

Status of Physical Health, Nutrition and Substance Use Habits of the Women in Rural Maharashtra During Post-COVID-19

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ABSTRACT

The COVID-19 pandemic has exacerbated health vulnerabilities among elderly women in rural Maharashtra, driven by socio-economic, cultural, and healthcare disparities. This study examines their physical health, nutrition, and habits during the post-COVID-19 period through a quantitative, cross-sectional survey conducted across 34 districts from April to December 2022. Data was collected using a structured questionnaire covering health status, chronic diseases, substance use, dietary habits, physical activity, and psychological impacts. Findings show that 80% of respondents perceived their health as normal or good, yet 83% lacked access to health cards or routine check-ups. Chronic diseases, including diabetes, hypertension, and heart disease, affected 40% of participants, with significant awareness gaps in those over 80. Substance use was low, with 11% reporting tobacco use and minimal alcohol or other substance use, likely influenced by stigma. Dietary habits revealed limited meal frequency, with poverty and gender disparities worsening hunger levels. Only 39% engaged in physical activity, and television was the primary source of entertainment. The study highlights critical healthcare access gaps, nutritional challenges, and low health awareness among rural elderly women. Addressing these issues requires targeted healthcare interventions, enhanced health education, and socio-economic support to improve their well-being.

Keywords: Elderly women, rural health, post-COVID-19, nutrition, chronic diseases, healthcare access, substance use, physical activity, Maharashtra

INTRODUCTION

The COVID-19 pandemic profoundly impacted global health systems, economies, and daily life, with vulnerable populations such as elderly women in rural areas bearing disproportionate consequences. Elderly women in rural Maharashtra represent a demographic often marginalized in terms of

healthcare access, nutritional support, and awareness of chronic diseases, necessitating targeted research to inform public health interventions. This study aims to investigate the status of physical health, nutrition, and habits among elderly women in rural Maharashtra during the post-COVID-19 period, offering insights into their well-

being and healthcare challenges. The physical health of older adults is influenced by many factors, including the availability of routine health check-ups, prevalence of chronic diseases, substance use patterns, and socioeconomic disparities. Research highlights that limited access to healthcare services exacerbates undiagnosed and untreated conditions among rural populations [1]. Additionally, gender disparities in nutrition and poverty contribute to poor dietary patterns and hunger levels among elderly women, further compounding their health vulnerabilities [2].

The psychological and social repercussions of the COVID-19 pandemic also play a critical role in shaping the well-being of elderly individuals. Studies reveal that isolation, disrupted access to healthcare, and economic instability have intensified health inequities in rural regions [3]. Understanding how these factors interact is essential for developing holistic public health strategies.

This study utilizes a quantitative, cross-sectional approach to assess health status, chronic disease prevalence, substance use, dietary patterns, and physical activity among elderly women in rural Maharashtra. By examining these dimensions, the research seeks to illuminate critical gaps in healthcare access and health awareness, ultimately contributing to evidence-based interventions tailored to the needs of this demographic.

Objectives:

This study evaluates the general health status of the population, focusing on routine health check-ups, health card utilization, and chronic disease prevalence such as diabetes, hypertension, and heart disease, particularly among the elderly. It examines substance use patterns, including tobacco and alcohol, and explores factors like stigma and bias. The study also analyses dietary habits and hunger levels, highlighting the impact of poverty and gender disparities on nutrition. Additionally, it investigates

physical activity levels and media consumption preferences while identifying unmet healthcare needs and barriers to health awareness in rural settings to inform targeted interventions.

REVIEW OF LITERATURE

Healthcare utilization among elderly populations varies significantly between rural and urban areas. Banerjee [4] identifies socio-economic factors as key determinants of these disparities, with rural elderly populations often experiencing limited access to healthcare services. Patel et al. [1] observed a high prevalence of non-communicable diseases (NCDs) among elderly women, emphasizing the need for targeted health interventions. Similarly, Goswami et al. [5] highlighted the burden of substance use, particularly tobacco and alcohol, among rural elderly populations, calling for culturally sensitive health education programs.

Food insecurity remains a critical issue among older adults, as evidenced by Srivastava and Muhammad [6], who found a strong association between rural food insecurity and cognitive impairment. Gender disparities further exacerbate these challenges, with women often facing limited nutritional access [2]. In terms of physical activity, Podder et al. [7] noted significant variations across demographics, with rural elderly populations showing lower engagement, which has implications for their overall health and resilience during crises like COVID-19.

