

## **A Case Control Study with the Statistical Predictive Modeling of Child Burn in Pakistan**

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### **Abstract**

In any country children are the precious asset and burns are targeting them usually in low income country regions so there is pressing need for some kind of predictive modeling to prevent the children from burning. This study aims to find out about the Risk Estimates of each factor, fitting of Conditional Logistic model along with the predicted probabilities for different choices of each Risk Factor. Simple random samples of 100 cases and 100 age and gender matched controls were selected from the Burn Unit and Pediatric OPD of Mayo Hospital, Lahore. It is found that males are at high risk of getting a burn injury 1.291 times more than females; children of last or high birth order are at risk of 1.222 times more than others; a child with  $\leq 4$  number of siblings has risk of burn 1.545 times more; if the child is cared by other persons, then it increase the risk by 2.042 times more; illiterate mother (1.556 times more), children that do not go to school (1.390 times more), low income occupation of father (1.430 times) rural residence (1.35 times), rented house (1.364 times), kitchen burden (1.176 times), joint family system (1.128 times), poor living standard (3.026 times), mother pregnancy (2.345 times), no past burn experience (6.192 times) will increase the risk of burning of any child with high Odds Ratios. Conditional Logistic model reported 7 variables as significant and gave best fit to it; residence (rural), house status (rented), availability of kitchen (no), living standard (poor), use of heating device (no use), availability of conveyance (no), past burn (no), all these socioeconomic factors have p-value  $< 0.10$  and they have strong significant association with child burning.

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**Keywords**

Odds ratio, Conditional logistic model

**1. Introduction**

Burn injuries are among the most devastating of all injuries and a major global public health crisis (Forjuoh, 2006; Peck et al., 2008). Burns are the fourth most common type of trauma worldwide, following traffic accidents, falls, and interpersonal violence (Mathers et al., 2008). Approximately 90% of burns occur in low to middle income countries, regions that generally lack the necessary infrastructure to reduce the incidence and severity of burns (Michaud et al., 2001). Burn injuries are becoming as a major public health issue in underdeveloped/developing countries, because they have become a leading cause of death in a developing country. They were responsible for over 322,000 deaths worldwide in 2002. India has probably 200,000 deaths annually from burns (Othman, 2010). Burns are the fourth most common type of trauma worldwide, following traffic accidents, falls, and interpersonal violence (Mathers et al., 2008). Approximately 90% of burns occur in low to middle income countries, regions that generally lack the necessary infrastructure to reduce the incidence and severity of burns (Mathers et al., 2008). Therefore, there is pressing need for a lot of work on this issue that one can take steps for the protection of children of our country. Basically a child is a human being below the age of puberty that is less or equal to 14 years of age. Burn has a very simple definition that is: the destruction of skin, either complete or partial, caused by different sources of energies, especially thermal energy, is called burn (Balseven-Odabasi et al., 2009). It can be caused by different factors like: stoves, heater, electrical wire, flame, explosive material, fire catching material, chemicals and hot surfaces (Michaud et al., 2001). Most burn injuries occur in a domestic setting, with cooking as the most common activity (Attia et al., 1997; Landry et al., 2012). Pediatric burns occur more commonly in the home (84 percent) while children are unsupervised (80%) (Rossi et al., 1998). The factors that increase the likelihood of getting a burn injury in children are called risk factors for child burning. Usually, the factors related to the child, his/her family and their housing conditions are very important.

The factors that are found significant from different studies are: history of burn, overcrowding, birth order, own house, no piped water supply at house, presence of disabilities, maternal education, father's education, income, house size, use of gas cooker and fewer bed rooms in a house, storage of inflammable things at

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house etc. Some factors that are repeated more than one times in studies are: poor living standard, overcrowding, presence of disabilities, and history of burn in siblings and fewer years of parent's education (Cillino et al., 2008; Okoro et al., 2009; Rossi et al., 1998). The worldwide incidence of fire-related injuries in 2004 was estimated to be 1.1 per 100,000 population, with the highest rate in Southeast Asia and the lowest in the America. The incidence of burns in low and moderate income countries (LMIC) is 1.3 per 100,000 population compared with an incidence of 0.14 per 100,000 population in high income countries (Cillino et al., 2008).

