International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

The Impact of Urban and Rural Environments on Social Support and Wellbeing in Patna's Elderly Population

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Abstract

This study investigates the impact of urban and rural environments on social support and wellbeing among the elderly population in Patna, India. Utilizing a mixed-methods approach, we conducted surveys and in-depth interviews with 400 elderly individuals, equally distributed between urban and rural settings. Our analysis reveals significant differences in the levels and types of social support available to the elderly in these distinct environments. Urban elderly benefit from better access to healthcare and social services but report higher levels of loneliness and stress. In contrast, rural elderly experience stronger community bonds and familial support, though they face challenges due to limited healthcare infrastructure and economic resources. The study highlights the critical role of social networks in enhancing wellbeing and underscores the need for tailored interventions to address the unique challenges faced by elderly populations in both urban and rural areas. Recommendations include the development of community-based programs to strengthen social support systems and improve access to essential services, aiming to enhance the overall wellbeing of Patna's elderly residents. This research contributes to a deeper understanding of the interplay between environment, social support, and wellbeing, providing a foundation for policymakers to create more inclusive and supportive communities for the aging population.

Keywords: Subjective wellbeing, Social support, Emotional wellbeing, Two stage sampling scheme, Chi-square goodness of fit.

Introduction

The wellbeing of the elderly population is a growing concern in India, as the country experiences rapid demographic changes. With an increasing proportion of elderly individuals, understanding the factors that influence their quality of life has become crucial. The elderly, often considered the custodians of culture and tradition, face unique challenges that differ significantly between urban and rural environments. Patna, the capital city of Bihar, presents a unique case study due to its mix of urban growth and extensive rural areas. In urban settings, the elderly often benefit from improved healthcare infrastructure and social services. However, studies have shown that urbanization can lead to weakened family ties and increased feelings of isolation among the elderly (Shah, 2013). Conversely, rural areas, while typically offering stronger community bonds and familial support, often suffer from inadequate healthcare facilities and economic hardship (Singh & Gupta, 2015). This paper aims to explore these dynamics by examining the social support systems and overall wellbeing of the elderly in both urban and rural areas of Patna. By employing a mixed-methods approach, this study seeks to provide a comprehensive understanding of how

different environments impact the elderly. The findings are expected to contribute to the development of targeted policies and programs that can enhance the quality of life for the elderly in diverse settings. Conversely, rural areas, while maintaining stronger familial and community ties, struggle with inadequate healthcare and economic resources, as noted by Rajan and Prasad (2017). This study builds on such foundational work, aiming to bridge the gap between theoretical insights and practical applications in urban and rural contexts. By focusing on Patna, this research not only highlights regional specificities but also adds to the broader discourse on aging in India, providing valuable insights for policymakers and practitioners dedicated to improving elderly care.

Subjective wellbeing

Subjective wellbeing, encompassing individuals' cognitive and affective evaluations of their lives, is a vital aspect of overall quality of life, particularly among older adults. As highlighted by Diener (2009), subjective wellbeing represents a multifaceted construct, incorporating life satisfaction, positive affect, and the absence of negative affect. Moreover, subjective wellbeing is influenced by various factors, including health, social relationships, and environmental conditions, as noted by Lucas et al. (1996). Understanding the determinants of subjective wellbeing is crucial for designing effective interventions aimed at enhancing the overall quality of life for older adults. This study seeks to contribute to this body of knowledge by exploring the impact of urban and rural environments on subjective wellbeing among the elderly population in Patna, India.

Social support

Social support, comprising emotional, instrumental, and informational assistance from social networks, plays a crucial role in promoting wellbeing, particularly among older adults. As highlighted by Cohen and Wills (1985), social support serves as a buffer against stressors and enhances individuals' ability to cope with life challenges. Additionally, House et al. (1988) emphasize the significance of social support in influencing health outcomes, including mortality rates and disease recovery. Furthermore, Thoits (2011) underscores the importance of both structural and functional aspects of social support, including network size, frequency of contact, and perceived support availability. Understanding the nuances of social support is essential for developing targeted interventions to bolster the wellbeing of older adults. This study aims to contribute to this field by examining the impact of urban and rural environments on social support among the elderly population in Patna, India.

Emotional wellbeing

Emotional wellbeing, encompassing individuals' subjective experiences of positive and negative emotions, is a fundamental component of overall mental health and quality of life. As elucidated by Fredrickson (2001), experiencing a broad range of positive emotions not only enhances immediate wellbeing but also fosters resilience and psychological growth over time. Conversely, persistent negative emotions, such as anxiety and depression, can have detrimental effects on both mental and physical health, as discussed by Kessler et al. (2003). Furthermore, Lazarus and Folkman (1984) propose that individuals' appraisal of stressors and their ability to cope with them significantly influence emotional outcomes. Understanding the intricacies of emotional wellbeing is essential for designing interventions aimed at promoting mental health and resilience among diverse populations. This study seeks to contribute to this area of research by

exploring the factors influencing emotional wellbeing among the elderly population in Patna, India, with a focus on the impact of urban and rural environments.

