



An Investigation into the Pre-disease Lifestyles of Women with Osteoporosis in Akungba-Akoko, Akoko-South West Local Government Area of Ondo State, Nigeria

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Abstract

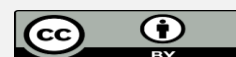
Background: Osteoporosis is a significant public health issue, frequently associated with lifestyle practices that predispose individuals to bone loss. Knowledge about women's pre-disease lifestyles is essential for the identification of modifiable risk factors and preventive strategies, especially in underserved populations where awareness of the disease is still low. This study investigated the pre-disease lifestyle of women with osteoporosis in Akungba-Akoko, Akoko South West Local Government Area of Ondo State, with a focus on how these practices may have contributed to disease.

Methods: A semi-structured interview was employed for data collection from six (6) participants recruited for the study using a purposive sampling technique. Inductive content analysis was used for analyzing the data, and a similarity process was undertaken to identify sub-themes. Similar sub-themes were grouped to form the final themes for the study.

Results: The findings indicated that several lifestyle factors including inadequate diet, lack of exercise, and second-hand smoke exposure were significant contributors to the development of osteoporosis among the participants. Furthermore, most of the women demonstrated low awareness of the link between their lifestyle practices and the onset of the disease. They were not aware of the health implications of their pre-disease lifestyles.

Conclusion: The study highlights the need for targeted health education interventions to raise women's knowledge of osteoporosis and its risk factors. NGOs, health workers, and community programs should prioritise awareness campaigns and promote lifestyle modifications that reduce osteoporosis risk, such as balanced diets, regular exercise, and preventive health checks.

Keywords: Pre-disease lifestyle, osteoporosis, Akungba-Akoko, health education, lifestyle modification, women's health, awareness.



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Introduction

Osteoporosis is a systemic skeletal disorder characterised by low bone mineral density and a compromised bone microarchitecture, leading to fragility and a greater susceptibility to fracture (Akkawi and Zmerly, 2018; Wallace, Rubin and Lieberman, 2015). It is considered a significant public health issue since it contributes to morbidity, mortality, and health spending, particularly for the elderly (Sarafrazi, Wambogo and Shepherd, 2021; Sözen, Özişik and Basaran, 2017). Although osteoporosis is mainly observed in postmenopausal women, it also occurs in men, young women, and even children, indicating that the illness crosses ages

(Mäkitie and Zillikens, 2021; Eastell et al., 2016). Osteoporosis burden is on the rise across the world, and osteoporotic fractures are among the leading causes of disability in elderly individuals (WHO, 2024; Golob and Laya, 2015; Khosla and Hofbauer, 2017). Osteoporotic fractures of the hip, spine, and wrist are more likely to occur after low trauma and have resulted in chronic pain, loss of function, and decreased quality of life (Anthamatten and Parish, 2019; Vidal et al., 2018). Moreover, an anterior osteoporotic fracture is likely to significantly enhance the risk of subsequent fractures in the future, which means that the disease is a chronic and

progressive condition (Anam and Insogna, 2021; Lupsa and Insogna, 2015).

Biologically, osteoporosis results from an imbalance between bone resorption and bone formation. During early life, the action of osteoblasts prevails, creating strong skeletal mass; but from midlife, osteoclast activity increases, leading to progressive loss of bone (Zhivodernikov et al., 2023; Yang et al., 2019). Estrogen deficiency post-menopause also accelerates this process, contributing to the high prevalence of osteoporosis among women (Eastell et al., 2016; Chin et al., 2022). Secondary causes such as chronic kidney disease, endocrine disease, and rheumatic diseases also contribute to osteoporosis risk (Pazianas and Miller, 2021; Adami et al., 2019). Lifestyle factors also play a crucial role in the etiology of osteoporosis (WHO, 2024). Poor nutrition, excessive alcohol consumption, smoking, and lack of physical activity increase risk for bone loss (Zhu and Prince, 2015; Muñoz-Garach et al., 2020). Healthy dietary practices, physical exercise, and avoidance of unhealthy lifestyles are preventative for bone fragility (An et al., 2016; Sirufo et al., 2020). Despite this evidence, osteoporosis and its modifiable risk factors remain poorly known among most populations, especially among the rural and semi-urban populace (Macías et al., 2020; Sözen et al., 2017). Given the multifactorial nature of osteoporosis, prevention and early intervention require knowledge about pre-disease lifestyles (Aspray and Hill, 2019; Eastell et al., 2016). However, in the majority of rural communities, women are not provided with sufficient information on the disease, risk factors, and preventive care (Sirufo et al., 2020). This is, therefore, a highlight of issues regarding the extent to which lifestyles put people at risk for osteoporosis within such communities. It is therefore extremely crucial to study pre-disease lifestyles for women who have osteoporosis.