This study includes all the Risk Factors that are reported in the literature and additional factors according to our society. Brief description of Risk Factors included in the study is: child age, child sex, total number of siblings, birth order of child, child usually cared by whom, child's mother and father education, child own school status, child's mother and father occupation, residential area (rural or urban), house status (own or rented), house is made by mud or concrete, number of rooms in a house, having a kitchen or not, how much burden in kitchen, joint family system or independent, number of children less than 14 years in a house, sharing of bed, living standard, use of heating and boiling device, presences of electricity generator and personal conveyance, pregnancy of mother and siblings with history of burn.

Allah has given us blessings of different facilities like gas, electricity, fuel and other things. The improper use of them may result in trouble for human beings. Burn injuries may occur due to many reasons such as: hot liquid injuries, flame burns injuries, contact burns, electrical burn injuries and chemical burn.

**Objectives:** This study will provide the insights about risk of child burning in Lahore through following objectives:

- Compute the Risk Estimates to assess the strength of each Risk Factor.
- To develop a significant model for the prediction of risk of child burning by using the Conditional Logistic Regression model with 1:1 matching pairs.
- To find out some predictive probabilities of child burning in the presence of significant factors.

## 2. Material and Methods

**2.1 Study Design:** It is a hospital based case control study. It is an analytical as well as predictive study of child burning up to the age of 14 years. The study was designed to interview all burned children at the Emergency Department of Burn Unit at Mayo Hospital, Lahore.

### 2.2 Study Population:

**2.1.1 Cases:** All patients that came to Emergency Department or in Burn Unit ward of Mayo Hospital with any kind of burn injury, under the age of 14 year, were the target population of case group.

**2.1.2 Controls:** Controls are defined as all the patients in the same hospital that came to child's OPD department with the criteria of sex and age (with  $\pm 5$  years of difference) matched children with any disease or injury rather than that of burn injury. Age and sex matched control were enrolled for each case.

**2.1.3 Sampling:** A simple random sample of 100 cases and 100 matched controls was used. Data was collected from 1<sup>st</sup> July 2011 to 30<sup>th</sup> September 2011.

**2.1.4 Data collection tool:** For the purpose of collection of requisite information for the study, a questionnaire was developed under the direction of a biostatistician. Face to face interviews were conducted through predefined questionnaire to the respondents or his/her attendants and Patients' records were also used.

**2.1.5 Statistical Analysis:** Statistical analysis was performed using SPSS v.17.0. Odd Ratios were used to estimate the relative risk of child burning in the presence of specific factor. Model building was done using the Conditional Logistic Regression on significant Risk Factors, for predicting the probability of child burning in the presence of specific Risk Factors.

## 3. Results

**3.1 Risk Estimates:** Odds Ratios are the Risk Estimates of different factors. Odds Ratio tells about which level of the factor has more risk of causing burn injury in

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children. According to the factors, detailed values of Odds Ratio are given in Table 1 and explained below.

In gender, male is compared to females and Odds Ratio of 1.291 signifies that males are at risk of getting a burn injury 1.291 times more than females. So, male children are at higher risk of burning.

In birth order, children with last order are compared with the children having not last birth order and Odds Ratio of 1.222 indicates that the children of last birth order are at risk of 1.222 times more getting a burn injury than those who are not having last birth order.

Under the factor total number of siblings, number of siblings  $\leq 4$  is compared with number of siblings  $> 4$  and Odds Ratio of 1.545 indicates that the children with number of siblings  $\leq 4$  are at risk of being burned 1.545 times more.

Under the factor of who usually cares for the child in a house, mother is compared with others and Odds Ratio of 2.042 reveals that If the child is usually cared by other people in house, he or she has 2.042 times more risk of getting a burn rather than those who are cared by mother.

Under the factor of mother education, illiterate is compared with literate mothers and Odds Ratio of 1.556 reveals that children with illiterate mothers have a risk of getting a burn injury 1.556 times more than children with literate mothers.

Under the factor of father education, illiterate is compared with literate father and Odds Ratio of 2.242 indicated that children with illiterate fathers have a risk of getting a burn injury 2.242 times more than those with literate fathers.

