Analysing the Outdoor Pollution: Factors Effect On Urban Health Conditions in Andhra Pradesh

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(A Case Study on East Coastal city of Andhra Pradesh Slum dwellers)
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ABSTRACT: *Growth of urban slums is a serious consequence of Urbanization. Slum is regard as the major problem of urban life. They are found in all our towns and cities. They represent the highest form of human Degradation. They reflect the failure of our urban planners, municipal Authorities and urban technology to provide basic services like water supply, Toilets, drainage, and garbage disposal etc. These socio-economical factors effect Environment. Almost all about 20 percent of all the diseases in Andhra Pradesh. Outdoor pollutions emitted from industrialization and explosive of urbanization it leads to slums. Slums are characterized by subhuman settlements conditions slums are overcrowded and lack of civic amenities so surrounding environment impact human health it deals with some chronic diseases like respiratory syndromes, asthma cardiovascular diseases kidney problems skin and joint problems different types of allergies noted in the Visakhapatnam city. Based on field survey of slum dwellers in selected areas of Visakhapatnam, this article studied about that relation between outdoor environmental factors effect on health of slums in Andhra Pradesh.*

Keywords: *Chronic diseases, Human degradation, Environment, Explosive, Industrialization.*

I. INTRODUCTION

Environmental problems are social problems. They begin with people as the cause and end with people as the cause and end with people as victims. The unfavourable interaction of people with environment resulted in environmental pollution. The pollution created by dumping of waste causing health hazards in other places from protecting some people. Solid wastes are the most visible forms of pollution. Most of methods of disposing them pose serious damage to environment it is a global problem like air and water pollutions. Most of the Visakhapatnam urban poor live in overcrowded and unsanitary slums and squatter settlements and often do not have accesses to basic infrastructure and services. They are forced to live in illegal and informal settlements because they cannot enter formal land and housing markets. The reasons for the formation of slums and squatter settlements are numerous and have been discussed extensively in the development literature. It suffices to say here that, because of the way formal markets are regulated and structured; the poor are unable to afford the choices offered to them in these markets. In contrast, the informal and illegal housing markets of slums and squatter settlements are specifically geared to meet their shelter needs.

II. OBJECTIVES OF THE STUDY

1. Trace out the outdoor pollutants around and within the selective slum
2. Analyze the environmental factors effect on health conditions

2.1 Methodology:

This work is empirical in nature and relies on primary data. The primary data was collected on the basis of a household survey of 250 house households for total. Selective slum is a popular noted visakha port area, which is surrounded by industrial area they getting a job (casual labour) in nearest industries so their lively hoods is better than other area slums but black dust and heavy sounds effected on surroundings. So environmental problems are arising. I collect the data purposive sampling technique for the study Area, and household samples are collected simple random techniques has been used. And the study was conducted on 2012 May-November.

The respondents have been drawn from this slum area. At this point, it should be noted that while considerable economic and socio-cultural activities in this slum. And also surrounding environment effect on human health like respiratory syndromes, asthma cardiovascular diseases, kidney problems, skin and joint pain problems noted in this slum. Based on field survey of slum dwellers in selected area of Visakhapatnam, this article analyzes that relation between outdoor environmental factors and health of slum peoples. General sickness are effected by all slums and both general and chronic diseases caused by indoor and outdoor pollutants also in this slums. But we are collecting data for factors influencing outdoor pollutants of percentages are

widely used and graphic analysis is presented wherever required to analyze different aspects of the problem. The Chi-square test is used for the association between Age and Sex in the case of chronic diseases.

III.   ENVIRONMENTAL PROFILE OF TH VISAKHAPATNAM CTIVE CITY
This city has several areas with air and water quality falling below norms. As for noise pollution, it is common occurrence in most public places and roads with fairly heavy traffic. Air pollution is largely attributed to automobile emissions and hence it is important to regulate traffic at various junctions and see that it is not stagnated for long durations. This can be achieved by measures such as (a) regulating traffic with more number of one-way traffic streets, (b) providing bus bays for city bus halts and proper parking places for all vehicles, (c) having pedestrian malls or squares with traffic moving around them (Jagadamba Junction and RTC complex area are important centers to begin with) and (d) providing flyovers where necessary and feasible.

