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# A COMPARATIVE CROSS SECTIONAL STUDY ON WHO FIVE KEYS FOR FOOD SAFETY (KAP) AMONG URBAN AND RURAL HOUSEHOLD IN BELGAVI DISTRICT

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ABSTRACT

**Background:** According to a report by the World Health Organization (WHO) in 2015, approximately 600 million individuals, equating to nearly one-tenth of the global population, become sick due to consuming contaminated food each year. Furthermore, the report indicates that 420,000 individuals perish annually as a result, leading to the loss of 33 million healthy life years (DALYs). Among these cases, 40% of the burden of foodborne diseases affects children under the age of five, resulting in 125,000 deaths annually. **Objectives:** To distinguish the attitudes towards food safety practices in urban and rural households based on the WHO Five Keys.

**Materials and Methods:** A cross-sectional study was conducted in Urban and rural households located in the field practice areas of Jawaharlal Nehru medical college in Belagavi Taluka, and District of Karnataka State. The study took place from January 1, 2017, to December 31, 2017.

**Results:** In urban participants, 30.0% were aged 25 to 35 years whereas for rural participants, 35.8% were aged 18 to 25 years. The mean age for urban participants was 37.96 ± 14.9 years, and for rural participants, it was 33.48 ± 13.5 years. The difference in mean ages between urban and rural participants was statistically significant ($\chi 2 = 39.53$, $p < 0.001$). According to Modified B. G. Prasad's Classification of socio-economic status of urban participants, 34.3% of study participants belonged to Class IV whereas in rural participants, 41.3% in Class IV, differences in socio-economic status between urban and rural participants were statistically significant ($\chi 2 = 59.61$, $p < 0.001$).

**Conclusion:** The study underscores the importance of recognizing and addressing the distinctive demographic characteristics between urban and rural populations, which can have implications for healthcare, education, and socio-economic interventions tailored to the specific needs of each community.

**Keywords**: WHO, Urban, Rural, Food, Safety, Household.

## INTRODUCTION

Unsafe food globally affects 600 million people annually, causing 420,000 deaths and the loss of 33 million healthy life years, as reported by WHO in 2015. Shockingly, 40% of foodborne diseases impact children under five, leading to 125,000 annual deaths. Diarrhoeal diseases, a result of contaminated food, afflict 550 million people, causing 230,000 deaths.[1]

India faces unnoticed food safety challenges, with unreported outbreaks causing significant health and economic damage. Prioritizing food safety is crucial to prevent such occurrences.[2]

Unsafe food may harbor infectious agents and toxins, with contamination from production to consumption.

Harmful fertilizers, adulteration, and distribution contribute to initial contamination. Poor hygiene, inadequate handwashing, and cooking during food preparation compound risks.[3]

Consuming unsafe food extends beyond immediate health impacts, leading to serious illnesses and death. Foodborne diseases also impose an economic burden on individuals, families, communities, and countries, with vulnerable populations, such as infants and the elderly, particularly at risk.[3]

Recognizing the crucial role of household food handlers is paramount. Ensuring adherence to food safety standards is imperative. Factors contributing to foodborne illnesses at home include a contaminated raw food supply, lack of public awareness, errors in food handling, and risky eating behaviors.[4] Assessing food safety measures by household food handlers is essential.

In essence, food safety involves proper handling, storing, and preparing food to prevent infections. WHO's 'Five Keys for Safer Food' provide a comprehensive framework, including maintaining cleanliness, separating raw and cooked foods, thorough cooking, maintaining safe temperatures, and using safe water and raw materials.[7]

World Health Day 2015's theme, "From farm to plate, make food safe," emphasizes the need for global policy decisions, health advocacy, and addressing food safety issues.[6]

To combat foodborne illnesses, disseminating and applying the 'Five Keys to Safer Food' is crucial. These simple yet impactful measures, endorsed by Margaret Chan, the WHO Director-General, have proven effective.[8]

In conclusion, understanding the knowledge, attitude, and practices related to food safety among urban and rural households is imperative. This study aims to distinguish these aspects between urban and rural households based on the WHO's 'Five Keys for Food Safety,' recognizing the importance of household-level interventions in preventing foodborne illnesses

## MATERIAL AND METHODS

A cross-sectional study was carried out within the urban and rural households served by the Urban Health Centre in Ashok Nagar, Belagavi city, Karnataka and Rural Health Training Centre in Kinaye, Belagavi District, Karnataka. This area falls under the urban and rural field practice jurisdiction of the Department of Community Medicine at JNMC, KAHER. The study spanned a duration of one year, commencing on January 1, 2017, and concluding on December 31, 2017.

