Factors Associated with Women having Breast Lump in Ghana: A Cross-Sectional Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author DN performed the conceptualization, validation, investigation, data curation, visualization. Authors DN and MFO did the methodology. Authors DN and MAO did the software and formal analysis. Authors DN, MAO and TA did the writing-original draft preparation. Authors MFO, DN, MAO and TA writing-review and editing and resources of the manuscript. Author MFO and MAO supervised the work. All authors read and approved the final manuscript.

Original Research Article

Abstract

Background: Breast lumps or lumpiness are a prevalent issue among women seeking guidance, with 40% to 70% reporting lumps or lumpiness. Any woman, regardless of age, who discovers a breast lump by self-examination, screening, or medical intervention begins to worry about developing breast cancer. Late stage of reporting suspected lumps is on the rise and this was impacted by the pandemic. The study examined factors that are associated breast lump and the risk on women who ever had breast lump.
Method: An institutional-based cross-sectional study was conducted on women who attended Peace and Love Hospital in Kumasi, Ghana for breast care services from January to February 2022. Closed-ended

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questionnaire was used to solicit information from 301 women within a period of six weeks. Chi-square and binary logistic regression model was used to determine the association and the risk respectively.

Results: Breast lump was dominant in women between 41 – 50 years and in those who do not have family history of breast cancer. The findings reveal that educational level [$\chi^2 = 11.170$; $p = 0.011$] and the practice of breast self-examination [$\chi^2 = 7.998$; $p = 0.005$] were significantly associated with breast lump. Married women were 0.764 less likely to have breast lump than those who are singles. Women between 31-40 years were 2 times more likely [AOR=2.061, CI=0.876-4.846] and those between 41-50 years 1 time more likely [AOR=1.131,CI=0.451-2.837] to have breast lump than women between 18 – 30 years.

Conclusion: Breast lump is predominant in women between 31 – 50 years. Factors associated with a woman having breast lump are educational background and the practice of breast self-examination. Surgeon managing a breast lump in women over 30 years old are encouraged to be extremely suspicious and cautious in order to detect and treat malignant lumps early.

Keywords: Breast lump; prevalence; risk factors.

1 Introduction

The female breast is a prominent feature of the anatomy of women. It consists of glandular tissue, fatty tissue, blood vessels, and a network of milk ducts that are responsible for producing and delivering milk during breastfeeding. However, detecting a lump in your breast might be frightening. The majority of breast lumps, especially in younger women, are not cancerous and, a non-cancerous lumps such as cysts or infection could be the cause [1]. The proportion of breast lump diagnosed as fibroadenoma is high in women less than 31 years, and cyst is common in women between 41-50 years [2]. Breast lumps or lumpiness are a prevalent issue among women seeking guidance, with 40% to 70% reporting lumps or lumpiness [3]. According to Buccimazza, any woman, regardless of age, who discovers a breast lump by self-examination, screening, or medical intervention begins to worry about developing breast cancer [3]. [4] conducted a study on 1,086 women with non-metastatic and found 83% of self-detected breast lump, 10% other breast symptom, 4% physician diagnosis, and 3% unknown. Taylor and Taguchi in their study, evaluated 345 women for a breast lump at a referral center and classified 89 as high risk for but did not currently have cancer [5]. A total of 100 palpable breast lumps were evaluated using ultrasonography; the average age of the patients with palpable breast lumps was 41 years [6]. They discovered that the age range of 20-29 years had the highest frequency of breast lumps and, lump alone was present in 78% of the cases. However, 54% of the lumps were present in outer upper quadrant of the breast [6]. A study on pattern of breast cancer distribution in Ghana: a survey to enhance early detection, diagnosis, and treatment show that 0.76% breast cancer cases out of 6.46% of clinical palpable breast lump was discovered in women [7]. Again, a total of 277 cases were also investigated which, 24.2% of breast lumps were cancerous while 75.8% were benign [8]. Ohene-Yeboah and Adjei investigated breast cancer in Kumasi, Ghana and found 75.2% palpable breast lump in 248 patient [9]. The incidence of malignancy was found in 51% of patients aged 40 and younger and 74 percent of patients aged 41 and older who presented with a clinically palpable breast mass and underwent follow-up biopsy [10]. According to [8], malignancy rates rise from 0% in the second decade to 38.9% in the fifth and 100% in the ninth. They recommended that a surgeon dealing with a breast lump in a patient over 30 years old be extremely suspicious and cautious in order to find and treat malignant lumps early. The percentage of breast lumps as a result of normal breast lumpiness is high among less than 51 years [3]. As a result of doctors' advice, a 27-year-old woman died of breast cancer, which was first diagnosed as a lump in her breast at the age of 21 years [11]. Despite the fact that the patient had no family history of breast cancer, the doctor identified the tumor as a cyst and told the woman not to be concerned [11]. However, a lump that arise and disappears during menstruation period may be normal in the premenopausal environment. A lump that persists for longer than one or two cycles should be reported to a healthcare practitioner's. In the postmenopausal environment, a lump that persists for more than a few weeks should be reported to a healthcare physician [12]. The problem is that breast lump can be cancerous in some instances. Breast lump, though, sometimes can be diagnosed as cyst or benign, women died from it with such deaths classified as breast cancer. The late stage of reporting suspected lumps is on the rise [13–16]. Late-stage diagnosis and lack of access to cancer treatment in developing countries is hit by the pandemic [17]. Women may not know how to detect a lump, not aware of breast self-examination, or relate breast cancer to family history. Demographic factors such as; marital status, age, location, educational level, may have an effect on a woman unable to examine her breast or undergo regular screening. Age and history of breast cancer are important factors relating to recurring or

