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MORBIDITY DUE TO BREAST PROBLEM: A STUDY IN THE SLUMS OF GUWAHATI CITY

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ABSTRACT

Morbidity due to breast problem is a burning health issue which demands intensive study and concern. In our study, we have attempted to analyze the morbidities due to breast problems among the married slum dweller women in the age group 15 to 59 years living in the slums of Guwahati city, using logistic regression. This group of women were questioned regarding their problems related to the breast, if there existed any, and these morbid conditions were studied and analyzed under various socio- demographic factors like their educational qualification, age groups and also their ages at the time of the first deliveries and the number of children ever born, so as to study their effect on the prevailing morbidity due to breast problems.

The study reveals that morbidity due to breast problem is very much associated with age of the respondents, their educational level and age at first birth and the no. of children ever born. The various types of breast problems studied here reveals that the younger women are less likely to suffer from breast problems. It is noteworthy to mention that the literate women were more prone to problems of the breast. Apart from this, we have also seen that women whose first delivery occurred after 18 years of age are less affected by breast problems as compared to those who gave birth before attaining the age of 18 years. At the same time, we may also infer that females with repeated child birth are also prone to breast problems.

KEYWORDS | slum dweller, logistic regression, age at first birth.

1. Introduction and Literature Review

Breast lumps or changes are a common health worry for most women. Other symptoms of breast cancer include a lump or thickening in the breast or armpit that is new or unusual, a change in the size or shape of the breast, skin changes, such as a dimple or pucker in the skin of the breast, spontaneous discharge or bleeding from the nipple, a change in the nipple, scaling or crusting of the nipple, a change in the color or feel of the skin of the breast or the darker area around the nipple (areola), etc. Treatment of a breast problem depends on the cause of the problem.

A hospital based prospective study by *Goel, et. al* [8]of 100 women, observed that the time of first contact from the time of feeling a lump ranged from 1 day to 9.5 years (mean 6.7 years). This study reported that only 20 women were aware of breast cancer. These were educated urban women with a family history of malignancies. The study also noted inappropriate medical practices leading to delay in referral and poor diagnosis. The WHO (2000) report states that breast cancer is the most common cancer affecting women from developed countries. The cancer studies reviewed here, could be broadly classified as 1) studies that attempt to examine the social factors that correlate with different cancers and 2) clinical studies that are carried out strictly to assess the efficacy of clinical and diagnostic procedures case management [4, 5]. Breast cancer represents approximately 30% of new cancer diagnosed in women [9]. The earlier breast cancer is detected, the more easily and successfully it can be treated. A population based survival study of cases of female breast cancers registered with the Madras Metropolitan Tumor registry, showed significant differences in survival on the basis of age at diagnosis, marital status, educational level and clinical extent of disease. The study revealed that decreased survival was associated with higher age at diagnosis. Single women displayed poorer survival compared to married women and survival rate was found to be higher among women with more than 12 years of schooling. An inverse relationship was seen between survival rates and clinical extent of disease [7].

2. Rationale of the Study and its Objectives

Morbidity due to breast problem is a burning health issue which demands intensive study and concern. Though a large number of studies have taken place in the west, India is still lagging behind in this aspect. At the same time, it has become necessary to make the women folk aware of the intensity of such morbidities so that malignancy of the breast and such other serious problems can be easily detected and treated.

Data

There are 25 slum pockets in the Greater Guwahati area, the total number of households in these pockets being recorded as 24,603 with a total population of 15, 6906 out of which 7,1995 are females (Guwahati Municipality Corporation Slum Survey Report, 2003). From these 25 slum pockets, 5 slum pockets have been selected for carrying out the survey. For our study, we have resorted to two stage sampling procedure and primary data have been collected from the female respondents who were the residents of the slums of Guwahati City and who were married and were in the age group 15-59 years.

In our study, we have attempted to analyze the morbidities due to breast problems among the married slum dweller women in the age group 15 to 59 years. These group of women were questioned regarding their problems related to the breast, if there existed any, ranging from breast pain, to presence of lumps in and around their breast and armpit and also regarding abnormal nipple discharges and changes in breast forms and sizes.

