

Housing Environment on Morbid Conditions of the Elderly

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ABSTRACT Housing environment plays a crucial role in determining the morbid conditions of the residents. In view of this, an attempt is made to examine the housing environment factors on the morbid conditions of the elderly, making use of the data collected from 778 elderly persons from Coimbatore city, Tamil Nadu. On the whole, more than one-fourth (27%) of the elderly were suffering from one or more morbid conditions. Results based on cross-tabular analysis highlighted that housing environment has exhibited the prevalence of morbid conditions among the elderly. Logistic regression analysis based on Model I (environmental factors alone) revealed that 'the odds of elderly' morbid conditions are significantly lower among those who reside in *pucca* houses and using drinking water from own tap, whereas such odds are moderately higher among those residing in more dense households. In Model II (socio-economic factors also included), the net effects of the first two environmental factors on morbid conditions have reduced a little extent. Further, it is noted that while the odds of morbid conditions are lower among elderly who belonged to better family income, forward castes as well as higher educational status than their counterparts, the reverse pattern is noticed across their age categories under consideration.

INTRODUCTION

Housing environment has been acknowledged as one of the main settings that affect human health. Living and housing conditions are the basis of many factors influencing the residents' health (Jackson 2003). Broadly, the word 'environment' refers to whatever surrounds an object or any other such entity. Among many factors that affect human health, the household environment carries the major part, especially those living in developing countries, since they are associated with lack of development (Gopalan and Seksen 1999). Further, in these countries, in-home environment as well as neighbourhood environment would greatly affect the persons living in rural areas, slums and other poor localities of urban areas. It has been widely argued and also noted that the quality of the environment in general and household environment in particular has become very poor and thereby, air and water pollution are widespread. Both of these pollutions play a vital role in causing respiratory, infectious as well as water-borne diseases / morbid conditions in addition to psychological problems and headaches. The WHO (1997) has estimated about 23 percent of the global burden of disease is due to environmental factors only. Moreover, among those residing in households the most vulnerable persons are children and women and

elderly people, as most of these persons spend their time in in-house environment and its close surroundings. Additionally, the elderly have another disadvantage of loss in their immunity capacity and thereby, susceptible to different types of environmental related diseases. The health of the elderly would be affected by both indoor and outdoor environment. Added to these, the socio-economic factors also either individually or in combination with household environment would affect the health of the persons living in households.

A critical review of studies on household environmental factors and health of residents (details provided in the next sub-section) has shown that while a modest number of studies have focused on child morbidity and women's health, there is little attention to study the health of the elderly. In view of this, in this paper an attempt is made to examine the role of housing environmental factors influencing the elderly morbid conditions based on the data collected from an urban setting of Tamil Nadu.

Review of Literature

Human beings are wholly dependent for their survival on the environment – both physical and socio-economic – from childhood to old age. Of all the basic needs of human beings, next to food and clothing, shelter is the crucial one for life.

By and large, studies that focused on association between household environment and morbid conditions of its dwellers mostly take into consideration the factors related to household structure and amenities, viz., role of type of house, materials used for floor, wall and roof, sources of water, sanitation facilities, type of toilet, place allotted for pet animals in the households, type of cooking fuel and energy used, etc. and morbid conditions like respiratory, allergies, diarrhoea, skin / eye irritations, etc. Few studies have examined the association between household environment factors and selected morbid conditions of elderly persons. The analysis of NFHS-2 data, 1998-99 (38,595 elderly) by Mishra (2003) revealed that the prevalence of asthma among those elderly who reside in households in which biomass fuel was used for cooking, had a separate kitchen, *pucca* in structure and low densely rooms than their counterparts. Elderly who smoke were also much more likely to suffer from asthma than those who had never smoked. The prevalence of asthma was considerably lower among those elderly who were literate and belonged to households of higher standard of living index (SLI) as against to those who were educated and from households of low SLI. Results from two indoor pollution studies – Po Delta area in north Italy (428 subjects and 140 houses investigated) and in Pisa in central Italy (764 subjects and 282 houses investigated) – (Simoni et al. 2003) highlighted that individuals aged 65 years and above, spent a significantly larger number of hours at home than the other age groups both in winter and summer. A pattern of higher occurrence of acute respiratory symptoms in the presence of environmental tobacco smoke (ETS) was shown in comparison to the unexpected elderly both in winter (31 versus 29%) and summer (33 versus 16%). The occurrence of acute respiratory system was consistently higher in relation to the high respirable suspended particle-index exposure compared to low exposure (33 versus 27%) in winter, 27 versus 21% in summer). In an analysis of a micro- level study (among 100 elderly) in Mugalur village, Bangalore, Lucas (2007) observed that the respiratory morbidity was higher among those elderly who were dwelling in semi-*pucca* houses, using only firewood fuel for cooking, outlet pipe in the kitchen as ventilation. In addition, men, those who were in the age group 70-79 years belonging to middle and high