breast lump [4]. The chance of a diagnosis relates more with socio-demographic factors [18]. It is in this regards that, the study seeks to examine factors that are associated with breast lump and their risk.

2 Method

2.1 Study design and setting

An institutional-based cross-sectional study was conducted on 301 women who attended Peace and Love Hospital in Kumasi, Ghana for breast care services from January to February 2022. This facility is established purposely to manage breast cancer and breast related issues. The hospital is registered under the Health Facility Regulatory Authority and it has its headquarters in Kumasi, with a branch in Accra.The hospital manages and offers treatment specifically in breast-related complications including breast cancer.

2.2 Study population

Female patients between the ages of 18 and 60 who visited the hospital during the study period to seek for breast screening or other medical care were recruited and consented for the study.
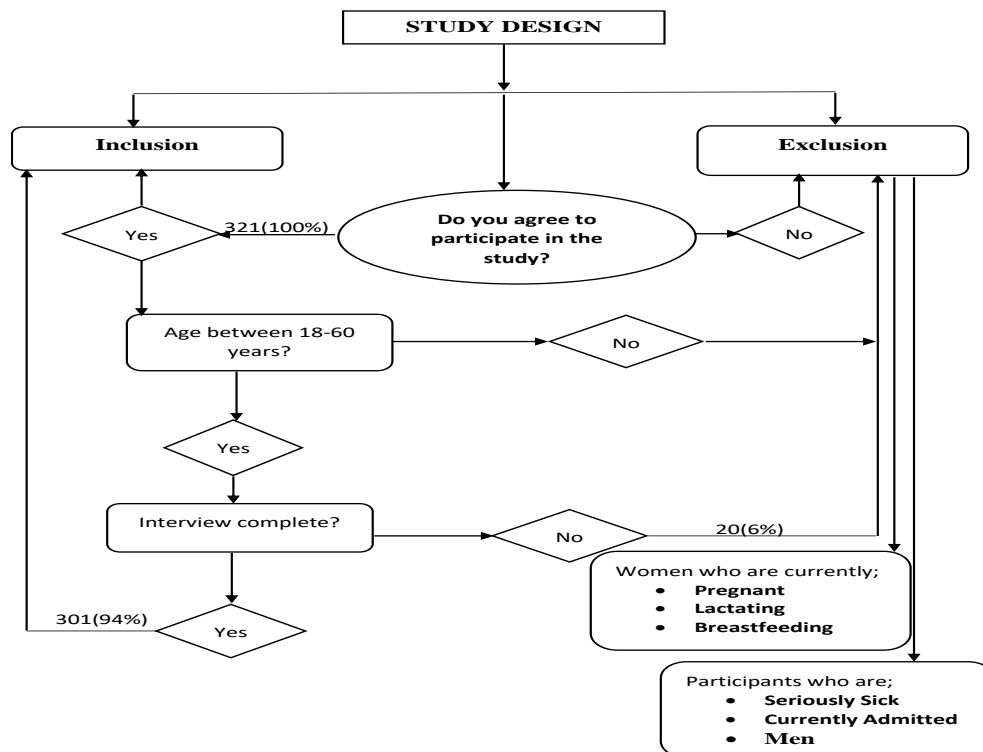
2.3 Schamatic diagram

