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Interrelationships of osteoporosis knowledge, attitudes, and health beliefs in premenopausal women attending maternal child health clinics at Thika level five and Gatundu level four hospitals.

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ABSTRACT:Little is known about osteoporosis knowledge, attitudes, health beliefs, and their interrelationships, particularly in Kenya. Therefore, w**e** assessed the association between knowledge, attitudes, and health beliefs about osteoporosis in premenopausal women attending maternal child health clinics at Thika level five and Gatundu level four hospitals using a cross-sectional quantitative study design among 428 women. We observedgood osteoporosis attitudes (mean score1:5.1± 3.9/20) and health beliefs (76.9± 0.4/ 110) but moderate knowledge (5/ 10). Osteoporosis health beliefs and self-efficacy (rho = 0.5789, $p < 0.001$), health beliefs and attitudes (rho = 0.5364, $p < 0.001$), and self-efficacy and attitudes (rho = 0.5935, $p < 0.001$) were moderately strong and significantly correlated. Osteoporosis knowledge was weakly correlated with self-efficacy (rho = 0.1376, $p = 0.026$) and attitudes towards osteoporosis (rho = 0.2038, $p = 0.0001$). Increasing the osteoporosis knowledge, health beliefs, attitudes, and self-efficacy might synergistically promote osteoprotective behaviours.

KEY WORDS: Osteoporosis; Knowledge; Attitudes; Health beliefs; premenopausal women.

I.INTRODUCTION

Osteoporosis is a chronic, progressive disorder which manifests with low bone mass, bone tissue microarchitecture deterioration, bone fragility, and higher fracture susceptibility (1,2). The disease occurs when bone resorption process exceeds bone formation process, which is coupled with low bone strength. Oftentimes, the disease remains asymptomatic until a fracture occurs. Therefore, most people remain unaware about their bone health and fragility fractures risk status. Schousboe and Ensrud (3) noted that an individual has osteoporosis when T-score is ≤-2.5 while those with osteopenia and normal bone health have their T-scores between -2.5 and -1, and greater than -1 respectively. Because of its huge burden on the society, the disease was declared by World Health Organization [WHO] disastrous to mankind alongside other major chronic diseases (4).

II. SIGNIFICANCE OF THE SYSTEM

This study assessed interrelationships between knowledge, attitudes, and health beliefs about osteoporosis in premenopausal women. We studied premenopausal women since being female has greater osteoporosis risk; and the fact that this group is yet to reach menopause during which they could be targeted for osteoporosis awareness and prevention.

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III. LITERATURE SURVEY

Osteoporosis accounts for various adverse effects, including disability, and mortality (5) as well as fractures and morbidity. Millions of people are afflicted by osteoporosis worldwide (6). The prevalence of osteoporosis among people over 50 years ranges between 9 to 38% and 1 to 8% in women and men respectively (7). Moreover, about one in ten women aged 60, one in five women aged 70, and two in five women aged 80 are affected by the disease (8). Furthermore, the fragility fractures constitute the most severe osteoporosis complication since they lead to dependence, poor quality of life, and a huge socioeconomic burden. These fractures could develop from minor trauma (9) and they frequently occur in old age. The National Osteoporosis Society [NOS] (10) reported that one out of two women and one out of five men over 50 years old will develop a bone fracture. The lifetime osteoporotic fractures risk among women ranges from 30% to 50% (11). These statistics are alarming and underscore the need to intervene in this growing problem.

Osteoporosis is a multifactorial disease. Its modifiable risk factors include sedentary lifestyle and not having a balanced diet while non-modifiable risk factors include sex, ageing plus family history (12). Regardless of age, gender, and ethnicity or race, anyone can develop osteoporosis. However, women and elderly individuals are generally more susceptible. Therefore, it is important to practice risk reduction behaviours such as taking balanced diet and early screening right from early stages of life to minimize osteoporosis incidences and burden.

Although osteoporosis cannot be cured, its consequences can be averted largely through adoption of healthy behaviors and awareness regarding its risk factors. Notably, effective osteoporosis management should start with knowledge, health beliefs, attitudes, and perceptions assessment about the disease in population of interest (13). Knowledge and awareness are key contributors to osteoporosis prevention (14). Research has also shown that healthy behaviors and lifestyle predict low osteoporosis and fragility fractures risk (14). Indeed, lifestyle is a critical factor for osteoporosis prevention (15). Therefore, lifestyle and behaviors modification are highly recommended.

