficiency. *The New England Journal of Medicine*, *357*:266–281.

Hosseini, H. and Hosseini, N. 2008. Epidemiology and prevention of fall injuries among the elderly. *Hospital Topics*, *86*(3): 15–20.

Hurst, P. R. Von and Wham, C. A. 2007a. Attitudes and knowledge about osteoporosis risk prevention : a survey of New Zealand women. *Public Health Nutrition.*, *10*:747–753. https://doi.org/10.1017/S1368980007441477

Hurst, P. R. Von and Wham, C. A. 2007b. *Attitudes and knowledge about osteoporosis risk prevention : a survey of New Zealand women*. *10* :747–753. https://doi.org/10.1017/S1368980007441477

Hyassat, D., Alyan, T., Jaddou, H. and Al, E. 2017. Prevalence and risk factors of osteoporosis among Jordanian postmenopausal women attending the National Center for Diabetes, Endocrinology and Genetics in Jordan. *Biores.Open. Access*, *6*: 85–93.

I. O. F. (2012). *Calcium*. Retrieved from http:/www.iofbonehealth.org/calcium

Johnell, O. and Kanis, J. 2005. Epidemiology of osteoporotic fractures. *Osteoporos Int.* 16:S3-S5

Juby, A. and Davis, P. 2001. A prospective evaluation of the awareness, knowledge, risk factors and current treatment of osteoporosis in a cohort of elderly subjects. *Osteoporosis Int*, *12*:617–622.

Kanis, J.A., Closkey, McCloskey, E.V., Johansson, H., Cooper, C., Rizzoli,R. and Reginster, J.Y.2013.European guidance for the diagnosis and management of osteoporosis in post-menopausal women.*Osteoporos.Int* 24 (1):23-57

Khan, Y. H., Sarriff, A., Khan, A. H. and Mallhi, T. H. 2014. Knowledge, attitude and practice (KAP) survey of osteoporosis among students of a tertiary institution in Malaysia. *Tropical Journal of Pharmaceutical Research*, *13*:155–162. https://doi.org/10.4314/tjpr.v13i1.22

Khuwaya, A. K., Nasir, A. and Mithani, Y. 2005. Preventing Osteoporosis epidemic by exercise interventions. *Med Today*, *3*: 2.

Kim, J., Lee, J., Shin, J. Y. and Park, B. J. 2015. Socio-economic disparities in Osteoporosis prevalence: Different results in the overall korean adult population and single-person households. *J Prev Med Public Health*, *48*:84–93.

Kish, L. 1965. *Survey Sampling*. New York: John Wiley and Sons, Inc.

Korsic, M. 2006. Pathophysiology of postmenopausal osteoporosis. *Reumatizam*, *53*: 5.

Lim, S., Ali, A. and Yusof, H. M. 2017. Knowledge, attitude and practices towards osteoporosis prevention among adults in Kuala Lumpur, Malaysia. *Malaysian Journal of Nutrition*, *23*: 279–290.

Maddah, M., Sharami, S. H. and Karandish, M. 2011. Educational difference in the prevalence of osteoporosis in postmenopausal women: a study in northern Iran. *BMC.Public.Health*, *11*.

Maher, A., Salmond, S. and Pellino, T. 2002. *Orthopaedic Nursing (3rd ed). Philadelphia; W.B Saunders.*

Mahran, D. G., Hussein, M. and Farouk, O. 2011. Bone mineral density among reproductive age women in rural Upper Egypt. *J Public. Health*, *20*:453–460.

Mc Lendon, A. N. and Woodis, C. B. 2014. Review of Osteoporosis Management in Younger premenopausal women. *Women's Health*, *13*:5977.

McLeod, K. M. and Johnson, C. S. 2011. A systematic review of osteoporosis health beliefs in adult men and women. *J Osteoporos*, *197454*.

National Institute of Health. Osteoporosis prevention, diagnosis, and therapy. 2000. *NIH Consensus Statement*, *17*: 1–45.

National Osteoporosis Foundation. 2002 America's bone Health: The state of osteoporosis and low bone mass in our nation. Washington DC: The Foundation.

National Osteoporosis Foundation.2010 Clinican's guide to prevention and treatment of osteoporosis. Washington, DC. National Osteoporosis Foundation. 1-56

Nevitt, M. C. and Cummings, S. R. 1993. Type of fall and risk of hip and wrist fractures: the study of osteoporotic fratures. *J Am Geriatr Soc*, *41*:1226–1234.

NIH Consensus Development Panel on Osteoporosis Prevention, D. and T. 2001. Osteoporosis prevention, diagnosis, and therapy. *JAMA*, *285*: 785–795.

W. H.O 2010. *Global recommendations on physical activity for health*. Retrieved from http:/www.who.int/publications/2010/9789241599979

Pande, K., Pande, S., Tripathi, S., Kanoi, R., Thakur, A. and Patle, S. 2005. Poor knowledge about osteoporosis in learned Indian women. *J Assoc Physicians India*, *53*:433–436.

Piaseu, N., Schepp, K.and Belza, B. 2002. Causal analysis of exercise and calcium intake behaviours for osteoporosis prevention among young women in Thailand. *Health Care Women*, *23*:364–376.

Pichowski, K., Nickols- Richardson, S., Clymer, E. and Roberto, K. 2010. Osteoporosis Health beliefs in women differ by menopausal status and Across age chorts. *Fam Consumer Sci Res J*, *38*: 345–355.

Pollitzer, W. S. and Anderson, J. J. 1989. Ethnic and genetic differences in bone mass: a review wuth a hereditary vs environmental perspective. *Am. J. Clin. Nutr*, *50*:1244–1259.