Fig. 1. Schematic diagram of the study design

2.4 Sampling method and size

A case study approach was used for the study. This method was adopted to interview participants on their comfort at the waiting area where patients sat down waiting for their attendance cards, to make payment or receive medicine prescribed by a doctor or physician at the pharmacy. A structured questionnaire was used as a research instrument. However, a sample of 321 in line with [19] was obtained, with 301 completing the study. The remaining 20 samples were excluded because they could not complete the study processes.

2.5 Data collection

Data collection commenced from 11th January to February 24, 2022 spanning a period of six weeks. Age was used as an eligibility criterion and this fall between the ages of 18-60 years. The consent of the participants in this study was of great interest. This was done verbally during the main data collection period by enquiring from participants if they agree and were ready to participate in the study. The relevance and purpose of the study was explained to participants before interview commenced. To this end respondednts were allowed to ask questions freely before or during the interviewing processe with no form of intimidation. This paved the way for free flow of information from participants. The variables that were considered in the study are; age-group, marital Status, religion, residential area, family history, awareness of breast self-examination and the practice of breast self-examination.

2.6 Model specification

A logistic regression model was used to estimate the risk factors on women if ever had breast lump. The response variable for logistic regression is usually Bernoulli consisting of probabilities between 0 and 1. That is the outcome variable in this study (ever had breast lump) was assigned a value of 1 with the probability of ever had breast lump (Yes), or 0 with the probability of never ever had breast lump (No). The logistic function [say; $f(y)$] on which logistic model is derived, can be stated mathematically as follows;

$$f(y) = \frac{1}{1 + e^{-y}} \qquad (1)$$

where y takes the values from $-\infty$ to $+\infty$ and the function $f(y)$ is not linear hence this can be transformed into a linear sum.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n \qquad (2)$$

where $\beta_0, \beta_1, \beta_2$ and β_n denotes constant and coefficients of unknown variables, x_1, x_2 and x_n denotes predictors and y represents the response variable.

Equations (1) and (2) gives;

$$f(y) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)}} \qquad (3)$$

The probability statement (say $p(y)$) for the above equation can be stated as;

$$p(y) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n)}} \qquad (4)$$

which denotes the logic model and is not also linear. Therefore, we use the logit transformation to make it linear as stated below;

$$logit\ p(y) = ln\left[\frac{p(y)}{1 - p(y)}\right] \qquad (5)$$

The linear transformation in Equation 5 enables us to determine the odds for an individual response variable x. We can deduce from equations 4 and 5 that; $logit\ p(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n$ (this becomes the simplified linear sum of the logit p(y)). However, the probability that a woman ever had breast lump is divided

by the probability that a woman never had breast lump gives us the odds probability of y which can be written as; $Odds(y) = \dfrac{p(y)}{1-p(y)}$. Finally, our logistic model for the study is given in Equation (6);

$$logit\ p(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \varepsilon \qquad (6)$$

where y denotes the response variable, x's are predictors of interest and; $\beta_0, \beta's$ and ε denote the constant, regression coefficients, and the error term respectively.

2.7 Data analysis

Cross tabulation, chi-square test and binary logistic regression were used for the analysis. Cross tabulation and chi-square test were used to determine the association and compare the differences in the variables levels on ever had breast lump. The binary logistic regression was carried out to estimate the risk factors on women who ever had breast lump. The risk was estimated using 95% confidence interval.