Research Objectives

Research objectives for a study on "The Impact of Urban and Rural Environments on Social Support and Wellbeing in Patna's Elderly Population":

1. To assess the levels of social support available to the elderly population in urban and rural areas of Patna.
2. To examine the differences in the types of social support received by elderly individuals residing in urban and rural environments.
3. To investigate the subjective wellbeing of elderly individuals in urban and rural settings in Patna.
4. To explore the factors contributing to variations in subjective wellbeing among the elderly population in urban and rural areas.
5. To analyze the impact of social support networks on the overall wellbeing and quality of life of elderly individuals in Patna.
6. To understand the role of environmental factors, such as infrastructure, community resources, and social norms, in shaping social support systems and subjective wellbeing among the elderly population.
7. To explore potential interventions and policy recommendations aimed at enhancing social support and wellbeing outcomes for elderly individuals in both urban and rural areas of Patna.

Data Source and Methods

This study was concluded in Patna district, the capital of Bihar. It is located at latitude 250 12'- 250 44' N and longitude 840 42'-860 14' E and area of about 3,202 sq. km. The Patna District has 5,838,465 people living there as of the 2011 census (males: 3,078,512, females: 2,759,953). From 2001 to 2011, the growth rate was 23.73%. The overall literacy rate is 70.68%; the rates for men and women are 78.48% and 61.96%, respectively. Patna is a multilingual district. The state of Bihar's official language is Hindi. There is also a lot of English spoken. (Source: 2011 India Census) Magahi is the native dialect. Bhojpuri, Hindi, and Maithili are some more languages from different parts of Bihar that are often spoken in Patna. In Patna, people also speak Bengali, Urdu, and Oriya.

Sampling Design

Patna district contains six sub-divisions (Patna Sadar, Patna City, Barh, Masaurhi, Danapur, and Paliganj). The sample size was determined by various factors, the most important of which were the ability to obtain credible estimates of indicators with a tolerable level of precision and cost. Because this was a survey of the elderly, assuming that 8% of the old person in the population have the factor of interest the study would require a sample size 400 was evenly divided across urban and rural locations, regardless of the proportion of the population in each. Two-stage sampling scheme used for data selection. Stage 1: Selection of primary sampling units (PSUs) Divide the Patna district into six subdivisions (Patna Sadar, Patna City, Barh, Masaurhi, Danapur, and Paliganj). As a first stage, choose two of the subdivisions (Patna Sadar and Paliganj) at random using a simple random sampling without replacement. Stage 2: Selection of secondary sampling units (SSUs) Each selected sub-division select two blocks. (Patna Sadar and Phulwarisarif) taken

from Patna Sadar sub-division and (Dulhin Bazar and Bikram) taken from Paligangj sub-division using simple random sampling without replacement.

Statistical Analysis

All analyses were conducted using statistical software SPSS V29 to examine the relationships between demographic characteristics (e.g., age, marital status, education, household income, etc.) and social support, subjective well-being, and emotional well-being.

Chi-square goodness of fit

The chi-square goodness of fit test is a statistical method used to determine whether observed sample frequencies differ significantly from expected frequencies in one or more categories. This test assesses how well the observed data fit a specific theoretical distribution or an expected distribution based on a hypothesis. It is commonly used to test if a sample comes from a population with a specific distribution. The test is performed by calculating the chi-square statistic, which measures the discrepancy between the observed and expected frequencies. The formula for the chi-square statistic is:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

where:

O_i represents the observed frequency for category i,

E_i represents the expected frequency for category i.

The calculated χ^2 value is then compared to a critical value from the chi-square distribution table with the appropriate degrees of freedom to determine if the difference is statistically significant. Degrees of freedom are calculated as the number of categories minus one (df = k - 1) at 5% level of significance.

Results and Findings

Table1: Gender Distribution Among Older People in Rural and Urban Areas

Gender of Respondents	Type of locality				Total	%
	Urban	%	Rural	%		
Male	107	53.50	154	77.00	261	65.25
Female	93	46.50	46	23.00	139	34.75
Total	200	100.00	200	100.00	400	100.00

The table 1 provides a detailed breakdown of the gender distribution among older people in both urban and rural areas. In urban areas, 53.5% of the respondents are male (107 individuals), while 46.5% are female (93 individuals). In contrast, rural areas show a higher proportion of male respondents at 77% (154 individuals), with females comprising 23% (46 individuals). When considering the total respondents, males account for 65.25% (261 individuals) and females for 34.75% (139 individuals), out of a combined total of 400 respondents, equally divided between urban and rural localities.

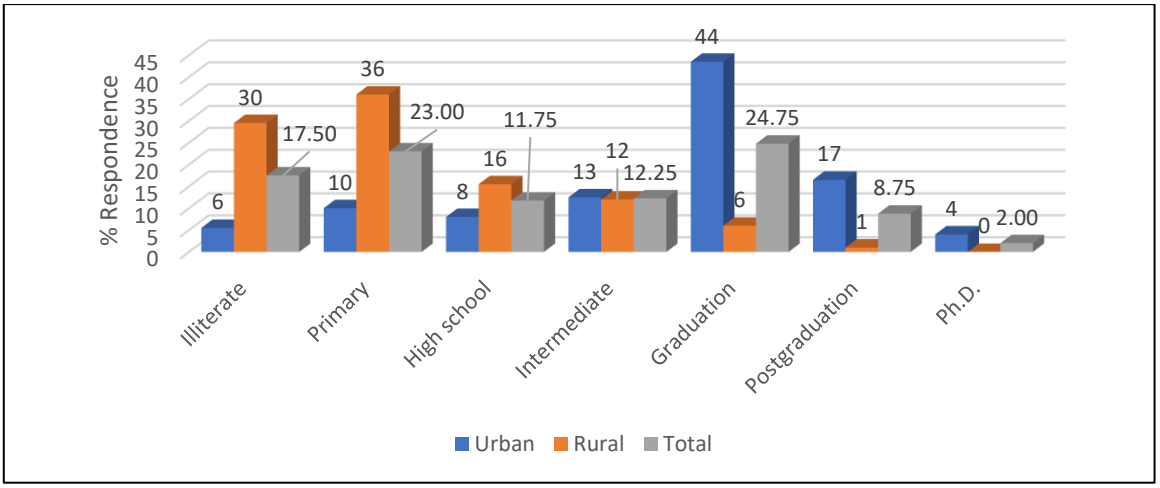
Table 2: Age Distribution of Respondents in Urban and Rural Areas