Methodology

Study design

A qualitative research design was adopted for the study. A qualitative research is an approach to the study of human behaviour that relies on the analysis of narrative data to create an interpretation of the meaning of these behaviours from the perspective of the participants themselves, within their own social context (Fitzgerald and Field, 2021). A qualitative research design is appropriate for this study because it helps the researcher have a profound insight of the study.

Description of study area/setting

The study was conducted in Akungba-Akoko, a semi-urban community in the Akoko South West Local Government Area of Ondo State, Nigeria. Akungba-Akoko is located in the northwestern axis of the state and is one of the major settlements in the Akoko region. The town is also well renowned for the presence of the Adekunle Ajasin University, thus adding to its people diversity, culture vibrancy, and continuous flow of people from different parts of the country. The people are mainly Yoruba in population and Christianity, Islam, and traditional religion are the main religions practiced. The population is characterised by a mix of civil servants, traders, artisans, and farmers, and there are actively engaged women in small-scale commerce, subsistence agriculture, and

household responsibilities. Health care is provided at primary health centres, private clinics, and some secondary health facilities.

Study population

The population of the study consisted of all women with osteoporosis in Akungba-Akoko, Akoko South West Local Government Area of Ondo State.

Research Questions

1. Will the pre-disease lifestyles of women with osteoporosis in Akungba-Akoko, Akoko South West Local Government Area of Ondo State be a predisposing factor to the disease?
2. Were women with osteoporosis in Akungba-Akoko, Akoko South West Local Government Area of Ondo State aware of the health implications of their pre-disease lifestyles?

Sample and sampling techniques

The sample for the study consists of six women who are living with osteoporosis in Akungba-Akoko, Akoko South West Local Government Area of Ondo State. The purposive sampling technique was used to select the sample. The purposive sampling technique belongs to the category of non-probability sampling techniques (Campbell et al., 2020). In this method, sample participants are selected on the basis of their knowledge, relationships and expertise regarding a research subject (Memon et al., 2024). In this study, the samples were women who are medically diagnosed sufferers of osteoporosis, and thus they have personal experience with the problem. The researcher approached the women already diagnosed with the problem in Akungba-Akoko and sought their consent to take part in the study. This process was continued until the six persons expected to make up the sample were recruited.

Training of research assistants, pretesting of tools and data collection

Two research assistants with backgrounds in health and social sciences were recruited to support data collection. Prior to the commencement of the study, they underwent a one-day training session conducted by the researcher. The training focused on the objectives of the study, ethical considerations such as confidentiality and informed consent, and practical skills on conducting semi-structured interviews. Emphasis was placed on accurate note-taking, probing techniques, and ensuring neutrality during interactions with participants.

The interview guide was pretested among two women in a neighboring community with similar socio-demographic characteristics to the study population. This pretesting helped to assess the clarity, relevance, and appropriateness of the questions, and necessary adjustments were made to improve the tool's validity and reliability.

Data collection was carried out over a two-week period in Akungba-Akoko. Semi-structured interviews were conducted in settings convenient and comfortable for the participants, mostly within their homes. Each interview lasted between 30 and 45 minutes, and responses were recorded manually with the consent of the participants. To ensure trustworthiness, member checking was employed by summarising participants'

responses during the interview for confirmation before proceeding.

Instrument for Data Collection

A semi-structured interview guide was used for data collection. The semi-structured interview was developed based on the two research questions which were used to probe into personal experiences of the women on the subject matter. The interview guide explored specific segment on the past lives of the women with focus on their pre-disease lifestyles alongside the health implications of such lifestyles. Questions were designed to extract open-ended responses from participants.

Data analysis

Inductive content analysis was adopted for the study. According to Kyngäs (2019), inductive content analysis is the type of data analysis where a researcher gathers data and categorises them in themes and sub-themes so as to be able to make a judgement on the focus of the study by comparing the themes. The researcher read the interview scripts personally and coded the experiences reported by the interviewees. Furthermore, inductive inference and similarity processes was done to identify sub-themes, similar sub-themes were brought together to form the final themes for the study. This process is in accord with the procedures outlined by Vears and Gillam (2022).