A growing body of evidence has also demonstrated that osteoporosis awareness is critical in its prevention, and that raising osteoporosis knowledge, attitudes, and practices levels in the general population is fundamental for ensuring successful program implementation towards osteoporosis prevention and control (16). Elsewhere, some studies reported moderate knowledge regarding bone health (17, 18) and osteoporosis (19) in different population groups. Others demonstrated that osteoporosis health beliefs were moderate (18) to good (17). And still others identified a gap in knowledge and its application which highlights the need for preventive health education to improve knowledge level and promote healthy behaviors (20). Therefore, knowledge, attitudes, and health beliefs determination about osteoporosis can provide more insight for effective preventive program development and implementation. However, little is known about the knowledge, health beliefs, and attitudes of osteoporosis and fragility fractures in Kenya.

IV. METHODOLOGY

A. Study design

A cross-sectional quantitative study design was conducted between June 2017 and February 2018 usingclosed-ended interviewer-administered standardized questionnaires.

B. Target Population

This study targeted 428 non-osteoporotic women aged 18 to 52 years at the hospitals both of which are government health facilities within Kiambu County in Kenya.

C. Eligibility criteria

All the study participants were women between 18 and 52 years at the selected hospitals; those who consented to participate in the study; and those who neither had history of osteoporosis nor osteoporosis. All other qualifying women who were attending other clinics at the hospitals; those who did not consent to participate in the study; those below or over 52 years; and those with history of osteoporosis or osteoporosis were excluded from the study.

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D. Study instruments

The questionnaire was developed in English and translated into Swahili to ensure clarity. Each questionnaire had a set of questions organized into five sections: socio-demographic characteristics (Section I); Osteoporosis Knowledge Test Scale (OKT) and Osteoporosis Health Belief Scale (OHBS) (13, 21) (Sections II and III respectively); Osteoporosis Self-Efficacy Scale (OSES) (Section IV); and attitudes towards Osteoporosis (Section V).

E. Pre-testing Questionnaire

Prior to the pretest, the researcher trained two research assistants with health-related training background for two days to ensure that they understood the study purpose, research variables, terms, and overall research tools, and the procedures to adhere to during the study. The questionnaire was pretested on 42 participants (10% of 420) at maternal and child health clinic in Kiambu District Hospital. This facility provided similar population to that of the study sites and ensured that the pretested participants were excluded from the main data collection to alleviate biasness. After data collection, validity and reliability of the questions were also achieved through re-checking sequence, wording, clarity, and any ambiguities following which necessary amendments were done accordingly before the main field exercise.

F. Data collection

Data collection by the research team on socio-demographic characteristics, knowledge, attitudes, and beliefs of osteoporosis was done from each participant during face-to-face interviews. All the data collected was recorded for analysis.

G. Ethical Principles

This study was approved by Institute of Tropical Medicine and Infectious Diseases (ITROMID) at Jomo Kenyatta University of Agriculture and Technology (JKUAT). All the study procedures and its later amendments adhered to ethical standards as per the Kenyatta National Hospital (KNH)-University of Nairobi (UoN) Ethical Research Committee, and the 1964 Helsinki declaration.

H. Data management and analysis

Data was double-checked to ensure consistency and quality. It was then coded and entered into a computer database and exported into a Statistical Package for Social Science (SPSS) software program (version 20) for analysis. Continuous variables were summarized into mean, standard deviation (±SD), and mode using descriptive statistics. Categorical variables were presented as percentages and frequencies. Mean score differences for knowledge, health beliefs, and attitudes were analyzed using One-way ANOVA. Correlations between osteoporosis knowledge, attitudes, and health beliefs sub scales were determined by Pearson correlation coefficient. Interrelationships between osteoporosis knowledge, attitudes, and health beliefs were analyzed using simple and multiple linear regression models. A p value of less than 0.05 was considered significant.