socio-economic status, had exposure to environmental tobacco smoke than their counterparts.

An analysis of NFHS-II, 1998-1999 data, (among 779 and 716 rural children) of Andhra Pradesh and Tamil Nadu states, Audinarayana (2007) concluded that the prevalence of three morbid conditions, viz., diarrhea, fever and cough, were much higher among those children living in households in which kerosene was used for lighting, followed by households that did not have a separate room for kitchen and any toilet facility. It was also noticed that unprotected drinking water had shown a positive effect on prevalence of morbid conditions, and also turned out significant in the case of fever in rural Tamil Nadu. Of course, a few unexpected patterns like children suffering to a lesser extent with diarrhea and fever in spite of they lived in houses that did not have a separate room for kitchen, wherein kerosene was used for lighting and used biomass fuels for cooking. Finally, it was also noticed that child morbidity conditions were lower among those children who belonged to lower socio-economic status, especially mother had little education than their counterparts. Likewise, the analysis of data from women aged 15 years and above belonging to north-eastern states who were as part of the NFHS-II, 1998-1999 (Harza et al. 2007) revealed that the risk of suffering from respiratory morbidities among women was more among those who were residing in households in which unclean fuel was used for cooking, do not have a separate kitchen, using kerosene for lighting and semi-*pucca* and *kuchcha* type, in addition to low SLI than their counterparts. Sengupta (2007) after examining data from NFHS-III, 2005-06, came to the conclusion that women and children of the households using biofuel were 24 percent and 49 percent more likely to be asthmatic than using clean fuels. The incidence of respiratory disease (ARI) was higher among children aged less than 2 years, who lived in semi-*pucca* and *kuchcha* houses, absence of electricity, more densely room (more than 3 person per room) and mothers' smoking habit compared to those aged 2 or more years, who lived in *pucca* houses, with electricity, low densely room, and those mothers who did not smoke.

All these earlier evidences clearly show that health effects of household environment have been addressed in many studies that dealt with

infants and children, but only a few studies have investigated such effects in older persons. Moreover, attempts to look into the effects of household environmental factors on elderly' health controlling for socio-economic conditions are also scarce. This study intends to fulfil these gaps in the knowledge of understanding the association between household environmental and morbid conditions with the help of cross-sectional primary data collected from elderly persons residing in a well developed city of Tamil Nadu state.

Objectives

The major objectives of this study are as follows:

1. To understand the magnitude of selected morbid conditions viz. Cough, Wheezing/ Asthma, Fever, Ulcer / Gastric and Tuberculosis among the elderly persons (60+ years) belonging to a well-developed city in Tamil Nadu state.
2. To examine the differentials in magnitude of elderly persons suffering with any morbid condition across their housing environment factors and background characteristics.
3. To find out the net effects of both housing environment and background characteristics on elderly suffering with any morbid condition.

DATA AND METHODOLOGY

Data Source

Data for the present study were collected from 778 elderly persons (60 years or more) from Coimbatore city, Tamil Nadu, during 2009 as part of a major research project funded by the Indian Council of Social Sciences Research (ICSSR), New Delhi. The elderly were selected (on census basis) from 8 clusters (streets or parts of streets), which were selected on the basis of simple random sampling technique, belonging to 4 Wards (out of 72 wards) in Coimbatore Municipal Corporation – 2 Wards each with lower and higher literacy rates among elderly population according to 2001 census.