The impact of COVID-19 on rural health systems has been profound. Gupta et al. [3] documented challenges such as disrupted healthcare services and increased health inequities, emphasizing the urgent need for resilient health infrastructure in rural areas. Patel et al. [8] further identified barriers to healthcare access, including financial constraints and geographic isolation, which disproportionately affect rural elderly populations. This body of literature underscores the complex interplay of socio-economic, cultural, and systemic factors

Age wise Distribution of Health Perception

Table – 1: Chi – Square Test for Physical Health with Age group

General Health	Total	(Percent)	Age of Respondents			Chi – Square Value χ^2	Degrees of Freedom (df)	P Value
			60-70	70-80	80+			
Excellent	820	(8.86%)	624 (10.59%)	165 (6.54%)	31 (3.71%)	462.76	6	0.0000
Good	3605	(38.96%)	2569 (43.59%)	745 (29.53%)	291 (34.81%)			
Normal	4507	(48.71%)	2593 (43.99%)	1499 (59.41%)	415 (49.64%)			
Poor	321	(3.47%)	108 (1.83%)	114 (4.52%)	99 (11.84%)			
Total %	9253	(100.00%)	5894 (63.70%)	2523 (27.27%)	836 (9.03%)			

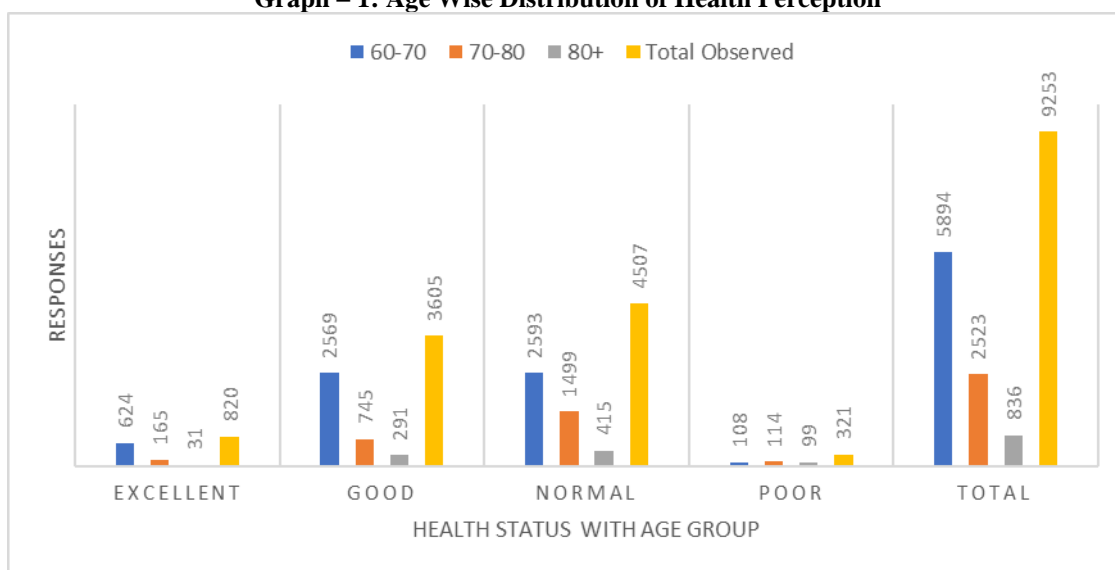
The table provides insights into the relationship between age groups and general health categories among the elderly respondents using observed and expected frequencies. The observed frequencies show a marked variation in health status across age groups. The "Excellent" health category is predominantly seen in the 60–70 age group (624), with a steep decline in the 80+ group (31). Similarly, the "Good" health category is highest in the 60–70 group (2569), while "Poor" health is disproportionately higher among the 80+ group (99).

The expected frequencies, calculated based on the assumption of no association between age and health status, significantly differ from the observed values.

This discrepancy is statistically significant, as indicated by the Chi-Square value ($\chi^2 = 462.76$) with 6 degrees of freedom and a p-value < 0.0001 . (Table – 1, Graph – 1)

The results suggest a strong association between age and general health, with declining health status in older age groups, warranting targeted interventions for elderly populations.

Graph – 1: Age Wise Distribution of Health Perception



This bar chart illustrates the distribution of health status across three age groups: 60–70, 70–80, and 80+, along with the total

observed responses. Health status is categorized into four levels: Excellent, Good, Normal, and Poor. The 60–70 age

group consistently exhibits higher responses in each category compared to older groups. Notably, the "Good" and "Normal" health statuses dominate across all age groups, with the highest total observed responses at 3,605 and 4,507, respectively. The "Excellent" and "Poor" categories show

fewer responses, especially for the 80+ group. Overall, 9,253 total responses were recorded, highlighting age-related variations in health perception.

