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Demographic Determinants of Elderly Self-rated Health Status

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Abstract:

Health of the elderly is an important issue that is affected by various demographic factors such as age, gender, marital status, place of residence, and social class. This study examines the health status of 500 elderly (265 males, 235 females) of Sahibganj district of Jharkhand. Structured interviews and Likert scale-based health assessments were used to collect data. Data of the elderly has violated assumptions of ANOVA so Kruskal-Wallis Test (Non-Parametric Alternative to ANOVA) and Post-hoc Dunn's Test were used.

The study found that health declines with ageing. In particular, the elderly aged 80 years and above are in the worst health condition. Rural elderly were found to be in better health than urban elderly. Married elderly were found to be in better health condition than widowed and unmarried elderly. No significant difference in health was found on the basis of gender. Similarities in health were observed among social classes but the difference between OBC and ST was significant.

The findings indicate the need for policy interventions, better availability of health services, and strengthening social support systems to improve the quality of life of the elderly.

Keywords:

Elderly health, age groups, marital status, rural-urban health disparity, social category, Kruskal-Wallis test, Dunn's post-hoc test, Self-rated health status.

Introduction:

The health of the elderly is important for the well-being of society, especially when the population is rapidly aging. As life expectancy increases, it is important for policy makers, health care providers and researchers to understand the health status of the elderly based on various demographic factors. Factors such as marital status, place of residence and gender affect the overall health and some important life aspects of the elderly.

Age is an important element of health. Health challenges vary across different age groups of the elderly. While elderly aged 60-70 years are generally in good health, those aged 70-80 years and above face problems such as chronic diseases, mobility problems, and dependency. Understanding these differences is important to improve health services.

Marital status also has a profound impact on the health of the elderly. Research shows that married individuals have better physical and mental health than widowed or divorced individuals. The presence of a spouse provides emotional support, financial status, and assistance in daily activities, which leads to better health. In contrast, widowed or unmarried elderly suffer from loneliness, social isolation, and mental stress, which leads to poor health.

Place of residence affects the health of the elderly. Elderly living in urban areas have access to better health services and facilities. On the other hand, rural elderly get limited and inadequate health services but they also benefit from a clean environment and close social relationships.

Gender is also an important factor affecting the health of the elderly. Women have a higher average life expectancy than men but they face more health problems and nutritional deficiencies. Widowed women generally face health problems due to a lack of economic and social security. In contrast, lifestyle-related diseases such as heart disease and diabetes are more common in men, which are related to their lifelong habits and work-related stress.

The new study analyses the health status of the elderly and tries to understand how different age groups, marital status, place of residence, and gender contribute to health inequalities. The trends identified through this thinking can help improve policies and programs.

Literature Review:

The health of the elderly is affected by many factors including gender, age group, marital status, social category (caste or class), and place of residence (urban or rural). Understanding these factors is important to develop better policies and health services for the elderly.

Desai and Temsah (2014) have reported that the health of elderly women in India is affected by family structure and social roles. Prakash (2003) states that women have an average age of more than men but they suffer from more diseases due to less economic resources and limited health facilities. Read & Gorman (2010) found that diseases like arthritis, osteoporosis, and depression are more prevalent in elderly women. In contrast, male elderly are more prone to fatal diseases like heart disease, and cancer but they often under-report their health problems (Case and Paxson, 2005).

Alam (2006) studied the health of elderly people of different age groups in India and reported that with increasing age, there is an increase in chronic diseases and a decline in work capacity. According to Dey et al., 2012, the Indian population, especially the 80-plus age group, has difficulties in getting affordable health services. Freedman et al., 2002, and Marengoni et al., 2011 added that Young-Old (65-74 year) are in relatively better health, while old-old (75 84 year) and oldest-old (85 + year) have more chronic diseases, and mental decline, and dependency.

Thompson et al., 1984 found that marriage affects the health of the elderly, especially for widowed women, this situation is more challenging. Widowed and unmarried elderly are more likely to suffer from loneliness, depression, and poor health in India (Gupta et al., 2003). William and Umberson, 2004 found that in the first year of the death of the spouse, a major decline is seen in the mental and physical health of the elderly. On the other hand, married elderly get more emotional and social support, which improves their health (Hughes & Waite, 2009).