Puttapitakpong, P., Chaikittisilpa, S., Panyakhamlerd, K., Nimnuan, C., Jaisamrarn, U. and Taechakraichana, N. 2014. Inter-correlation of knowledge, attitude, and osteoporosis preventive behaviours in women around the age of Peak bone mass. *BMC Womens' Health*, *14*:35.

Qussif, O., Oumghar, K., Sbai, K. and Al, E. 2012. Relation of Plasma total homocysteine, folate and vitamin B12 levels to bone mineral density in Moroccan healthy postmenopausal women. *Rheumatol.Int*, *32*:123–128.

Rafraf, M., Bazyun, B. and Afsharnia, F. 2009. Osteoporosis-related life habits and knowledge about osteoporosis among women in Tabriz, Iran. *International Medical Journal*, *8*:17–20.

Riaz, M., Abid, N., Patel, J., Tariq, M., Khan, M. and Zuberi, L. 2008. Knowledge about Osteoporosis among healthy women attending a tertiary care hospital. *J Pak Med Assoc*, *58*:190–194.

Ross, C. A., Taylor, C. L., Yatkine, A. L. and Del Valle, H. B. 2011. DRI dietary reference intakes calcium and vitamin D. In *The National Academic Press. Food and Nutrition Board, Washington, D.C.*

Sadat-Ali, M., Almowen, A. W., AlOmar, H. K. and Al, E. 2012. The current issues on osteoporosis among male Saudi Arabians. *J. Mens' Health*, *13*:53-59.

Sedlak, C. A., Doheny, M. O. and Jones, S. L. 2000. Osteoporosis education programs: changing kowledge and behaviours. *Public Health Nurs*, *17*: 398–402.

Shanthi, J. C., McLeod, W., Kennedy, L. and McLeod, K. 2008. Osteoporosis health beliefs among younger and older men and women. *Health Educ Behav*, *35*:721–733.

Sharma, S., Tandon, V. R., Mahagan, A., Kour, A. and Kumar, D. 2006. Preliminary screening of osteoporosis and osteopenia in urban women from Jammu using calcaneal QUS. *Indian J Med Sci*, *60*:183–189.

Sharmai, S. H., Millani, F., Alizadeh, A. and Al, E. 2008. Risk factors of osteoporosis inWomen over 50 years of age: A population based study in the north of Iran. *J Turkish-German Gynecol Assoc*, *9*: 1-5

Spencer, S. J. 2007. Lack of knowledge of Osteoporosis: a multi-center, observational study. *Scott Med J*, *52*: 6.

Sultan, A., Khan, D. A., Mushtaq, M. and Hassan, M. 2006. Frequency of Osteoporosis and its associated risk factors in postmenopausal women in clinical practice at Rawalpindi. *Pakistan J Pathol*, *17*: 8.

Teezcan, S., Subasn, N. and Altintas, H. 2002. The level of knowledge of osteoporosis in female teachers in some schools. *From the World of Osteoporosis*, *8*:161–168.

Terrio, K. and Auld, G. N. 2002a. Osteoporosis knowledge, calcium intake, and weight-bearing physical activity in three age groups of women. *J Community Health*, *27*:307–320.

Terrio, K. and Auld, G. W. 2002b. Osteoporosis knowledge, calcium intake and weight-bearing physical activity in three age groups of women. *J Community Health*, *27*:307–320.

Toon, N. 2005. *Intakes of calcium and vitamin D and their relationship to bone health*. Cincinnati: University of Cincinnati.

Tung, W. C. and Lee, I. F. 2006. Effects of an Osteporosis educational programme for men. *Journal of Advanced Nursing*, *56*:26–34.

Umay, E., Tamkan, U. and Gundogdu, I. 2011. The risk factors of osteoporosis effect on bone mineral density. *Turk J Osteoporos*, *17*:44–50.

Vijayakumar, R. and Busselberg, D. 2016. Osteoporosis: An under-recognized public health problem: Local and global risk factors and its regional and worldwide prevalence. *J. Local. Glob. Heal. Sci*, *2*.

Wallace, L. S. 2002. Osteoporosis prevention in college women: application of the expanded health belief model. *Am J Health Behav*, *26*:163–172.

Wardle, J., Paramenter, K. and Waller, J. 2000. Nutritin knowledge and food intake. *Apetite*, *34*:269–275.

Werner, P. 2005. Knowledge about Osteoporosis: assessment, correlates, and outcomes. *Osteoporosis Int*, *16*:115–127.

WHO, 2003a Prevention and management of osteoporosis. *Geneva, World Health Organization*.

Worsley, A. 2002. Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? *Asia Pacific Journal of Clinical Nutrition*, *11*: 579-585.

Yang, R., Huang, L., Hsieh, Y., Chung, U., Huang, C. and Bih, H. 2010. *Motivations and reasons for women attending a Breast Self-Examination training program : A qualitative study*.

Yin-King, L. L. and King-Fai, L. E. 2006. Osteoporosis in older Chinese men: knowledge and health beliefs. *J Clin Nurs*, *15:*353–355.

Yin, S. and Huang, Y. 2003. Knowledge of, attitudes toward, and activity to prevent osteoporosis among middle-aged and elderly women. *J Nurs Res*, *11*:56–72.

APPENDICES

APPENDIX 1

Dear respondent,

Good day. My name is ………………………………… I am here on behalf of Orintunsin Tosin Pelumi, a postgraduate student of the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan. You are invited to take part in a research study. Before you decide whether to participate, you need to understand why the research is being done and what it would involve. Please take the time to read or to listen as I read the following information. You may talk to others about the study if you wish. Please ask me if there is anything that is not clear, or if you would like more information. When all of your questions have been answered and you feel that you understand this study, you will be asked if you wish to participate in the study and if yes, to sign this 'Informed Consent Form'. You will be given a signed copy to keep.