Ethics consideration

This study received ethical approval from the ethics committee in Adekunle Ajasin Univeristy, Akungba-Akoko (approval no. 140216020). This ensured that the research protocol confirms ethical guidelines and that possible risks to participants were reduced as much as possible. Informed consent was one of the core ethical procedures. Participants had complete information given about the aim, the role that they would play, and their procedures in the study. Participants were informed that participation is purely voluntary and they may withdraw at any point from the study without any adverse consequences. Throughout the process of the study, the absorption of anonymity and confidentiality were rigorously observed. Each participant was given unique identifiers, and personal information were anonymised on the transcripts. Recorded interviews and transcripts were stored in encrypted files only accessible by the researcher, research assistants, researcher's supervisor and members of the ethics committee. This ensures that ethical considerations were taken into account to ensuring the integrity of the research and the welfare of participants.

Results

Emerging themes from the inductive data analysis are used to present the result (as seen in figure 1). Quotes are used to allow the reader have an understanding of the milieu from which the themes emerged from the data.

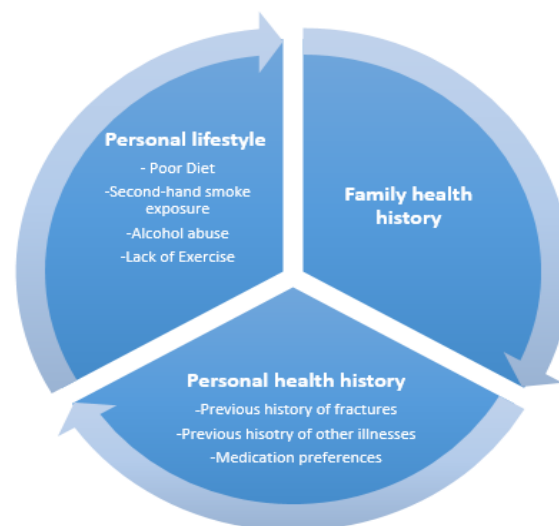


Figure 1: Mind map of identified themes showing the predisposing factors of osteoporosis.

Personal lifestyle

The first broad theme deduced from the result is “Personal Lifestyle”. Lifestyle can be defined as the interests, opinions, behaviours and behavioural orientations of an individual, group or culture (Janas, 2009). It is a manner of living and collective patterns of behavior. When it becomes personal it implies the course an individual’s life, especially when viewed as the sum of personal choices contributing to one’s personal identity and manner of living. The results revealed that certain personal lifestyle factors contributed to the development of osteoporosis among the participants. This personal lifestyle factors were group as sub-themes. The lifestyle factors included poor diet, second-hand smoke exposure, alcohol abuse and insufficient exercise.

Poor Diet: The findings from the result ascribed the development of osteoporosis to diet regularly high in carbohydrate and unawareness of adequate diet. All participants reported that they eat pounded yam as often as possible. Pounded yam is a significant source of carbohydrate and their report revealed that they take carbohydrate in excess. The data also revealed that most of the participants were not aware of adequate diet hence their choices of foods are not in accordance with good nutrition. Only one of the participants was slightly aware of adequate diet, however she had difficulties following it due to her family background and demand.

“It is pounded yam that I do eat most but sometimes I do eat beans. Pounded yam and cassava were my most common meal. Even at present Pounded yam is still my best meal and I prefer taking it with melon soup”. (Participant A)

“The food I do eat most then is pounded yam. I eat rice on very rare occasions. Aside that I do eat corn, cassava, yam, coco yam and fruits. But then, it’s pounded yam I do eat most often because that was the best choice of every one in my family. Till this moment, I still eat pounded yam although not as regular as before”. (Participant C)

Second-hand Smoke Exposure: The result revealed that secondary smoking is a predisposing factor to osteoporosis. Four of the participants were exposed to passive smoking. They reported that they lived around people who smoke (cigarettes, cigar, pipes) while they were young. According to their response they were ignorant of the health implication of such exposure.