These morbid conditions were studied and analyzed under various socio- demographic factors like educational qualification of the respondents, their age groups and also their ages at the time of the first deliveries and the number of children ever born, so as to study their effect on the prevailing morbidity due to breast problems.

4. Methodology: Logistic Regression

The study has been carried out using logistic regression. The dependent variable in logistic regression is usually dichotomous, that is, the dependent variable can take the value 1 with a probability of success θ, or the value 0 with probability of failure $1-\theta$. The relationship between the predictor and response variables is not a linear function in logistic regression; instead, the logistic regression function is used, which is the logit transformation of θ:

$$\emptyset = e^{(\alpha+\beta 1x1+ \beta 2x2+......+ \beta ixi)} / [1 + e^{(\beta 1x1+ \beta 2x2+......+ \beta ixi)}] \qquad (1)$$

Where α = the constant of the equation and, β = the coefficient of the predictor variables.

An alternative form of the logistic regression equation is:

$$\text{logit } [\emptyset(x)] = \log [\emptyset(x) / \{1 - \emptyset(x)\}] = (\alpha + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_i x_i) \qquad (2)$$

The goal of logistic regression is to correctly predict the category of outcome for individual cases using the most economical model. Stepwise regression is used in the exploratory phase of research but it is not recommended for theory testing [11]. Backward stepwise regression appears to be the preferred method of exploratory analyses, where the analysis begins with a full or saturated model and variables are eliminated from the model in an iterative process. The fit of the model is tested after the elimination of each variable to ensure that the model still adequately fits the data. When no more variables can be eliminated from the model, the analysis is considered to be completed.

The interpretation of the effect of the independent variables has intuitive appeal on the response variable. The logistic regression coefficients show the change in the predicted logged odds of experiencing an event or having a characteristic for a one-unit change in the independent variables. Odds in logistic regression express the likelihood of an occurrence relative to the likelihood of a nonoccurrence. To illustrate this, we assume that each independent variable has a probability of experiencing an event, defined as Pi.

Given this probability, the *logit* transformation involves two steps. First, we take the ratio of Pi and $1-Pi$, or odds of experiencing the event. Second, we take the natural logarithm of the odds. The logged odds or *logit* thus equals,

$$Li = \ln [Pi / (1-Pi)] \qquad (3)$$

Manipulating the above formula for odds will give further insight into one of the inherent problems faced with nonlinear functions in linear regression and how logistic regression performs in dealing with these functions.

$$Pi / (1-Pi) = Oi \text{ implies that } Pi = Oi / (1+Oi) \qquad (4)$$

Based on this formula, the probability can never be equal or exceed one. Conversely, the probability can never fall below zero. So the first property of *logit* is that it has no upper or lower boundary. *Logits* vary from negative infinity to positive infinity.

In the case of binary logistic regression models, the relationship between a binary response variable and one or more explanatory variables are modeled. The logistic regression model uses the explanatory variables to predict the probability that the response variable takes on a given value. The response variable takes one of the two binary values (0 and 1) in the case of binary logistic regression models. For a binary response variable y, the logistic regression model has the form as,

$$\text{Logit } (Pi) = \log [Pi/(1-Pi)] = \alpha + \beta Xi \qquad (5)$$

Where Pi = Prob. ($y_i = y_1 | X_1$) is the response probability to be modeled, and y_1 is the first ordered level of y.

α = Intercept parameter, β = Vector of slope parameters,

X_i = vector of explanatory variables

This logistic regression equation models the logit transformation of the *ith* individual's event probability, Pi, as a linear function of the explanatory variables in the vector, Xi[3].

4.1 Data Coding for Logistic Regression
Coding and preparing data for statistical analysis were required to transform contributing factors into useful qualitative variables for logistic regression modeling. Information extracted from the respondents regarding morbidities due to breast problems were initially not formatted appropriately for logistic regression. Therefore, a data set of variables specifically formatted for finding the factors that influence prevailing breast morbidities were built from database. The set of promising variables fell into four categories viz. age, education, age at first birth and number of children ever born.