Age of Respondents	Type of locality				Total	%
	Urban	%	Rural	%		
60-65	118	59.00	66	33.00	184	46.00

65-70	37	18.50	61	30.50	98	24.50
70-75	19	9.50	29	14.50	48	12.00
Above 75	26	13.00	44	22.00	70	17.50
Total	200	100.00	200	100.00	400	100

The table 2 provides a detailed breakdown of the age distribution among respondents in urban and rural areas. In urban areas, 59% of respondents are aged 60-65 (118 individuals), 18.50% are aged 65-70 (37 individuals), 9.5% are aged 70-75 (19 individuals), and 13% are above 75 (26 individuals). In rural areas, 33% of respondents are aged 60-65 (66 individuals), 30.50% are aged 65-70 (61 individuals), 14.5% are aged 70-75 (29 individuals), and 22% are above 75 (44 individuals). When considering the total respondents, 46% are aged 60-65 (184 individuals), 24.5% are aged 65-70 (98 individuals), 12% are aged 70-75 (48 individuals), and 17.5% are above 75 (70 individuals), out of a combined total of 400 respondents equally divided between urban and rural localities.

Figure1: Percentage of Current Education Levels Among Older People in Rural and Urban Areas



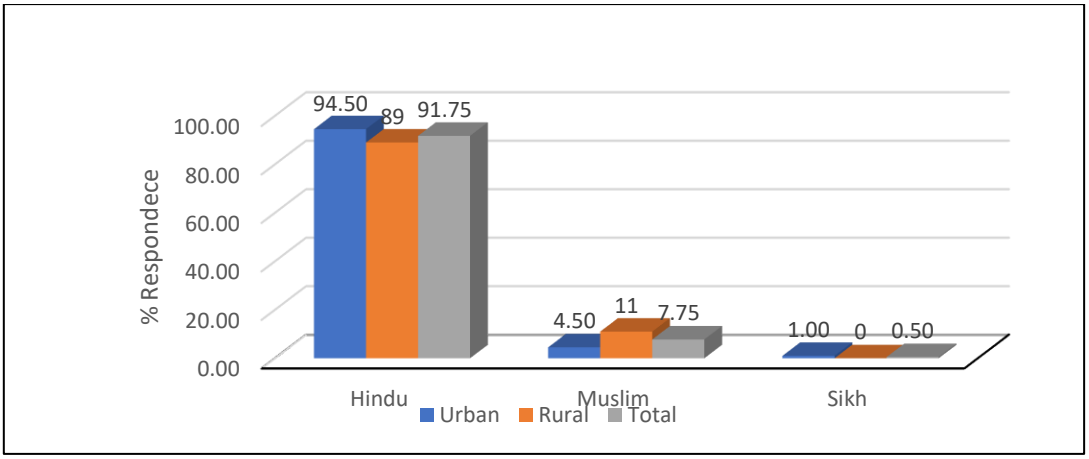
The multiple bar diagram presents a comparison of the current level of education among old people in rural and urban areas, segmented into categories ranging from Illiterate to Ph.D. the urban older population, 6% are illiterate, compared to a higher 30% in rural areas, contributing to a total of 17.5% across both localities. Primary education is more common in rural areas, where 36% have completed this level, in contrast to 10% in urban areas, making up 23% of the total. High school completion shows a disparity as well, with 16% in rural areas and 8% in urban areas, totaling 11.75%. Intermediate education is fairly even, with 13% of urban older adults and 12% of rural older adults, comprising 12.25% overall. A significant gap is evident in graduation rates; 44% of urban older individuals have completed graduation, compared to just 6% in rural areas, resulting in a total of 24.75%. Postgraduation is also more prevalent in urban areas, with 17% compared to 1% in rural areas, totaling 8.75%. The presence of Ph.D. holders is exclusive to urban areas at 4%, with no representation in rural areas, amounting to 2% overall. The total sample includes 400 individuals, evenly split between urban and rural localities. This data highlights the educational divide between urban and rural older populations, with urban areas showing higher levels of educational attainment.