3.1 Environmental Attributes:
The environmental quality varies from region to region within the city area depending upon the assimilative capacity of a region, population density and the quantity of pollutants causing social damage, the level of valuation and appreciation of the surrounding environment by people in a region etc. All these factors together accord different values regarding the environmental quality to different region within the city. Environmental policy coupled with regional and zonal planning which is presently underway by the APPCB takes into account the long term as well as short term orientation. Major environmental variables characteristic of the city which are responsible for the degradation of the quality of the environment in the city area are considered for describing the environmental scenario of Visakhapatnam - the point and non-point sources of pollution of air, noise, water, land, soil, regimes s well as coastal and marine sectors have been taken into consideration.
The point sources are mostly concentrated in a limited area along the northern flank and in the Steel plant-Parawada area located on the south western flank of the Yarada Hill range. The major industries are concentrated in pockets. The map of the city gives a fair idea of the industrial and residential areas. The other industrial areas are of minor consequence.

3.2 Air Pollution:
The air pollution in the city area has been mainly determined by the presence and levels of sulphur oxides, nitrous oxides, carbon monoxide and SPM. The air pollution is contained to the northern flank of the Yarada hill range and nearby environs like Steel Plant area and Paravada mandal where a Pharmacity is proposed and near Agnampudi where   manufacturing industry is proposed. The standards adopted are as follows.

Table: 3.2.1 Ambient Air Quality Standards:

Pollutant	Area-A	Area-B	Area-C
TSP	500	200	100
SO$_2$	120	80	30
CO	5000	2000	1000
NOX	120	80	30

(Source: GVMC urban development authority report)

A= Industrial and mixed use area
B =   Residential and rural
C =   Sensitive

3.4 Topographic bearing:
Topography produces – "mountain valley effects" preventing the dispersion of air pollutants. While the coast line of Visakhapatnam by virtue of its SW-NE direction is said to be congenial for the dilution and diffusion of pollutants, the stagnation pockets at the land-sea interface lead to the build up of air pollutants over the city for short periods. The undulating terrain and hills ranging to around 200 m, encourage the formation of micro eddies which contribute to the erratic trend of the stack emission plumes. This results in the drifting of emissions towards residential areas, Some of the major industries whose emissions pollute the air of Visakhapatnam and its environs are Hindustan Petroleum Corporation Limited, Hindustan Zinc, Coramandal Fertilizers, Duncan Cements, Visakhapatnam Port Trust, LG Polymers, Visakhapatnam Steel Plant.
The major industries responsible for pollution of water sources in the city area are Hindustan Polymers Limited, Coramandal Fertilizers Ltd., Hindustan Petroleum Corporation Ltd (HPCL), Hindustan Zinc Ltd., Visakha Dairy, Aluminium factory, Pragati Fertilizers Ltd., Coastal Chemicals, Hindustan Shipyard, Fish Processing Units, Bharath heavy Plates & Vessels, Visakhapatnam Steel Plant.

IV. RELEVENT REVIEWS

Esther duflo, Michael Greenstone, Rema hanna, (2008)[i],survey of traditional stove ownership and health among 2,400 households in rural Orissa. We find a very high incidence of respiratory illness. About one-third of the adults and half of the children's in the survey had experienced symptoms of respiratory illness in the 30 days preceding the survey, with 10 percent of adults and 20 per cent of children's experiencing a serious cough. We find a high correlation between using a traditional stove and having symptoms of respiratory illness. We cannot, however, rule out the possibility that the high level of observed respiratory illness is due to other factors that also contribute to a household's decision to use a traditional stove, such as poverty , health preferences and the bargaining power of women in the households.