Agarwal 2012 researched the impact of the living arrangements and place of residence (urban vs. rural) on the elderly in India. Joshi et al 2003 rural elderly in North India face more health problems due to a lack of health services and more poverty. Vlahov and Galea, 2002 reported that urban elderly have better access to health facilities but stress, pollution, and inactive lifestyle have a negative impact on their health. Rural elderly are at greater risk of health problems due to distance from hospitals, lack of healthcare providers, and social isolation (Goins et al., 2005).

Muhammad et al., 2022 elderly from lower castes and economically weaker sections in India have more difficulties in getting health care. Subramanian et al., 2005 found that in socially divided societies like India, elderly from lower castes are more likely to face discrimination, poor health services, and poverty.

Arokiasamy et al., 2012 concluded that gender, age, marital status, social class, and place of residence all together affect the health of the elderly. These studies make it clear that policy interventions are needed to improve the health of the elderly so that all sections of society can get better health services.

Objectives:

1. To examine the self-rated health status of elders in their demographic determinants.
2. To analyse differences in health status among different demographic determinants of elders.

Data:

Sample of 500 elders has taken from Sahibganj District, Jharkhand (India). There are 265 male and 235 female elders from rural (448) and urban (52). The sample has concentrated with different age groups of elders such as 60-70 years, 70-80 years, and 80 years and above. The sample has collected elders' demographic features like gender (male, female), age group (60-70, 70-80, 80 and above), place of residence (rural, urban), marital status (married, unmarried, widow, widower, separated), social category (general category: GEN, other backward class: OBC, schedule cast: SC, schedule tribe: ST).

Methodology:

Data was gathered through face-to-face structured interviews to account for literacy barriers and ensure the clarity of responses. Sample taken through stratified random sampling. Participants were aged 60 years or older. The variable heath status is categorized into five distinct levels (very good, good, average, poor, and very poor) on the Likert Scale.

To analyse average health scores in different demographic categories/groups, put the numerical value of health status: Very Poor = 1, Poor = 2, Average = 3, Good = 4, Very Good = 5. The greater average health score shows better health status.

Since this sample has violated assumptions (normality and equal variance) of ANOVA, the Kruskal-Wallis Test (Non-Parametric Alternative to ANOVA) and Post-hoc Dunn's Test has conducted to check significance.

The Kruskal − Wallis test statistic (H) *is calculated as*:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(N+1)$$

where:
$k = Number\ of\ groups$
$N = Total\ number\ of\ observations\ across\ all\ groups$
$n_i = Sample\ size\ of group\ i$
$R_i = Sum\ of\ ranks\ for\ group\ i$

Decision Rule:

- The null hypothesis H_0 states that all groups have the same distribution (i.e., no significant difference).
- The test statistic H follows a chi-square (χ^2) distribution with $k - 1$ degrees of freedom:

$$H \sim \chi^2_{(k-1)}$$

If the p-value is less than the chosen significance level (α), we reject H_0, indicating at least one group differs significantly.

Formula for Dunn's Test Statistic:

For two groups i *and* j, *Dunn's test statistic is calculated as*:

$$Z_{ij} = \frac{R_i - R_j}{\sqrt{\frac{N(N+1)}{12}\left(\frac{1}{n_i} + \frac{1}{n_j}\right)}}$$

where:
$R_i\ and\ R_j = Mean\ ranks\ of\ groups\ i\ and\ j,$
$n_i\ and\ n_j = Sample\ sizes\ of\ groups\ i\ and\ j,$
$N = Total\ number\ of\ observations.$

Bonferroni Adjustment for Multiple Comparisons:

Since multiple comparisons increase the risk of Type I error, the Bonferroni adjustment modifies the significance level (α) as follows:

$$\alpha_{\text{adjusted}} = \frac{\alpha}{m}$$

where:

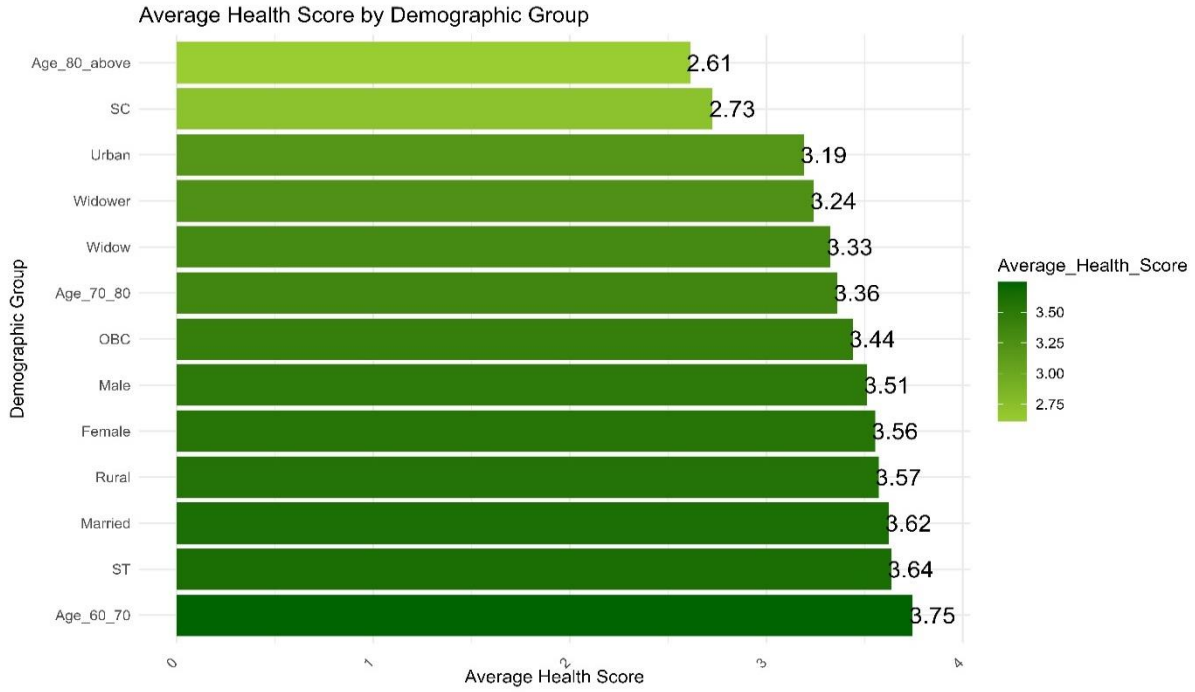
$m = Number\ of\ pairwise\ comparisons.$

The adjusted p-value for each pairwise test is: $p_{\text{adjusted}} = p_{\text{original}} \times m$. A comparison is considered significant if: $p_{\text{adjusted}} < \alpha$

All Statistical tests and graphs used in this study, helped with R software.

Results:

- **Average Health Score**



Analysis of health scores across different demographic groups shows important facts. Elders aged 60-70 years have the best average health score of 3.75 while those aged 70-80 years have a score of 3.36 and those aged 80 years and above have the lowest score of 2.61, i.e., health worsens as age increases. As per place of residence, the average health score of rural elderly is 3.57 higher than that of urban elderly at 3.19, which may be due to more physical activity, less pollution and stronger social support in rural lifestyle. There is not much difference in health by gender, the average health score of female elderly is 3.56 while that of male elderly is 3.51. Marital status also impacts health, where married people have the best health score of 3.62, probably due to the cooperation and emotional support of spouse, while widows have a health score of 3.32 and widowers have a health score of 3.24, probably because men are more emotionally affected by the death of spouse. Differences in health scores have also been found according to caste.

- **Test for Significant**

Result

Gender				
	Kruskal-Wallis χ^2	Df	p-value	Significant
	0.0688	1	0.7931	No significant difference
Residence (Rural vs. Urban)				
	Kruskal-Wallis χ^2	Df	p-value	Significant
	9.8804	1	0.00167	Yes ($p < 0.05$)
Post-hoc Dunn's Test				
Comparison	Z-score	Unadjusted p-value	Bonferroni Adjusted p-value	Significant
Rural - Urban	3.1433	0.00167	0.00167	Yes
Age Group (60-70, 70-80, 80+)				
	Kruskal-Wallis χ^2	Df	p-value	Significant
	43.983	2	$2.81e^{-10}$	Yes ($p < 0.05$)