3 Results

3.1 Factors associated with breast lump

From Table 1, 130 women out of 301, ever had breast lump. Majority (30%) of the women who ever had breast lump were between 41-50 years, about 29% of the lumps were found in women between 31-40 years, about 23% of the lumps were in those between 51-60 years. The least percentage (17.7%) of breast lump reported was from women between 18-30 years. The association between age-group and ever had breast lump was therefore not significant [χ^2 = 5.509; p = 0.138]. Close to 44% of breast lump were found in women who have obtained basic certificate. Almost 22% of breast lump were found in those who graduated with tertiary certificate, 17.7% among those with secondary certificate and 16.9% found in those with no educational background. However, the association between educational level and ever had breast lump was statistically significant $\left[\chi^2 = 11.170;\ p = 0.011\right]$. Similarly, 61.5% breast lump was in women who are married, 18.5% in never married women, 8.9% in widows, 6.8% in divorced, and with 2.3% each found in cohabitation and separated. Meanwhile, there is no statistical association between breast lump and marital status or type of residence of a woman $\left(\left[\chi^2 = 5.427;\ p = 0.366\right];\ \left[\chi^2 = 0.298;\ p = 0.585\right]\right)$. However, close to 71% of breast lump were found in women living in the rural areas compared with about 29% of breast lumps found among women in the urban areas. Breast lump found in Christian women was 83.1%, Muslim (16.2%) and traditionalist (0.8%). But there is no association between religion and breast lump $\left[\chi^2 = 2.752;\ p = 0.431\right]$. Majority (82.3%) of breast lump were found in women with no family history of breast cancer, compared to 17.7% of those with family history of breast cancer. Also, the association between breast lump and family history of breast cancer was statistically not significant $\left[\chi^2 = 2.169;\ p = 0.141\right]$. Those who are aware of breast self-examination presented about 98% of breast lump compared with almost 2% of breast lump in those that are not aware of breast self-examination (BSE). The practice of breast self-examination is associated with breast lump $\left[\chi^2 = 7.998;\ p = 0.005\right]$. That is, almost 94% of breast lump were in those who practice breast self-examination compared with 6% in those who do not.

3.2 Risk of experiencing breast lump

Table 2 shows that women between 31-40 years are 2 times more likely to have breast lump [AOR=2.061, CI=0.876-4.846] and those between 41-50 were 1 time more likely [AOR=1.131, CI=0.451-2.837] as compared with those between 18-30 years. Women with basic level [AOR = 0.521], secondary [AOR = 0.294] and tertiary [AOR = 0.255] education are less likely to have breast lump than those with no educational background.

Women who have experienced divorce [AOR = 1.151] or separated [AOR = 1.117] were 1 time more likely to have breast lump than those who had never married.

Table 1. Factors associated with ever had breast lump

Factors	Ever had breast lump? N=301		χ^2	P-value
	No n (%)	**Yes** n (%)		
Totals	171(100)	130(100)	n/a	n/a
Age-group				
18-30	49(28.7)	23(17.7)	5.509	0.138
31-40	38(22.2)	38(29.2)		
41-50	45(26.3)	39(30.0)		
51-60	39(22.8)	30(23.1)		
Educational Level				
No education	13(7.6)	22(16.9)	11.170	0.011
Basic level	62(36.3)	57(43.8)		
Secondary level	39(22.8)	23(17.7)		
Tertiary level	57(33.3)	28(21.5)		
Marital Status				
Never married	40(23.4)	24(18.5)	5.427	0.366
Married	95(55.6)	80(61.5)		
Divorced	8(4.7)	9(6.9)		
Separated	3(1.8)	3(2.3)		
Cohabitation	12(7.0)	3(2.3)		
Widow	13(7.6)	11(8.5)		
Residential Area				
Rural	116(67.8)	92(70.8)	0.298	0.585
Urban	55(32.2)	38(29.2)		
Religion				
Christianity	150(87.7)	108(83.1)	2.752	0.431
Muslim	19(11.1)	21(16.2)		
Traditionalist	1(0.6)	1(0.8)		
Others	1(0.6)	0(0.0)		
Family History				
No	151(88.3)	107(82.3)	2.169	0.141
Yes	20(11.7)	23(17.7)		
Are you aware of Breast Self-Examination (BSE)				
No	4(2.34)	2(1.54)	0.249	0.618
Yes	167(97.66)	128(98.46)		
Do you practice Breast Self-Examination				
No	29(17.0)	8(6.2)	7.998	0.005
Yes	142(83.0)	122(93.8)		