Table 3: Marital Status Distribution Among Older People in Urban and Rural Areas

Marital status	Type of locality				Total	%
	Urban	%	Rural	%		
Currently Married	160	80.00	129	64.50	289	72.25
Separated/Deserted	4	2.00	5	2.50	9	2.25
Divorced	1	0.50	1	0.50	2	0.50
Widowed/ Widower	35	17.50	65	32.50	100	25.00
Total	200	100.00	200	100.00	400	100.00

The table3 illustrates the marital status of old people in both rural and urban areas, as shown by the collected data. In urban areas, a substantial majority of older individuals (80%) are currently married, compared to 64.50% in rural areas. This indicates a stronger tendency for marital continuity among older urban residents. Conversely, the percentage of widowed older adults is notably higher in rural areas, with 32.50% compared to 17.50% in urban areas, suggesting that widowhood is more prevalent among the rural elderly. The proportions of older people who are separated or deserted are relatively low but slightly higher in rural areas (2.5%) compared to urban areas (2%). Similarly, the percentage of divorced older individuals is uniformly low in both localities, standing at 0.5%. Overall, these differences highlight the distinct social dynamics and challenges faced by older adults in rural and urban settings, with rural areas having a higher incidence of widowhood and slightly higher separation rates, while urban areas have a higher percentage of those currently married. This data underscores the need for tailored social and healthcare services to address the unique needs of the elderly population in different localities.

Figure 2: Religious Affiliation Among Older Individuals in Urban and Rural Areas



The multiple bar diagram illustrates the religious affiliations of old people in both rural and urban areas. The data highlights significant differences in religious distribution between these two types of localities. In urban areas, the majority of older individuals identify as Hindu, constituting 94.5% of the urban population in the sample, while in rural areas, Hindus also represent the majority, albeit slightly lower at 89%. This suggests a prevalent adherence to Hinduism among older adults across both urban and rural settings. However, it's noteworthy that while Muslims represent a smaller percentage in urban areas (4.5%), their presence is more pronounced in rural areas (11%), indicating a higher proportion of Muslims among the older rural population. Conversely, the Sikh population is negligible in both urban and rural areas, with only 1% in urban areas and no representation in rural areas. This disparity in religious

distribution underscores the diverse cultural and religious landscape of older populations in urban and rural regions.

Table 4: Occupational Distribution Among Older Individuals in Urban and Rural Areas

Occupation	Type of locality				Total	%
	Urban	%	Rural	%		
Govt Job	50	25.00	20	10.00	70	17.50
Pvt Job	80	40.00	25	12.50	105	26.25
Business	70	35.00	35	17.50	105	26.25
Agriculture	0	0.00	120	60.00	120	30.00
Total	200	100.00	200	100.00	400	100.00

The table 4 provides a comprehensive breakdown of occupational distribution among older individuals residing in both urban and rural areas. It delineates the varying patterns of employment between these two distinct types of localities. In urban settings, the predominant occupations among older individuals include private jobs, accounting for 40% of the urban population, followed by business activities at 35%, and government jobs at 25%. Conversely, in rural areas, agriculture emerges as the primary occupation, engaging 60% of the rural elderly population. This stark contrast underscores the prevalent economic activities in each setting, with urban areas exhibiting a more diverse range of employment opportunities, including private and government sector jobs as well as entrepreneurial endeavours, while rural areas are predominantly agrarian. Notably, there are no older individuals engaged in agriculture in urban areas, reflecting the urbanization trend where agricultural activities are less common. Overall, this data highlights the significance of understanding and addressing the distinct occupational landscapes in urban and rural environments when formulating policies and programs aimed at supporting the socio-economic well-being of older individuals.

Table 5: Family Size Distribution Among Older Individuals in Urban and Rural Areas

Family Members	Type of locality				Total	%
	Urban	%	Rural	%		
1-3	25	12.50	2	1.00	27	6.75
4-6	109	54.50	63	31.50	172	43.00
7-9	45	22.50	89	44.50	134	33.50
10-12	16	8.00	42	21.00	58	14.50
13-15	5	2.50	4	2.00	9	2.25
Total	200	100.00	200	100.00	400	100.00

The table 5 offers an insightful breakdown of the distribution of family sizes among older individuals in both urban and rural areas. It presents the percentages of older individuals residing in families of different sizes, categorized into ranges from 1-3 members, 4-6 members, 7-9 members, 10-12 members, and 13-15 members. In urban areas, the majority of older individuals (54.50%) reside in families with 4-6 members, followed by 22.50% in families with 7-9 members. Conversely, in rural areas, the largest proportion of older individuals (44.50%) belong to families with 7-9 members, with 31.50% residing in families with 4-6 members. The data indicates a higher prevalence of larger family sizes in rural areas compared to urban areas, reflecting the traditional family structures often found in rural communities. Additionally, a significant proportion of older individuals in urban areas (12.50%) reside in smaller families of 1-3

members, possibly indicating a trend toward smaller family sizes in urban settings. This information underscores the diversity in family structures between urban and rural environments and provides valuable insights into the living arrangements of older individuals in different localities. Such insights are crucial for policymakers and social service providers when designing programs and interventions tailored to the specific needs of older populations in urban and rural areas.

Table 6: Current Living Status of Older Individuals in Urban and Rural Areas

Current Living Status	Type of locality				Total	%
	Urban	%	Rural	%		
Living with spouse & servant	72	36.00	24	12.00	96	24.00
Living with all others	94	47.00	150	75.00	244	61.00
Living with spouse only	34	17.00	26	13.00	60	15.00
Total	200	100.00	200	100.00	400	100.00

The table 6 illustrates the current living arrangements of older individuals in both urban and rural areas, categorizing them based on their living status. The data is divided into three main categories: "Living with spouse & servant," "Living with all others," and "Living with spouse only." In urban areas, 36% of older individuals reside with their spouse and a servant, while 47% live with all other family members or individuals. Additionally, 17% of urban older individuals live solely with their spouse. Conversely, in rural areas, the majority (75%) of older individuals live with all other family members or individuals, with 12% living with their spouse and a servant, and 13% living with their spouse only. This data suggests that a significant portion of older individuals, particularly in rural areas, continue to reside with their extended family members or other individuals. However, there are notable differences in living arrangements between urban and rural areas, with urban settings showing a higher prevalence of living with a spouse and a servant, while rural areas exhibit a greater tendency for older individuals to live with all other family members.

