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ENVIRONMENTAL DENSITY AND ITS EFFECT ON HEALTH AND QUALITY OF LIFE

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Abstract

The sample comprised of a total of 200 residents of Gorakhpur city. Amongst them100 were residing in the two densely populated areas of Gorakhpur (high density) namely, Urdu bazaar and Alinagar and 100 participants were residing in new residential colonies and societies (low density). They had been given the questionnaires to assess health and quality of life, as well as some open ended questions werealso asked. The findings suggested significant differences in groups in evaluating quality of life and health status. The high density residents had reported more physical and psychological symptoms and poor quality of life than low density residents. Although the high density residents had compromised health and quality of life but they had not been ready to change their accommodation to less dense areas. The reasons given are- proximity to market, schools, railway and bus stations, hospitals etc. The interesting finding was that residents of less dense area also want to shift to such crowded places because of the convenience related reasons.

Key Words: environmental quality, physical health, psychological health, quality of life.

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Introduction

Human health inseparably coexists with environmental conditions. Environmental factors play a pivotal role in causation and onset of many physical diseases and psychological disorders.Environmental health incorporates the physical milieu, the

Biological and chemical makeup as well as the social and psychological settings in which human behavior takes place. Furthermore, the environmental health also refers to the systems, principles, beliefs and exercises ofconsidering, correcting, monitoring, guiding, thwartingand checking those elementsin the natural, ambient and psychosocial environment that can possiblyand adversely affect the health of present and future generations. The linkages between health and environment are definitely very strong. A World Health Organization report (2009) highlighted that 25% burden of diseases is linked to the environment. The environment influences our health through the air we breathe, the water we drink, radiation and noise, the work environment, the built environment, and also the climate and the ecosystem. Spread of pathogenic microorganism through water, food, biogenic vectors and improper waste disposal constitute a significant threat to human health.

The environment and human health share aparticularlymultifaceted relationship. For example polluted air causes respiratory diseases, unclean water and lack of sanitation causes diarrhea, poorly managed water bodies causes vector borne diseases such as malaria, poorly designed streets, cities and buildings causes injuries and accidents etc. Altogether more than 80% of all major diseases, both communicable and non-communicable and injuries are caused by factors associated to environment. Collectively, all environmental factors are considered to be the macro environment. However, the other more identifiablehuman-environment transactionslike, workplace contacts and exposures, indoor air qualityconcerns, confined and restrainedplaces are ponderedto be micro environment. Both the macro and micro environment shapes the experience of crowding and the density. Here is a debate on the terms crowding and density. Stokols (1972) proposed to adopt the psychological definition of crowding rather than exclusively defining crowding in terms of spatial restriction, specificallydensity, overlookingthe subjectiveexperiences that may interveneamidthe spatial componentsof crowding and the subsequenteffects on human behavior. He suggested that, density is restricted to the strictly

physical or spatial aspects of a setting while crowding should be used to refer to the psychological or subjective factors in a situation. However, the other view is that crowding should not be circumscribedto subjective perception but preferablyshould refer to the volumeof real space obtainable per person (Freedman, Heshka &Levy, 1975).

Research evidences clearly proposedthat certain features of physical environment, including the aspects of the ambient environment affect the human performance, adjustment and health. Crowding is a constant source of stress and high density can negatively affect the physical and mental health (Ruback & Pandey, 1991).The more crowded the residential settings (i.e., higher number of people per room); the more it causes social withdrawal and impair the development and maintenance of socially supportive quality relationships (Evans, 2001; Evans & Lepore, 1993) and well-being (Evans, 2003; Cattell, Dines, Gesler & Curtis, 2008). Wells (2000) had speculated that restricted access to the outdoors is the key factor in lower physical activity, behavioural problems, and respiratory illnesses in children, and with neuroticism and social isolation in stay-at-home mothers.Ruback and Pandey, (2002) did a study on the slum dwellers of New Delhi and reported that a gender difference in rating the household stressors and environmental stressors. Women rated household stressors more negatively and men rated environmental stressors like-traffic, garbage, air pollution, and crime more negatively.Moreover, the individual-level factors, such as age and psychological variables significantly predicted both mental distress and physical symptoms in both groups.