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QUESTIONNAIRE

INFORMED CONSENT FORM

Title of the research: Knowledge, Attitude and Preventive Practices of Osteoporosis among Women of Reproductive Age in Ibadan North- East Local Government Area, Oyo State.

Names and affiliation of researcher: The study is being conducted by Orintunsin Tosin, a postgraduate student at the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan

Purpose of the research: The purpose of this study is to gather information about the Knowledge, Attitudes and Preventive Practices of Osteoporosis among women of reproductive age in Ibadan North- East Local Government Area, Oyo State.

Procedure of the research: You have been invited to take part because you are a woman within the reproductive age group (15-49 years). If you agree to take part in the study, you will be asked to sign an informed consent form. You will also be asked to respond to questions about the knowledge, attitude and preventive practices about osteoporosis.

Expected duration of research and of participant's involvement: You will complete the questionnaire within 30 minutes approximately.

Risks and discomfort: There are no risks associated with this study and your participation.

Cost to the participant: Your participation will not cost you anything other than your time of answering the questions in the questionnaire.

Confidentiality: You should not write your name in the questionnaire. All information collected will be treated as anonymous and will not be linked to you in any way.

Benefit: The information collected will be of benefit to health administrators, doctors and nurses on how they can take care of women with osteoporosis.

Alternative to participation: Participation in this research study is entirely voluntary and you can withdraw at any time. If you choose to withdraw at any time, this will not affect you in anyway but please note that some of the information that has been obtained about you before

your withdrawal may be modified or used in reports and publications. These cannot be removed anymore, however, the researcher promises to make an effort in good faith to comply with your wishes as much as is practicable. The researcher will inform you of the outcome of the research through journal articles. Your willingness to complete the questionnaire implies you have given consent to participate in the study. Kindly append your signature in the section below as a form of written consent to participate in the study. Thank you for your cooperation.

Statement of the person obtaining informed consent:

I have fully explained this research to the respondent and have given sufficient information, including about risks and benefits, to make an informed decision.

Date: …………………………………………….

Signature: …………………………………………..

Name: …………………………………………………………………………………………..

Statement of the person giving consent:

I have read the description of the research and have had it translated into a language I understand. I have also talked it over with the researcher to my satisfaction. I understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research study to judge that I want to take part in it. I understand that I may freely stop being part of this study at any time. I have received a copy of this consent form and additional information sheet to keep for myself.

Date: …………………………………………….

Signature: …………………………………………..

Detail contact information including a contact address, telephone, fax, e-mail and any other contact information of researcher, institutional HREC and head of the institution:

If you have any question about participation in this research, you can contact the Researcher: Miss Orintunsin Tosin, Department of Health Promotion, Faculty of Public Health, College of Medicine, University of Ibadan, Phone №: 09097391459, e-mail: pelumiorins92@gmail.com

TOPIC: Knowledge, Attitude and Preventive practices against Osteoporosis among Women of Reproductive Age in Ibadan North-East Local Government Area, Oyo state.

Section A: Socio-demographics

Kindly respond to the following questions by marking appropriately in the spaces provided

1.   Ethnicity: 1= Yoruba (   ) 2=Igbo (   )   3= Hausa (   )   4=Others _____

2.   Marital Status: 1= Single (   ) 2= Married (   )3= Divorced (   ) 4=Separated (   )

3.   Age (in years as at last birthday) _____

4.   Occupation: —————————————————

5.   Number of children: —————————————————

6.   Highest level of education: 1=No formal education (   ) 2= Primary (   )
        3=Secondary (   ) 4=Tertiary (   ) 5=Vocational (   ) 6 Others _____

7.   Average monthly income: _____

8   Type of family: 1= Nuclear (   ) 2= Extended (   )

9   Do you have a family history of osteoporosis: 1= Yes (   ) 2= No (   )

10   If yes, what is your relationship with the person_____

11   Who influences your decision your health decisions the most? 1= Father (   ) 2=Mother (
) 3= Sibling (   ) 4= Husband (   ) 5=Friends (   ) 6= Religious leader (   ) 7=
        Other_____

Awareness of osteoporosis

12   Have you ever heard of osteoporosis? 1= Yes (   ) 2=No (   )

If no, kindly ignore the knowledge questions and continue from Question 45.

13   Source of information: 1= Television (   ) 2=Radio (   ) 3=Newspaper (   ) 4=Magazines (   )
        5=Health worker(   ) 6=Friend (   ) 7= Relative/ Family member (   ) 8= Others please
        specify _____

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SECTION B: Knowledge of Osteoporosis

Instruction: - Kindly go through the questions given below and tick (√) against appropriate answer.

Osteoporosis Knowledge Assessment TOOL(OKAT)

Knowledge of Osteoporosis risk factors

N^0	Statement	Yes	No
14	Is eating a diet low in dairy products likely to cause osteoporosis?		
15	Can menopause increase a woman's likelihood of having osteoporosis?		
16	Does having a parent or grandparent who has osteoporosis increase one's chance of getting osteoporosis?		
17	Does being an African makes one at risk of having osteoporosis?		
18	Being an elderly woman increase the chance of having osteoporosis?		
19	Having a surgical removal of the ovaries predispose one to osteoporosis?		
20	Prolonged use of steroids increase the likelihood of having osteoporosis?		
21	Overweight/Obesity is a risk factor for osteoporosis?		
22	Having an eating disorder is a risk factor for osteoporosis?		
23	Consumption of more than 2 alcoholic drinks per day a risk factor for osteoporosis?		
24	Smoking daily a risk factor for osteoporosis?		