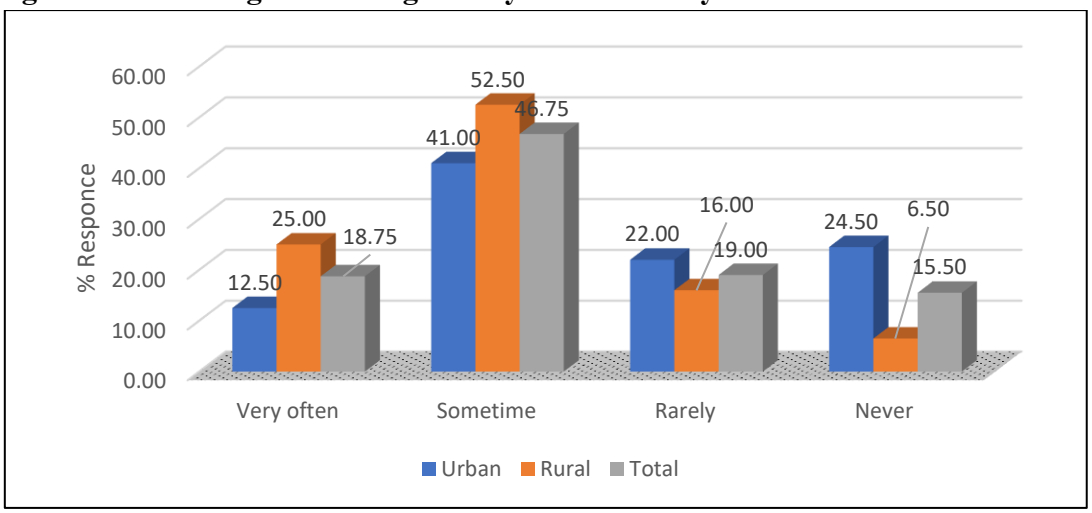
Table 7: Ability to Perform Activities of Daily Living by Urban and Rural Localities

Perform activities of daily living	Type of locality				Total	%
	Urban	%	Rural	%		
Without any assistance	164	82.00	143	71.50	307	76.75
With some assistance	30	15.00	51	25.50	81	20.25
Require full assistance	6	3.00	6	3.00	12	3.00
Total	200	100	200	100	400	100.00

A large majority of individuals in both urban and rural areas can perform daily activities without any assistance: 82% (164 individuals) in urban areas and 71.50% (143 individuals) in rural areas, combining for an overall prevalence of 76.75%. However, some individuals require assistance: 15% (30 individuals) of the urban population and a higher 25.50% (51 individuals) of the rural population perform daily activities with some assistance, resulting in a total of 20.25%. A small percentage of individuals require

full assistance, with both urban and rural areas reporting 3% (6 individuals each), leading to an overall prevalence of 3.00%. This data highlights that a higher percentage of urban residents can perform daily activities independently compared to rural residents. In contrast, rural residents are more likely to need some assistance with daily activities. The need for full assistance is equal across both localities.

Figure 3: Percentage of Feeling Lonely or Isolated by Urban and Rural Localities



The multiple bar diagram provides insights into the feelings of loneliness or isolation experienced by old people in both rural and urban areas, categorized into four groups: Very often, Sometimes, Rarely, and Never. A notable difference is observed in the proportion of individuals who feel lonely or isolated very often: 12.50% (25 individuals) in urban areas compared to a significantly higher 25.00% (50 individuals) in rural areas, resulting in an overall prevalence of 18.75%. When considering those who sometimes feel lonely or isolated, 41.00% (82 individuals) of the urban population report these feelings, whereas this percentage is higher in rural areas at 52.50% (105 individuals), combining for a total of 46.75%. For those who rarely feel lonely or isolated, 22.00% (44 individuals) in urban areas report this frequency, compared to 16.00% (32 individuals) in rural areas, leading to an overall total of 19.00%. Finally, a higher percentage of urban residents never feel lonely or isolated (24.50%, or 49 individuals) compared to only 6.50% (13 individuals) in rural areas, resulting in a total of 15.50%. This data indicates that feelings of loneliness or isolation are more prevalent among rural residents, with a higher percentage reporting feeling lonely or isolated very often or sometimes compared to their urban counterparts. Conversely, urban residents are more likely to rarely or never experience these feelings.