Under the factor of child school status, not school going children are compared with school going children and Odds Ratio of 1.391 reveals that the children who do not go to school and spend more time at home are at risk of being burned 1.390 times more than those children who go to school.

Under the factor of mother occupation, mothers doing job are compared with those who were housewives. As Odds Ratio 0.804 is less than one that indicates children are more protected with working mothers.

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Under the factor of father occupation, fathers with low income jobs are compared with the fathers with good income jobs and Odds Ratio of 1.430 indicates that children whose fathers are doing low income jobs are at risk of burning 1.430 times more than those children whose fathers are doing good income jobs.

Under the residence, rural residence is compared with urban residence and Odds Ratio of 1.345 indicates that children residing in rural areas are at risk of burning 1.345 times more than children who are living in urban areas.

Under the factor house status, rented is compared with owned house and Odds Ratio of 1.364 reveals that the people living in rented house have risk of their children getting burns 1.364 times more than people with children living in owned houses.

Under the factor house material, concrete houses are compared with mud houses and Odds Ratio of 1.860 reveals that children living in concrete houses are at risk of burning 1.860 times more than those living in mud houses.

Under the factor total number of rooms in a house, rooms  $>3$  is compared with rooms  $\leq 3$  and Odds Ratio of 4.041 tells that children living in houses which has 3 or more number of rooms are at risk of burning 4.041 times more than those who have less or equal to 3 number of rooms.

Presence of kitchen is compared with no presence of kitchen in a house and Odds Ratio of 2.447 indicates that presence of kitchen increases the risk of burning 2.447 times more than in houses with no kitchen.

Kitchen with burden of  $>2$  people is compared with kitchen having burden of  $\leq 2$  people and Odds Ratio of 1.176 tells that rush in kitchen with more than 2 people working in it can increase the risk of child burning by 1.176 times more than the kitchen with less burden/rush.

Joint family system is compared with independent family system, and Odds Ratio of 1.128 reveals that joint family system (with a number of people in a house) can increase the risk of child burning 1.128 times more than in independent families.

Poor living standard is compared with good living standard, and Odds Ratio of 3.026 reveals that poor living conditions can increase the risk of child burning by 3.026 times more than under good living conditions.

No use of heating device for heating rooms is compared with use of heating device. The people who do not use any heating device and use stove or fire at open place for heating that may become cause of child burning, Odd Ratio of 1.440 reveals that the people who do not use any heating device have their children at risk of burning 1.440 times more than people who use heating device for heating.

Use of device for boiling is compared with no use of boiling device and Odds Ratio of 1.447 reveals that the people who use any device for boiling water have their children at risk of burning 1.447 times more than those of people who do not use any device for boiling water.

No use of electricity generator/UPS is compared with use of electricity generator/UPS and Odds Ratio of 9.803 reveals that no use of generator/UPS means economic conditions are not very good and that may increase the chance of child burning by 9.803 times more than those with very good economic conditions.

No ownership of personal conveyance is compared with own conveyance. This factor also determines economic conditions directly. Odds Ratio of 7.169 reveals that the people with poor economic standard have their children at the risk of burn injury 7.169 times more than those with good economic condition.

Children whose mothers are pregnant are compared with the children whose mothers are not pregnant and Odds Ratio of 2.345 reveals that pregnant mothers are less able to care for their children and that can increase the risk of child burning by 2345 times more than those children whose mothers are not pregnant.

No past burn is a very important Risk Factor. The parents of children, who had an experience with burn injury in the past, become more conscious about their children and this reduces the risk of getting burn again in their children than the parents of those children who were not exposed to any burn injury in the past. So, having no past burn experience is compared with having past burn experience, and Odds Ratio of 6.192 reveals that the children who were not exposed to any burn injury in the past have risk of 6.192 times more than those who ever experienced the burn injury in the past.