V. RESULTS

This study assessed 428 premenopausal women, 213 (49.8%) at Thika level five and Gatundu level four hospitals. We achieved 100% response since data collection from each participant was done by the researcher with two research assistants during face-to-face interviews. The participants' mean age was 28.5 years while the most common age groups at both hospitals were 18-22 years (27.6%) and 23-27 years (26.6%) (Figure 1).

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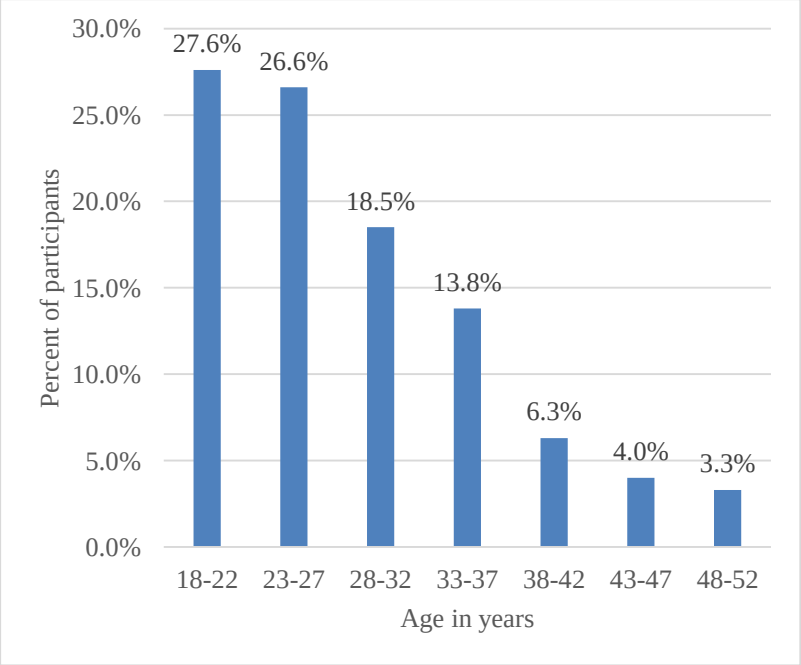

Figure 1: Age distribution of premenopausal women participating in study

Table 1 illustrates distribution of participants by education level, residence, housing type, and occupation. Most participants 197 (46%) had secondary level education, then tertiary 126 (29.4%), primary 71 (16.6%), post-tertiary 25 (5.8%), and none 9 (2.1%). 163 (38.2%) participants resided in urban settings, followed by similar distribution in peri-urban (31.3%), and rural (30.6%) settings. 279 (65.2%) women lived in permanent housing type, then temporary (74, 17.3%), and semi-permanent (73, 17.1%). Most participants were self-employed (161, 37.6%), then unemployed (97, 22.7%), students (57, 13.3%), farmers (14.7%), formal wage employment (11.4%), and retired (0.2%).

Table 1. Participant's educational level, residence, housing type, and occupation		
Education level	Frequency (n)	Percent (%)
None	9	2.1
Primary	71	16.6
Secondary	197	46
Tertiary	126	29.4
Post-tertiary	25	5.8
Residence		
Urban	163	38.1
Peri-urban	134	31.3
Rural	131	30.6
Type of housing		
Temporary	74	17.3
Semi-permanent	73	17.1
Permanent	279	65.2
Occupation		
Unemployed	97	22.7
Self-employed	161	37.6
Farmer	63	14.7
Student	57	13.3
Formal wage employment	49	11.4
Retired	1	0.2

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Overall, most participants were Christians 418 (97.7%). Similar distribution was also observed at individual hospitals, Thika level five 207 (96.3%) and Gatundu level four 211 (99.1%) (Figure 2).