4.2 Dependent Variable
In this study an analysis has been done on the morbidities due to breast problems among the married slum dweller women in the age group 15 to 59 years. These group of women were questioned regarding their problems related to the breast, if there existed any, ranging from breast pain, to presence of lumps in and around their breast and armpit and also regarding abnormal nipple discharges and changes in breast forms and sizes. These morbid conditions have been considered as the dependent variables.

4.3 Independent Variable
The data analyzed in this study had 1350 women in the age group 15-59 years. These morbid conditions were studied and analyzed under various socio- demographic factors

like educational qualification of the respondents, their age groups and also their ages at the time of the first deliveries and the number of children ever born, so as to study their effect on the prevailing morbidity due to breast problems which has been considered as the independent variables. The various dependent and independent variables and their final coding with their level of significance are illustrated in Table1.

TABLE 1: Dependent and Independent Variables with coding

Data Variable	Label	Data Type	Conditions
DEPENDENT			
BRSTPRB	Do you have any breast problem?	Categorical	0- No, 1- Yes
A98	Have you noticed any size/ form difference in your breast?	Categorical	0- No, 1- Yes
A99	Do you find any lump in and around breast?	Categorical	No, 1- Yes
A100	Do you find any kind of abnormal discharge from the nipples?	Categorical	No, 1- Yes
A101	Do you experience irritation in the nipples?	Categorical	No, 1- Yes
A102	Is there any blister in your breast?	Categorical	No, 1- Yes
A103	Is there presence of any kind of swelling under your armpit near the breast?	Categorical	0- No, 1- Yes

INDEPENDENT			
AGEINTR	Age Interval of respondents	Categorical	0- (15-19), 1- (20-29), 2- (30- 39), 3- (40-49), 4- (50-59)
EDUCATN	Educational Qualification of respondents	Categorical	0- Illiterate, 1- Literate
CIFRSTBR	Age Interval of respondents at first birth.	Categorical	0- < 18 years, 1- >18years
CHILDLOGI	Children ever born	Categorical	0- no or 1child, 1- 2 or more children.

5. Data Analysis and Modeling

The final dataset obtained by categorizing different socio-demographic factors influencing morbidity due to breast problem was analyzed by the logistic regression method using SPSS. The dependent variable in this research is dichotomous and indicates whether the respondents suffered from any kind of breast problems. Logistic regression then determines the coefficients that make the observed outcome (having or not having breast problem) most likely using the maximum likelihood estimation (MLE) technique. MLE seeks to maximize the log likelihood LL, which reflects how likely it is (i.e., the odds) that the observed values of independent variable may be predicted from the observed values of the dependent variable.

6. Results and Discussions

Out of the 1350 women in our study, 217 complained of having some type of breast problem ranging from change in size and form of breast, presence of lump in and around breast, abnormal discharge from nipples, swelling in the armpit etc. These women with breast problem were studied in reference to various socio- demographic characteristics like age, educational qualification, age at first birth and number of children ever born. TABLE 2 shows the distribution of women with and without breast problems according to these characteristics.

TABLE 2: Showing number of women with breast problem under various background characteristics

BACKGROUND CHARACTERISTICS	BREAST PROBLEM		TOTAL
	NO	YES	
AGE INTERVAL 15 – 19 20 – 29 30 – 39 40 – 49 50 – 59	65 548 294 159 67	11 105 64 30 07	76 653 358 189 74
TOTAL	1133	217	1350
EDUCATION Illiterate Literate	298 835	118 99	416 934
TOTAL	1133	217	1350
AGE AT FIRST BIRTH < 18 years 18 years and above	305 677	25 163	330 840
TOTAL	982	188	1170
NO. OF CHILDREN EVER BORN No child 1 or more child	152 981	29 188	181 1169
TOTAL	1133	217	1350