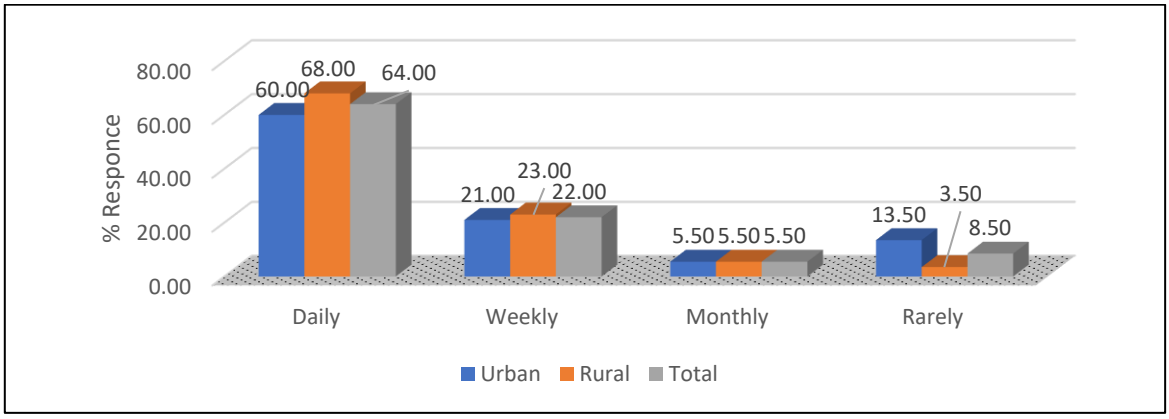
Table 8: Methods of Calming Down Anger by Type of Locality

Cope with stress or emotional challenges	Type of locality				Total	%
	Urban	%	Rural	%		
Talking to friends/family	120	60.00	131	65.50	251	62.75
Engaging in hobbies	23	11.50	41	20.50	64	16.00
Meditation/relaxation techniques	32	16.00	15	7.50	47	11.75
Worship	13	6.50	2	1.00	15	3.75

Talking to friends/family & engaging in hobbies	9	4.50	4	2.00	13	3.25
Talking to friends/family & Meditation/relaxation techniques	3	1.50	7	3.50	10	2.50
Total	200	100.00	200	100.00	400	100.00

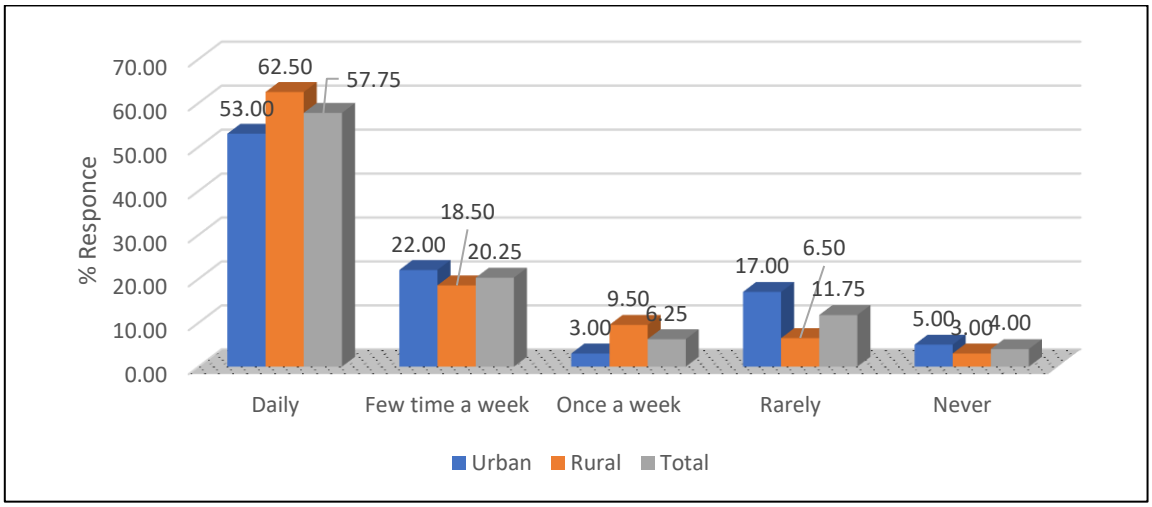
The table 8 provides a breakdown of how individuals from urban and rural areas manage their anger, categorizing the various methods they employ to calm down. It highlights both the number of respondents and the percentage they represent within each locality and overall. Talking to friends or family emerges as the most prevalent method for managing anger, utilized by 62.75% of the total respondents, with a slightly higher percentage in rural areas (65.50%) compared to urban areas (60.00%). Engaging in hobbies is the second most common strategy, with 16.00% of the respondents using this approach. It is more popular in rural areas (20.50%) than in urban areas (11.50%). Meditation or relaxation techniques are chosen by 11.75% of respondents overall, with urban residents (16.00%) more likely to use this method compared to rural residents (7.50%). Worship is another coping strategy, although less common, with 3.75% of total respondents opting for it, and it is more prevalent among urban residents (6.50%) than rural ones (1.00%). A smaller portion of individuals combine methods: 3.25% talk to friends or family and engage in hobbies simultaneously, while 2.50% combine talking to friends or family with meditation or relaxation techniques. These combined methods are slightly more common in urban areas. The total sample comprises 200 individuals from each locality, making up a total of 400 respondents. The data indicates that while the primary method of managing anger is consistent across both urban and rural populations, there are notable differences in the secondary methods they choose.

Figure 4: Percentage of Social Interaction with Friends and Family by Type of Locality



The multiple bar diagram illustrates the engagement of old people in social activities or interaction with friends and family across different frequencies (Daily, Weekly, Monthly, Rarely) and locations (Rural and Urban areas), represented in percentages. A majority of the respondents interact daily, with 64.00% of the total sample doing so. This is more prevalent in rural areas (68.00%) compared to urban areas (60.00%). Weekly interactions are the next most common frequency, reported by 22.00% of the respondents overall, with similar percentages in both urban (21.00%) and rural (23.00%) areas. Monthly interactions are less common, at 5.50% for both localities. Rarely interacting with friends and family is reported by 8.50% of the total respondents, with a significantly higher percentage in urban areas (13.50%) compared to rural areas (3.50%).