Vinish Kathuria, Nisar A Khan (2007)[ii] study tries to find evidence of environmental inequity by looking into the relationship between socio-economic characteristics and air pollution exposure. This is carried out by first computing a household specific air pollution exposure index for 347 households around seven pollution monitoring stations in Delhi The econometric analysis shows that, other things being equal, the economically backward communities are the most affected by the exposure to air pollution on an average. The effect is quite pronounced when they are staying in industrial areas. However, the study could not find any evidence of environmental inequity due to religion and the evidence was weak for communities that are socially backward.

M.Shivasankaraiah, K. Thulasi Naik and K.Dasaratharamaiah(2008)[iii], discussed about Environmental pollution : Effects, causes and concerns Pollution is an undesirable change in the physical, or biological characteristics of our air, land and water that will harmfully affect, the human life and that the desirable aspects, or that may waste or deteriorate our raw material resources. Pollution is the deliberate or accidental contamination of the environment with man's waste. Pollution is the introduction by man of waste matter or surplus energy into the environment, which directly causes damage to man and his environment.

Sabu Thomas an analyzed (2006)[iv], people themselves creates certain environmental problems Environmental problems are social problems. They begin with people as the cause and end with people as the cause and end with people as victims. The unfavorable interaction of people with environment resulted in environmental pollution. The pollution created by dumping of waste causing health hazards in other places from protecting some people. Solid wastes are the most visible forms of pollution. Most of methods of disposing them pose serious damage to environment; it is a global problem like air pollution and water pollution. Air: Effect of air pollution on human health: the air pollutants attack human health primary through the respiratory system.

[v] J.Stalin and K.K. Falgunan (2006)The growth of populations has increased several environmental problems, which are focused in this study. Thus and attempt is made to picture the black area of the environment in India and global, while undertaking the challenges and try to make clear and healthy environment for quality of human life. The study focuses the following environmental area, which is very much necessary for human life. In India with growing population, the relentless pressure to convert forest lands for agriculture industries, power and irrigation projects, housing and urban development has gone up substantially, trapping the country in vicious spiral of deforestation, land degradation and poverty. Since 1970 there has been a 160% increase in fuel wood and charcoal production. The largest portion (104%) occurred between 1970-80. Looking forward, the demand for fuel wood is likely to continue growing in pace with growing population. i.e., 24% decade. By 2010 according to the planning commission that the demand for the fuel wood and charcoal will exceed 33 million cubic meters.

[vi]On pollution, the reports showed that India's record was dismal. Class-I and Class-II cities generated around 20 billion liters of sewage waste water per a day, but treated only a tenth, the total sewage generation from the urban centers had grown six times in the last 50 years. The water requirement of major water consuming industries, petrochemicals, fertilizers and chemicals had grown 40 times, but these were not treating the large quality of waste water generated Municipal solid waste had grown seven times while the collection, transport and disposal of solid waste continued to be unscientific and hazardous. The report also showed that indoor and outdoor air pollution cost the nation almost 2.5 million premature deaths. If the above trend continues, then the matter of intergenerational equity will be far from reality.

V. FINDINGS OF THE STUDY

In this research observation slums are very near to visakha port so black dust and sound pollution effect on slum dwellers some the seasonal diseases and some of the chronic diseases I collected data from which house is belongs to chronic dieses. That is Asthma, respiratory diseases, cardiovascular dieses kidney problems, skin allergies and joint pains are noted in the survey. My research research article presented number of the suffering patients between age and sex as a graphical analysis given below.

5.1 Asthma:

Is a chronic disease characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person. Symptoms may occur several times in a day or week in affected individuals, and for some people become worse during physical activity or at night. During an asthma attack, the lining of the bronchial tubes swell, causing the airways to narrow and reducing the flow of air into and out of the lungs. Recurrent asthma symptoms frequently cause sleeplessness, daytime fatigue, reduced activity levels and school and work absenteeism. Asthma has a relatively low fatality rate compared to other chronic diseases.