Post-hoc Dunn's Test				
Comparison	Z-score	Unadjusted p-value	Bonferroni Adjusted p-value	Significant
60-70 - 70-80	4.404	$1.06e^{-05}$	$3.19e^{-05}$	Yes
60-70 - 80+	5.727	$1.02e^{-08}$	$3.07e^{-08}$	Yes
70-80 - 80+	3.4538	$5.53e^{-04}$	0.00166	Yes
Marital Status (Married, Unmarried, Widow, Widower)				
	Kruskal-Wallis χ^2	Df	p-value	Significant
	14.243	4	0.00656	Yes ($p < 0.05$)
Post-hoc Dunn's Test				
Comparison	Z-score	Unadjusted p-value	Bonferroni Adjusted p-value	Significant
Married - Unmarried	-0.3941	0.6935	1	No
Married - Widow	-0.2859	0.775	1	No
Unmarried - Widow	0.2757	0.7828	1	No
Married - Widow	3.1818	0.00146	0.0146	Yes
Unmarried - Widow	0.7285	0.4663	1	No
Widow - Widower	1.2024	0.2292	1	No
Married - Widower	2.3057	0.0211	0.2113	No
Unmarried - Widower	0.8262	0.4087	1	No
Social Category (GEN, OBC, SC, ST)				
	Kruskal-Wallis χ^2	Df	p-value	Significant
	9.9776	3	0.01876	Yes ($p < 0.05$)
Post-hoc Dunn's Test				
Comparison	Z-score	Unadjusted p-value	Bonferroni Adjusted p-value	Significant
GEN - OBC	2.0105	0.0444	0.2663	No
GEN - SC	1.9825	0.0474	0.2845	No
OBC - SC	0.7544	0.4506	1	No
GEN - ST	0.3617	0.7176	1	No
OBC - ST	-2.4353	0.0149	0.0893	No (Borderline)
SC - ST	-1.9928	0.0463	0.2777	No

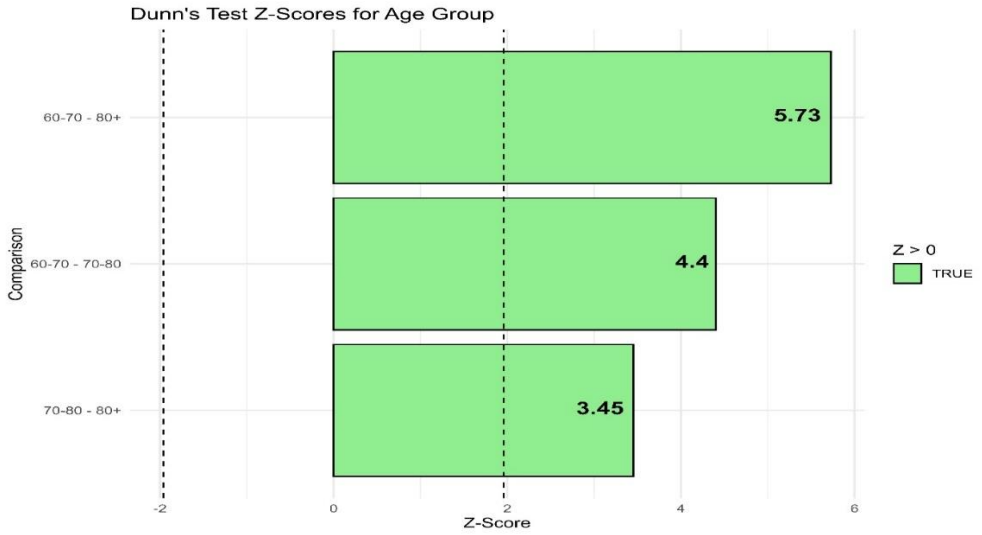
Gender

The Kruskal-Wallis test ($\chi^2 = 0.0688$, $p = 0.7931$) indicates that there is no significant difference in health scores between male and female elders. This result suggests that gender does not play a major role in determining health status in this sample.

Residence (Rural vs. Urban)