Dependent Variable

In the present study, the magnitude of elderly who are suffering with any morbid condition (selected ones as shown in Table 1) or not is used as the dependent variable. This variable has been computed based on whether elderly persons are suffering with one or more number of morbid conditions for a period longer than one-month preceding to the survey.

Explanatory Variables

Selected household environment factors as well as background characteristics of the elderly have taken into consideration as explanatory variables (independent variables). The details related to the independent variable are given in the following lines and the data are presented in Table 3.

<i>Type of houses</i>	<i>Kuccha / Hut, Pucca</i>
Source of drinking water	Community well / Street tap, Own Tap
Type of fuel for cooking	Firewood/ Kerosene, LPG
Type of toilet facility	No, Yes - Separate Outside the House, Yes - Separate Inside the House
Density of living room	1 - 2 Person per Living Room 3 or More Persons per Living Room
Age	60-64, 65-69, 70-74, 75 years or more
Gender	Males, Females
Caste	Schedule Castes, Most Backward /Backward Castes, Forward Castes
Educational status	Illiterates, Up to High School, High Secondary+
Monthly family income	Rs. <4,000, Rs. 4,000-9,999, Rs. 10,000 +

Most of these explanatory variables are self-explanatory, except density of living room. This variable is computed as 'number of family members divided by number of rooms'.

Data Analysis

The analysis has been carried out in the following manner. Firstly, the prevalence of morbid conditions among the sample elderly, in addition to housing environment factors and background characteristics have been analysed with the help of simple frequency tables. At the

next stage, the differentials in the prevalence of elderly suffering with any morbid condition or not across their housing environment factors and background characteristics have been analysed making use of cross-tabulations with chi-square test of significance. Finally, logistic regression analysis is carried out keeping the elderly suffering with any morbid condition or not as the dependent variable and housing environment factors as well as background characteristics of the elderly as explanatory variables. The dependent variable treated in this paper as dichotomous and the independent variables are categories. In such a situation, logistic regression technique is the most suitable one.

RESULTS AND DISCUSSION

Patterns of Morbid Conditions among Elderly

Information about the morbid conditions of the elderly is given in Table 1. On the whole, slightly more than one-fourth of the elderly are suffering from one or the other morbid conditions at the time of survey. Details about individual morbid conditions highlight that about one-tenth (11%) are suffering from wheezing/asthma closely followed by 7 percent suffering from cough problem. Such morbidity is because of prevailing indoor ambience, such as particles, smoke, heat, cooking conditions and cleanliness. Some of the elderly have reported to be suffering from ulcer/gastric problems and a few from tuberculosis.

Table 1: Percentage distribution of the elderly respondents by type of morbid conditions they suffer (N=778)

Type of morbid conditions	Percent
Cough	7.1
Wheezing/ Asthma	7.5
Fever	10.7
Ulcer/Gastric	6.3
Tuberculosis	2.4
Suffering with any morbid conditions	27.0

Number of Morbid Conditions among Elderly

Data shown in Table 2 highlights that slightly less than three-fourths of the sample elderly are said to be morbid-free. On the other hand, about one-fifth of the elderly reported to be suffering from only one type of morbid condition, whereas

7 percent from two or more morbid conditions. On an average, the sample elderly have 1.3 morbid conditions each.