## 4. Model Building

**4.1 Conditional Logistic Regression Model:** According to the objective of the study, Conditional Logistic Regression model was fitted for the future prediction of Risk Factor of burn injuries in children. For this purpose, we used stepwise forward likelihood ratio for model building by considering all the Risk Factors simultaneously to estimate the effect of each Risk Factor after adjusting the effect of the remaining to be constant. After many trials we were able to reach the most significant model. Method of Conditional Logistic Regression was used with 1:1 matching data. The fitted model is based on socio-economic factors that relate to child household conditions, that regressing the poverty and overcrowding directly and this poverty and overcrowding produces significant circumstances for child burning. Some factors included in the model show no association with child burning due to their indirect relation. But they appeared significant in the model.

All the variables included in the model of socio-economic factors have  $p\text{-value} < 0.10$  indicating the model coefficients are significant and Odds Ratio of Risk Factors indicates significant association with child burning. This signifies that all the independent variables have strong predictive strength and this strength is explained by Regression Coefficients that are all positive.

Rural residence is compared with urban residence and Odds Ratio for residence is 2.682 with the  $p\text{-value} = 0.053 < 0.10$  which reveals that risk of getting a burn injury in rural resident children is 2.682 times more as compared to those children who live in urban areas.

Rented/other's house is compared with own house and Odds Ratio for house status is 2.772 with the  $p\text{-value} = 0.041 < 0.10$  which reveals that getting burn injury in the children of people who have low economic conditions and were living in rented/other's house has risk of 2.772 times more than that children who have good economic conditions and living in own house.

Unavailability of kitchen is compared with availability of kitchen in a house and Odds Ratio of 3.580 with the  $p\text{-value} = 0.005 < 0.10$  indicates that the people who have no separate room for cooking and they cook on stove (wood or gas stove) at floor level, their children have risk of getting burn injury 3.580 times more than children of people who have separate room for cooking.



Poor living standard is compared with good living standard and Odds Ratio of 4.124 with p-value= 0.017<0.10 reveals that people with poor living standard have a risk of their children getting burns is 4.124 times more than that of people who have good living standard.

The people who do not use any heating device for heating rooms and use stove for heating which may become cause of child burning, Odd Ratio of 4.051 with p-value=0.003<0.10 reveals that the people who do not use any heating device have their children at risk of burning 4.051 times more than those of people who use heating device.

No ownership of personal conveyance is compared with own conveyance. This factor also determines economic conditions directly. Odds Ratio of 7.952 with p-value=0.017<0.10 reveals that the people with poor economic standard have their children at the risk of burn injury 7.952 times more than children of those with good economic condition.

No past burn is a very important Risk Factor. The parents of children who had ever an experience with burn injury in the past, become more conscious about their children and this reduces the risk of getting burn again in their children than the parents of those children who were not exposed to any burn injury.

So, having no past burn experience is compared with having past burn experience and Odds Ratio of 7.467 with p-value=0.001<0.10 reveals that the children who were not exposed to any burn injury in the past have risk 7.467 times more than those who ever experienced the burn injury in the past.

**4.2 Assessment of the Model:** In Table 2, Model is assessed by the Omnibus Test of model coefficients According to it, 62.030 is the value of model Chi-square computed on the basis of 7 degrees of freedom, has a p-value of 0.000. It is a smallest standard p-value that shows the significance of the model at any level of significance. It is, therefore, concluded that predictor variables included in the model significantly increase the predictive strength of the model, hence the fitted model is appropriate or good enough.

Finally, the model is:

Logit (p=1/X) = 0.987 (Resi.) +1.020 (H.S.) + 1.275 (A.K.)+1.417 (L.S.)+1.399 (U.H.D.)+ 2.073 (Con.) +2.011 (P.B.)

Residence=Resi.

House Status=H.S.

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Availability of kitchen=A.K.      Living Standard=L.S.  
 Usage of heating device=U.H.D.      Conveyance=Con.  
 Past Burn=P.B.

As all the coefficients are positive, this reveals the positive relationship between above mentioned risk factors and child burn injury.  $\beta$ 's refer to the Log-odds of child burning (Table 2).