Health Card Possession Across Age Groups:

Table – 2: Chi – Square Test for Health Cards with Age Groups

Health Card	Total	(Percent)	Age of Respondents			Chi Square Value χ^2	Degrees of Freedom (df)	P Value
			60-70	70-80	80+			
Yes	1583	(17.11%)	1054 (17.88%)	390 (15.46%)	139 (16.63%)	7.51	2	0.0238
No	7670	(82.89%)	4840 (82.12%)	2133 (84.54%)	697 (83.37%)			

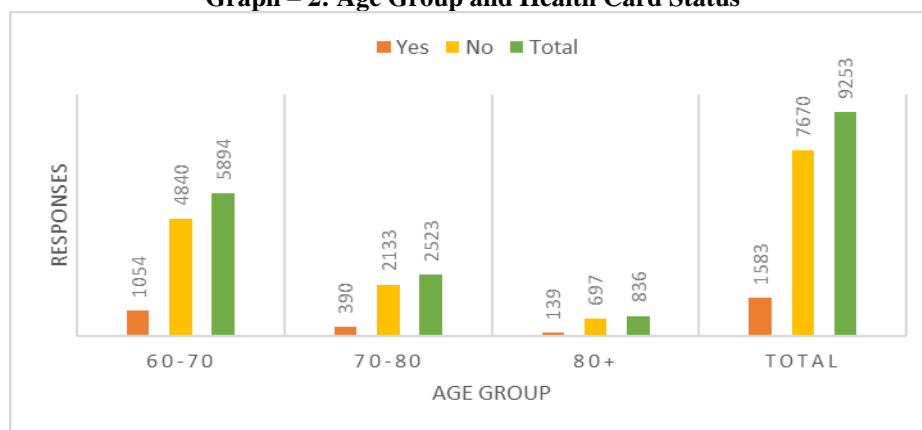
The table shows that 17.88% of respondents aged 60–70 reported having a health card, compared to 15.46% in the 70–80 age group and 16.63% in the 80+ group. Despite this variation, the majority across all age groups (82.89%) lacked a health card, indicating a widespread gap in healthcare access in rural Maharashtra.

The analysis of health card possession across age groups reveals statistically

significant differences ($\chi^2 = 7.51, p = 0.0238$), suggesting that age influences the likelihood of possessing a health card. (Table – 2, Graph - 2)

This highlights the need for targeted policy interventions to increase awareness and distribution of health cards, especially among vulnerable elderly populations.

Graph – 2: Age Group and Health Card Status



This diagram presents the distribution of health card ownership among respondents across three age groups: 60–70, 70–80, and 80+. Overall, 17.11% (1583) of respondents reported having a health card, while 82.89% (7670) did not. Among the 60–70 age group, 17.88% (1054) possessed a health card, compared to 15.46% (390) in the 80+ group, indicating a decline in ownership with increasing age. The majority in all

groups did not have health cards, with the highest percentage (84.54%) in the 80+ group. These findings suggest limited health card accessibility or usage across the elderly population, highlighting a potential area for intervention and support through awareness campaigns or government initiatives could improve health outcomes and provide better access to essential healthcare services for the population.

Routine Check-Up Practices Across Age Group:

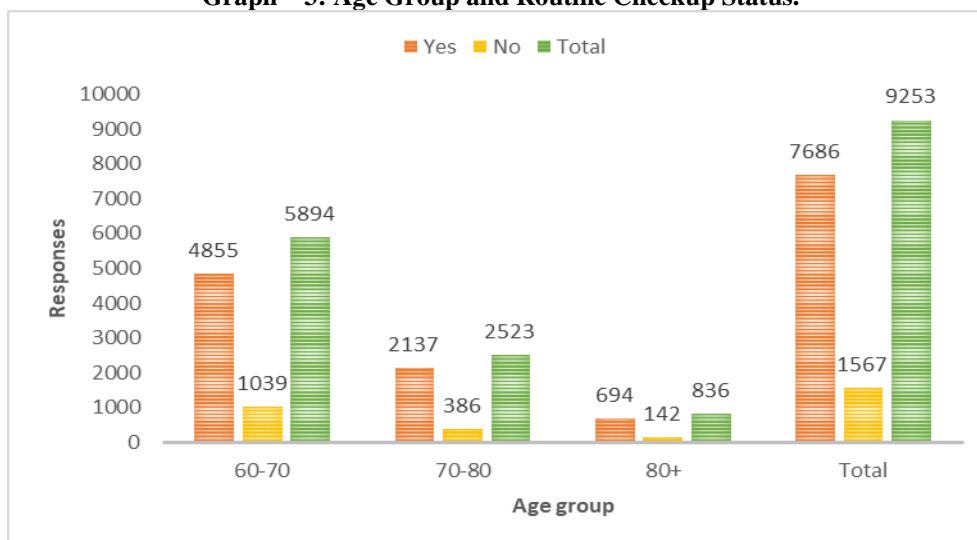
Table – 3: Chi – Square Test for Routine Check-up with Age Group

Routine Check-up	60-70 Age Group	70-80 Age Group	80+ Age Group	Total	Chi – Square Value χ^2	Degrees of Freedom (df)	P-value
Yes	4855 (82.37%)	2137 (84.70%)	694 (83.01%)	7686 (83.06%)	6.84	2	0.0332
No	1039 (17.63%)	386 (15.30%)	142 (16.99%)	1567 (16.94%)			
Total	5894	2523	836	9253			

Among respondents, 82.37% of those aged 60–70 reported undergoing routine checkups, slightly lower than 84.70% in the 70–80 age group and 83.01% in the 80+ group. While routine checkup rates are relatively high, the remaining 16.94% who do not participate in regular screenings reflect a critical gap. Factors like accessibility, financial constraints, and lack of awareness might contribute to this disparity.