6.1 Analysis of Significant Variables:

To analyze the factors affecting morbidity due to breast problems, four explanatory variables, as described in the above tables, were selected. A binary logistic regression of each individual variable was performed to investigate the effect of each independent variable on morbidity due to breast problems. The logistic regression coefficients show the change in the predicted logged odds of experiencing an event or having a characteristic for a one-unit change in the independent variables. Odds in logistic regression express the likelihood of an occurrence relative to the likelihood of a nonoccurrence. The higher the ratio, the stronger is the correlation. TABLE 3 summarizes these explanatory variables along with their coefficients, odds ratios and p-values after performing stepwise regression.

TABLE 3: Summary of Variables effecting morbidity due to breast problems

Variable Name		Co-eff.	Odds ratio	p value
DEPENDENT VARIABLE Breast Problem				
INDEPENDENT VARIABLE				
Age interval:	15- 19	1.160	3.189	.479
	20- 29	.633	1.884	.100
	30- 39	.682	1.978	.145
	40- 49	.546	1.727	.114
	50- 59	1.091	2.978	.232
Education:	Illiterate	-1.143	.319	.000
Age at first birth:	> 18 years	0.157	1.170	.000
No. of Children:	2 or more	-2.487	.083	.482
Constant				.000

It is seen that age interval 20- 29 is significant. That is, the respondents in the age group 20 – 29 are 3.19 times more likely to have breast problems, taking age interval 15 – 19 as the reference category.

Again as far as educational level is concerned, we may infer that the literate respondents are 2.98 times more likely to have breast problems as compared to the illiterate respondents, taking the latter as the reference category.

Taking less than 18 years as the reference category, we may infer that the respondents whose age at first birth is more than 18 years are less likely to have breast problems.

As far as number of children is concerned, we may infer that the respondents having 2 or more children are more likely to have breast problems than those who have one or no children.

6.2 Analysis of prevalence of various types of breast problems with reference to the various socio demographic characteristics under consideration:

The 217 respondents who complained of having some kind of breast problem were further questioned regarding the type of problem they had. There were problems related to change in size and form of breast, presence of lump in and around breast, abnormal discharge from nipples and irritation, presence of blisters in the breast and swelling in the armpit. TABLE 4shows the percentage distribution of these morbidities.

TABLE 4: Percentage distribution of morbidities due to breast problems

Type of problem	No. of women	Percentage of women
Change in size and form of breast	135	62.2
Presence of lump in and around breast	179	82.5
Abnormal discharge from nipples	157	72.4
Irritation in the nipples	188	86.6
Presence of blisters in the breast	162	74.7
Swelling in the armpit	112	51.6

To analyze each of these morbidities, we have considered four socio demographic variables, viz., age of respondents, their education, age at first birth and no. of children ever born. A binary logistic regression of each individual variable has been performed to investigate the effect of each independent variable on these various types of morbid conditions. The higher the ratio the stronger is the correlation. The following tables (TABLE 5.1 to TABLE 5.6) summarize these explanatory variables along with their coefficients, odds ratios and p-values after performing stepwise regression.

TABLE 5.1: Summary of Variables effecting morbidity due change in size and form of breast

Variable Name	Co-eff.	Odds ratio	P value
DEPENDENT VARIABLEChange in size and form of breast			
INDEPENDENT VARIABLE			
Age interval: 15- 19			.062
20- 29	-.377	.686	.613
30- 39	-.378	.686	.296
40- 49	-.940	.391	.014
50- 59	-.261	.770	.503
Education: Illiterate	.866	2.377	.000
Age at first birth: > 18 years	-.825	.438	.001
No. of Children: 2 or more	.317	1.373	.196
Constant	-1.783	.168	.000

From TABLE 5.1, we may infer that respondents in the age group 40 – 49 are less likely to suffer from breast size and form difference as compared to the respondents in the age group 15 – 19 (reference category). As far as education of the respondents is concerned, it has been found that the literate respondents are more likely to suffer from this morbid condition as compared to their illiterate counterparts. Again, the factor of age at the time of first birth is also significant. Respondents whose age at the time of first delivery is more than 18 years are less likely to suffer from this morbidity as compared to the respondents who had their first delivery before attaining 18 years of age. And as far as no. of children is concerned respondents with 2 or more children is more likely to suffer from breast size and form difference as compared to the respondents who has one or no child at all.