"Tobacco use is bad. But when I was young my boyfriends do smoke tobacco and were oftentimes together. Nevertheless, we don't usually smoke tobacco with them". (Participant D)

"I don't smoke. Never have I. Not at all. But nevertheless, I once worked in a bar where people smoke. Whenever I am in a place where people smoke I don't feel comfortable. I leave immediately sometimes". (Participant F)

Alcohol Abuse: The result revealed that alcohol abuse is a predisposing factor to osteoporosis. All participants reported that they abused alcohol when they were much younger. Their response indicated that they were not aware of the health implication. Most of them noted that they take alcohol owing to peer influence.

"I take alcohol a lot and hide it from my parent when I was young. I usually follow my friends to alcohol joint to drink and have fun". (Participant C)

"I can recall that my fiancé takes alcohol and at that time whenever he offers me, I drink as well. Then we do drink it natural and unmixed. Our parent must not be aware of it then; they would chastise us. What actually made me drink such alcohol then was as a result of peer influence and also influence of my fiancé". (Participant D)

"I take alcohol but in very little quantity but that was when I was young. As I grew older I stopped taking alcohol. Nevertheless, at present once in a while I can still have a sip if I feel like". (Participant F)

Lack of Exercise: Furthermore, the results revealed that not insufficient exercise can be a predisposing factor to osteoporosis. Most of the participants reported that they did not engage in exercise and even when it seems they do, it became extreme physical activity. Some reported that the reason being that they were afraid of sustaining injuries why others said they were not interested as it seemed strenuous. Their responses indicated that they were not aware of the health benefits of exercise.

"When I was in secondary school I really did not partake in any exercise or sporting activities. I never loved exercising and the reason was that I was afraid of sustaining injury. I had phobia for injuries then which made me not to get involved in sport and exercise". (Participant B)

"I didn't attend any formal school. I never exercised except when we go farming and fishing. Oftentimes, we come back extremely stressed and our body aching". (Participant E)

"When I was in school, I did not partake in any sport or game. I wasn't interested then. Although sometimes during recess I do run with my friends playfully and a times as

competition between ourselves. I actually was not involved in any organized exercise or sport. To recreate then, I do go with my friends to a nearby river to swim. Although not every time, sometimes we go on a long walk to the extent that our body does ache by the time we get back to the village". (Participant F)

Family health history

The second general theme deduced from the result is "Family health history". The result revealed that family health history can be a predisposing factor to osteoporosis which is a secondary finding for this study. Three of the participants reported that bone health has been a reoccurring issue in their family. One clearly noted that her parents suffered from rheumatism as they were aging. Another participant reported that her mother also suffered from the same problem. A participant reported that most women in her family commonly suffer from strain (An injury to a muscle often caused by overuse; results in swelling and pain) and arthritis (Inflammation of a joint or joints). These are conditions that affects bone health and can be a predisposing factor to osteoporosis. Hence, the result revealed that family health history can be a predisposing factor to osteoporosis.

"Well, one health problem that was common in my family was rheumatism. I can remember vividly that my father and mother suffered from rheumatism as they grew older. Even my father's brothers suffered from it and it usually gives them serious discomfort and in inconveniences". (Participant C)

"Yes, my mum also had an impaired walking. I am not really sure what the actual cause was but according to what my step mother told us, she sustained a fracture while working on the farm. There was really no consequence at the first instance but there after it became a problem. Aside that it seems most women in my family do complain of arthritis and strain to their muscle I noticed that". (Participant E)

Personal health history

The third broad theme deduced from the result is "Personal health history". Personal health history has to do with the health condition of an individual in the past such as illness behaviour or practices of an individual in the past which includes occurrence of illnesses, injuries and medications. The findings of the study attributed personal health history as a predisposing factor to osteoporosis. The result of the study revealed that the personal health history of participants were predisposing factors of osteoporosis. The sub-themes includes previous history of fractures, previous history of other illnesses and medication preferences. Those segments will be discussed below as it relates to the result of the present research work:

Previous history of fractures: Findings from the result showed a strong relationship between history of fractures and osteoporosis. Beyond the normal falls and trips usually resulting to sprain participants reported that they had experienced one or two fractures at a time or the other before they became sufferers of osteoporosis. Those fractures were severe ones which took time before they could recover.