The analysis of routine checkup practices across age groups also showed significant differences ($\chi^2 = 6.84$, $p = 0.0332$), indicating an association between age and participation in routine health screenings. These findings underscore the importance of expanding healthcare infrastructure and outreach services to ensure regular health monitoring, especially for the oldest cohorts who are at higher risk for chronic diseases. (Table – 3, Graph – 3)

Graph – 3: Age Group and Routine Checkup Status.

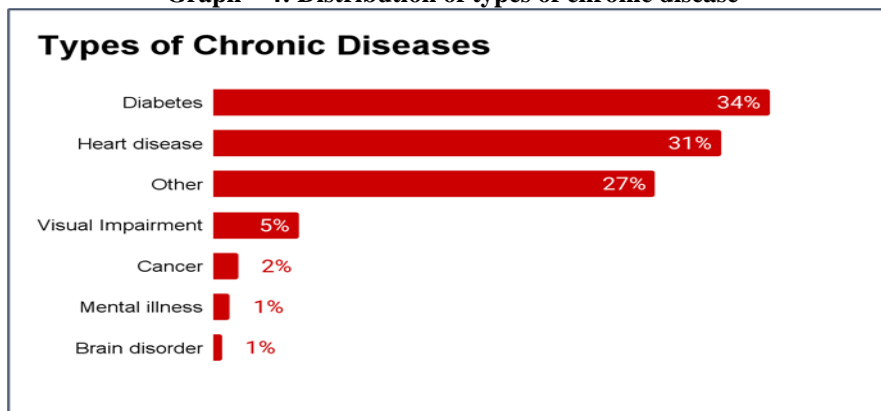


This diagram highlights routine health checkup practices across three age groups: 60–70, 70–80, and 80+. Overall, 83.06% (7686) of respondents undergo routine checkups, with the highest percentage 84.70% (2137) in the 70–80 age group. A

smaller proportion 16.94% (1567) do not attend checkups, indicating widespread participation in preventive healthcare among elderly individuals.

Chronic Disease:

Graph – 4: Distribution of types of chronic disease



The diagram illustrates the distribution of various chronic diseases reported among respondents. Diabetes is the most prevalent condition, affecting 34% of individuals with chronic diseases, followed by heart disease at 31%. A notable 27% fall into the "Other" category, indicating a diverse range of chronic conditions not specified. Visual impairment accounts for 5%, suggesting a moderate impact on the population. Cancer is reported by 2% of individuals, while mental illness and brain disorders are each reported by 1%, indicating a relatively lower prevalence.

The chart highlights that diabetes and heart disease dominate as the primary chronic conditions, reflecting global health trends. The "Other" category suggests the need for more detailed data collection to identify specific additional conditions. While conditions like cancer and brain disorders are less common, they remain critical due to their severe implications for quality of life. These insights emphasize the need for targeted healthcare interventions and awareness programs. (Graph – 4)

Chronic Disease and Recent Serious Illness with Age Group:

Table- 4: Chi - Square Test Chronic Disease with Age Group

Health Status	Total (%)	60-70 Age Group	70-80 Age Group	80+ Age Group	Chi – Square Value χ^2	Degrees of Freedom (df)	P- Value
Chronic Disease	39.55%	36.65%	44.51%	45.10%	3.8412	2	0.0000
No Chronic Disease	60.45%	63.35%	55.49%	54.90%			-
Serious Illness	9.13%	8.43%	11.06%	8.25%	4.2973	2	0.0004
No Serious Illness	90.87%	91.57%	88.94%	91.75%			-

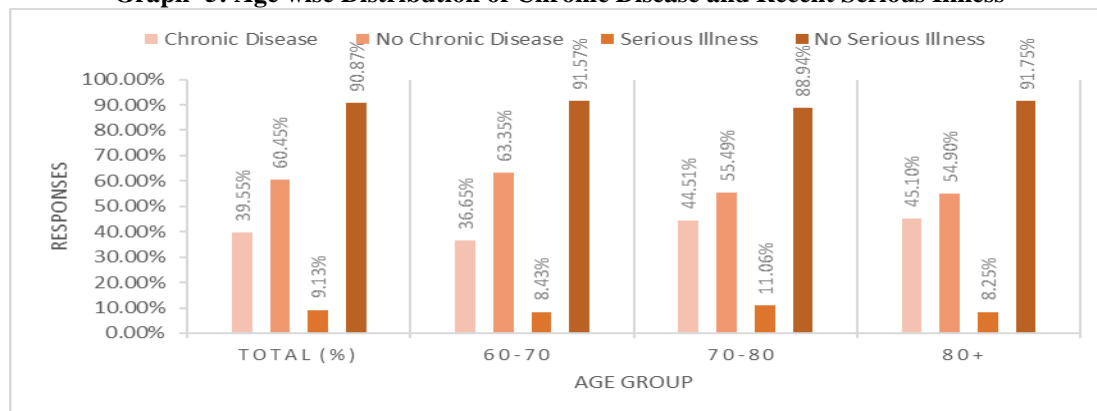
Chronic diseases are more common in older age groups, with the prevalence increasing significantly from 36.65% (60-70 years) to 45.10% (80+ years). Similarly, serious illnesses show a higher prevalence in the 70-80 age group (11.06%) compared to others.