Residence has coefficient of 0.987. This indicates that living in rural/urban areas will increase the Log-odds of child burning relative to those who were not burned. House status has coefficient of 1.020. This reveals that living in own/rented house will increase the Log-odds of child burning. Having kitchen or not in a house will increase the Log-odds of child burning by 1.275 units. Having poor or good living standard will increase the Log-odds of child burning by 1.417 units. Usage of heating device or not, having conveyance or not, and having past burn experience or not will increase the Log-odds of child burning by 1.399, 2.073 and 2.011, respectively (Table 3).

**4.3 Predicted Probabilities:** As we have seven Risk Factors in the Conditional Logistic model, so we have a number of choices of combinations of Risk Factors according to their presences and absences that may vary from individual to individual. For understanding the predicted strength of Risk Factors, we computed some probabilities in Table 3. From Table 3, we can see the probability of child burning in the presences of specific Risk Factors such as, in model 1, when all the Risk Factors are present that a person living in rural residence with rented house and there is no separate room for cooking, they have poor living standard, they did not use any device for heating, they do not have personal conveyance and no past experience of burning in siblings then that specific person (male or female child) has probability to get burn injury is 0.9999. This means when all the Risk Factors are there, then a child has higher chance of getting a burn injury that is 99.99%. This higher value indicates about the strong predictive strength of the Risk Factors.

In model 2, when all Risk Factors are present instead of only past experience of burn injury is absent (there is past experience of burn in siblings) then a child having a chance of getting a burn injury is 0.9997.

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For checking the individual influence of each Risk Factor, we look at model 7 in which only residence is present (having rural residence) and rest of the Risk Factors are absent then a child having a chance of getting a burn injury is 0.7284.

In model 8, where house status is present only (having a rented house) and rest of the Risk Factors are absent then a child having a chance of getting a burn injury is 0.7349.

In model 9, there is no availability of kitchen and remaining Risk Factors are absent, then a child has 0.7815 probability of getting a burn injury.

In model 10, there is poor living standard is present only and rest of the Risk Factors are absent, then a child having a chance of getting a burn injury is 0.8048.

In model 11, no usage of specific device for heating is present. This means they are using unsafe equipment for heating rooms, and rest of the Risk Factors are absent, means they are living with good living standard in own house in urban areas, having a personal conveyance and past experience of burning in siblings, then that specific child has 0.8020 probability of getting a burn injury.

Similarly, in model 12, under the presence of Risk Factor of having no personal conveyance, a child having chance of burn injury is 0.8882. In model 13, under the presence of past experience of burn in siblings, a child having chance of getting a burn injury is 0.8819.

From models 7-13, we seek for the individual influence of each Risk Factor assuming the others are absent; we found that under the presence of single Risk Factor, the probability is  $> 0.73$ . This means each Risk Factor is playing a significant role in determining the probability of child burning.

In model 14, when all the Risk Factors are absent, then probability of burning of any child is 0.5000. It means that if all the reported variables are absent, then chance of burning of a child will be 50%. On the same lines, we can estimate the probability of child burning for other choices also.

## **5. Discussion**

This study seeks the significant Risk Factors of child burning through Odds Ratio (OR) and through fitting of Conditional Logistic model. This study provides the

ground for predicting the probability of child burning under the presences of significant Risk Factor, and we found an echo of our results in previous literature. Males were found at high risk of burning. Balseven-Odabasi et al. (2009), Okoro et al. (2009), Niekerk et al. (2003) and Rehmani (2008), in their studies also found male as predominant class for burning. This finds an echo in Nigerian study of Iregbulem and Nnabuko (1993), and other studies of El-Badawy and Mabrouk (1998), Lari et al. (1992), and Tse et al. (2006), whereas the study of Kumar et al. (2000) opposes it.

Low literacy rate of parents and poor income and lack of clear demarcations of cooking place at home finds an echo in the study of Godwin et al. (1996). Having last birth order and no experience of burns in siblings increase the risk of burning that is supported by study in Greece (Petridou et al., 1998).

High crowding and pregnancy of mothers was reported as increased Risk Factor by Werneck and Reichenheim (1997). Delgado et al. (2002) reported that the children of low economic class are more vulnerable to burning.

Having last birth order, being male, pregnancy of mother, siblings having past burn experience, poor living condition, overcrowding increase the risk of child burning. This is supported by a number of studies such as Delgado et al. (2002), El-Badawy and Mabrouk (1998), Othman (2010), Samuel et al. (1995), and Werneck and Reichenheim (1997).