Table 2: Percentage distribution of the elderly respondents by no. of morbid conditions they are suffering (N=778)

No. of morbid conditions	Percent	Frequency
0	73.0	568
1	20.4	159
2+	6.6	51
Mean no. of morbid conditions	1.3	

A Brief Description of the Elderly' Housing Environment Factors and Background Characteristics

Data related to the housing environment and background characteristics of the elderly is presented in Table 3. From panel 1 of this table, it is evident that slightly more than fifty percent of the elderly are residing in *kuchcha* / hut houses and the rest of them in *pucca* houses. Such pattern shows most of the elderly do not have fully featured houses (like floor, wall and roof). With regard to source of drinking water to households (panel 2), it can be seen that slightly more than fifty percent (53%) of the elderly are using drinking water from own tap and remaining from community well / street tap. About three-fourths of the households have LPG fuel for cooking and the rest have firewood / kerosene fuel for such purpose (panel 3). It is to be noted that an overwhelming percent of the households wherein elderly live have toilet facility either within or outside their house (panel 4). Slightly more than fifty percent of the elderly live in households than can be said as low densely or crowded (1-2 persons per living room) and the remaining high density households (3 or more person per living room).

Information relating to demographic and socio-economic background characteristics of the elderly (panel 6-8 of Table 3) highlights that, with a few exceptions, on an average one-fourth of the elderly persons are in the four age-categories under consideration, women slightly outnumber men and most backward and backward castes (moderate in their socio-economic strata) are large in number than their counterparts. Among sample elderly persons, illiterates

Table 3: Prevalence of morbid conditions among elderly respondents according to housing environment factors and background characteristics

Selected housing environment and background characteristics	% Suffering from any morbid condition		Total	
	%	Freq- uency	%	N
<i>Type of Houses***</i>				
Kuchcha / Hut	37.1	152	52.7	410
Pucca	15.8	58	47.3	368
<i>Sources of Drinking Water***</i>				
Community well / Street tap	40.3	147	46.9	365
Own tap	15.3	63	53.1	413
<i>Type of Fuel for Cooking***</i>				
Firewood / kerosene	37.1	72	24.9	194
LPG	23.6	138	75.1	584
<i>Type of Toilet Facility***</i>				
No	43.9	36	10.5	82
Yes-Separate outside the house	24.7	147	76.6	596
Yes-Separate inside the house	27.0	27	12.9	100
<i>Density of Living Room***</i>				
1-2 person per living room	20.4	84	53.0	412
3 or more persons per living room	34.4	126	47.0	366
<i>Current Age*</i>				
60 – 64	23.0	51	28.5	222
65 – 69	26.2	50	24.6	191
70 – 74	24.7	40	20.8	162
75 +	34.0	69	26.1	203
<i>Gender***</i>				
Male	21.7	79	46.8	364
Female	31.6	131	53.2	414
<i>Caste***</i>				
Scheduled Castes/ Tribes	44.6	75	21.6	168
Most Backward / Backward castes	25.3	117	59.5	463
Forward castes	12.2	18	18.9	147
<i>Educational Status***</i>				
Illiterates	39.3	138	45.1	351
Up to high school	19.4	60	39.8	310
Higher secondary and above	10.3	12	15.0	117
<i>Monthly Family Income***</i>				
Rs. < 4,000	39.7	83	26.9	209
Rs. 4,000–9,999	29.2	75	33.0	257
Rs. 10,000 and above	16.7	52	40.1	312
Total	27.0	210	100.0	778

Note: Percentages calculated for Morbid Conditions by Housing Environment and Background Characteristics row-wise.

Percentage for the total sample of respondents are computed column-wise in order to understand the magnitude of each category in the total sample.

Therefore, these percentage are no away related to their morbid conditions. However, the figure cited under 'N' are served the denominators for each of the categories of varibale under consideration.

* and *** = Chi-square results between each of the factor and elderly suffering with 'any morbid condition or not' significant at 0.05 and 0.001 levels, respectively.

are in majority closely followed by up to high school and the remaining are educated up to higher secondary school and above. On the other hand, about two-fifths of the elderly belonged to households in which the monthly family income is Rs. 10,000 or more, about one-third to households of moderate family income bracket and the rest one-fourth belonged to households of low income bracket (panel 10).