The chi-square test reveals a significant association between age groups and the prevalence of chronic diseases ($p=0.0000$)

and serious illnesses ($p=0.0004$). (Table- 4, Graph- 5)

This analysis highlights the need for targeted health interventions, focusing on routine checkups and improved access to healthcare for the elderly, particularly in higher age brackets. The data can guide policy formulation for better health outcomes in rural Maharashtra.

Graph- 5: Age wise Distribution of Chronic Disease and Recent Serious Illness



The diagram highlights the prevalence of chronic diseases across different age groups. Overall, 39.55% of the participants have a chronic disease, with the percentage increasing with age, 36.65% in the 60-70 age group, 44.51% in the 70-80 group, and 45.10% in those aged 80 and above. Conversely, 60.45% of participants do not have a chronic disease, with higher

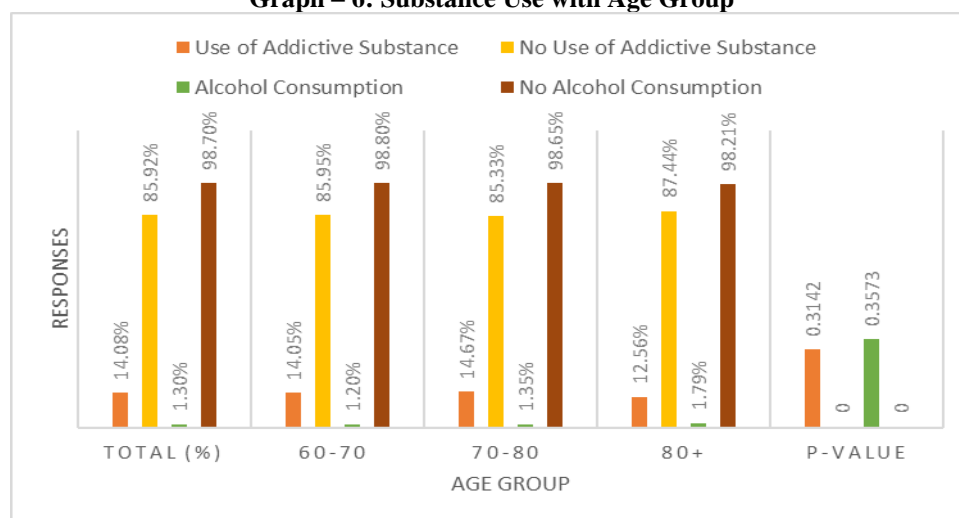
proportions in younger age groups: 63.35% in the 60-70 category, decreasing to 55.49% in the 70-80 group, and 54.90% in the 80+ group. The data indicates a clear trend of rising chronic disease prevalence as age increases.

Substance Use with Age Group:

Table – 5: Chi – Square Test for Substance Use with Age Group

Habit	Total (%)	60-70 Age Group	70-80 Age Group	80+ Age Group	Chi Square Value χ^2	Degrees of Freedom (df)	P-Value
Use of Addictive Substance	14.08%	14.05%	14.67%	12.56%	0.7528	2	0.3142
No Use of Addictive Substance	85.92%	85.95%	85.33%	87.44%			-
Alcohol Consumption	1.30%	1.20%	1.35%	1.79%	2.0584	2	0.3573
No Alcohol Consumption	98.70%	98.80%	98.65%	98.21%			-

Graph – 6: Substance Use with Age Group



The chi-square test shows no significant association between substance use (p=0.3142) or alcohol consumption (p=0.3573) and age groups. Substance use is observed in approximately 14% of respondents, with minimal variation across age groups. Alcohol consumption is rare (1.3%), slightly higher in the oldest age group (1.79%).