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Knowledge of Physical Exercise in relation to Osteoporosis

Instruction: kindly tick against the appropriate answer.

25   How many days a week do you need to exercise at least to strengthen your bones

     a)2 days

     b)4 days

     c)5 days

26   To make strong bones, exercise must be hard enough to make breathing;

     a) fast and talking impossible

     b) fast but talking is possible

27   Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?

     a) swimming

     b) walking briskly

     c) stretching

28   Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?

     a) bicycling

     b) cooking

     c) lifting weight

29   Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?

     a) jogging

     b) sweeping

     c) sitting

30   Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?

     a) washing clothes

     b) aerobic dancing

     c) boxing

Knowledge of Calcium Intake (Nutrition)

Instruction: kindly tick against the appropriate answer

31   Which of these is the best source of calcium?

a) apple

b) cheese

c) cucumber

32   Which of the following is the best source of calcium?

a) butter

b) turkey

c)Titus fish

33   Which is the best source of calcium?

a) chicken

b) kale

c) grapes

34   Which of the following is the best source of calcium?

a) yoghurt

b) banana

c) cabbage

35   Which of these is the best source of calcium?

a) ice-cream

b) pineapple

c) carrot

36   What is the recommended amount of calcium for an adult?

a)1000-1200mg daily

b)400-600mg daily

c)1400-1700mg daily

37   How much milk must an adult drink to meet the recommended calcium intake?

a)1 glass daily

b)2 glasses daily

c)3 or more glass

38   What is the best reason for taking a calcium supplement?

a) not getting enough calcium from diet

b) difficulty in sleeping properly

c) for increased growth

Others please specify_____

39   Which vitamin is required for the absorption of calcium?

a) Vitamin A

b) Vitamin B

c) Vitamin D

40   What is the best natural source of vitamin D required for the absorption of calcium?

a) carrot

b) orange

c) sunlight

41   What is the best food source of the vitamin required for the absorption of calcium?

a) salmon

b) cheese

c) spinach

42   Which is the recommended amount of vitamin required for the absorption of calcium for an adult of 50 years and older

a)200-400IU daily

b)400-800IU daily

c)800-1000IU daily

43.   When is the best time to build strong bones? 1= childhood (   ) 2= adolescence (   )

3=young   adulthood ( ) Others please specify_____

44. Osteoporosis can be diagnosed by? 1= blood test (   ) 2=DXA scan (   ) 3= symptoms (   )

Section C: Attitude towards osteoporosis

Instruction: - *Kindly go through the questions given below and tick (√) against appropriate responses.*

N^0	Statement	Yes	No
45	I consume foods rich in calcium		
46	I'm against taking alcohol as it can affect my bone health		
47	I'm comfortable with exercising to prevent osteoporosis		
48	I think osteoporosis cannot be prevented		
49	I can be influenced by the opinion of my partner in preventing osteoporosis		
50	I would engage in preventive practices against osteoporosis only if my friends do		
51	I find it important to seek information about my health		
52	I'm against screening for osteoporosis because it is against my beliefs		
53	I would be able to prevent osteoporosis if I have access to relevant information		
54	I feel osteoporosis only affects the wealthy		
55	My will to exercise is influenced by the opinion of my friends		
56	My will to exercise is based on the opinion of my partner		
57	I will engage in preventive practices against osteoporosis only if my partner approves		

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Section D: Preventive practices against Osteoporosis

Instruction: - Kindly go through the questions given below and tick (√) against the appropriate answer to the under listed questions.

N0	Statement

58   Do you consume alcohol weekly? 1. Yes ( )   2. ( )

59   Have you ever been screened for osteoporosis at a health facility? 1.Yes ( ) 2.( )

60   Do you take milk daily? 1.Yes ( ) 2.( )

61   Do you expose yourself to sunlight for at least 30 minutes three times a week?
      1.Yes ( ) 2. No ( )

62   Do you eat sardine fish weekly? 1.Yes ( ) 2.No ( )

63   Do you consume nuts weekly? 1. Yes ( ) 2.No ( )

64   Do you engage in short distance walk daily? 1.Yes ( ) 2. ( )

65   Do you engage in jogging exercise weekly? 1. Yes ( ) 2.( )

66   Do you perform aerobic dancing? 1.Yes ( ) 2.No ( )

ÌWÉ ÌBÉÈRÈ LÓRII ÌMÒ, ÌHUWASI ÀTI ÌSESÍ TÍ Ó LE DÈNÀ ÀÀRÙN SÁANGUNSÁANGUN LAARIN AWỌN OBINRIN TI O WA NI IPO ỌMỌ BÍBÍ NÍ AGBÈGBÈ ÌJỌBA ÌBÍLẸ ÌBÀDÀN NORTH-EAST, ÌBÀDÀN ÌPÍNLẸ ỌYO.

Akopa owon,

Eku bi oju ojo se ri o. Orukọ mi ni Orintunsin Tosin. Mo jé akẹ́ẹ́kọ̀ làtí ile ìwé giga Yunifàsitii tí Ile Ibadan, Koleeji tí a tín sètọjú alaisan pélu oogun òyìnbó, ní abala tí óhún rísí ètò ilera àwọn ará ìlú, ẹka tí àtí n risi eto nípa idanilẹkọọ ati igbega eto ilera. Mo nse iwadìí yìí gẹgẹ bi akẹẹkọ lati gba iwe erii yunifasitii ti ipele giga, Mo si tun nse ìwadìí yìí lóríi ìmò, ìhùwàsi àti ìsesí tí ó le dènà àààrùn sáangunsáangun laarin awọn obinrin ti o wa ni ipo ọmọ bíbí ní agbègbè Ìjọba Ìbílẹ Ìbàdàn North-East, Ìbàdàn Ìpínlẹ Ọyo. Jọwọ dahun si awọn ibeere yii pelu idahun tootọ.