Conditional Logistic model fit on seven significant factors with the perfect significance of the model (p-value=0.00) that are rural residence, rented house status, no availability of kitchen, poor living standard, no use of heating device, no ownership of conveyance, no experience of past burning. Othman (2010) used Logistic Regression modeling. So, Conditional Logistic modeling and computation of predicted probabilities of child burning through Conditional Logistic model is the new work and no such work has been reported in literature.

## **6. Conclusion**

We may conclude from the Risk Estimate section that male child, the child with last birth order and the child cared by any other person than mother has high chance of burning. Children with large number of siblings and parent's education also matter in child burning. Odds Ratio tells us that due to illiterate mother or father, a child can be at the edge of burning. Rural residence, rented house and

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poor living standard, joint family system, small houses, no proper place for cooking, no use of any safety devices for boiling or heating are the factors that increase the risk of burning.

In Conditional Logistic model, out of 23 variables, 7 variables were best fits. This tells the strength of increment in risk of child burning under the presences of specific Risk Factor. Rural residence increases the risk of burning by 2.682 times, rented house increases the risk by 2.772 times, unavailability of proper place for cooking will increase the risk by 3.580 times, poor living standard increases it by 4.124, no use of heating device increases it by 4.051, no past burn experience in siblings or in family increases the risk of burning in children by 7.467 times. In Conditional Logistic model, all Risk Factors have wide confidence intervals.

By the predicted model, we searched about different choices of presence and absence of certain factors. If all the Risk Factors are present, then the probability of burning of child is 0.999962; this means in the presences of these 7 factors, there is 99.9962% chance of child burning. If only one factor is present then probability lies within 0.734973 to 0.881947. If all the Risk Factors are absent, then chance of burning is 50%.

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**Table 1: Risk Estimates**

| Sr.# | Factors                  | OR    | C.I.         | Highest code |
|------|--------------------------|-------|--------------|--------------|
| 1    | Patient Sex              | 1.291 | 0.728-2.288  | Male         |
| 2    | Birth Order of Child     | 1.222 | 0.701-2.131  | Last         |
| 3    | Total number of siblings | 1.545 | 0.836-2.857  | ≤4           |
| 4    | Usual care of child      | 2.042 | 0.365-11.408 | Other        |
| 5    | Mother education         | 1.556 | 0.891-2.717  | Illiterate   |
| 6    | Father education         | 2.242 | 1.255-4.005  | Illiterate   |
| 7    | Child school status      | 1.391 | 0.791-2.445  | No school    |
| 8    | Mother occupation        | 0.804 | 0.380-1.701  | Doing job    |
| 9    | Father occupation        | 1.430 | 0.438-4.667  | Low          |
| 10   | Residence                | 1.345 | 0.759-2.381  | Rural        |
| 11   | House status             | 1.364 | 0.760-2.450  | Rented       |
| 12   | House material           | 1.860 | 1.008-3.432  | Concrete     |
| 13   | Total rooms in a house   | 4.041 | 1.728-9.448  | >3           |
| 14   | Presence of kitchen      | 2.447 | 1.386-4.321  | Yes          |
| 15   | Kitchen burden           | 1.176 | 0.617-2.243  | >2           |
| 16   | Family system            | 1.128 | 0.648-1.963  | Joint        |
| 17   | Living standard          | 3.026 | 1.499-6.105  | Poor         |
| 18   | Usage of heating device  | 1.440 | 0.823-2.525  | No use       |
| 19   | Usage of boiling device  | 1.447 | 0.824-2.541  | Yes          |
| 20   | Electricity generator    | 9.803 | 1.126-76.92  | No use       |
| 21   | Personal conveyance      | 7.169 | 2.378-21.608 | No           |
| 22   | Mother pregnancy         | 2.345 | 0.912-6.027  | Yes          |
| 23   | Past burn                | 6.192 | 2.697-14.217 | No           |