In the modern society due to technological advancement a number of environmental stressors have been emerged, especially in the urban settings. Psychologists have identified noise and air pollution to be dangerous for physical and psychological health and well-being (Stansfeld & Matheson, 2003). The potential effects of noise of heavy traffic, building construction, music systems, machines of several kinds on health and social behavior were examined (Lercher, 2007; Olaosun, Ogundiran, & Tobih, 2009).Experienceof heavy noise both at home and at work upsurges the irritable behavior and negative affect (Berglund, Lindyall & Schewel, 2000). Noise also increases the expression of aggression (Cohen & Spacapan, 1984). However, the researchers (Gidlof-Gunnarsson, & Ohrstrom, 2007) have also advocated that the perceived availability to nearby green areas affects various aspects of well-being. Particularly, in those individuals who

are exposed to high road-traffic noise but with access to a quiet side. The results showed that "better" availability to nearby green areas is crucialfor their well-being and day-to-daybehavior by lesseninglong-term noise exasperationsand incidenceof stress-linked psychosocial symptoms, and by expandingthe usageof outdoor spaces.Similarly, the air of the metropolitanand other major cities is chockfull withharmfulparticles like carbon monoxide and sulphur-dioxide along with the contaminants including, asbestos particles, building insulation and nitrogen oxide and photo oxidants emitted from automobiles etc. (Bruce, Perez-Padilla, & Albalak, 2000). Moreover, the increasing population and decreasing land is also creating both inside and outside density.

To measure the impact of crowding on health,both the experimental and correlational researches had been performedby the psychologists. Experimental studies with random assignment, short term crowding in the laboratory revealed that even the short term crowding situation produce negative affect and physiological stress (Baum & Paulus, 1987; Evans, 2001). A number of correlational studies had taken the residential density as a variable and reported the evidences of dose-response relationship or exposure-response relationship (Evans, Lepore & Allen, 2000). Chemical properties of building materials (e.g. lead, mercury, manganese, organic solvents) are noxiousand createneuropsychiatric symptoms like anxiety, depression, irritability and concentration difficulties (Bell, Baldwin & Schottenfeld, 2001).

Two important aspects of built environment i.e. housing quality and neighborhood quality are comprehensively investigated by psychologists. The elementsof deficienthousing quality includes insecurity and safeguarding, structural quality, maintenance and upkeep, facilities, unresponsive landlords, nearnessto high-pitchedstreet traffic etc. The psychological consequences of poor housing quality incorporate risks for socio-emotional problems in children (Adam & Chase-Lansdale, 2002) and safety hazards (Gielen et. al., 1995). Thus, the research evidences from more urban and metro like places as well as laboratory experiments had clearly suggested that crowding defined in terms of both subjective experiences and on objective criteria may produce harmful effect on human health and well-being.

Objective of the Study

1. The available research literature in environmental psychology had clearly given evidences that the crowding and both spatial and social density significantly impair the cognitive functioning, social behavior and health (both physical and mental) of the users. Therefore, it was thought pertinent to find out the impact of density on the health of the residents of two different types of residential areas i.e. high density and low density.

2. The research evidences had suggested that density, perceived environmental attitude and health are interrelated. Residential density may affect environmental attitude. Therefore, the other objective of the present piece of work was to find out the relationship in stress, density and health.

3. Perception of environmental pollution, living conditions have an impact on the evaluation of quality of life of the individuals. Hence, the objective of the present study was to uncover the influence of density and stress on evaluation of quality of life.

Method

Sample: This study was conducted on two different sample groups.

(1) The first sample comprised of 100 adult residents of Gorakhpur who resided in the highly dense part of the city like Urdu Bazar, Chote Kazipur, and Nakhash. These three mohallas (streets) were taken as there were both spatial and social density was high as well as, outside density was also very high.

(2) The second sample comprised of 100 adult residents of Gorakhpur who reside in the low dense part of the city like Civil Lines, newly developed colonies and society apartments. These areas were taken as there were both spatial and social density was low as well as, outside density was also less.

Material: In the present investigation both quantitative and qualitative tools were used. The standardized questionnaires were used in the study for assessing environmental pollution attitude, health status, and quality of life. Besides this, an interview schedule was considered with open-ended items.

Interview Schedule: An interview schedule was prepared to understand the level of stress derived by environmental pollution and the reason behind people's wish to reside in polluted or not polluted area. The respondents were asked 10 open ended questions. These were –

1. Do you get clean water supply from Municipal Corporation?
2. Do you get uninterrupted electricity?
3. Does your area get cleaning of garbage done every day by Municipal Corporation?
4. Does your area haveproper sewage and drainage system?
5. Does your area have encroachment of roads and streets by vendors and vehicles?
6. Do you find high concentration of smoke and dust by transport vehicles in your area?
7. Are you bothered by regular traffic jam and unmanaged traffic in your area?
8. Do you have narrow roads and streets in your area?
9. Do you encounter noise of vehicles and other loud sounds in your area regularly?
10. Do you have parks, open spaces and greenery in your area?
11. If you have an opportunity to change your residence, would like to change? Justify your choice with reasons.