Agbegbe Ijoba Ibile _____

ABALA A (APA KINI): SOCIO-DEMOGRAPHIC CHARACTERISTICS (Àlàyé lori eto igbesiaye olùkópa)

Ilana: E jowọ ẹ fi ìdáhùn sí àwọn ìbéèrè wọn yìí pẹlù fí fi ìlà tàbí kíkọ èsì tí o yẹ sí àwọn àlàfo tí a pèsè.

1. Kíni Eya tí ẹ tíwa?: 1 = Yoruba ( ) 2 = Igbo ( ) 3 = Hausa ( ) 4 = Awọn miiran _____

2. Kíni ipo igbeyawo yìín? : 1 = Mi o i tí fe oko ( ) 2 = Mo ti ṣe igbeyawo ( ) 3 = Mo tí fi oko mi sile ( ) 4 = Moti kuro nile ọkọ ( ) Oko mi tí ku ( )

3. Ọmọ ọdún mélo ni ẹ jẹ ní ìgbà tí ẹ se ojọ ìbí yín kẹhìn (ní ọdún)? _____

4. Kini iṣẹ ti ẹ ń se?:_____

5. Melo ni awọn ọmọ ti ẹbi?:

6. Kíni ìpéle tí ẹ ka ìwé de? 1= Mi o ka iwe Kankan rara [ ] 2 = ile ìwé alakobere [ ] 3 = Ile ìwé girama [ ] 4 = Ile iwe giga agba [ ] 5= Ile ẹkosẹ 6 = Isẹ miiran: (ẹ dárúkọ ẹ ni pàtó) _____

7. Kíni gbèdéke àpapọ owó ọyà yìín lósoosù? _____

8. Irú ìdílé wo ni ìdílé yin : 1 = ìdílé ti o gbooro 2 = ìdílé to gbooro

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9. Njẹ enikẹni ninu ẹbi yin ni aarun sáangunsáangun ri?: 1= Bẹ́ẹ̀ni 2= Bẹ̀ẹ̀kọ́

10 Bi o ba je be, tani eni naa si yin_____

11 Tani o ni ipa julọ lori awọn ipinnu eto ilera rẹ? 1 = Baba () 2 = Iya ( ) 3 = arakunri/arabinrin ()
4= Ọkọ ( ) 5 = Awọn ọrẹ () 6 = Olori ẹsin () 7 = Ẹlomiiran (ẹ dárúkọ ẹ ni pàtó)
_____

Imoye nipa aarun sa'angunsa'angun

12 Njẹ o ti gbọ alaye nipa aarun sáangunsáangun ri? 1. Bẹẹni [ ] 2. Bẹẹkọ [ ]

Bo' ba` je pe beeko, tesiwaju si ibeere 45.

13 Nibo ni o ti gbọ nipa alaye na? _____ 1.ori ẹrọ ayelukara tẹlifisonu ( ) 2. Redio ( )
3.Awọn iwe ipolongo pelebe ( ) 4.Awọn akọsilẹ ( ) 5. Awon osise et oilers ( ) 6. Awọn ọrẹ ( )
7. Awọn molebi ( ) 8. Awọn ona miran (ẹ dárúkọ ẹ ni pàtó) _____

ABALA B (APA KEJI): ÌBÉÈRÈ LORÍI ÌMÒ NÍPA ÀÀRÙN SÁANGUNSÁANGUN (KNOWLEDGE ABOUT AARUN SÁANGUNSÁANGUN)

Ilana: - ẹjọwọ fi arabalẹ dahun awọn ibeere ti o wa ni isalẹ yii pẹlu fifi ami si (√) si idahun ti o
yẹ. Idahun ti o tọ ati e yi ti o yẹ ni ami kọọkan lori.

(OSTEOPOROSIS KNOWLEDGE ASSESMENT TOOL (OKAT))

Ìmò nípa awọn àmìn aisan hàn ati awọn okùnfà ti o lewu lorii àràrùn sáangunsáangun

 (Knowledge of osteoporosis risk factors)

Òhùnkà	Ìbéèrè	Bẹ́ẹ̀ni	Bẹ̀ẹ̀kọ́
14	Njẹ jijẹ ohunjẹ ti wara ati miliki rẹ kere fun igba pipẹ le fa aarun sáangunsáangun?		
15	Njẹ ki obinrin ma se nkan oosu mọ le lekun aaye nini aarun sáangunsáangun?		
16	Njẹ ki obi tabi awọn obi obi ẹni ni		

	aarun sáangunsáangun lee mu ki awa nọọni aarun sáangunsáangun?		
17	Njẹ jije eniyan adulawọ jẹ nkan ti o ni eewu fun nini aarun sáangunsáangun?		
18	Njẹ jije arugbo obinrin ṣe alekun aye nini aarun sáangunsáangun ?		
19	Njẹ sise iṣẹ-abẹ lati yọ apo ile ọmọ lee mu ki aye nini aarun sáangunsáangun peleke si?		
20	Njẹ lilo awọn oogun siṭẹriọdu amaradagba fun igba pipẹ le se afikun aaye nini aarun sáangunsáangun ?		
21	Njẹ titobi ju iwọn ara lọ le jẹ eewu fun nini aarun sáangunsáangun ?		
22	Njẹ nini isoro pẹlu ohunjẹ jẹ eewu fun nini aarun sáangunsáangun ?		
23	Njẹ mimu ju igo oti lile meji lojoojumọ jẹ ọna ewu fun nini aarun sáangunsáangun ?		
24	Njẹ mimu siga ni ojoojumọ jẹ ọna ewu ni ewu fun nini aarun sáangunsáangun ?		