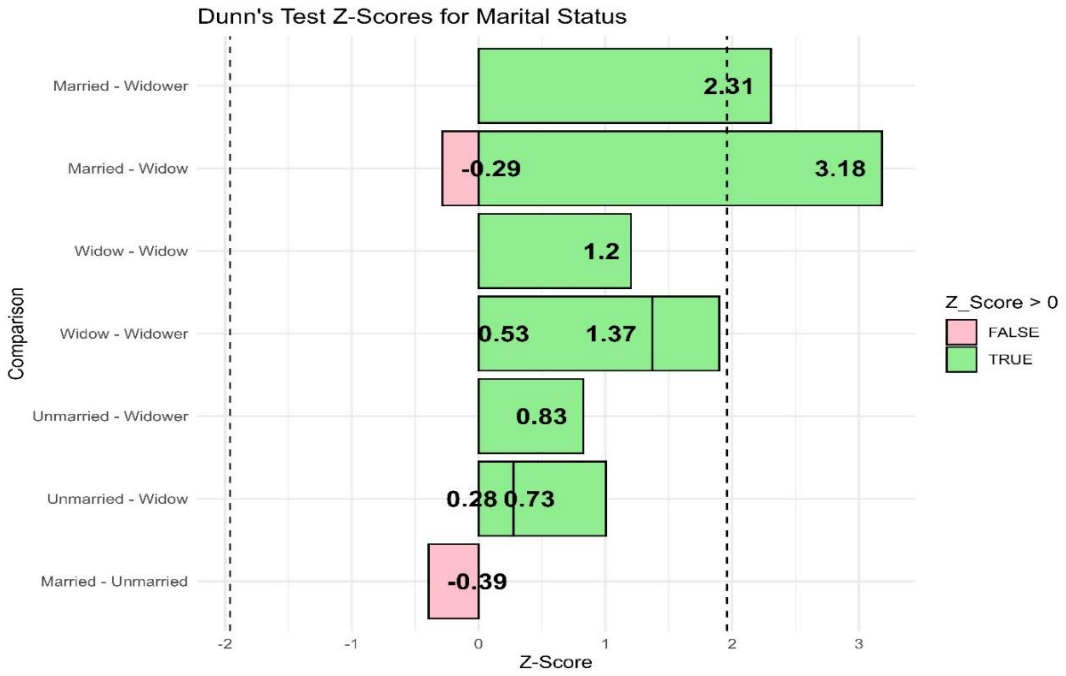
A significant difference was found ($\chi^2 = 9.8804$, $p = 0.00167$), with rural elders having better health than urban elders. The Dunn's post-hoc test confirms this, with a significant difference ($p = 0.00167$) between rural and urban elders. This suggests that rural elders may have a healthier lifestyle, might be due to low pollution, more physical activity, and a less stressful environment.

Age Group (60-70, 70-80, 80+)



A highly significant difference was found between age groups ($\chi^2 = 43.983$, $p = 2.81e^{-10}$), indicating that health deteriorates with age. Post-hoc comparisons show that Age group 60-70 vs. 70-80 ($p = 3.19e^{-05}$) has significant difference, 60-70 vs. 80+ ($p = 3.07e^{-08}$) has highly significant and 70-80 vs. 80+ ($p = 0.00166$) has significant difference. This confirms a clear downward trend in health as age increases, with the oldest group (80+) having the lowest health scores.

Marital Status (Married, Unmarried, Widow, Widower)



A significant difference was found ($\chi^2 = 14.243$, $p = 0.00656$). Post-hoc analysis shows that married elders have significantly better health than widow elders ($p = 0.0146$). No significant differences were found between other groups (e.g., married vs. unmarried, unmarried vs. widow, widow vs. widower).

This suggests that being married provides social and emotional support, which positively impacts health.

Social Category (GEN, OBC, SC, ST)

A significant difference was found ($\chi^2 = 9.9776$, $p = 0.01876$), indicating disparities in health across caste groups. However, Dunn's post-hoc test reveals that GEN vs. OBC and GEN vs. SC has no significant difference. OBC vs. ST ($p = 0.0893$) has a borderline significance difference (OBC elders may have slightly worse health than ST elders).

Conclusion:

This study helps in understanding the various demographic influences on the health of the elderly. Age is an important factor as health declines with increasing age. Rural elderly were found to have better health than all elderly which may be due to lifestyle and environmental differences. Marital status also had a major impact. Married elderly get emotional and social support which leads to better health, while widowed and widowed elderly face more health problems. Some difference in health was found based on social class but this difference was not very significant. Only a slight difference was seen between OBC, OBC and ST elderly. Overall, this study suggests that there is a need to improve health services for the elderly, especially widowed and older elderly living in urban areas.

Recommendations:

Special health programmes should be prepared to keep in view the physical and disability and dependency of the elderly and elderly care centres should be established.

Problems related to increasing pollution and mental stress in urban areas should be addressed and mobile health centres should be established for rural areas.

Community support centres should be run for widows, widowers, and unmarried elderly people so that their loneliness and mental stress can be treated and awareness campaigns should be run to increase family participation.

Health services should be made equally available to the elderly from weaker sections of society and lower castes.

Elderly-friendly health services infrastructure, regularity and awareness are essential.

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