Note: Totals applied to all factors; n/a = Not applicable

Women who reside in urban areas have a higher chance to suffer from breast lump [AOR= 1.078] than those in rural areas. In terms of religion, Traditionalist [AOR = 1.761] and Muslim [AOR = 1.150] were about 1 time more likely to experience breast lump compared with Christians. Women with a family history of breast cancer were about 1.8 times more likely to experience breast lump than women with no family history of breast cancer [AOR = 1.755]. Similarly, women who are aware of BSE are 2 times more likely to report breast lump [AOR=2.179, CI=0.297-15.969] as against women who have not heard breast self-examination before. This implies that the more the awareness of breast self-examination, the more women will report to health facility with any suspected lump in their breast. It is significant to note that women who practice breast self-examination are 3 times more likely to report breast lump [AOR = 3.153, CI= 1.287-7.723] than the non-practitioners.

Table 2. Risk of parameters on ever had breast lump

Parameters	COR	95% CI		AOR	95% CI	
		Lower	Upper		Lower	Upper
Age-group						
18-30	Ref					
31-40	2.130*	1.091	4.159	2.061*	0.876	4.846
41-50	1.846	0.959	3.555	1.131	0.451	2.837
51-60	1.639	0.824	3.257	0.890	0.333	2.375
Educational Level						
No education	Ref					
Basic level	0.543	0.250	1.178	0.521	0.222	1.225
Secondary level	0.348*	0.148	0.822	0.294*	0.112	0.769
Tertiary level	0.290*	0.128	0.660	0.255*	0.095	0.684
Marital Status						
Never married	Ref					
Married	1.404	0.780	2.524	0.764	0.323	1.809
Divorced	1.875	0.638	5.513	1.151	0.300	4.422
Separated	1.667	0.311	8.928	1.117	0.182	6.853
Cohabitation	0.417	0.107	1.628	0.174*	0.038	0.803
Widow	1.410	0.546	3.643	0.806	0.225	2.881
Residential Area						
Rural	Ref					
Urban	0.871	0.531	1.430	1.078	0.610	1.906
Religion						
Christianity	Ref					
Muslim	1.535	0.787	2.994	1.150	0.536	2.464
Traditionalist	1.389	0.086	22.451	1.761	0.099	31.368
Others	-----	-----	-----	-----	-----	-----
Family History of Breast Cancer						
No	Ref					
Yes	1.623	0.849	3.104	1.755	.854	3.604
Are you aware of Breast Self-Examination						
No	Ref					
Yes	1.533	0.276	8.500	2.179	.297	15.969
Do you practice Breast Self-Examination						
No	Ref					
Yes	3.114*	1.373	7.066	3.153*	1.287	7.723

*Note: COR = Crude Odd Ratio; AOR = Adjusted Odd Ratio; CI =Confidence interval; Ref. = Reference Category; * = Significant at 5%*

3.3 Model assessment

The Omnibus test of the model according to [25], the model is significantly better than the null model $\left[\chi^2 (18) = 33.303, \ p < 0.05 \right]$ as presented in Table 3. Also, the -2 Log likelihood for the model value is 378.37 which shows a significant decrease in the -2LL as compared with the null model of Omnibus test of the model coefficient. According to [26] the H-L test posited that the variables used are unlikely to differ from those employed in the proposed model $\left[\chi^2 (8) = 7.923, \ p < 0.441 \right]$ as shown in Table 3.

Table 3. Model fitting information and goodness of fit test

Model/Test	-2 Log Likelihood	Chi-Square	df	p value
Model	378.369	33.303	18	.015
Hosmer and Lemeshow		7.923	8	.441

3.4 Classification

The classification results show that, the overall success rate of the full model correctly classified was about 64% compared with 57% predicted by the null model as presented in 4. This implies the full model has a better prediction rate than the null model [25].