TABLE 5.2: Summary of Variables effecting morbidity due presence of lump in and around breast

Variable Name	Co-eff.	Odds ratio	p value
DEPENDENT VARIABLEpresence of lump in and around breast			
INDEPENDENT VARIABLE			
Age interval: 15- 19			.722
20- 29	.618	1.856	.394
30- 39	.513	1.671	.214
40- 49	.370	1.448	.371
50- 59	.267	1.306	.546
Education: Illiterate	1.198	3.313	.000
Age at first birth: > 18 years	-.974	.378	.000
No. of Children: 2 or more	.195	1.215	.387
Constant	-2.425	.089	.000

From TABLE 5.2 we may conclude that age interval is not significant here. However, as far as education of the respondents is concerned, the literate respondents are more likely to have lumps as compared to the illiterate respondents. Again, the respondents whose age at the time of first delivery is more than 18 years are less likely to suffer from this morbidity as compared to the respondents who had their first delivery before attaining 18 years of age. And as far as no. of children is concerned respondents with 2 or more children is more likely to suffer from this morbidity as compared to the respondents who has one or no child at all.

TABLE 5.3: Summary of Variables effecting morbidity due to abnormal discharge from nipples

Variable Name	Co-eff.	Odds ratio	P value
DEPENDENT VARIABLE Abnormal discharge from nipples			
INDEPENDENT VARIABLE			
Age interval: 15- 19			.458
20- 29	1.064	2.898	.165
30- 39	.703	2.020	.131
40- 49	.455	1.577	.328
50- 59	.389	1.475	.431
Education: Illiterate	1.076	2.933	.000
Age at first birth: > 18 years	-1.534	.216	.000
No. of Children: 2 or more	.239	1.270	.304
Constant	-2.610	.074	.000

From TABLE 5.3, we may infer that respondents in the age group 20 – 29 and 30 - 39 are more likely to suffer from

abnormal discharge from the nipples as compared to the respondents in the age group 15 – 19 (reference category). As far as education of the respondents is concerned, it has been found that the literate respondents are more likely to suffer from this morbid condition as compared to their illiterate counterparts. Again, the factor of age at the time of first birth is also significant. Respondents whose age at the time of first delivery is more than 18 years are less likely to suffer from this morbidity as compared to the respondents who had their first delivery before attaining 18 years of age. And as far as no. of children is concerned respondents with 2 or more children is more likely to suffer from this morbidity as compared to the respondents who has one or no child at all.

TABLE 5.4: Summary of Variables effecting morbidity due to irritation in the nipples

Variable Name	Co-eff.	Odds ratio	p value
DEPENDENT VARIABLE Irritation in the nipples			
INDEPENDENT VARIABLE			
Age interval: 15- 19			.001
20- 29	1.937	6.935	.009
30- 39	1.205	3.336	.016
40- 49	1.160	3.189	.020
50- 59	.169	1.184	.758
Education: Illiterate	1.307	3.695	.000
Age at first birth: > 18 years	-1.702	.182	.000
No. of Children: 2 or more	.268	1.307	.220
Constant	-2.945	.053	.000

From TABLE 5.4, we may infer that respondents in the age group 20 – 29, 30 – 39 and 40 - 49 are more likely to suffer from the problem of irritation in the nipples as compared to the respondents in the age group 15 – 19 (reference category). Moreover, the literate respondents are more likely to suffer from this morbid condition as compared to their illiterate counterparts. Again, the respondents whose age at the time of first delivery is more than 18 years are less likely to suffer from this morbidity as compared to the respondents who had their first delivery before attaining 18 years of age. And as far as no. of children is concerned respondents with 2 or more children is more likely to suffer from this morbidity as compared to the respondents who has one or no child at all.