"I stopped going to the market since I experienced a fracture on my way to church. I actually thought it to be a minor fracture but as time goes on it became severe that I could not

walk on my own for months. I was placed on treatment but there was no significant improvement for a long while. Even till now, I cannot work appropriately as a result of that I am always staying at home". (Participant B)

"I couldn't believe that I can stay indoor the way I am presently unlike before when I could have gone to the market twice. For the period of time that I have been indoor as a result of a sustained fracture I have just been sleeping all through and I don't like it because it doesn't make me agile and it has also reduced my functionality. I suffered this fracture about ten years ago and the healing process was very slow till it got stagnant". (Participant D)

"I have been farming since my younger days not until few years ago when I could no longer go the farm because of chronic back pain. I have tried a lot to recover from it but the rate of it healing has been extremely slow. I had no choice other than to manage it". (Participant F)

Previous history of other illnesses: Results revealed that previous history of other illnesses can serve as a predisposing factor to osteoporosis. An illness in this context is simply the impairment of normal physiological function affecting part or all of an individual. Participants reported that they had suffered from one illness or the other before they became sufferers of osteoporosis. From their response, it's obvious that some of those illnesses could impaired their bone health.

"I can't remember precisely when but it happened few years after my husband retired from civil service. I was at first reporting general body weakness before I later experienced a fall and was thereafter tested and diagnosed with hypertension. Aside that I was once diagnosed of appendicitis and I was operated.. I had to use several drugs to combat it alongside prayers before I was eventually free from it". (Participant B)

"Whenever I'm sick, I resort to taking herbs. I can remember vividly I once suffered from severe arthritis. Thanks to several herbs that I used to treat it. Although it reoccurs sometimes. Personally, I don't usually fall sick but whenever I eventually do, I only take herbs and it has always been working for me". (Participant C)

Medication preferences: Lastly, the final sub-theme under personal health history revealed that medical preferences can be a predisposing factor to osteoporosis. All participants reported that they used herbs for treatment whenever they were ill. Participants noted that they strictly resort to the use of herb whenever they fall sick and they rarely use prescribed medications from a medical doctor. They noted that their parents nurtured them with herbs and they became accustomed to it.

"Herbs. I was nurtured with herbs right from my childhood and I have been used to it since then. Whenever I'm sick, I resort to taking herbs. I can remember vividly I once suffered from severe arthritis. Thanks to several herbs that I used to conquer it. Personally, I don't usually fall sick but whenever I eventually do, I only take herbs and it has always been effective for me". (Participant C)

"I do take herbs but only when I am ill. When we were young our parents usually prepare the herb for us. It has always been herbs. Varieties of herbs differently prepared for diverse sicknesses". (Participant D)

"I have the habit of cooking, preparing and using herbs. I cook these herbs and drink it almost every day. I so much cherish herb. I don't use any medication prescribed by a nurse or a medical doctor". (Participant E)

Discussion

This study explored the pre-disease lifestyles of women with osteoporosis in Akungba-Akoko, identifying personal lifestyle, family health history, and personal health history as predisposing factors to the condition. The findings provide important insights into how individual behaviors, cultural practices, and health histories interact to influence bone health.

Personal Lifestyle Factors

The role of lifestyle in the causation of osteoporosis has been well-ascertained, and the findings of this study are in agreement with prior evidence. Overreliance on carbohydrate diets such as pounded yam among the participants, combined with inadequate knowledge of balanced dieting, had a tendency towards bad bone health. Adequate consumption of vitamin D and calcium is vital in the maintenance of bone mineral density (Sarafrazi, Wambogo, and Shepherd, 2021; Muñoz-Garach, García-Fontana, and Muñoz-Torres, 2020). Diets deficient in micronutrients but rich in starchy staples can impair osteoblast function and accelerate bone resorption (An et al., 2016; Zhivodernikov et al., 2023). It suggests that nutrition education among rural women could have a preventive role.

Second-hand smoke exposure also emerged as a risk factor. Tobacco smoking has been found to reduce the amount of estrogen and affect the absorption of calcium, thereby weakening the bone (Zhu and Prince, 2015; Khosla and Hofbauer, 2017). The lack of knowledge among participants regarding the danger of passive smoking is in line with findings from previous studies that people in underserved populations are not educated on modifiable risk factors (Anthamatten and Parish, 2019). Alcohol abuse was likewise frequently reported. Alcohol hinders osteoblast function, increases oxidative stress, and interferes with hormonal control, all of which result in bone frailty (Chin et al., 2022; Petakov, 2023). Peer pressure, as highlighted by the women who participated in this research, has been discovered to be a major reason for unhealthy health habits among youths and young adults, thus setting the stage towards long-term skeletal complications.