Figure 5: Percentage of Physical Activity or Exercise by Type of Locality



The multiple bar diagram illustrates the engagement of old people in physical activity or exercise across different frequencies (Daily, Few times a week, Once a week, Rarely, Never) and locations (Rural and Urban areas), represented in percentages. A majority of respondents engage in physical activity or exercise daily, with 57.75% of the total sample reporting this frequency. This is higher in rural areas (62.50%) compared to urban areas (53.00%). Exercising a few times a week is the next most common frequency, with 20.25% of the respondents overall, slightly higher in urban areas (22.00%) than in rural areas (18.50%). Exercising once a week is less common, with 6.25% of the total respondents, more prevalent in rural areas (9.50%) than in urban areas (3.00%). Rarely exercising is reported by 11.75% of the total respondents, with a higher percentage in urban areas (17.00%) compared to rural areas (6.50%). Lastly, 4.00% of the respondents never engage in physical activity or exercise, with a higher percentage in urban areas (5.00%) compared to rural areas (3.00%). In total, the sample consists of 200 individuals from each locality, making up a total of 400 respondents. The data indicates that daily physical activity or exercise is the most common in both urban and rural areas, with a higher incidence in rural localities.

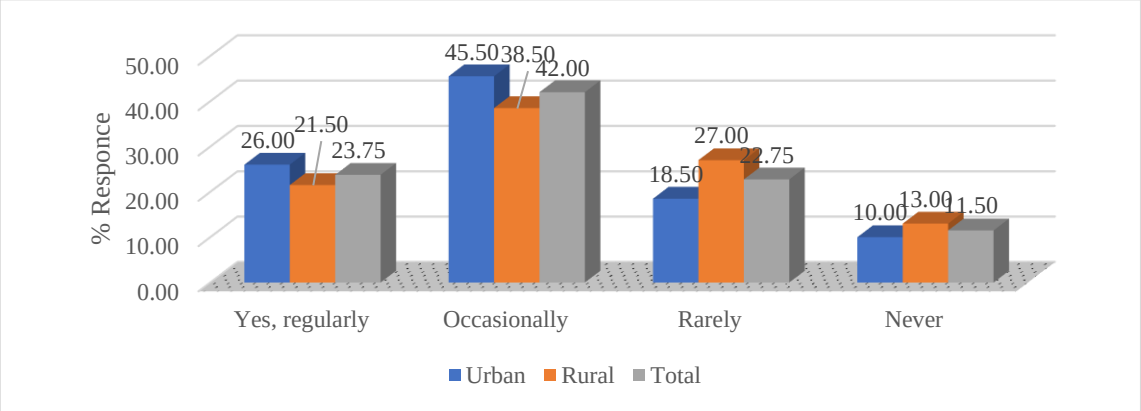
Table 9: Participation in Various Physical Activities by Urban and Rural Localities

Types of physical activities	Type of locality				Total	%
	Urban	%	Rural	%		
Cycling	22	11.00	40	20.00	62	15.50
Yoga	72	36.00	30	15.00	102	25.50
Walking	90	45.00	118	59.00	208	52.00
Swimming	6	3.00	8	4.00	14	3.50
Gentle stretching	10	5.00	4	2.00	14	3.50
Total	200	100.00	200	100.00	400	100.00

In urban areas, walking is the most popular physical activity, with 90 individuals participating, representing 45% of the urban sample. Yoga follows, with 72 individuals or 36%. Cycling has a smaller share with 22 individuals, accounting for 11%. Swimming and gentle stretching are the least common activities in urban areas, with 6 individuals (3%) and 10 individuals (5%), respectively. In rural areas, walking is also the predominant activity, even more so than in urban areas, with 118 individuals participating, which is 59% of the rural sample. Cycling is the second most common activity in rural areas, with 40 individuals or 20%. Yoga is less popular in rural areas compared to urban areas, with 30 individuals

(15%). Swimming and gentle stretching are the least practiced, with 8 individuals (4%) and 4 individuals (2%), respectively. Overall, across both localities, walking is the most common physical activity, with 208 participants representing 52% of the total sample. Yoga is the second most popular, with 102 participants or 25.5%. Cycling follows with 62 participants (15.5%). Swimming and gentle stretching have the lowest participation rates, each with 14 participants, accounting for 3.5% of the total sample. This data highlights the differences in physical activity preferences between urban and rural populations, with walking being the predominant activity in both areas, but with varying degrees of popularity for other activities such as yoga and cycling.

Figure 6: Engagement in Cognitive-Challenging Activities by Urban and Rural Localities



The multiple bar diagram illustrates the engagement of old people in activities that challenge cognitive skills across different frequencies (Yes regularly, Occasionally, Rarely, Never) and locations (Rural and Urban areas), represented in percentages. In urban areas, 26% (52 individuals) engage in cognitive-challenging activities regularly. A larger portion, 45.5% (91 individuals), participate occasionally. Those who rarely engage make up 18.5% (37 individuals), while 10% (20 individuals) never engage in such activities. In rural areas, 21.5% (43 individuals) regularly engage in activities that challenge cognitive skills. Those who do so occasionally constitute 38.5% (77 individuals). A higher percentage, 27% (54 individuals), rarely engage, and 13% (26 individuals) never engage in cognitive-challenging activities. Overall, across both localities, 23.75% (95 individuals) regularly engage in cognitive-challenging activities, 42% (168 individuals) do so occasionally, 22.75% (91 individuals) rarely engage, and 11.5% (46 individuals) never participate in such activities. This data indicates a trend where urban residents are more likely to engage regularly or occasionally in activities that challenge their cognitive skills compared to rural residents.