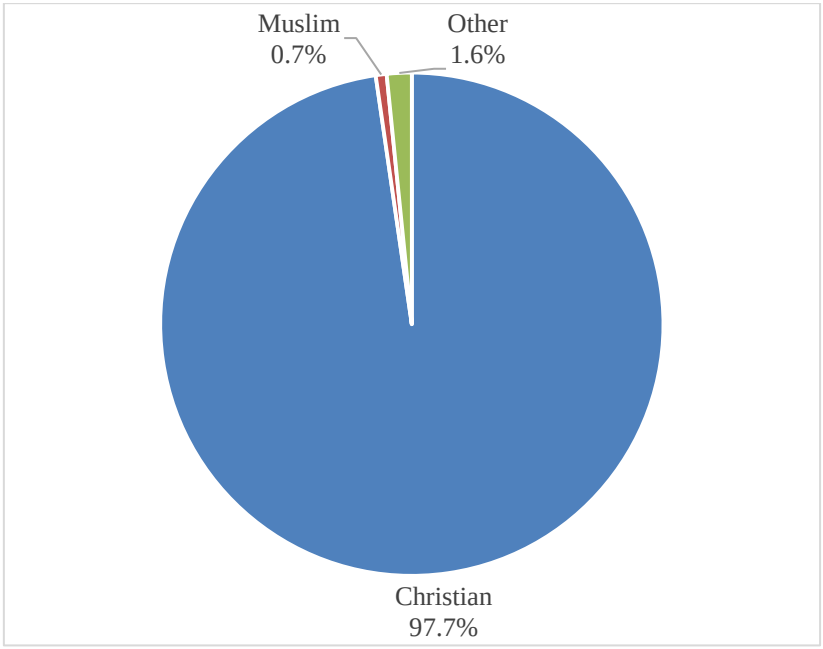

Figure 2: Distribution of premenopausal women by religion

Approximately two thirds (65.9%) participants in each hospital were married, 144 (67%) at Thika level five and 138 (64.3%) at Gatundu level four (Figure 3).

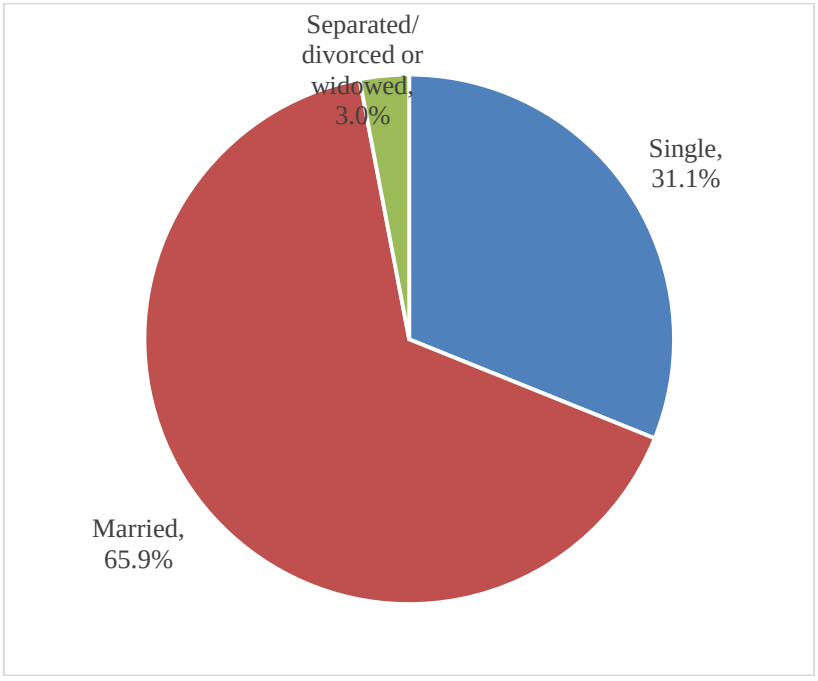

Figure 3: Distribution of premenopausal women by marital status

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The overall mean scores for osteoporosis attitudes was highest (15.1± 3.9/20), followed by health beliefs (76.9± 0.4/110), and knowledge (5/10). The mean values for knowledge, attitudes, and health beliefs generally increased with age. Age was associated with knowledge (p=0.016), attitudes (p =0.009), and health beliefs (p=0.007). Marital status (p=0.038), occupation (p=0.005), and residence (p =0.013) were associated with knowledge unlike attitudes, and health beliefs. There was no association between attitudes, knowledge, and health beliefs with education level, religion, and housing type (Table 2).

Table 2. Association of demographic characteristics with knowledge, attitudes, and health beliefs.