The sample size was determined utilizing the formula $n = 4pq/d2$, with an assumed prevalence (p) of 50% for knowledge about food safety among households and an acceptable error of 5%, resulting in a sample size of 400 for urban and rural households each. Systematic random sampling was employed by calculating the sampling interval, and each fourth household was chosen for inclusion in the study. Ethical clearance was acquired from the Institutional Ethics Committee for Human Subjects Research at the medical college, dated October 17, 2016, under the reference letter (MDC/DOME/5).

Information was gathered from women aged 18 years and above who were actively engaged in regular food preparation within urban and rural households. Participants included permanent residents, residing in the area for at least a year. Exclusions comprised cooks employed for food preparation who were not family members and households that remained locked during three consecutive visits. Data collection occurred through personal interviews, with participants providing written informed consent. A pre-designed and pretested questionnaire based on the WHO guidelines for "Five Keys for Food Safety" was utilized to gather details on sociodemographic as well as knowledge, attitudes, and practices related to food safety.

The assessment of knowledge, attitudes, and practices (KAP) related to food safety utilized a questionnaire endorsed by the World Health Organization (WHO).[3] The knowledge section consisted of 11 true or false items, with one mark awarded for each correct response and zero for each incorrect answer, yielding a maximum score of 11.

For the attitude section, nine items gauged respondents' attitudes toward food safety, with response options of agree, disagree, and not sure. Marks were assigned as two, one, and zero for each respective response, resulting in a maximum score of 18.

Similarly, the practices section encompassed 10 items evaluating respondents' food safety practices. Response options included always, most times, sometimes, not often, and never, coded as 4, 3, 2, 1, and 0, respectively, with a maximum cumulative score of 40.

The collected data from the questionnaire underwent coding and entry into a Microsoft Excel sheet. Descriptive analyses, incorporating mean and standard deviation, frequency, and percentages, were performed. To examine the association of sociodemographic profiles with knowledge, attitudes, and practices concerning food safety, ANOVA with the least significant difference test was employed.

## RESULTS

In urban participants, 30.0% were aged 25 to 35 years and 7.3% were aged 45 to 55 years. For rural participants, 35.8% were aged 18 to 25 years and 10.0% were over 55 years. The mean age for urban participants was 37.96 ± 14.9 years, and for rural participants, it was 33.48 ± 13.5 years. The difference in mean ages between urban and rural participants was statistically significant ($\chi 2 = 39.53$, $p < 0.001$).

In urban households, 52.5% were Muslims, 46% were Hindus, and 1.5% belonged to other religions

such as Christians. In rural households, 78.8% were Hindus, and 21.3% belonged to the Muslim community. This suggests an expressive variance in religious affiliations between the two different areas was found to be statistically significant ($\chi2 = 93.16$, $p < 0.001$).

In urban participants, 52.3% had a secondary education and 0.8% were illiterate whereas in rural areas, 46.0% had a secondary education and 10.3% were graduates. The educational gap between urban and rural participants was statistically significant ($\chi2 = 88.44$, $p < 0.001$), indicating higher education levels among urban participants.

Among urban participants, the majority (84%) were homemakers and 1.3% involved in farming. In the rural participants, 57.0% were homemakers and 10% were engaged in either labor or other occupations. The disparities in occupational distribution between urban and rural participants reached statistical significance ($\chi2 = 103.04$, $p < 0.001$)

According to Modified B. G. Prasad's Classification of socio-economic status, In the urban participants, 34.3% of study participants belonged to Class IV and 8% to Class V whereas in rural participants, 41.3% in Class IV and 4% in Class I. The observed differences in socio-economic status between urban and rural participants were statistically significant ($\chi2 = 59.61$, $p < 0.001$).

In the urban area, the study participants included 355 (88.8%) married women and 20 (5%) widows. Conversely, in the rural area, the participants comprised 379 (94.8%) married women and 9 (2.3%) widows. The differences in marital status distribution between urban and rural participants were statistically significant ($\chi2 = 9.52$, $p < 0.0085$).

In the urban area, 234 households (58.5%) were classified as nuclear families, while 166 households (41.5%) belonged to joint family structures whereas in the rural area, the majority, 261 households (65.3%), were nuclear families, with 139 households (34.8%) following a joint family arrangement. The observed differences in family structure distribution between urban and rural participants were found to be statistically significant ($\chi2 = 3.86$, $p < 0.049$).

Among urban households, the mean ± SD knowledge score was 7.1 ± 1.47 (out of 11), the mean ± SD attitude score was 15.45 ± 1.65 (out of 18), and the mean ± SD practice score regarding food safety was 30.18 ± 4.21 (out of 40). For rural households, the mean ± SD knowledge score was 6.57 ± 1.58 (out of 11), the mean ± SD attitude score was 15.14 ± 2 (out of 18), and the mean ± SD practice score regarding food safety was 25.12 ± 4.55 (out of 40). The study found that urban participants had higher knowledge and practices of food safety compared to rural participants, and these differences were statistically significant ($p < 0.001$). However, there was no significant difference in attitude regarding food safety between urban and rural households ($p = 0.018$).