**Table 2: Conditional Logistic Model Parameter**

| Variables    | B     | S.E. | Wald   | d.f. | Sig. | Exp(B) | 95.0% C.I. for Exp(B) |        |
|--------------|-------|------|--------|------|------|--------|-----------------------|--------|
|              |       |      |        |      |      |        | Lower                 | Upper  |
| <b>Resi.</b> | .987  | .510 | 3.748  | 1    | .053 | 2.682  | .988                  | 7.282  |
| <b>H.S.</b>  | 1.020 | .500 | 4.158  | 1    | .041 | 2.772  | 1.040                 | 7.388  |
| <b>A.K.</b>  | 1.275 | .450 | 8.033  | 1    | .005 | 3.580  | 1.482                 | 8.649  |
| <b>L.S.</b>  | 1.417 | .592 | 5.730  | 1    | .017 | 4.124  | 1.293                 | 13.156 |
| <b>D.H.</b>  | 1.399 | .470 | 8.861  | 1    | .003 | 4.051  | 1.613                 | 10.176 |
| <b>Con.</b>  | 2.073 | .865 | 5.749  | 1    | .017 | 7.952  | 1.460                 | 43.307 |
| <b>P.B.</b>  | 2.011 | .602 | 11.155 | 1    | .001 | 7.467  | 2.295                 | 24.296 |

**Table 3: Predicted Probabilities**

| Sr # | Risk Factors |        |      |      |        |      |      | Z      | P(Z)     |
|------|--------------|--------|------|------|--------|------|------|--------|----------|
|      | Resi.        | H.S.   | A.K. | L.S. | U.H.D. | Con. | P.B. |        |          |
| 1    | Rural        | Rented | No   | Poor | No     | No   | No   | 10.182 | 0.999962 |
| 2    | Rural        | Rented | No   | Poor | No     | No   | Yes  | 8.171  | 0.999717 |
| 3    | Rural        | Rented | No   | Poor | No     | Yes  | Yes  | 6.098  | 0.997758 |
| 4    | Rural        | Rented | No   | Poor | Yes    | Yes  | Yes  | 4.699  | 0.990978 |
| 5    | Rural        | Rented | No   | Good | Yes    | Yes  | Yes  | 3.282  | 0.963806 |
| 6    | Rural        | Rented | Yes  | Good | Yes    | Yes  | Yes  | 2.007  | 0.88153  |
| 7    | Rural        | Own    | Yes  | Good | Yes    | Yes  | Yes  | 0.987  | 0.728495 |
| 8    | Urban        | Rented | Yes  | Good | Yes    | Yes  | Yes  | 1.02   | 0.734973 |
| 9    | Urban        | Own    | No   | Good | Yes    | Yes  | Yes  | 1.275  | 0.781597 |
| 10   | Urban        | Own    | Yes  | Poor | Yes    | Yes  | Yes  | 1.417  | 0.804868 |
| 11   | Urban        | Own    | Yes  | Good | No     | Yes  | Yes  | 1.399  | 0.802025 |
| 12   | Urban        | Own    | Yes  | Good | Yes    | No   | Yes  | 2.073  | 0.888251 |
| 13   | Urban        | Own    | Yes  | Good | Yes    | Yes  | No   | 2.011  | 0.881947 |
| 14   | Urban        | Own    | Yes  | Good | Yes    | Yes  | Yes  | 0.000  | 0.500000 |
| 15   | Urban        | Own    | Yes  | Good | Yes    | No   | No   | 4.084  | 0.983439 |
| 16   | Urban        | Own    | Yes  | Poor | No     | Yes  | Yes  | 2.816  | 0.943534 |
| 17   | Urban        | Rented | No   | Good | Yes    | Yes  | Yes  | 2.295  | 0.908462 |
| 18   | Rural        | Own    | No   | Good | No     | Yes  | No   | 5.672  | 0.996571 |
| 19   | Urban        | Rented | Yes  | Poor | Yes    | No   | Yes  | 4.51   | 0.989121 |
| 20   | Urban        | Rented | No   | Poor | Yes    | Yes  | Yes  | 3.712  | 0.976154 |
| 21   | Urban        | Own    | No   | Poor | No     | No   | Yes  | 6.164  | 0.997901 |

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