	Knowledge	Attitude	Health beliefs
Age in years	P Value=0.016	P Value =0.009	P Value=0.007
18-22	4.8(SD±2.0)	14.2(SD±3.3)	74.2(SD±7.3)
23-27	5.0(SD±1.8)	14.7(SD±4.6)	79.0(SD±8.3)
28-32	5.1(SD±1.7)	16.0(SD±2.6)	81.1(SD±9.1)
33-37	5.1(SD±1.6)	15.9(SD±3.9)	77.6(SD±14.7)
38-42	6.5(SD±1.5)	16.6(SD±3.4)	79.3(SD±8.3)
43-47	6.8(SD±1.4)	18.0(SD±1.6)	80.8(SD±7.0)
48-52	4.3(SD±2.3)	17.5(SD±2.2)	82.0(SD±5.9)
Education level	P Value=0.109	P Value =0.823	P Value=0.736
None	4.3(SD±2.5)	15.3(SD±2.1)	79.7(SD±10.7)
Primary	4.8(SD±1.7)	15.7(SD±2.9)	78.9(SD±7.9)
Secondary	4.9(SD±1.8)	15.2(SD±4.3)	78.1(SD±10.0)
Tertiary	5.7(SD±1.9)	14.8(SD±3.2)	76.4(SD±9.5)
Post-tertiary	4.8(SD±1.3)	16.2(SD±3.1)	76.7(SD±7.6)
Religion	P Value=0.556	P Value =0.833	P Value=0.849
Christian	5.1(SD±1.8)	15.2(SD±3.7)	77.8(SD±9.5)
Other	4.0(SD±.)	16.0(SD±.)	76.0(SD±.)
Marital status	P Value=0.038	P Value =0.471	P Value=0.341
Single	5.3(SD±2.0)	14.8(SD±4.0)	76.6(SD±7.5)
Married	5.1(SD±1.7)	15.4(SD±3.6)	78.3(SD±10.3
Separated/ divorced or widowed	3.3(SD±1.6)	15.5(SD±2.8)	80.7(SD±8.1)
Residence	P Value=0.013	P Value =0.769	P Value=0.187
Urban	4.8(SD±2.0)	15.0(SD±4.0)	76.2(SD±8.7)
Peri-urban	5.6(SD±1.7)	15.4(SD±3.5)	79.2(SD±7.6)
Rural	4.9(SD±1.8)	15.3(SD±3.6)	77.9(SD±11.2)
Housing type	P Value=0.629	P Value =0.777	P Value=0.18
Temporary	5.3(SD±1.8)	15.7(SD±4.3)	78.6(SD±8.6)
Semi-permanent	4.9(SD±1.5)	15.0(SD±3.1)	75.2(SD±7.5)
Permanent	5.1(SD±1.9)	15.2(SD±3.8)	78.4(SD±9.9)
Occupation	P Value=0.005	P Value =0.301	P Value=0.179
Unemployed	4.5(SD±1.8)	14.3(SD±4.2)	76.9(SD±7.8)
Self-employed	5.5(SD±1.7)	15.9(SD±2.7)	79.7(SD±8.6)

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Farmer	4.9(SD±1.7)	15.3(SD±4.6)	75.8(SD±12.5)
Student	5.9(SD±1.9)	14.9(SD±1.9)	76.3(SD±8.2)
Formal wage employment	4.8(SD±2.0)	15.7(SD±4.9)	79.1(SD±10.2)
Retired	4.0(SD±.)	16.0(SD±.)	89.0(SD±.)

There were moderately strong and significant correlations between osteoporosis health belief and self-efficacy (rho = 0.5789, p < 0.001), health belief and attitudes (rho = 0.5364, p < 0.001), and self-efficacy and attitudes (rho = 0.5935, p < 0.001). Osteoporosis knowledge was weakly correlated with self-efficacy (rho = 0.1376, p = 0.026) and attitude (rho = 0.2038, p = 0.0001). There was no correlation between osteoporosis knowledge and health beliefs (rho=0.0771, p =0.6687) (Table 3).