This analysis highlights low alcohol consumption among elderly women,

aligning with cultural norms. The steady rate of substance use across age groups suggests consistent habits over time. Programs promoting awareness and support for healthier alternatives could help reduce substance use. The data provide actionable insights for community health interventions in rural Maharashtra. (Table -5, Graph -6)

Food Habits:

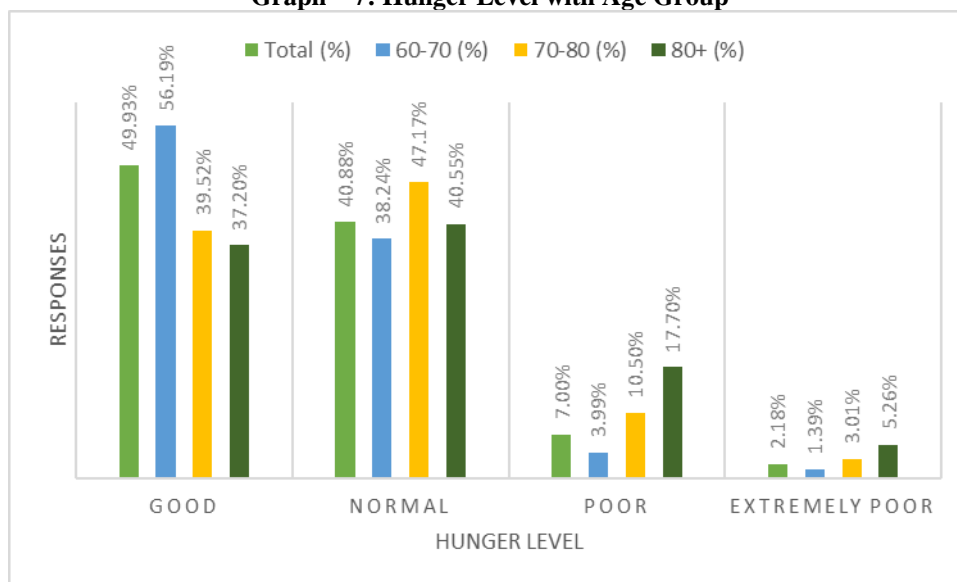
Table – 6: Chi-Square Test for Hunger Levels with Age Group

Hunger Level	Total (%)	60-70 Age Group	70-80 Age Group	80+ Age Group	Chi – Square Value χ^2	Degrees of Freedom (df)	P-Value
Good	49.93%	56.19%	39.52%	37.20%	25.6718	6	0.0000
Normal	40.88%	38.24%	47.17%	40.55%			-
Poor	7.00%	3.99%	10.50%	17.70%			-
Extremely Poor	2.18%	1.39%	3.01%	5.26%			-

The chi-square test indicates a significant association between hunger levels (p=0.0000) and age groups. Older women (70-80 and 80+) report higher rates of poor

or extremely poor hunger levels (10.50% and 17.70%, respectively). This suggests declining nutritional adequacy with age. (Table – 6, Graph -7)

Graph – 7: Hunger Level with Age Group



The diagram illustrates the distribution of hunger levels across various percentages of dietary sufficiency along with age groups. “Good” hunger levels are most common, peaking at 60-70 age group (56.19%). “Normal” hunger levels increase with higher sufficiency, reaching 47.17% at 70-

80 age group. “Poor” and “Extremely poor” hunger levels are rare but rise sharply at 80 + age group indicating potential dietary imbalance.

Meal Frequency:

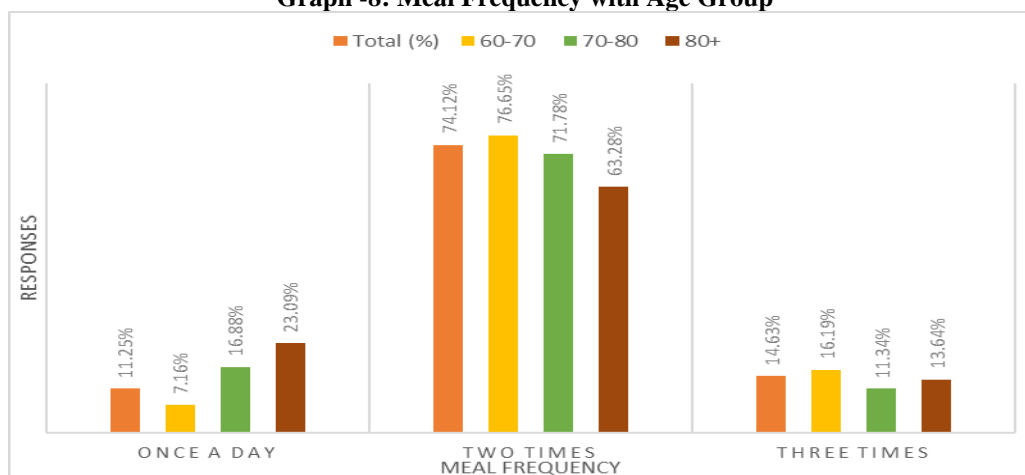
Table – 7: Chi-Square Test for Meal Frequency with Age Group

Meal Frequency	Total (%)	60-70 Age Group	70-80 Age Group	80+ Age Group	Chi – Square Value χ^2	Degrees of Freedom (df)	P-Value
Once a Day	11.25%	7.16%	16.88%	23.09%	15.8723	4	0.0000
Two Times	74.12%	76.65%	71.78%	63.28%			-
Three Times	14.63%	16.19%	11.34%	13.64%			-

Meal frequency also shows a significant variation across age groups ($p=0.0000$). The oldest group (80+) has the highest percentage of women eating only once daily

(23.09%) and the lowest percentage eating twice or thrice. This highlights the need for targeted interventions to improve meal frequency and quality among older women.