Differentials in Elderly' Morbid Conditions by Household Environment Factors and Background Characteristics

The morbid conditions of the elderly would vary across their household environment factors as well as background characteristics. In order to understand such differentials, cross-tabulations have been carried out keeping the elderly who ever suffering with any morbid condition or not as dependent variable and the household environment as well as background characteristics as independent variables with chi-square test of significance. These results are presented in Table 3. From this table (panels 1-3), it is evident that the morbid conditions are much lower among the elderly who are residing in houses that are *pucca* type, have own tap facility for drinking water, using LPG fuel for cooking as compared to those residing in *kuchcha* / hut type of houses, getting drinking water from community well / street tap and using firewood / kerosene fuel for cooking. All these percentages differentials also turn out highly significant ($p < 0.001$ in each case). On the other hand, the prevalence rate of morbid conditions observed to be higher among elderly who do not have toilet facility at their houses and those living in more densely houses (panel 4 and 5 of Table 3) and these patterns are also turn out highly significant ($p < 0.001$).

The percentage of elderly morbid conditions appear to be increasing side with an increase in their current age, but the results turn out significant to a moderate extent only (panel 6;

$p < 0.05$). The magnitude of elderly suffering with one or more morbid conditions is significantly higher among women as well as among those who belonged to lower and middle social strata (scheduled castes / tribes and most backward / backward castes) than their men and forward castes counterparts (panel 7-8; $p < 0.001$ in each case). It is also conspicuous to note that the percentage of elderly suffering with any morbid condition differed significantly (panel 9-10; $p < 0.001$ in each case) across their educational status and monthly family income, indicating a consistent decrease in the magnitudes of morbid conditions among elderly with an increasing level of educational attainments and monthly family income.

Determinants of the Elderly' Morbid Conditions

As stated earlier, in order to find out the principal determinants of elderly suffering from any morbidity condition (under consideration), it is proposed here to adopt logistic regression analysis. This has been carried out with two models; in the first model, only housing conditions have been regressed with those who suffer from any morbid condition and in the second model, selected demographic and socio-economic background characteristics have also been included. These results have been provided in Table 4.

Results based on the Model I of Table 4 highlight that among the five housing environment factors three have turned out to be comparatively significant in showing their net effects, mostly in expected direction on elderly' suffering with any morbid condition. For instance, the odds of elderly suffering from any morbid condition are 0.6 times and 0.4 times lower and also significant ($p < 0.01$ and $p < 0.001$) among those elderly who live in households that are *pucca* buildings and which have drinking water facility from own tap as compared to those reside in *kuchcha* houses / huts and use unprotected water (community well/ street tap). Conversely, the likelihood of occurring any morbid conditions among elderly is significantly higher ($p < 0.05$) among those who are residing in more densely households against to those who are living in less densely households.

When the socio-economic factors are included in the analysis (Model II of Table 4), it is interesting to note that, on the one side, the direction of net effects are mostly intact, but the

Table 4: Results of logistic regression on the elderly' morbid conditions

Explanatory variables	Model I		Model II	
	Coeff.	Odds ratio	Coeff.	Odds ratio
<i>Type of Houses</i> (Ref: Kuchcha)		1.000		1.000
Pucca	-0.552	0.576**	-0.448	0.639*
<i>Sources of Drinking Water</i> (Ref: Community Well/ Street Tap)		1.000		1.000
Owntap	-0.894	0.409	-0.490	0.572
<i>Type of Fuel for Cooking (Ref:</i> <i>Firewood/Kerosene)</i>		1.000		1.000
LPG	-0.116	0.723	-0.397	0.488
<i>Type of Toilet Facility</i> (Ref: No)		1.000		1.000
Yes-Separate outside the house	-0.299	0.742	-0.123	0.884
Yes-Separate inside the house	-0.025	0.976	-0.014	0.986
<i>Density of Living Room (Ref: 1-2 Person per living room)</i>		1.000		1.000
3 or more persons per living room	0.412	1.510*	0.432	1.640**
<i>Current Age (in Years)</i> (Ref: 60-64)				1.000
65-69			0.282	1.325
70-74	-	-0.359	1.432	
75+		0.866	2.377***	
<i>Gender (Ref: Male)</i>				1.000
Female	-	-	0.100	1.105
<i>Caste (Ref: Scheduled Castes/Tribes)</i>				1.000
Most backward/ Backward castes	-	-0.519	0.595*	
Forward castes		-0.776	0.460*	
<i>Educational Status</i> (Ref: Illiterates)				1.000
Up to high school	-	-	-0.291	0.747
Higher secondary and above			-0.412	0.663
<i>Monthly Family Income</i> (Ref: Rs < 4,000)				1.000
Rs. 4,000 – 9,999	-	-	-0.454	0.635*
Rs. 10,000 and above			-0.674	0.510**
-2 Log	831.168		799.361	
Likelihood	76.263		108.071	
Chi-square Value				
Level of Significance	0.001		0.001	
N	778		778	