Table 3. Correlation coefficients for osteoporosis knowledge, health beliefs, attitudes, and self-efficacy

		Osteoporosis knowledge test (OKT)	Osteoporosis health belief scale (OHBS)	Osteoporosis self-efficacy scale (OSES)	Attitude/ perception towards osteoporosis
Osteoporosis knowledge test (OKT)	rho	1			
Osteoporosis health belief scale (OHBS)	rho	0.0771	1		
	P value	0.6687			
Osteoporosis self-efficacy scale (OSES)	rho	0.1376*	0.5789*	1	
	P value	0.026	<0.001		
Attitude/ perception towards osteoporosis	rho	0.2038*	0.5364*	0.5935*	1
	P value	0.0001	<0.001	<0.001	

Table 4 below shows association of osteoporosis health belief scale, self-efficacy scale, and attitudes scale on osteoporosis knowledge test. Further linear regression model analysis showed that the health belief scale was not associated with osteoporosis knowledge (p = 0.111). However, osteoporosis self-efficacy scale was significantly associated with osteoporosis knowledge test scores. The linear regression model showed that osteoporosis knowledge increased by 0.05 units for each unit increase in osteoporosis self-efficacy and this increase was statistically significant (p = 0.004). Similarly, the attitudes towards osteoporosis were associated with osteoporosis knowledge (p <0.001). The participants' scores in the osteoporosis knowledge test increased by 0.1 for each unit increase in scores measuring attitudes towards osteoporosis.

Table 4. Associations of osteoporosis health belief scale, self-efficacy scale, and attitudes on osteoporosis knowledge test

	Coef.	Std. Err.	t	P value	95% CI	
Osteoporosis health belief scale (OHBS)	0.01	0.01	1.6	0.111	0.00	0.03
Constant	4.00	0.66	6.09	<0.001	2.71	5.29
Osteoporosis self-efficacy scale (OSES)	0.05	0.02	2.87	0.004	0.02	0.09
Constant	3.81	0.43	8.77	<0.001	2.96	4.67
Attitudes towards osteoporosis	0.10	0.02	4.3	<0.001	0.05	0.14
Constant	3.58	0.35	10.26	<0.001	2.90	4.27

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In the multivariable linear regression analysis of health belief, self-efficacy, and attitudes against osteoporosis knowledge, only attitudes showed a significant effect on knowledge (p = 0.001). In the model adjusting for effect of health belief and self-efficacy, a unit change in score in attitude resulted change of 0.1 in the knowledge score of premenopausal women (Table 5).

Table 5. Association of attitude, health beliefs and self-efficacy on OKT score

	Coef.	Std. Err.	t	P value	95% CI	
Osteoporosis health belief scale (OHBS)	-0.01	0.01	-1.05	0.293	-0.03	0.01
Osteoporosis self-efficacy scale (OSES)	0.02	0.02	0.81	0.42	-0.03	0.07
Attitudes towards osteoporosis	0.10	0.03	3.36	0.001	0.04	0.16
Constant	3.96	0.65	6.1	<0.001	2.68	5.24

VI. DISCUSSION

This study identified high attitudes towards osteoporosis with mean score of 15.1± 3.9/20, followed by health beliefs (76.9± 0.4/ 110), and knowledge (5/10). Age specific means in these domains generally increased with age, suggesting that the women generally became more aware of osteoporosis as they grew older and thereby greater likelihood of perceived osteoporosis threat. Similarly, previous studies reported moderate knowledge regarding osteoporosis (19) in different population groups. Khalid et al (22) reported similar mean scores of knowledge (50%) and significantly lower attitudes (55%). Still others demonstrated moderate (18) to good (17) osteoporosis health beliefs. Accordingly, health education initiatives are needed to raise the knowledge level which may improve the attitudes and health beliefs. Collectively, these domains can influence healthy behaviours among the women and thereby contribute to better bone health and osteoporosis prevention.

We identified that age was associated with knowledge (p=0.016), attitudes (p =0.009), and health beliefs (p=0.007). Similarly, some previous studies demonstrated a positive correlation in age and knowledge about the disease (23). Inconsistent to our finding, some studies showed a lack of significant relationship between knowledge of osteoporosis and age (P = 0.188) which was similar to other reports (24, 25). In terms of beliefs, a previous study reported that younger people had lower perceived seriousness of osteoporosis compared to other chronic diseases like cancer and diabetes since it is misconstrued to be part of ageing process (26). Our findings suggest that the older women generally had better knowledge, attitudes, and health beliefs about osteoporosis than younger ones. Therefore, it is important to target these women for osteoporosis prevention from early ages by raising their knowledge level and motivating positive attitudes and health beliefs in order to minimize the risk of osteoporosis and its burden in their later stages of lives.