TABLE 5.5: Summary of Variables effecting morbidity due presence of blisters in the breast

Variable Name	Co-eff.	Odds ratio	p value
DEPENDENT VARIABLE Presence of blisters in the breast			
INDEPENDENT VARIABLE			
Age interval: 15- 19			.471
20- 29			.319
30- 39	6.850	944.251	.338
40- 49	6.560	706.329	.328
50- 59	6.696	808.822	.359
Education: Illiterate	6.278	532.630	.000
Age at first birth: > 18 years	1.272	3.568	.000
No. of Children: 2 or more	-1.622	.197	.486
Constant	-0.172	.842	.214
	-8.495	.000	

From TABLE 5.5, we may infer that age interval and the no. of children born is not significant. However, the literate respondents are more prone to blisters problem as compared to their illiterate counterparts. Again, the respondents whose first delivery occurred after 18 years are less likely to suffer from this morbidity as compared to the respondents who had their first delivery before attaining 18 years of age.

TABLE 5.6: Summary of Variables effecting morbidity due to swelling in the armpit

Variable Name	Co-eff.	Odds ratio	p value
DEPENDENT VARIABLE Swelling in the armpit			
INDEPENDENT VARIABLE			

Age interval: 15- 19			.128
20- 29	7.986	2938.406	.494
30- 39	6.825	920.853	.558
40- 49	7.276	1445.777	.532
50- 59	7.131	1249.681	.540
Education: Illiterate	1.093	2.984	.000
Age at first birth: > 18 years	-0.490	.613	.057
No. of Children: 2 or more	.123	1.131	.675
Constant	-9.609	.000	.409

From TABLE 5.6, we may infer that age interval and the no. of children born is not significant. However, the literate respondents are more likely to suffer from this morbid condition as compared to their illiterate counterparts. Again, the factor of age at the time of first birth is also significant. Respondents whose age at the time of first delivery is more than 18 years are less likely to suffer from this morbidity as compared to the respondents who had their first delivery before attaining 18 years of age.

7. Conclusion:

Morbidity due to prevalence of various types of breast problems is very high in India. Inappropriate medical practices, delay in referral practices coupled with lack of knowledge, fear, lack of permission, diagnostic facilities, resources including support structures have played their own part in decreasing the survival rate of women suffering from these morbid conditions.

In our study it has been observed that morbidity due to breast problem is very much associated with age of the respondents, their educational level and age at first birth and the no. of children ever born. The various types of breast problems studied here reveals that the younger women are less likely to suffer from breast problems. It is noteworthy to mention that the literate women were more prone to problems of the breast. Apart from this, we have also seen that women whose first delivery occurred after 18 years of age are less affected by breast problems as compared to those who gave birth before attaining the age of 18 years. At the same time, we may also infer that females with repeated child birth are also prone to breast problems.

The fact that literacy is inversely related with morbidity due to breast problems is a case of serious concern which demands immediate attention. Earlier studies have revealed the fact that longer duration of lactation is associated with a statistically significant trend towards reduced risk of breast cancer [2, 12 , 6]. *Coppa et al (1990)*[1] suggested that breast feeding has a preventive effect on urinary tract infection in both the mother and the infant. A study by Khan (1990) [10] has revealed that the practice of breast feeding is almost universal in India. But there are indications that in certain segments of the population such as among the educated class living in the urban areas, the duration of breast feeding is declining.

From the results of our study we get a clear indication of the fact that with higher educational levels of the slum dweller women, they have opted to take up more of work outside their homes to make their both ends meet which has obviously compelled them to reduce their breastfeeding hours and has thus become more prone to morbidities due breast problems like cancer, tumour, etc.

Thus, it becomes highly necessary for policy makers to recommend all women to understand the causes underlying morbidity due to breast problems and take necessary steps either medical or personal so as to , if not eradicate, at least bring down these morbidities.

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