Ìmò nípa awọn ere idaraya tí ó le dènà ààrùn sáangunsáangun

(Knowledge of Physical Exercise in relation to Osteoporosis)

Ilana: - ẹjọwọ fi arabalẹ dahun awọn ibeere ti o wa ni isalẹ yii pẹlu fifi ami si (√) si idahun ti o yẹ. Idahun ti o tọ ati e yi ti o yẹ ni ami kọọkan lori.

25   Awọn ọjọ melo larin osẹ ni o kere tan lati fisere idaraya fun ki awọn egungun ara rẹ ni okun
      a) ọjọ meji
      b) ọjọ mẹrin
      c) ọjọ marun

26   Lati mu ki awọn egungun ara lagbara, ere idaraya gbọdọ gbe pẹẹli debi pe ogbọdọ gbe emi
      gbona;
      a) yiyara ati ati sọro soro
      b) yiyara sugbọn ọrọ seesọ

27   Ewo ninu awọn ere idaraya ni ọna ti o dara julọ lati dinku aye nini aarun sáangunsáangun ?
      a) wiwẹ lodo
      b) ririn irin to ja fafa
      c) nínàá ara

28   Ewo ninu awọn ere idaraya ni ọna ti o dara julọ lati dinku aye nini aarun sáangunsáangun ?
      a) gigun kẹkẹ
      b) sise ohunjẹ
      c) sise ere idaraya pẹlu gbigbe eru towuwo

29   Ewo ninu awọn ere idaraya ni ọna ti o dara julọ lati dinku aye nini aarun sáangunsáangun ?
      a) sisare jẹlẹnkẹ
      b) gbigba ilẹ
      c) jijoko

30   Ewo ninu awọn ere idaraya ni ọna ti o dara julọ lati dinku aye nini aarun sáangunsáangun ?
      a) fifọ aṣọ
      b) Ijó aerobic
      c) Kikan ẹsẹ

Imọ nipa èròjà améegunle (kasiomu) (Ohunje jijẹ)

Knowledge of Calcium Intake (Nutrition)

Ilana: - ẹjọwọ fi arabalẹ dahun awọn ibeere ti o wa ni isalẹ yii pẹlu fifi ami si (√) si idahun ti o
yẹ. Idahun ti o tọ ati e yi ti o yẹ ni ami kọọkan lori.

31   Ewo ninu iwọnyi ni orisun èròjà améegunle (kasiomu) ti o dara julọ?

a) eso apple

b) warankasi

c) kukumba

32   Ewo ninu iwọnyi ni orisun èròjà améegunle (kasiomu) ti o dara julọ?

a) bota

b) Tọki

c) Ẹja taitosi

33   Ewo ni orisun orisun kalisiomu ti o dara julọ?

a) adìẹ

b) efo igba

c) àjàrà

34   Ewo ni orisun èròjà améegunle (kasiomu) ti o dara julọ?

a) yugọti

b) ope oyinbo

c) karọọti

35   Ewo ni orisun èròjà améegunle (kasiomu) ti o dara julọ?

a) ohun mumu oniyinyin(Ice-cream)

b) ọgẹdẹ

c) eso kabeeji

36   Kini iwọn iseduro ti èròjà améegunle (kasiomu) fun agbalagba?

a) iwọn ẹgbẹrun si ẹgbẹrunlenigba lojoojumọ (1000-1200mg)

b) iwọn irinwo si ẹgbata lojoojumọ (400-600mg)

c) iwọn ẹgbaje1 si ẹgbẹrundin ni ọgọrun mẹta lojoojumọ (1400-1700mg)

37   Melo ni osuwọn wara ti agbalagba gbọdọ mu lati pe iye èròjà améegunle (kasiomu)?

a) gilasi kan lojoojumọ

b) gilaasi meji lojoojumọ

c) gilasi mẹta tabi ju bẹ lọi

38   Kini idi ti o dara julọ fun lilo afikun èròjà améegunle (kasiomu)?

a) aito èròjà améegunle (kasiomu) lati bi ohunjẹ

b) Nini iṣoro pẹlu orun sisùn deede

c) fun alekun idagbasoke

d) Awọn ona miran (ẹ dárúkọ ẹ̀ ni pàtó)

39   Fitamin wo ni o nilo fun gbigba èròjà améegunle (kasiomu)?

a) Fitamin A

b) Fitamin B

c) Fitamin D

40   Kini orisun ọna adayeba ti o dara julọ ti o nilo fun gbigba èròjà améegunle

(kasiomu)?

a) karọọti

b) osan

c) oorun

41   Kini orisun ounjẹ ti o dara julọ fun Fitamin nilo fun gbigba èròjà

améegunle (kasiomu)?

a) Eja salmon

b) warankasi

c) efo tete

42   Ewo ni iye iṣeduro ti Vitamin nilo fun gbigba èròjà améegunle (kasiomu)

fun agba ti ọdun 50 ati agbalagba

a) iwọn igba si irinwo lojoojumọ (200-400IU)

b) iwọn irinwo lojoojumọ si ọgọrun mẹjọ(400-800IU)

c)) iwọn ogọrun mẹjọ si egbẹrun lojoojumọ (800-1000IU)

43. Nigbawo ni akoko ti o dara julọ lati mu egungun ara lagbara? 1 = igba ewe () 2 = igba ọdọ 3 = igba agba () 4= Awọn ona miran (ẹ dárúkọ ẹ̀ ni pàtó)_____

44. A le se iwadii aarun sáangunsáangun nipa? 1 = idanwo ẹjẹ () 2 = Skaani DXA () 3 = awọn aami aisan ()

ABALA D (APA KETA): ÌBÉÈRÈ LORÍI ÌHUWASI MÒ NÍPA ÀÀRÙN SÁANGUNSÁANGUN (ATTITUDE TOWARDS OSTEOPOROSIS)

Ilana: - ẹjọwọ fi arabalẹ dahun awọn ibeere ti o wa ni isalẹ yii pẹlu fifi ami si (√) si idahun ti o yẹ.