There was no association between attitudes, knowledge, and health beliefs with education level, religion, and housing type. By contrast, osteoporosis awareness was shown to be affected by and positively correlated with education level (27). Similarly, education level was shown to be positively correlated with awareness about osteoporosis (23). Moreover, Grace (28) reported a significant correlation between knowledge, beliefs, attitudes plus barriers to healthy bone practices with age and education. It may be argued that education is a critical factor that influences cognitive skills, including seeking health knowledge or information, access to it, and its application. The overall effects are increased osteoprotective behaviours in the general population and good bone health. However, future studies are needed to ascertain the influence of education on knowledge and health beliefs, and how these domains affect osteoporosis preventive behaviours.

Marital status (p=0.038), occupation (p=0.005), and residence (p =0.013) were associated with knowledge but not attitudes and health beliefs. These findings support previous report by Barzanji et al. (20) that osteoporosis knowledge was associated with occupation state and education. Other studies demonstrated that knowledge varied with residence (27, 29). Priyanka and colleagues (30) found that education and marital status were not significantly associated with belief for intention to take osteoporosis screening from a pharmacy. Our findings suggest that marital status,

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occupation, and residence may influence knowledge and awareness factors but not attitudes and health beliefs about osteoporosis.

Economic status also has a bearing on osteoporosis awareness. A previous study showed that middle income earners have higher osteoporosis awareness level than higher income earners whereas those with lower income lacked knowledge (27). Similar findings were reported by Barzanji et al. (20). Moreover, Fahd and colleagues (27) found that most of the participants who were knowledgeable about osteoporosis were employed unlike most of those with poor knowledge. Similar findings were reported by Barzanji et al. (20). This finding indicates that education is a requirement for securing employment which in turn influence osteoporosis knowledge accessibility.

On the other hand, low economic status may play a critical role in developing osteoporosis since individuals with low income may lack financial ability to afford better healthcare services, healthy foods, and even better housing. Additionally, low income earners are more likely to be less literate due to lack of finances which may explain why low income earners are likely not to have adequate knowledge about prevention of osteoporotic fractures (31) or comply with osteoporotic medication (32). Since socio-economic status (SES) is an effective factor for osteoporosis and knowledge, these findings may be a wakeup call to policy makers to subsidize medical expenses to ensure access to appropriate treatments by all people.

There were also moderately strong and significant correlations between osteoporosis health belief and self-efficacy (rho = 0.5789, $p < 0.001$). This is consistent with previous study by Cui et al. (33) who found that beliefs were not only associated with self-efficacy ($\beta = 0.31$, 95% CI = 0.25-0.38) but also significantly predicted self-efficacy ($\beta = 0.81$, $p<0.001$). This implies that both health beliefs and self-efficacy are effective in shaping individual's health behaviours towards osteoporosis prevention.

We found that health beliefs were moderately strong and significantly correlated with osteoporosis attitude (rho = 0.5364, $p < 0.001$). Similarly, Priyanka and the colleagues (30) reported that the attitudes of women about screening from pharmacy for osteoporosis and intention to take screen from a pharmacy were significantly positively associated (rho =0.553, p=0.000). Another study by Puttapitakpong et al. (2) reported that attitudes was significantly correlated with osteoporosis behaviors, educational level as well as knowledge. Our finding imply that osteoporosis attitudes and health beliefs may influence each other and thereby shape an individual's health behaviors which is critical for osteoporosis prevention.

Our study observed a weak correlation between osteoporosis knowledge and attitudes (rho = 0.2038, p = 0.0001). This weak correlation may be linked to poor osteoporosis knowledge and awareness among the women. Inconsistent to our findings, Puttapitakpong et al. (2) found that attitudes were significantly correlated with knowledge. Further analysis showed that osteoporosis attitudes were associated with osteoporosis knowledge ($p <0.001$) unlike health belief and self-efficacy. Our findings highlight a knowledge gap in women which could be bridged through health education. Consequently, this will raise their attitudes, health beliefs, and self-efficacy about osteoporosis which are critical for healthy behaviors and osteoporosis prevention.