It may be observed from the graphical analysis presentation in Fig: 5.1 shows that more than 50 percent of the affected sample respondents are suffering from Asthma under the age group of above 46 years & the rest of the percentage belongs to below 30 years age group. It is interesting to note that, more than 60 percent males are affected from this chronic disease under the age group of less than 30 years. But more than 56 percent females are affected at the upper age group of above 46 age group and it can be also observed from the slum.

5.2 Respiratory Syndromes:

The possibility that the high level of observed illness is due to other factors that also contribute to a household's decision to dwell in the slum The information is relating to the distribution of the affected sample respondents those who are suffering with Respiratory Syndromes according to the age & sex in study area.

It can be seen from the Fig:5.2 that out of the total, more than 38 percent of the affected sample respondents are suffering from 'Respiratory Syndromes' under the age group of 31-45, under this age group mostly men are affected when compared to women. With regard to at the upper age group of above 46 years, 37.93 percent of the respondents are affected with 'Respiratory Syndromes'.

Fig-5.1: Distribution of the affected sample respondents suffering from Asthma in the total study area
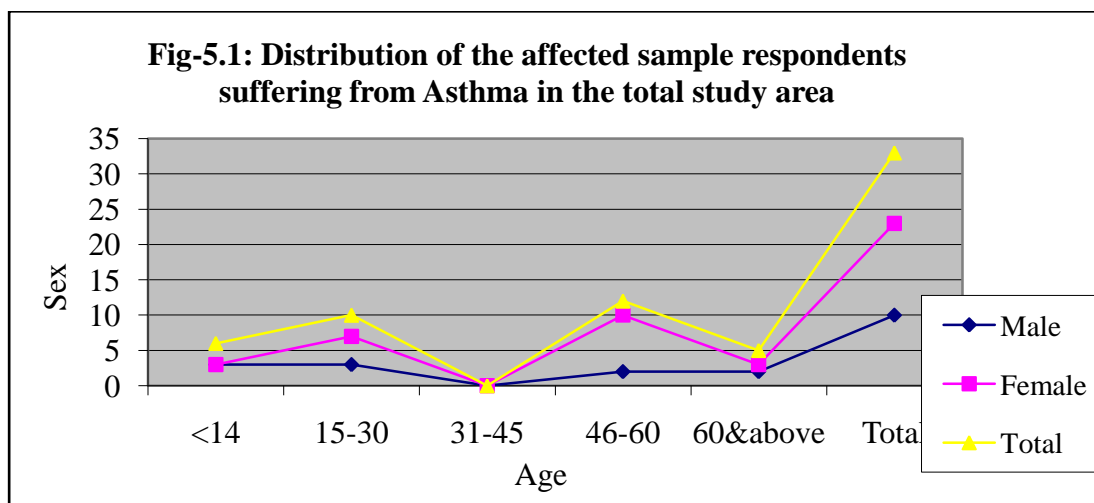
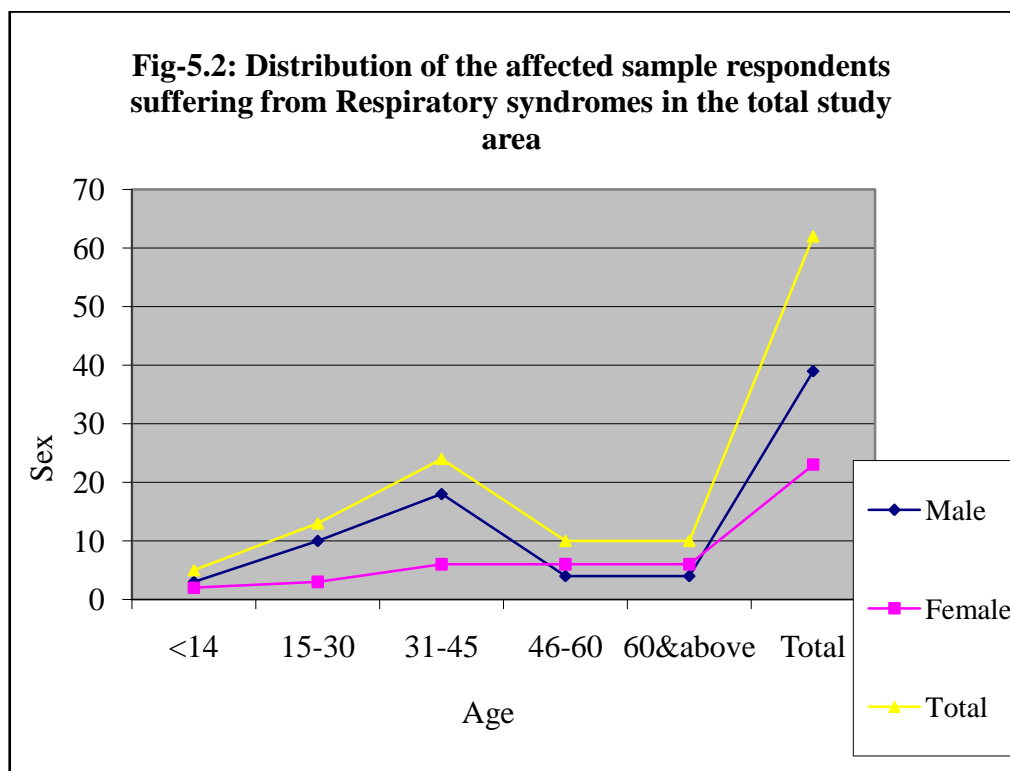**(Source: Field Data form selective slum on 2011)**