**Table 1: Distribution of study participants according to the demographic Variables**

| DEMOGRAPHIC VARIABLES | URBAN | RURAL | $\chi2$ Value | P value |
|---|---|---|---|---|
| **AGE GROUP (YEARS)** | | | | |
| **18 to 25** | 85 (21.3 %) | 143 (35.8 %) | 39.537 | < 0.00001 |
| **25 to 35** | 120 (30.0 %) | 110 (27.5 %) | | |
| **35 to 45** | 84 (21.0 %) | 58 (14.5 %) | | |
| **45 to 55** | 29 (7.3 %) | 49 (12.3 %) | | |
| **55 and above** | 82 (20.5 %) | 40 (10.0 %) | | |
| **Total** | **400** (100 %) | **400** (100 %) | | |
| **RELIGION** | | | | |
| **Hindu** | 184 (46.0 %) | 313 (78.3 %) | 88.449 | < 0.00001 |
| **Muslim** | 210 (52.5 %) | 85 (21.3 %) | | |
| **Others** | 6 (1.5 %) | 2 (0.5 %) | | |
| **Total** | **400** (100 %) | **400** (100 %) | | |
| **EDUCATION STATUS** | | | | |
| **Illiterate** | 3 (0.8%) | 67 (16.8 %) | 92.7862 | < 0.00001 |
| **Primary** | 41 (10.3 %) | 67 (16.8 %) | | |
| **Secondary** | 209 (52.3 %) | 184 (46.0 %) | | |
| **PUC/Diploma** | 44 (11.0 %) | 41 (10.3 %) | | |
| **Graduates** | 103 (25.8 %) | 41 (10.3 %) | | |
| **Total** | **400 (100 %)** | **400 (100 %)** | | |
| **OCCUPATION** | | | | |
| **Home maker** | 336 (84 %) | 228 (57 %) | 103.0451 | < 0.00001 |
| **Farmer** | 5 (1.3 %) | 92 (23 %) | | |
| **Labourers** | 24 (6 %) | 40 (10 %) | | |
| **Others** | 35 (8.8 %) | 40 (10 %) | | |
| **Total** | **400 (100 %)** | **400 (100 %)** | | |
| **SOCIO ECONOMIC STATUS** | | | | |
| **Class I** | 43 (10.8 %) | 16 (4 %) | 59.6193 | < 0.00001 |
| **Class II** | 76 (19 %) | 54 (13.5 %) | | |
| **Class III** | 112 (28 %) | 70 (17.5 %) | | |
| **Class IV** | 137 (34.3 %) | 165 (41.3 %) | | |
| **Class V** | 32 (8 %) | 95 (23.8 %) | | |
| **Total** | **400 (100 %)** | **400 (100 %)** | | |
| **MARRITAL STATUS** | | | | |
| **Married** | 355 (88.8 %) | 379 (94.8 %) | 9.5247 | .008545 |

| | | | | |
|---|---|---|---|---|
| **Unmarried** | 25 (6.3 %) | 12 (3 %) | | |
| **Widow** | 20 (5 %) | 9 (2.2 %) | | |
| **Total** | **400** (100 %) | **400** (100 %) | | |
| **TYPES OF FAMILY** | | | | |
| **Nuclear** | 234 (58.5 %) | 261 (65.3 %) | 3.8629 | .049365 |
| **Joint** | 166 (41.5 %) | 139 (34.8 %) | | |
| **Total** | **400** (100 %) | **400** (100 %) | | |