Graph -8: Meal Frequency with Age Group

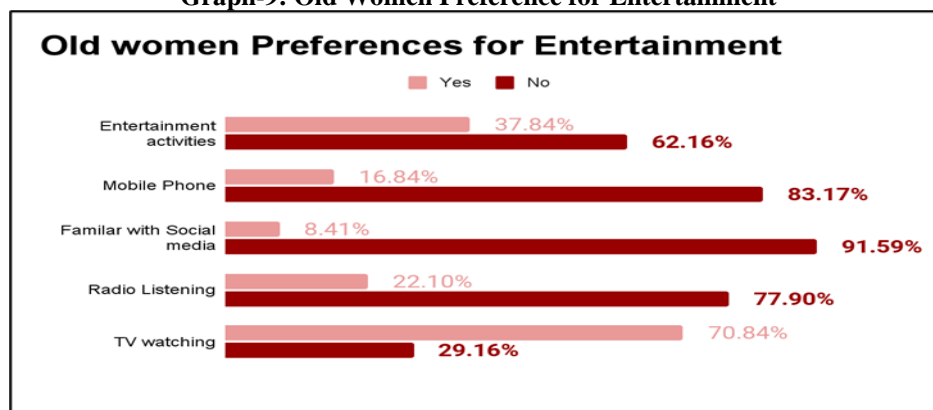


The diagram examines meal frequency distributions across dietary sufficiency with age group. “Once a day” meal frequency shows an increasing trend, rising from 7.16% at 60-70 years to 23.09% at 80+ years. “Two times” meals are the most prevalent across levels, although their share declines from 76.65% at age 60-70 years to 63.28% at the age 80+. “Three times” meals remain relatively stable, with slight variations across sufficiency levels.

These findings underscore the importance of nutritional programs tailored to the elderly population, particularly those in the 70-80 and 80+ age brackets. Addressing these disparities can significantly improve health outcomes in rural Maharashtra. (Table – 7, Graph -8)

Entertainment & Physical Activity:

Graph-9: Old Women Preference for Entertainment



The diagram illustrates the entertainment preferences of elderly women, highlighting limited engagement in various activities. Only 37.84% participate in entertainment activities, while 62.16% abstain. Mobile phone usage is minimal, with just 16.84% using them, and 83.17% do not. Familiarity with social media is even lower, with only 8.41% aware of it, while 91.59% lack awareness. Listening to the radio is practiced by 22.10%, with a majority (77.90%) refraining. TV watching is relatively more common, with 70.84% engaging and 29.16% not. These findings emphasize a decline in recreational

engagement and technology use, underscoring the need for age-friendly entertainment programs. These findings highlight the need to design inclusive entertainment and technology programs tailored to older adults to enhance their engagement and social connection. (Table-8, Graph -9).

To analyze the association between entertainment activities and the age groups of respondents, **Chi-square tests for independence** performed. This test assesses whether there is a significant association between categorical variables (entertainment/activity and age groups).

Table – 8: Chi – Square test for Entertainment activities and the age groups

Variable	Test Applied	P-Value	Interpretation
Entertainment or Activity (Yes/No)	Chi-square test	0.0000	Significant association; older age groups are less likely to engage in activities.
Use of Technology (Yes/No)	Chi-square test	0.0000	Significant association; technology usage decreases with age.
Knowledge of social media (Yes/No)	Chi-square test	0.0028	Significant association; awareness of social media is lower in older groups.
Watching TV (Yes/No)	Chi-square test	0.0000	Significant association; older age groups watch TV less frequently.
Listening to Radio (Yes/No)	Chi-square test	0.0010	Significant association; older age groups listen to the radio less.

The Chi-square tests reveal significant associations between age groups and various forms of entertainment or activity.

The table highlights significant associations between age and various entertainment or activity-related variables among the surveyed elderly population. Older age groups are less likely to engage in activities (p=0.0000) and show decreased use of technology (p=0.0000) and awareness of social media (p=0.0028). Additionally, watching TV (p=0.0000) and listening to the radio (p=0.0010) also decline with age. These trends underscore the reduced participation in recreational and technological activities among older cohorts, indicating potential challenges in maintaining mental stimulation and social connection. These findings emphasize the need for tailored interventions promoting accessible entertainment and technology use to enhance well-being.