5.3. Cardio vascular Problems:

Heart disease covers a wide range of cardiac problems that are all very serious health issues. It includes cardiovascular disease, which is narrowed or blocked blood vessels. It also includes a number of other infections and conditions that can affect any part of the heart or blood vessels.

The information is relating to the distribution of the affected sample respondents those who are suffering with Cardiac Problems according to the age & sex in the study area.

It can be observed from the Fig 5.3 that out of the total, more than 44 percent of the respondents are suffering from cardiac problems under the age group of 31-45.

But the picture is quite different in the study area i.e., more than 57 percent of the respondents are suffering with Cardiac problems in the productive age group of 31-45.

Fig-5.2: Distribution of the affected sample respondents suffering from Respiratory syndromes in the total study area

(Source: Field Data form selective slum on 2011)

Fig-5.3 : Distribution of the affected sample respondents suffering from Cardiac problems in the total study area
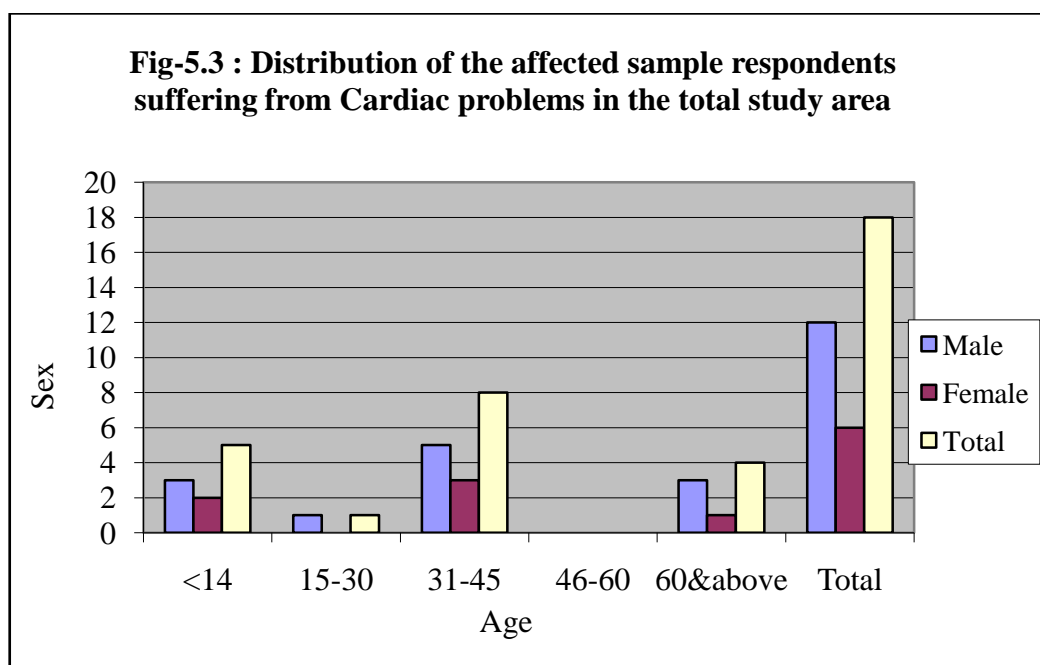
(Source: Field Data form selective slum on 2011)