**Table 2: Distribution of study participants according to knowledge regarding WHO five keys for food safety**

| | WHO Key | Max. score | Mean ± SD | | p value |
|---|---|---|---|---|---|
| | | | Urban (n = 400) | Rural ( n = 400) | |
| KNOWLEDGE | **Keep clean** | 2 | 1.77 ± 0.42 | 1.61 ± 0.49 | < 0.001 |
| | **Separate raw and cooked food** | 2 | 1.41 ± 0.52 | 1.30 ± 0.063 | 0.008 |
| | **Cook thoroughly** | 2 | 0.87 ± 0.74 | 0.73 ± 0.64 | 0.004 |
| | **Keep food at safe temperature** | 3 | 1.83 ± 0.93 | 1.75 ± 0.88 | 0.229 |
| | **Use safe water and raw materials** | 2 | 1.23 ± 0.41 | 1.19 ± 0.40 | 0.168 |
| ATTITUDE | **Keep clean** | 4 | 1.98 ± 0.08 | 1.974 ± 0.18 | 0.768 |
| | **Separate raw and cooked food** | 4 | 1.64 ± 0.68 | 1.698 ± 0.58 | 0.066 |
| | **Cook thoroughly** | 4 | 1.52 ± 0.65 | 1.60 ± 0.06 | 0.986 |
| | **Keep food at safe temperature** | 2 | 1.44 ± 0.59 | 1.094 ± 0.62 | 0.378 |
| | **Use safe water and raw materials** | 4 | 1.98 ± 0.13 | 1.945 ± 0.21 | 0.494 |
| PRACTICE | **Keep clean** | 8 | 3.66750 ± 0.59 | 3.776 ± 0.15 | 0.54 |
| | **Separate raw and cooked food** | 8 | 3.53375 ± 0.75 | 3.179 ± 1.03 | 0.34 |
| | **Cook thoroughly** | 8 | 2.52375 ± 0.98 | 1.574 ± 1.05 | 0.7 |
| | **Keep food at safe temperature** | 8 | 1.57125 ± 1.22 | 1.339 ± 0.98 | 0.23 |
| | **Use safe water and raw materials** | 8 | 3.79375 ± 0.50 | 2.691 ± 0.90 | 0.68 |

## DISCUSSION

The study included participants from 400 urban households and 400 rural households. A preliminary review of existing literature revealed a significant gap, as no prior studies focused on the Knowledge, Attitude, and Practices (KAP) of women at the household level. Comparing findings from previous studies with the current research proved challenging due to variations in study participants, which encompassed food handlers in homes, restaurants, campus mess facilities, street vendors, etc. Additionally, diverse socio-cultural cooking practices in India and varying criteria for defining KAP in food handling further complicated direct comparisons.

The study revealed varying levels of awareness regarding the use of separate cutting boards for raw and cooked food, with 42.7% in urban areas and 43.7% in rural areas acknowledging this practice. Compared to a Malaysian canteen study (82%) and a Singapore residential community study (75.4%), these figures indicate regional differences, highlighting the need for targeted educational interventions to enhance food safety practices.

In our research, an overwhelming majority in both urban (98.5%) and rural (86.25%) areas demonstrated awareness of the importance of separating raw and cooked food during storage. Notably, a study in Putrajaya, Malaysia, found 100% awareness among food handlers regarding health risks linked to improper food storage.[25] These findings highlight a commendable level of knowledge among our participants, aligning with global food safety standards. Nonetheless, more investigation is needed to grasp the factors influencing this awareness and to promote consistent adherence to safe food storage practices in varied environments.

In our research, 44% of urban participants and 55% of rural participants acknowledged the importance of thoroughly reheating cooked food. This differs from findings in Karnataka, where 81.3% of anganwadi workers showed awareness, and in Jordanian military hospitals, where 96% of food handlers were knowledgeable.[21] These results emphasize the necessity for focused educational efforts to enhance safe food handling practices, considering regional and occupational variations.

In our research, awareness of the recommended temperature for proper meat cooking (>60˚C) was low, with 42.3% in urban and 17.5% in rural areas. Similarly, a study in the United States found that only 11.3% of primary food preparers knew the best method to ensure thorough chicken cooking—by checking for clear juices.[22] These results underscore the necessity for improved education on meat cooking standards to encourage safer practices across different environments.

In our research, 55.3% of urban and 43% of rural participants recognized that leaving cooked meat at room temperature overnight is unsafe. This differs from a study in Karnataka, where 90.1% of anganwadi workers were aware of the risks of consuming cooked leftovers left at room temperature for over six hours,[28] and a study in Jordanian military hospitals, which reported 91.5% awareness among food handlers.[21] These findings stress the importance of focused educational efforts to encourage safe food storage practices, taking into account regional differences.

In our research, 48% of urban and 59.3% of rural participants understood that refrigerating food slows bacterial growth, consistent with a study in Slovenia where 63.4% of food handlers recognized the same.[36] These results highlight the significance of refrigeration awareness for ensuring food safety.

In our study, all urban and nearly all rural participants recognized the importance of washing fruits and vegetables, echoing findings from studies in Karnataka and Jordanian military hospitals. This reaffirms the universal understanding of the crucial role of washing in food safety.

## CONCLUSION

The study highlights the importance of recognizing and addressing the distinctive demographic characteristics between urban and rural populations, which can have implications for healthcare, education, and socio-economic interventions tailored to the specific needs of each community. These findings contribute valuable insights for policymakers and practitioners aiming to implement targeted strategies for improved public health and well-being in diverse urban and rural settings.

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