Another salient finding was the absence of structured exercise among participants. Weight-bearing exercise is strongly associated with higher bone density and reduced risk of fractures (Eastell et al., 2016; Sözen, Özişik, and Basaran, 2017; Odubia & Adeuga, 2024). Instead, participants either avoided exercise for fear of injury or engaged in extreme physical labor such as farming, which may increase fracture risk when unbalanced with strengthening activity. The observed lack of awareness of the protective role of exercise

echoes prior reports on the need for community-based education (Golob and Laya, 2015).

Family Health History

Family health history was also noted to be a factor that was reported by some participants, with the reporting of a familial prevalence of rheumatism, arthritis, and fractures. Genetics play a significant role in osteoporosis, accounting for up to 80% of the variance in bone mineral density (Yang et al., 2019; Schembri and Formosa, 2024). Mutations in genes regulating bone remodeling and calcium homeostasis have been linked to increased susceptibility to osteoporosis across generations (Gao, Patil, and Jia, 2021). Therefore, women whose families have had musculoskeletal disorders can have been genetically predisposed to the illness as well, as their lifestyle habits added another factor to their condition.

Personal Health History

Previous fractures, chronic conditions, and the use of herbal medications were also identified in the study as common among the participants. Previous fracture is one of the most powerful predictors of future osteoporotic fractures (Eastell et al., 2016; Lupsa and Insogna, 2015). Similarly, comorbidities such as hypertension and arthritis, as suggested by the participants, further contribute to increased bone fragility either directly or indirectly as a result of long-term medication use (Adami et al., 2019; Pazianas and Miller, 2021).

The practice of using herbal drugs over prescribed medication calls out cultural beliefs coupled with limited access to formal healthcare. While traditional medicine is prevalent within rural Nigeria, unregulated use of the same may delay appropriate screening, diagnosis, and care of osteoporosis (Akkawi and Zmerly, 2018). This corroborates previous findings that called for the harmonization of community health education with acceptable practices in order to boost evidence-based uptake of management interventions (Vidal et al., 2018; Chen et al., 2024).

Implications and Future Directions

Generally, the implications highlight the interaction between modifiable and non-modifiable risk factors in the etiology of osteoporosis. Microenvironment within the bone has age-related alterations, and when complemented by lifestyle risk factors, prevalence for osteoporosis is significantly enhanced (Yu and Wang, 2016; Zhang et al., 2022). Preventive interventions in rural areas such as Akungba-Akoko should address nutritional education, smoking campaigns, awareness of alcohol risk, and promotion of safe physical exercise. Furthermore, with the prominent role of family and personal history of health, group-level screening programs in high-risk populations could facilitate early identification (Anam and Insogna, 2021).

Moreover, the reliance on herbal medicine presents an opportunity to engage traditional healers in educational campaigns about bone health. As emphasized by Odubia, Ojo, et al. (2025), incorporating culturally sensitive strategies into intervention programs may improve health-seeking behavior and this will likely included adherence to osteoporosis prevention guidelines. Finally, advances in molecular research and pharmacological interventions as identified by Odubia,

Ajileye, et al. (2025) provide opportunities for tailored treatment in the future, but for rural women in resource-limited settings, lifestyle modification and preventive education remain the most cost-effective strategies (Li et al., 2020; Tonk et al., 2022; Fu et al., 2022).

Conclusion

This study highlights that the pre-disease lifestyles of women with osteoporosis in Akungba-Akoko, particularly poor diet, second-hand smoke exposure, alcohol abuse, lack of exercise, and reliance on herbal remedies were significant predisposing factors to the disease. Additionally, family and personal health histories further increased susceptibility. Furthermore, the women were not aware of the health implications of their lifestyle. The findings underscore the need for improved health education, early lifestyle modifications, and awareness programs which should be tailored to women in similar communities in order to reduce the burden of osteoporosis and promote healthier aging.

Limitations

This study was limited by its small sample size, which might restrict generalisability of findings beyond the study area. The use of self-reported data also risked recall bias, particularly when participants reflected on past lifestyle practices

Declarations

Consent for Publications

Not applicable. This study does not contain any individual person's data in any form (including individual details, images, or videos) that would require consent for publication.

Availability of Data and Materials

All data collected and analysed in the study are currently not publicly available but are available from the corresponding author on request. This can only be used for non-commercial purposes which ensures that participants' confidentiality is protected.

Competing Interests

The authors declare that they have no competing interests related to this study.

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