5.4. Kidney Problems:

Chronic kidney disease occurs when one suffers from gradual and usually permanent loss of kidney function over time. This happens gradually, usually months to years. Chronic kidney disease is divided into five stages of increasing severity (see Table 1 below). The term "renal" refers to the kidney, so another name for kidney failure is "renal failure." Mild kidney disease is often called renal insufficiency. With loss of kidney function, there is an accumulation of water; waste; and toxic substances, in the body, that are normally excreted

by the kidney. Loss of kidney function also causes other problems such as anemia, high blood pressure, acidosis (excessive acidity of body fluids), disorders of cholesterol and fatty acids, and bone disease.

The information is relating to the distribution of the affected sample respondents those who are suffering with kidney problems according to the age & sex of study area.

It can be observed from the Fig:5.4 that out of the total, 34 percent of the respondents are suffering from Kidney Problems under the age group of 60 & above followed by 46-60 (28 percent), 15-30 (16 percent) and a meager percent of the respondents are suffering with this disease under the age group of less than 14, and it is also observed from the total that more than 35 percent of the female respondents are suffering from this disease under the age group of 46-60 & above. Further it can be noticed that majority of the females are affected by kidney problems. The calculated value of chi-square of the table is 4.0444, which is significant at 1 percent level. Hence it can be concluded that there is a significant difference between age and sex in the case of kidney problems in the study area.

5.5. Skin Problems:
The information is relating to the distribution of the affected sample respondents those who are suffering with skin problems according to the age & sex in study area.

It can be observed from theFig: 5.5 that out of the total, 39 percent of the respondents are suffering from skin problems under the age group of 46-60 followed by 31-45 (28 percent). Further it can be observed from the total that most of the females are affected by skin diseases. The calculated value of chi-square of the table is 4.897159, which is significant at 1 percent level. Hence it can be concluded that there is a significant difference between age and sex in the case of skin problems in the study area.

5.6 Theoretical explanation of the Independent Variables:
a) Sound pollution: The variable Sound pollution is included as an explanatory variable to estimate the impact of sounds on the selected households. If the increase in sound pollution leads to there may a chance to affect of the chronic disease. Hence we expect positive sign.

b) Dust accumulation: The variable Dust accumulation is included an explanatory variable to estimate the impact of the dust accumulation on the selected households. If the increase in Dust accumulation leads to there may be a chance to affect of the chronic disease. Hence here we expect positive sign.

c) Smoke pollution: The variable Smoke pollution is the main problem for the chronic diseases in recent times. For this reason the smoke pollution is considered as explanatory variable to estimate the impact of smoke on the selected households. If there is an increase in smoke pollution than there may be a chance of affect of the chronic disease. Therefore here we expect positive sign.

d) Water pollution: The water pollution is considered as the explanatory variable for estimate the impact of water pollution on the selected households. If there is an increase in water pollution than there may be a chance of the affect of chronic disease. Therefore here we expect positive sign.

e) Vector Problems: The vector problems arise generally out of dirty environment, drainage and sewage in the study area. Here we considered, as the vector problem is explanatory variable to estimate the impact of water pollution on the selected households. If there is an increase in vector problem than there may be a chance of the affect of the slum.

