Assessment of knowledge and practices on effective hand hygiene among rural and urban population of South India: A web based cross sectional survey.

ABSTRACT

Aims: The study aims to assess the level of awareness regarding Hand hygiene among the population in urban and rural areas of South India.
Study design: A web based cross sectional survey.
Place and Duration of Study: An online study was conducted among public of South India for a period of 6 months.
Methodology: The data was collected through online mode by providing google link to fill questionnaire form through various social media platforms. The questionnaire consists of demographic details, knowledge and practice related questions.SPSS was used to interpret data and chi-square test, independent T test, backward multiple regression analysis was done.
Results: From the collected data a total of 1178 responses were collected (urban:726, rural:452). From independent T test the knowledge mean score of HH was: 10.07±2.136 for urban population and 9.79±2.138 for rural population. By this urban population has more knowledge than rural population. From backward multiple regression analysis of Knowledge score, the findings shown that the urban male residents with 2 members household residing in Tamilnadu have preferably more knowledge than others when compared with demographic details. From the independent T test the HH practice mean score was 11.25±1.991 for urban residents and 10.77±2.280 for rural residents. From the Backward multiple regression analysis of Practice score, the findings shown that most parsimonious combination of region (rural, urban), age group (10-30 years, 30-60 years and >60 years), gender(female, male), state and UT (Andhra Pradesh, Karnataka, Tamilnadu, Kerala, Telangana, Andaman and nicobar, Puducherry, Lakshadweep), household (2, 3, 4, >4 members), education level (10 and below 10, intermediate, UG, PG, Ph. D) in predicting the practice score.
Conclusion: The study results concluded that urban residents have preferably more knowledge than rural residents. Creative campaigns and awareness programs should be conducted to attain persistent improvement in HH practices.

Keywords: Hand Hygiene, Infections, Public, Knowledge and Practice

1. INTRODUCTION

Hygiene is practiced since ages and considered as the central element in cultural and religious customs. The relation between hand hygiene and health was first made less than two centuries ago [1]. In mid-19th century, two pioneers, Ignaz Semmelweis and Florence Nightingale delivered the importance of hand washing [2]. Food borne outbreaks of diseases caused by Campylobacter and health related infections in 1980's made United states CDC to actively encourage HH [3].

HH is an important, cost-effective, preventive and practical measure to reduce the incidence of infections in clinical and community settings; it is a well-recognized tool for disease prevention [4,5]. As per WHO and UNICEF joint monitoring program report on hygiene interventions, 542 million people in India live without a basic hand washing facility and around 41% schools have no hygiene services, affecting 900 million children. In the world, two out of five people and half of the schools do not have hand washing facilities with soap and water on premises.

In 2017, 78 countries had comparable data available on the accessibility of basic hand washing facilities and discloses the actual levels of hand washing with soap are generally low[6]. 40% of world's population do not have place in their residence to wash hands with water and soap. Three quarters of those who lack access to water and soap live in the world's poorest countries and are amongst most vulnerable: children and families living in informal settlements, migrants and refugee camps.43% of clinical settings do not have hand hygiene facilities at points of care where patients are treated. With limited or no hand hygiene facility and improvement programs, health care worker's compliance with hand hygiene best practices can be as low as 8%. This puts teachers, doctors, nurses, patients-all of us-at risk [7]. 13 million deaths are estimated across the globe annually and infectious diseases proceed to be a health challenge and economic burden between 1980 and 1992 due to poor hand hygiene promotion and education, deaths caused by infectious diseases is increased of 22% [8].

There are some organisms which are not found on the skin of humans most consistently and considered as transient flora which is located on the superior layer of the skin and can be contacted during direct contact with clients, patients, residents, health care providers and in the environment. Transient bacteria may also be easily passed onto others or to objects in the environment and causes health associated infections. Such flora can be removed by mechanical friction of washing with soap and water or removed by using an antiseptic hand rub. Hand washing is a widely established practice to control the cross transmission of infections. The Centre for disease control and prevention and the association for professionals in infection control and epidemiology in the United States has clearly identified that successful hand washing practice is useful to prevent the spread of infections. Knowledge on hand washing supports the public to stay safe and healthy. Hand washing education helps to decrease the rate of people who gets sick with diarrhea by 31%, diarrheal illness in people with weakened immune systems by 58%, respiratory infections by 16-21% and absenteeism in school children due to gastrointestinal infections by 29-57% [9,10].