Table 4. Classification outcomes

Observed		Ever had Breast Lump Before (Predicted)		Percentage
		No	Yes	Correct
Ever had Breast Lump	No	132	39	77.2
Before?	Yes	69	61	46.9
Null model	-	-	56.8	
Full model		-	-	64.1

4 Discussion

The study found 43.2% breast lump in 301 women. This corroborate the outcome reported from Sheffield by [19]. It is also consistent with the result that [9] reported in Kumasi. This means that for every 10 women more than 4 women are living with breast lump and this may be cancerous or benign. Despite that most breast lump are not cancerous, the majority are benign lumps [20]. However, detecting a lump or any initial changes in one breast raises fear of having breast cancer [4,21]. As a result, for young women in particular, the panic itself could affect their physical well-being. Breast cancer diagnoses and treatment cause physical and emotional issues [22]. The study also found 53.1% breast lump in women above 40 years (41-60 years) compared with 46.9% of breast lump in those between 18 – 40 years. It was noticed that close to 77% (about 8 in 10) breast lump were found in women within the active working (18 – 50 years) population. This finding also confirms that [9] that more than 70% of breast canxer cases are among the ages of 20 – 59 years. Therefore, it is suspicious that some of these lumps found in the active working population could be cancerous. Majority of non-encapsulated cyst adenomas microscopically suspicious of malignant were subjected to the complete operation for cancer [23]. Meanwhile, the probability that breast mass in women less than 25 years ranges from 0.0044 to 0.0014 [4]. Breast lump in this study is significantly associated with educational background. Nearly 61% (about 6 in 10 women) breast lumps were in women who could not progress to the second cycle whilst 39.2% breast lump was found in women with at least secondary education. This implies, the higher a woman's educational level, the lesser (about 4 in 10 women) her chance of experiencing breast lump. This result is in line with [24-27] study in Nigeria that found that "Women with higher level of education and those employed in professional jobs were significantly more knowledgeable about breast cancer. Participants with higher level of education were more likely to practice BSE".

The risk of having breast lump among women with a minimum of secondary education is lower than those with basic or no education. Meanwhile, breast lump experienced by married women was higher (61.5%) than those who are single, divorced, cohabitation or being a widow. However, the logistic regression model estimations (adjusted odds ratio) show that married women were 0.764 less likely to have breast lump than those who are single. The implication could be that, married women get support such as; financial, home and emotional from their spouses than unmarried women [14]. Married men are willing to help their wives detect breast lump [24]. The results further indicate that there is a higher risk of breast lump among women in urban areas than their counterparts in rural areas. The odds for Muslim and Traditionalist women to have breast lump in the study is higher than those who are Christian. This corroborates the findings by Cheung and Lam [18] that breast examination and treatment of breast lump is influenced by religious beliefs.

The risk of women with family history of breast cancer to develop breast lump is about 1.8 times compared with those without family history of breast cancer. Women who are aware of breast self-examination have about 2.2 chance to detect breast lump than those who are not aware. Moreso, women who practice breast self-

examination are more than 3 times likely to detect breast lump than those who do not practice it. This means that breast self-examination is one surest way of early detection of breast lump in women.

5 Conclusions

Breast lump was more prevalent in women who are between 41-50 years, those with low level of education as well as those with family history of breast cancer. Again, breast lump prevalence was also high among women who lack breast self-examination awareness and practice breast self-examination. Factors that are associated with breast lump are educational background and the practice of breast self-examination. Women who have higher educational background have a lower chance to have breast lump. It is necessary to intensify awareness of breast examination, and to educate women with less or no educational background on the risk of breast lump.

6 Limitation and Recommendation for Further Studies

Some shortfalls that might have affected the results in this study are; first, no screening procedure or laboratory test was conducted on the respondents by the team. Another significant challenge was inadequate related published papers in Ghana and developing countries, hence only available published papers on reputable journals were reviewed. It is suggested that, screening procedures and laboratory test be conducted in similar studies to identify the lump type. Finally, grants or funds should be provided to enable future researchers conduct screening and laboratory test to know if the lump reported is benign or malignancy.

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Acknowledgement

Ethical Approval

As per international standard or university standards written ethical approval has been collected and preserved by the author(s).

Consent

As per international standard or university standards, respondents' written consent has been collected and preserved by the author(s).

Competing Interests

Authors have declared that no competing interests exist.

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