Òhùńkà	Ìbéèrè	Beeni	Beeko
45	Mo jẹ awọn ounjẹ ti o ni èròjà améegunle (kasiomu) ninu		
46	Mo lodi si mimu oti lile nitori pe o le ni ipa lori ilera egungun mi		
47	Ara mi ya pẹlu sise ere idaraya lati dena àràùn sáangunsáangun		
48	Mo ro pe a ko le ṣe idiwọ aarun sáangunsáangun		
49	Imọran ti alabaṣiṣẹpọ mi ba funmi le yi ipinnu mi pada lorii idena aarun sáangunsáangun		
50	Ma a ṣe awọn ohun ti o ledena aarun sáangunsáangun niwọn ba igba ti awọn ọrẹ mi ba ṣe wọn		
51	Mo rii pe o ṣe pataki lati wa alaye nipa ilera mi		
52	Mo tako si ikogun fun aarun sáangunsáangun notitori o lodi si igabgbo mi		
53	Emi yoo ni anfani lati dena aarun sáangunsáangun ti mo ba ni aaye si alaye ti o wulo		
54	Mo ro wipe awọn olowo nikan ni aarun sáangunsáangun ma ń mu		
55	Ero mi lati se ere idaray yipada		

	nipasẹ ero awọn ọrẹ mi		
56	Ero mi lati se ere idaray yipada nipasẹ ero alabasepọ mi		
57	Ma a se awọn ohun ti o le dena aarun sáangunsáangun niwọngba ti alabasepọ mi ba fi ọwọ si		

ABALA IPIN E (APA KERIN): ÌBÉÈRÈ LORÍI ÌSESÍ TÍ Ó LE DÈNÀ ÀÀRÙN SÁANGUNSÁANGUN (PREVENTIVE PRACTICES AGAINST OSTEOPOROSIS)

Ilana: - ẹjọwọ fi arabalẹ dahun awọn ibeere ti o wa ni isalẹ yii pẹlu fifi ami si (√) si idahun ti o yẹ

58   Se e ma nmu oti lile losẹ ọsẹ? 1.Beeni (   ) 2. Beeko (   )

59   Nje e ti ṣe ayẹwo fun àmàrùn sáangunsáangun ni ile-iṣẹ eto ilera? 1.Beeni (   ) 2. Beeko (   )

60   Nje e ma nmu wara lojoojumọ? 1. Beeni (   ) 2. Beeko (   )

61   Nje e ma nwa ni inu oorun fun bi ogbọn iṣẹju ni bi ẹ mẹta ni ọsẹ kan? 1. Beeni (   )
        2. Beeko (   )

62   Nje e ma njẹ eja sandini ni osẹ-sẹsẹ? 1. Beeni (   ) 2. Beeko (   )

63   Nje e ma njẹ ohun eso onikoro ni osẹ-sẹsẹ? 1. Beeni (   ) 2. Beeko (   )

64   Nje e ma nse ere idaraya pẹlu rinrin iwọnba ibusọ lojoojumọ? 1. Beeni (   ) 2. Beeko (   )

65   Nje e ma nse ere idaraya pẹlu sisa ere niwọnba ni ọsẹ-sẹ? 1. Beeni (   ) 2. Beeko (   )

66   Nje e ma njo jijo ni iwon mba? 1. Beeni (   ) 2. Beeko (   )

CODING GUIDE

Knowledge, perception and preventive practices of osteoporosis among women of reproductive age in Ibadan North-East Local Government, Ibadan, Oyo state, Nigeria,

Questions	Variable (Question/Statement)	Variable label	Code
Q1	Ethnicity	_____	1 2 3 4
Q2	Marital status	Single Married Divorced Separated	1 2 3 4
Q3	Age (in years as at last birthday)		
Q4	Occupation (*will be coded from respondents' responses*)		
Q5	Number of children (*will be coded from respondents' responses*)		
Q6	Highest level of education	No formal education Primary Secondary Tertiary Vocational Others (start from)	1 2 3 4 5 6
Q7	Average monthly income (*will be coded from respondents' responses*)		
Q8	Type of family	Nuclear Extended	1 2
Q9	Do you have a family history of osteoporosis	Yes No	1 2
Q10	If yes, who? (*will be coded from respondents' responses*)		
Q11	Who influences your health decisions the most?	Father Mother Sibling Husband Friends Religious leader Others (Start from)	1 2 3 4 5 6 7

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Q12	Have you ever heard of osteoporosis?	Yes	1	
		No	2	
Q13	Source of information	Television	1	
		Radio	2	
		Newspaper	3	
		Magazines	4	
		Health worker	5	
		Friend	6	
		Relative	7	
		Others (Start from)	8	
Q14	Is eating a diet low in dairy products likely to cause osteoporosis?	Yes	1	
		No	2	
Q15	Can menopause increase a woman's likelihood of having osteoporosis?	Yes	1	
		No	2	
Q16	Does having a parent or grandparent who has osteoporosis increase one's chance of getting osteoporosis?	Yes	1	
		No	2	
Q17	Does being an African makes one at risk of having osteoporosis?	Yes	1	
		No	2	
Q18	Being an elderly woman increase the chance of having osteoporosis?	Yes	1	
		No	2	
Q19	Having a surgical removal of the ovaries predispose one to osteoporosis?	Yes	1	
		No	2	
Q20	Prolonged use of steroids increase the likelihood of having osteoporosis?	Yes	1	
		No	2	
Q21	Overweight/Obesity is a risk factor for osteoporosis?	Yes	1	
		No	2	
Q22	Having an eating disorder is a risk factor for osteoporosis?	Yes	1	
		No	2	
Q23	Consumption of more than 2 alcoholic drinks per day a risk factor for osteoporosis?	Yes	1	
		No	2	
Q24	Is smoking daily a risk factor for osteoporosis?	Yes	1	
		No	2	