Environmental Stress Checklist: A stress checklist was prepared by the present researcher to assess the level of stress in participants. In the check list five categories of stresses have been examined namely, physical stress, psychological stress, social stress, emotional stress, and relational stress. The participants had to mark anoption against each stressor. The face validity of the checklist was ascertained.

C.M.I. Health Questionnaire: Cornell Medical Index known as C.M.I. is extensively used to assess health status of the individual. This scale was translated in Hindi and standardized by Wig, Pershad and Verma (1983). The scale has 195 items grouped into two sections physical distress and psychological or emotional distress. The areas covered in the physical distress section are eyes and ears, respiratory systems, cardiovascular system, digestive tract, musculoskeletal system, skin, nervous systems, genitourinary system, fatigability, frequency of illness, miscellaneous diseases and habits. The areas covered in the psychological distress section are feeling of inadequacy, depression, anxiety, sensitivity, anger and tension. There are two forms of the CMI, one for men and one for women. They are identical except for six items in the genitourinary section. The participants had to make their responses by encircling ‘Yes’ or ‘No’ against each item. Each ‘Yes’ answered item is counted and considered as score. The Hindi

version of the CMI was found to be highly correlated (0.77 to 0.87) with that of original English form.

WHO Quality of Life Scale (WHOQOL): In order to assess the quality of life in health care settings in India, this questionnaire was developed by a team of researchers of World Health Organization (WHO), namely Saxena, Chandirmani and Bhargava (1998).The scale consists of 100 items related to four domains, namely, Physical Health, Psychological Health, Social Relationships and Environment. Each domain has a number of facets and in each facet there are four items. The facets related to each domain are-*Physical Health*-Activities of daily living, dependence on medicinal substances & medical aid, energy and fatigue, mobility, pain and discomfort, sleep and rest and work Capacity. *Psychological Health*- Body image and appearance, negative feelings, positive feeling, self esteem, spirituality/religion/personal belief, thinking, learning, memory, and concentration. *Social Relationship*- Personal relation, social support and sexual activity. *Environmental Health*-Financial resource, freedom, physical safety and security, health and social care accessibility and quality, home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreational or leisure activities, physical environment, pollution, noise, traffic, climate, and transport. Cronbach alpha for this scale was moderately high for most of the facets. All facets were significantly correlated with their respective domains. All items of WHOQOL-100 distinguished significantly between the "diseased" and "healthy". The scoring was done on a five point scale. Some of the items in the scale are positively worded and some are negative. So the scoring for positively worded items was (5) for strongly satisfied to (1) for strongly dissatisfied and vice versa for negatively worded items. The retest reliability of Hindi version of this scale was 0.67 and split-half reliability was 0.71 (Dubey, 2003).

Results

The data was subjected to analysis to find out the impact of living in high and low density area and the stress produced by it on the health and quality of life of participants. Hence, based on the stress scores the participants were divided into high and low stress groups. The 2x2 analysis of variance was computed where factor one was residential area having two levels (high density area and low density area) and factor two was stress with two levels (high and low).

Table 1: Summary of ANOVA as a function of residential area and environmental stress in relation to Health (CMI total)

Source	Sum of Square	df	Mean Square	F
Residential Area (A)	98157.31	1	49078.65	151.05**
Environmental Stress (B)	9202.96	1	383.45	1.18
A x B	16427.38	1	529.91	1.63
Error	62380.89	196	324.90	
Total	3043133	200		

Note= P<.01** P<.05*

This table clearly shows that the main effect of living in different residential area was found significant for the health status. The mean values indicated that participants living in high density (M= 124. 60, S.D.= 18.87) area have been presenting more physical and psychological ill health symptoms than participants living in low density area (M= 75.68, S.D.= 17.45).

Table 2: Summary of ANOVA as a function of residential area and environmental stress in relation to Quality of Life

Source	Sum of Square	df	Mean Square	F
Residential Area (A)	113595.28	1	56797.64	70.89**
Environmental Stress (B)	19086.37	1	795.26	.993
AxB	29837.27	1	962.49	1.20
Error	153812.56	196	801.10	
Total	14970247	200		

Note= P<.01** P<.05*

Table 2 revealed that the main effect of living in different residential area was found to be significantfor quality of life. The mean values indicated that participants living in high density (M=214.33, S.D.=24.03) area have been evaluating their life quality more negatively than participants living in low density area (M= 273.46, S.D.= 33.65).