There was no correlation between osteoporosis knowledge and health beliefs (rho=0.0771, p =0.6687). This lack of correlation may be attributed to poor osteoporosis knowledge and awareness among the women. The implication is that the women are likely not to engage in osteoprotective behaviours. Further analysis showed that health belief scale was not associated with osteoporosis knowledge ($p = 0.111$). This suggests that the study participants are less likely to adopt osteo-protective behaviours. By contrast, Chin et al. (34) reported a positive association between knowledge and health beliefs with regard to benefits of exercise and consumption of calcium and health motivation domains. Since knowledge and health beliefs about osteoporosis are crucial factors for its prevention, health education programs may be required to raise the level of knowledge on osteoporosis, its risks, and consequences which ultimately promotes health beliefs and preventive behaviours among the women.

Osteoporosis knowledge was weakly correlated with self-efficacy (rho = 0.1376, $p = 0.026$). This finding suggests that our study group has poor knowledge to influence intention to adopt osteoprotective behaviours, which is likely to increase their risk for the disease. Contrawise, Iwasaki et al (35) demonstrated a significant relationship between osteoporosis knowledge and bone health among young women. Indeed, knowledge increases awareness of

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osteoporosis and its risk factors, leading to increased positive beliefs and attitudes and thereby adoption of osteoprotective behaviours. However, there is need for more interventional studies to validate this hypothesis.

Osteoporosis self-efficacy was significantly associated with osteoporosis knowledge test scores. The predictive effects of osteoporosis self-efficacy were significantly associated with osteoporosis knowledge test scores. For each unit increase in osteoporosis self-efficacy, the osteoporosis knowledge increased by 0.05 units and this increase was statistically significant ($p = 0.004$). These findings indicate that having greater knowledge and self-efficacy is likely to influence osteoprotective behaviours in this population and vice versa.

Strengths and Limitation

This study used simple random sampling to ensure a representative normal sample distribution. Second, we used validated tools for assessing osteoporosis-specific knowledge, beliefs, and attitudes. However, external validity of the findings may be limited by the recruitment of participants from two hospitals in the same geographical location which may not be generalized to the population of the region or country. Additionally, there is potential for social desirability bias due to self-report for the osteoporosis knowledge, beliefs, and attitudes scales. Nevertheless, this bias was reduced by using validated Likert scale items, explaining the interview purpose to participants, and assuring them of anonymity of their responses, and training interviewers on administering the Likert items. Furthermore, we used a descriptive cross-sectional design which does not provide adequate evidence for inferring causal relationships. Therefore, future studies using stronger designs on different population groups in different regions are highly recommended.

VII. CONCLUSION AND FUTURE WORK

Health Belief Model (HBM) is a psychological theoretical framework that can provide important insight regarding adoption and practice of osteoprotective behaviors. However, the preventive behaviours should be based on appropriate knowledge, attitudes, and health belief of the target population. This study found low knowledge about osteoporosis among the women despite their good attitudes and health beliefs. From a public health standpoint, this study will provide current data on osteoporosis-related knowledge, attitudes, and health belief. This is critical for informing program development aiming to raise knowledge and awareness level among the premenopausal women and general publicabout osteoporosis. Ultimately, this can influence the health beliefs and attitudes, motivate healthy behaviours, and hence contribute to primary osteoporosis prevention, reduce its burden on society, and promote bone health. From a clinical perspective, targeted screening of at-risk age groups is needed to promote early detection, better management, and improved outcomes in osteoporosis cases.

A. Funding

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B. Acknowledgments.

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C. Author Contributions

JMMW was the principal investigator responsible for identifying the research topic, developing study design, and research implementation, data management, and writing manuscript. EOA sourced for research implementation fund, critically reviewed/ refined the study and manuscript, and approved for publication. AOM and PW critically reviewed/ refined the study and manuscript and approved for publication.

D. Conflict of interest

None declared.

E. Data availability statement

All the data supporting our findings are included in this article or uploaded as supplementary materials.

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