Knowledge of Physical Exercise in relation to Osteoporosis

Questions	Variable (Question/Statement)	Variable label	Code
Q25	How many days a week do you need to exercise at least to strengthen your bones	2 days 4 days 5 days	
Q26	To make strong bones, exercise must	Fast but talking is	

	be hard enough to make breathing;	impossible Fast but talking is possible	
Q27	Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?	Swimming Walking briskly stretching	For all variables 1=Yes 2=No
Q28	Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?	Bicycling Cooking Lifting weight	
Q29	Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?	Jogging Sweeping Sitting	
Q30	Which of the following activity is the best way to reduce a person's chance of getting osteoporosis?	Washing clothes Aerobic dancing Boxing	

Knowledge of Calcium Intake (Nutrition)

Questions	Variable (Questions/Statement)	Variable label	Code
Q31	Which of these is the best source of calcium?	Apple Cheese Cucumber	
Q32	Which of the following is the best source of calcium?	Butter Turkey Titus fish	
Q33	Which is the best source of calcium?	Chicken Broccoli Grapes	
Q34	Which of the following is the best source of calcium?	Yoghurt Banana Cabbage	For all variables 1=Yes 2=No
Q35	Which of these is the best source of calcium?	Ice-cream Pineapple Carrot	
Q36	What is the recommended amount of calcium for an adult?	1000-1200mg daily 400-600mg daily 1400-1700mg daily	
Q37	How much milk must an adult drink to	1 glass daily	

	meet the recommended calcium intake?	2 glasses daily 3 or more glass daily	
Q38	What is the best reason for taking a calcium supplement?	Not getting enough calcium from diet Difficulty in sleeping properly For increased growth	
Q39	Which vitamin is required for the absorption of calcium?	Vitamin A Vitamin B Vitamin D	
Q40	What is the best natural source of vitamin D required for the absorption of calcium?	Carrot Orange Sunlight	For all variables 1=Yes 2=No
Q41	What is the best food source of the vitamin required for the absorption of calcium?	Salmon Cheese Spinach	
Q42	Which is the recommended amount of vitamin required for the absorption of calcium for an adult of 50 years and older	200-400IU daily 400-800IU daily 800-1000IU daily	
Q43	When is the best time to build strong bones?	Childhood Adolescence Young adult Others	
Q44	Osteoporosis can be diagnosed by?	Blood test DXA scan symptoms	

Section C: Attitudes towards Osteoporosis

N⁰	Statement	Variable label	Code
Q45	I consume foods rich in calcium	Yes No	
Q46	I'm against taking alcohol as it can affect my bone health	Yes No	
Q47	I'm comfortable with exercising to prevent osteoporosis	Yes	For all variables

		No	
Q48	I think osteoporosis cannot be prevented	Yes No	1= Yes
Q49	I can be influenced by the opinion of my partner in preventing osteoporosis	Yes No	2=No
Q50	I would engage in preventive practices against osteoporosis only if my friends do	Yes No	
Q51	I find it important to seek information about my health	Yes No	
Q52	I'm against screening for osteoporosis because it is against my beliefs	Yes No	
Q53	I would be able to prevent osteoporosis if I have access to relevant information	Yes No	
Q54	I feel osteoporosis only affects the wealthy	Yes No	
Q55	My will to exercise is influenced by the opinion of my friends	Yes No	
Q56	My will to exercise is based on the opinion of my partner	Yes No	
Q57	I will engage in preventive practices against osteoporosis only if my partner approves	Yes No	

Section D: Preventive practices against Osteoporosis

Instruction: - Kindly go through the questions given below and tick (√) against the appropriate answer to the under listed questions.

N^0	Practice Statement	Variable label	Code
Q58	Do you consume alcohol weekly	Yes No	
Q59	Have you been screened for osteoporosis at a health facility	Yes No	
Q60	Do you take milk daily	Yes No	For all variables
Q61	Do you exposure yourself to sunlight for at least 30 minutes three times a week	Yes No	1=Yes

Q62	Do you eat sardine fish weekly	Yes No	2=No
Q63	Do you consume nuts weekly	Yes No	
Q64	Do you engage in short distance walk daily	Yes No	
Q65	Do you engage in jogging exercise weekly	Yes No	
Q66	Do you perform aerobic dancing	Yes No	

APPENDIX 4

ETHICAL APPROVAL

TELEGRAMS.................   TELEPHONE.................

MINISTRY OF HEALTH
DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION
PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. ....
All communications should be addressed to
the Honorable Commissioner quoting
Our Ref. No. AD 13/479/1388   29th August, 2019

The Principal Investigator,
Department of Health Promotion and Education,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Ibadan, Nigeria.

Attention: Orintunsin Tosin

ETHICS APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Knowledge, Attitude and Preventive Practices of Osteoporosis among Women of Reproductive Age in Ibadan North East Local Government Area, Ibadan, Oyo State." has been reviewed by the Oyo State Ethics Review Committee.

2.   The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3.   Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

4.   Wishing you all the best.

Dr. Abbas Gbolahan
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethics Review Committee

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