Analysis of Interview Data

The questions asked to the participants related to water, air and sound pollution, transportation, electricity supply etc. were analyzed through frequency and reported in Table 3.

Table 3: Frequency of the responses on open ended interview data

Questions	Frequency			
	High Density		Low Density	
	Yes	No	Yes	No
Receive clean water supply from municipality	85	15	89	11
Uninterrupted supply of electricity	10	90	16	84
Cleaning of garbage everyday by municipality	09	91	77	23
Sewage and drainage system without any problem	06	94	27	63
Encroachment of roads and streets by vendors and vehicles	100	00	31	69
Smoke and dust by transport vehicles	100	00	25	75
Regular traffic jam and unmanaged traffic	100	00	10	90
Narrow roads and streets	67	33	56	44
Noise of vehicles and other loud sounds	100	00	12	88
Availability of parks and open spaces to walk around	03	97	54	46

The findings of the interview data revealed that participants whether living in highly dense area or less dense area, were bothered by interrupted supply of electricity, garbage and blocked drainage. However, the participants of highly dense area were more troubled and disturbed by regular traffic jams, encroachment on roads, dust and smoke and high pitched sound of vehicles and lack of open spaces.

Table 4: Frequency of the responses on open ended interview data about changing the present Residence area

Questions	Frequency			
	High Density		Low Density	
	Yes	No	Yes	No
If you have the opportunity to change the residence, would you like to change	05	95	44	56
Close proximity with school, hospital, market	90	10	37	63
Close proximity with railway/bus station	94	06	47	53
Easy accessibility of things of utility in odd hours	100	00	31	69

Table 4 presented the responses on the question "If they had an opportunity to change their present residence to some high/low dense area, whether they will change?" The strange thing was found that on the one hand the participants of highly dense area were facing serious problems related to health, traffic, different types of pollutions etc. and evaluating that their quality of life is not good on several dimensions but they don't want to change their residences because of the proximity to schools, railway/bus station or hospitals etc. Not only this because of the same reasons the participants of less dense area also want to shift to these areas.

Discussion

In the present piece of work it was the contention of the researchers that people living in the densely populated areas of the city have more health related problems and they will evaluate their quality of life more negatively than people living in less densely populated areas of the city. The health status (both psychological and physical) of the residents of highly dense area was found poor than residents of less dense area. Living in a highly dense area for a long time had after effects and cumulative effects such as illness. The overload notion explains that high density can be inimical because it may cause us to become overwhelmed by sensory inputs. High density along with the environmental pollution intensifies its impact on health. The behavior constraint approach also explains these findings; high density and environmental pollution lead to reduced behavioral freedom (e.g. fewer behavioral choices and more interference). The high

density over arouse the residents due to traffic jams, violation of personal space, excessive unarguable or unwanted contacts, air and sound pollution, disruption or blocking of goal directed behavior etc. and all these things have negative effects on physiological conditions and leads to more complaints about physical and psychological health.

The findings indicated the significant differences in physical and psychological health status of the residents of highly dense area and less dense area. However, the strange aspect is that although the residents of highly dense area were reporting both physical and psychological ailments and evaluating their quality of life more negatively but they didn't want to change their present place of residence and move to a less dense and better environmental quality place. Bechtal (1976) had long back cautioned that surrounding conditions as well as activities in which people engage are likely to affect environmental judgment. People's satisfaction or dissatisfaction with their current residential environments as well as their preferences in regard to an ideal living environment play a central role in shaping both their decisions about moving and their choices of new residential settings. The self-control interacting with the availability of social support moderatesthe crowding effects of density. The participants in high-density households evaluated their home environments more positively and reduced their personal space requirements (Sinha & Nayyar, 2000).

In the present study population density as an indicator of individual stress level focused on impact of density on the health of the residents of two different types of residential areas i.e. high density and low density. This paper establishes environmental attitude as a powerful predictor of stress and health. But one of the limitations of the study is that it characterizes consequences of environmental density but it does not describe about person-environment relationship which should be elaborated here to ascertain that how people are being closed together in certain places. Since the present study put emphasis on environmental density but for the sake of health it should be also take into account the outdoor and indoor environmental effects on health and quality of life.

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