Note: — = Not Applicable

+, *, **, and ***= Beta Coefficients are significant at 0.10, 0.05, 0.01 and 0.001 levels, respectively.

magnitude of independent effects have come down to a little extent in the case of first two

housing environment factors. On the other side, magnitude of net effect of density of living room on morbid condition of the elderly has strengthened further. Another interesting fact noticed here is that with the inclusion of background factors in the logistic model, the odds of elderly suffering with any morbid condition are 0.5 time lower ($p < 0.10$) among those who dwell in households in which LPG is used for cooking as against to those who are living in households wherein firewood / kerosene is used for such purpose.

Some of these findings as well as in the case of differentials in morbid conditions across the housing environment factors found to be almost similar as in the case of earlier studies (Mishra 2003; Lucas 2007).

From Model II, it can also be noted that the background characteristics of the elderly persons do play a crucial role in influencing their morbid conditions. It is conspicuous to note that the odds of elderly suffering from any morbid condition are consistently increasing with an increase in their age. However, the results turn out as highly significant only in the case of 'old-old' age group as compared to 'young-old'. In this connection, it is worth noting the positive influence of age on respiratory health among elderly in north Italy (Simoni et al. 2003) and in a village near Bangalore (Lucas 2007). Conversely, such odds have decreased with an increase in their social standing (based on caste background) and monthly family income. These findings are also turned out as significant (at different levels of significance).

CONCLUSION

Though it is difficult to find out the relative effects of housing environment factors on elderly morbid conditions in a holistic manner, based on the findings of the present paper some following conclusion has been drawn. This study revealed that about 27 percent of the elderly are suffering from one or the other morbid conditions; fever is little higher than the others under consideration. On the whole, differentials in the percentage of elderly suffering from any morbid conditions across their housing environment factors are on the expected lines: lower among those who are living in *pucca* houses, using LPG for cooking, have drinking water from own tap and toilet facility either inside/outside

than those living in households that did not have such facilities, whereas the reverse pattern is noticed in the case of the elderly who live in households that have higher density per room. Likewise, the differentials in the percentage of elderly who suffer from any morbidity condition across their background characteristics are also on the expected lines: lower among those who belonged to forward castes, higher educational status (up to Higher Secondary School and above) and whose monthly family income is higher than their counterparts. On the other hand, the percent of the elderly who have one or the other morbidity condition is moderately higher among those who are much older in age and women than amongst 'young-old' and men. Logistic regression analyses mostly reiterated these patterns of net effects and also noted to be significant in most of the cases. However, the point to be borne in mind here is that the net effects of the housing environment factors on elderly suffering from any morbid conditions have reduced to a lower extent in the case of type of house, source of drinking water and density of living room, the net effect of type of fuel for cooking has increased to a moderately significant extent in the presence of background characteristics of the elderly.

POLICY IMPLICATIONS

In the light of the findings observed in this study, one can put forth some of the following policy implications. First of all, the people in general and elderly in particular have to be informed about the detrimental effects of housing conditions on their health through various mass media channels and extension education. Both government and Non-governmental Organizations have to play a greater role in this regard. Government / Banks can provide loans for the construction of *pucca* houses to weaker sections of society, in addition, to providing subsidies with less interest rates for construction of such houses would also be helpful for a better environment of houses, providing protected water through taps and LPG comparatively with cheaper rates would also be beneficial for elderly. Improving the socio-economic conditions of the elderly is also essential for taking both preventive and curative services so as to not affect by any ill-health if at all affected for an early treatment.

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