Table 10: Chi-Square Test of Independence Between Eating Habits and Type of Locality

Describe your eating habits		Type of locality		Total	Chi-Square	df	P
		Urban	Rural				
Balanced and nutritious	Observed	91	81	172	33.214	3	0.001
	Expected	86	86	172			
Somewhat healthy, with occasional indulgence	Observed	56	27	83			
	Expected	42	42	83			
Varied, but not always healthy	Observed	44	49	93			

	Expected	47	47	93			
Poor, often lacking proper nutrition	Observed	9	43	52			
	Expected	26	26	52			
Total	Observed	200	200	400			
	Expected	200	200	400			

The hypothesis test examining the relationship between eating habits and the type of locality (urban or rural) Null Hypothesis (H0): There is no association between eating habits and the type of locality. In other words, eating habits are independent of whether an individual lives in an urban or rural area.

Alternative Hypothesis (H1): There is an association between eating habits and the type of locality. In other words, eating habits are dependent on whether an individual lives in an urban or rural area.

At a 5% level of significance ($\alpha = 0.05$) with 3 degrees of freedom compare the p-value to the significance level. The p-value (0.001) is less than the significance level (0.05). Since the p-value is less than 0.05, we reject the null hypothesis (H0) that there is no association between eating habits and the type of locality. This indicates that there is a statistically significant association between eating habits and whether individuals live in an urban or rural area. Specifically, the observed distribution of eating habits differs significantly from what we would expect if there were no relationship between eating habits and locality type. Urban and rural localities show different patterns in eating habits, with urban areas having higher counts in the "Balanced and nutritious" and "Somewhat healthy" categories, while rural areas have higher counts in the "Poor, often lacking proper nutrition" category.

Table 11: Chi-Square Test of Independence Between Self-Rated Memory and Cognitive Abilities and Type of Locality

Rate your memory and cognitive abilities		**Type of locality**		**Total**	**Chi-Square**	**df**	**P**
		Urban	**Rural**				
Excellent	Observed	51	38	89	19.58	3	0.001
	Expected	45	45	89			
Good	Observed	107	79	186			
	Expected	93	93	186			
Average	Observed	36	72	108			
	Expected	54	54	108			
Below average	Observed	6	11	17			
	Expected	9	9	17			
Total	Observed	200	200	400			
	Expected	200	200	400			

The hypothesis test examining the relationship between self-rated memory and cognitive abilities and the type of locality (urban or rural).

Null Hypothesis (H0): There is no association between self-rated memory and cognitive abilities and the type of locality. In other words, the distribution of ratings for memory and cognitive abilities is the same in both urban and rural areas.

Alternative Hypothesis (H1): There is an association between self-rated memory and cognitive abilities and the type of locality. In other words, the distribution of ratings for memory and cognitive abilities differs between urban and rural areas.

The chi-square statistic is calculated to be 19.58, at a 5% level of significance (α = 0.05) with 3df, we compare the p-value to the significance level. The p-value (0.001) is less than the significance level (0.05). Since the p-value is less than 0.05, we reject the null. This indicates that there is a statistically significant association between self-rated memory and cognitive abilities and whether individuals live in an urban or rural area. The observed distribution of cognitive ability ratings differs significantly from what we would expect if there were no relationship between cognitive abilities and locality type. Specifically, urban areas have higher counts in the "Excellent" and "Good" categories, while rural areas have higher counts in the "Average" and "Below average" categories.

Table 12: Comparison of Depression Symptoms between Urban and Rural Areas

Symptoms of Depression		Type of locality		Total	Chi-Square	df	P
		Urban	Rural				
Yes	Observed	54	80	134	7.58	1	0.004
	Expected	67	67	134			
No	Observed	146	120	266			
	Expected	133	133	266			
Total	Observed	200	200	400			
	Expected	200	200	400			

Null Hypothesis (H0): There is no association between experiencing symptoms of depression and the type of locality. In other words, the distribution of depression symptoms is the same in both urban and rural areas.

Alternative Hypothesis (H1): There is an association between experiencing symptoms of depression and the type of locality. In other words, the distribution of depression symptoms differs between urban and rural areas.

The table presents the results of a chi-square test of independence, examining the relationship between experiencing symptoms of depression and the type of locality (urban or rural). The data is categorized into two groups: "Yes" for individuals who report experiencing symptoms of depression and "No" for those who do not. At a 5% level of significance (α = 0.05) with 1 df, the p-value (0.004) is less than the significance level (0.05). Since the p-value is less than 0.05, we reject the null hypothesis. This result indicates a statistically significant association between experiencing symptoms of depression and the type of locality. Specifically, fewer individuals in urban areas report experiencing symptoms of depression compared to rural areas, while more individuals in urban areas report not experiencing symptoms of depression compared to rural areas. This disparity suggests that the prevalence of depressive symptoms may be higher in rural areas than in urban areas.

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