VI. STATISTICAL MODELS
Generally a large number of variables in the social sciences are dichotomous viz., Male Vs female, literate Vs illiterate, employed Vs unemployed, married Vs un-married, guilty Vs not guilty, suffering Vs not suffering, dwelling Vs not dwelling and so on. To deal with such cases, general linear regression models are not found to be useful, but Logit or Probit regression models are of use.

From the above discussion it can be noted that a dichotomous dependent variable in a linear regression model necessarily violates assumptions of homoscadasticity (Assumption 3) and normality (Assumption 5) of the error term. However, the consequences are not that serious. If just assumptions (1) and (2) hold good, ordinary least squares will produce unbiased estimates of α and β. Further, the normality assumption is not needed if the sample is reasonably large. The central limit theorem assures that coefficient estimates will have a distribution approximately normal even when ε_I is not normally distributed. It means that we can still use a normal table to calculate p-values and confidence intervals. If the sample is small, however, these approximations could be poor.

6.1 Odds and Odds Ratio:
To explain the logit model, it's helpful to know odds and odds ratios. Probability is generally regarded as the "natural" way to quantify the chances that an event will occur. We automatically think in terms of numbers ranging from 0 to 1, with a '0(zero)' meaning that the event certainly will not occur. But there are

other ways of representing the chances of an event, one of which the odds, has a nearly equal claim to being "natural". Although 'α' cannot be estimated from a case-control or cross-sectional study, the β's can be estimated from such studies as β's provide information about odds ratios of interest. Thus, even though we cannot estimate 'α' in such studies, and therefore, cannot obtain predicted risks. We can, nevertheless, obtain estimated measures of association in terms of odds rati.

6.2 Step – Wise Logistic Regression:

The term " step – wise " refers to the use of decision made by chance rather than theoretically valid hypothesis (computer made this easy), by the researches, to select a set of predictors (that is independent variable) for inclusion in or removal from any model including the logistic model. Step – wise logistic regressions is most often used in situations where the "important" independent variables cannot be easily identified and associate with an outcome not well understood (Hosmer and lemeshow, 1989). In studies where it is difficult to identify cause and effect, all possible independent variables are screened for significance. Step – wise logistic regression offers a fast and effective means of screening a large number of variables, and simultaneously fit a number of logistic regression equations.

6.3 Statistical Exercise:

Here the dependent variable is whether the household suffering from chronic disease during the past one year can be given a value (1) and the household not suffering from chronic disease during the past one year can be given (0), in the studies of explaining factors behind such cases. We have to select the independent variables on the basis of field experience. They are sound pollution (X1), Dust accumulation (X2), Smoke pollution (X3) and Water pollution (X4) and Vectors (X5).
Using the above-mentioned five variables, binary logit model is used in this study. It is specified as follows.

6.4 Logistic Regression Model:

$$\text{Ln } \left(\frac{P}{1-P}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \text{ui}$$

Where α – is the constant term
β_1 to β_2 are the coefficients of the respective independent variables

X_1 – Dummy variable that takes the value of 1 if the household opines that sound pollution is the cauase for chronic disease.

X_2 - Dummy variable that takes the value of 1 if the household opines that dust accumulation is the cauase for chronic disease.

X_3 - Dummy variable that takes the value of 1 if the household opines that smoke pollution is the cauase for chronic disease.

X_4 - Dummy variable that takes the value of 1 if the household opines that water pollution is the cause for chronic disease.