DISCUSSION

The findings from this study provide a comprehensive understanding of the physical health, nutrition, and habits of elderly women in rural Maharashtra. A significant association between age and health status is evident, aligning with previous research that highlights aging as a strong determinant of declining health outcomes [4]. The study reveals that individual in the 60–70 age group report better health compared to those aged 80 and above, as indicated by a statistically significant Chi-Square value ($\chi^2 = 462.76, p < 0.0001$). This finding is consistent with Patel et al. [1], which emphasizes the increasing prevalence of non-communicable diseases among elderly women, particularly in the oldest age groups.

One critical concern identified in the study is the limited possession of health cards among the elderly population, with only 17.1% of the surveyed individuals having

access to such resources. The statistically significant variation across age groups ($\chi^2 = 7.51$, $p = 0.0238$) highlights the barriers to accessing formal healthcare services. These findings align with Patel et al. [8], which identifies infrastructural and socio-economic constraints as major impediments to healthcare access in rural India.

Routine health checkups, although relatively common, also display significant disparities among age groups ($\chi^2 = 6.84$, $p = 0.0332$), with older individuals less likely to participate. This gap in preventive healthcare measures highlights the need for outreach programs tailored to the needs of the elderly, a concern echoed in Gupta et al. [3] regarding rural health systems during the COVID-19 pandemic.

The study further identifies a concerning trend in the prevalence of chronic diseases, which increase significantly with age, affecting nearly 45% of individuals aged 80 and above. These findings are consistent with Srivastava and Muhammad [6], who found that food insecurity and poor nutrition exacerbate cognitive impairment among older adults in rural settings.

Substance use remains relatively low among the elderly population, with 10.69% using tobacco and 1.3% consuming alcohol. These patterns are consistent with findings by Goswami et al. who reported [5], similar trends in rural Indian populations.

The analysis of nutrition patterns reveals a statistically significant association between age and meal frequency ($p = 0.0000$), with older individuals experiencing reduced meal frequency and hunger. This finding is supported by Srivastava and Muhammad [6].

CONCLUSION

The segment pertaining to Physical Health, Nutrition, and Habits encapsulates crucial insights into the well-being of the surveyed population. The findings reveal a significant association between age groups and general health outcomes among elderly respondents in rural Maharashtra. Health status declines markedly with age, as evident from the

observed frequencies showing better health predominantly in the 60–70 age group and a steep decline in the 80+ group. The disparities between observed and expected frequencies in health categories, coupled with the statistically significant Chi-Square value ($\chi^2 = 462.76$, $p < 0.0001$), underscore the strong relationship between aging and declining health.

Health card possession remains low, with only 17.1% of respondents reporting ownership, indicating barriers to accessing formal healthcare services. The variation in health card ownership across age groups is statistically significant ($\chi^2 = 7.51$, $p = 0.0238$), emphasizing the need for targeted interventions to improve access. Similarly, while routine health checkups are relatively common, significant differences across age groups ($\chi^2 = 6.84$, $p = 0.0332$) highlight gaps in participation, particularly among older cohorts.

The prevalence of chronic diseases increases with age, affecting nearly 45% of individuals aged 80 and above. These trends call for strengthened healthcare infrastructure, awareness programs, and policy measures focused on preventive care, routine checkups, and accessibility to ensure better health outcomes for the elderly population.

The study also highlights critical patterns in substance use, nutrition, and entertainment activities among elderly women in rural Maharashtra. Substance use, including tobacco (10.69%) and alcohol (1.3%), remains low, with no significant variation across age groups, reflecting cultural norms. However, hunger levels and meal frequency show significant associations with age ($p=0.0000$), with older women reporting poorer nutrition and reduced meal frequency, particularly in the 80+ age group. Entertainment activities also decline with age, with the oldest group (80+) reporting lower engagement (28.11%) compared to the 60–70 group (40.09%). Watching TV is the most common activity but decreases with age, alongside diminishing use of technology and social media. These trends

underscore the need for targeted interventions, including nutritional programs to improve meal quality and frequency and inclusive entertainment initiatives to foster social connection and mental well-being among elderly women. Addressing these gaps can enhance health and quality of life outcomes.

In summary, this dataset presents a nuanced picture, showcasing both strengths and challenges in the physical health, nutrition, and lifestyle habits prevalent among the surveyed population. These insights serve as pivotal information for healthcare planning and targeted interventions in rural areas, aiming to address prevalent health issues and foster improved well-being among the surveyed demographic.

Recommendations

- Conduct studies evaluating the impact of targeted nutritional interventions and routine health checkups on improving elderly health outcomes in rural areas.
- Investigate strategies to increase health card ownership and address barriers to accessing formal healthcare services.
- Explore age-specific entertainment programs and their role in enhancing mental well-being among the elderly.
- Perform longitudinal studies assessing the effects of chronic disease management initiatives and substance use patterns on quality of life.
- Collaborate with policymakers and community leaders to develop and implement effective, community-specific healthcare and wellness interventions.

Declaration by Authors

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