X_5 - Dummy variable that takes the value of 1 if the household opines that vectors are the cause for chronic disease. and ui is the error term.
Using STATA- Statistical package results have been estimated. The step-wise logistic regression method uses to chi-square test to identify which variable add or drop automatically. The results are interpreted with the help of odds ratio i.e. e$^{\beta i}$, instead of the actual coefficient, as the interpretation of odds ratio is more intuitive. It would mean that for a unit change in the independent variable there would be a corresponding change in the Odds Ratio.

Table-6.1: Results of the (Step-wise) Logistic Regression Analysis for selective slum.				
Independent Variable	**Coefficient**	**Standard error**	**P-value**	**Odds Ratio**
Constant	1.716321	0.7727699	0.026	
Sound pollution (X1)	1.594221**	0.710931	0.025	1.03122
Dust accumulation (X2)	1.645826***	0.778153	0.034	1.62312
Smoke pollution (X3)	0.4024476	0.361582	0.266	.6686814
Number of obs = 250 **LR chi2 (3) = 9.96** **Prob > chi2 = 0.0189*** **Pseudo R2 = 0. 2015** **Log likelihood = -167.50481**				
*Note: * indicates that the variable significant at 1 percent level* *** indicates that the variable significant at 5 percent level* **** indicates that the variable significant at 10 percent level*				

6.5 Results

The result of analysis of estimated logistic regression model for the impact of outdoor pollution environmental factors on health conditions of the selected urban slum dwellers particularly in Visakhapatnam city are presented in the Table-   . This analysis has been carried out for the entire sample of 250 households collected from the selective study area in Visakhapatnam city in the state of Andhra Pradesh.

For the total model, independent variables are selected are 5 in number to carry out the analysis. Among the five independent variables sound pollution (X1), Dust accumulation (X2) and Water pollution (X4) are turned out to be statistically significant in differentiating those who are suffering from chronic diseases than their counterparts i.e. the households of those who are not suffering from chronic diseases in urban slum dwellers in Vishakhapatnam city.

The results of the model indicate that the variable sound pollution (X1) is statically significant at 5 percent level of χ^2 - value with expected positive sign. The odds ratio associated with this variable 1.37 times more likely to impact than with their counterpart's i.e. the household's one who had not suffering chronic diseases and vice –versa. The variable Dust accumulation (X2) is statistically significant at 1 percent level of χ^2 - value with expected positive sign. The odds ratio of this variable indicates that 2.61 times more likely to the impact on those who are suffering chronic disease than their counterparts.

For slum, there were 250 observations and independent variable 3 in number to carry out the binary logit analysis. Thus, there were three independent variables to begin with. From these, Sound pollution (X1) and Dust accumulation (X2) are turned out to be statistically significant at 5 percent levels of χ^2 - value with expected positive signs. The odds ratio associated with these variables has 1.03 and 1.62 times higher the impact for those who are suffering from chronic disease compared to their counterparts and vice-versa.

VII. CONCLUSIONS AND FUTURE RESEARCH

The observation of the statistical results pertaining to environmental factors affecting health of the urban slum dwellers in the total study area are sound pollution, dust accumulation and water pollution which turned out to be statistically significant in differentiating respondents who are suffering from chronic diseases compared to their counterparts with the help of odds ratio.

The analysis relating to sound pollution and dust accumulation turned out to be statistically significant at different significant levels.

A successful city is one which meets multiple goals like adequate housing, environment for her dwellers, water supply, and provision of vision sanitation, garbage disposal, paved roads and others forms of infrastructural services essential for health achievement. Environmental problems become very serious where there is rapid expansion in urban population with little or no consideration for the environmental implications. Most of the cities in the developing countries have inadequate affordable housing and their residential environments are commonly characterized as slums.

In the Visakhapatnam city slums are rapidly growing these slums are located near industries inadequate housing and lack of infrastructure facilities are leading to the various health problems in the city. Government should take rehabilitation centers for most chronic diseases affected slums according to public health.

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