1.1 Statement of the problem

Assessment of knowledge and practices on effective hand hygiene among rural and urban population of South India: A web based cross sectional survey.

1.2 Objectives of the study

- To develop a self-administered questionnaire form on HH.
- To assess the knowledge among rural and urban residents.
- To understand the practices of HH among the general public

2. MATERIAL AND METHODS

The design used in this study is a web based cross sectional survey.

2.1 Study site and duration:

The study was carried out by using an online questionnaire form from the residents of South India and was planned and carried out for a period of 6 months.

2.2 Variables:

2.2.1.Independent variables:
In this study the independent variables are rural and urban residents.
2.2.2.Dependent variables:
In this study the dependent variables are knowledge and practice.
2.2.3.Demographic variables:
In this study the socio demographic variables include age, gender, states and union territories, household and education level.

2.3 Sampling Criteria:

2.3.1.Inclusion criteria:
Individuals residing in rural and urban areas of South India.
Individuals above 10 years of age.
Individuals willing to participate in the study.
2.3.2.Exclusion criteria:
People who are unable to understand the questionnaire.
Responses without appropriate information were excluded.
Individuals who do not have accessibility to the internet.

2.4 Sample size determination and Sampling technique:

The sample size required is calculated by using Epi info 7 software, considering confidence interval as 95%, margin of error as 3% and design effect as 1, the sample size is obtained as 1067. A total of 1174 sample is selected to compensate unpredicted errors and Snowball sampling technique is used in the study.

2.5 Study procedure:

Respondents aged ≥10 years old, residents of South India were recruited via snowball sampling method, google forms were used to facilitate data collection, it is an online survey tool that can ease the distribution of questionnaire via e-mail, WhatsApp, Facebook, telegram, Instagram etc. It analyzes and exports the results after responses have been collected, it also guides the respondents to complete all questions after responses have been collected, it also guides the respondents to complete all questions before exiting, thereby minimizing the frequency of missing questions before exiting, thereby minimizing the frequency of missing questions.

2.6 Description of the tool:

A self-administered questionnaire on Hand hygiene was developed by an extensive literature review on key issues related to hand washing and hand drying and critical times of Hand washing.

- Section-A includes electronic consent.
- Section-B includes 7 questions related to demographic details.
- Section-C includes 15 questions related to knowledge on hand hygiene.
- Section-D includes 15 questions related to practice on hand hygiene.

Participants were asked to select an answer for the multiple choice questions. Score of 1 was given for each correct answer for a knowledge question and 0 for a wrong answer. The score ranged from 0 to 15 with highest score indicating considerable knowledge on hand hygiene. The score ranged 0 to 15 even for practice questions with highest score indicating good practice on Hand hygiene.

2.7 Content validity:

The amount to which an element in a measuring technique is relevant and indicative of the construct that will be measured is the content of validity. The developed questionnaire was sent to 6 academicians in the field of public health and the tool was adjusted based on their suggestions and the final tool was prepared.

2.8 Pilot study:

After getting approval from the Institutional review board, a pilot study with the sample size of 30 was conducted in online platform, the responses were collected from the participants which were determined to be practicable therefore no changes were made thus the tool was finalized.

2.9 Data analysis:

Descriptive statistics for socio-demographic details, Knowledge level on hand hygiene and hand hygiene practices were presented, the data was retrieved from google forms and interpreted in the Microsoft excel. Chi square test was used to determine the association between the categorical variables by using Graph Pad Prism version 9.0.0.121, Graph Pad Software LLC. Independent t test was used to compare the region differences in knowledge and practice scores on hand hygiene. Backward multiple regression was conducted to identify the most parsimonious combination of region and other extraneous variables in predicting knowledge and practice scores by using SPSS.

3. RESULTS

3.1 Data interpretation:

A total of 1191 responses were collected by using Google forms, among them the data which was incomplete and inappropriate was excluded, therefore 1178 responses were included for the analysis.

Section 1: Socio demographic characteristics of the respondents:

The respondents were distributed according to age groups (10-30, 31-60, >60), majority of the respondents were in between 10-30 years (86.33%, n=1017) of age group. Over half of the participants were males (56.79%, n=669), population with household 4 in number were greater in proportion (49.49%, n=583). The majority of the respondents attained under graduation (56.45%, n=665). The characteristics were compared within regions, Rural (38.37%, n=452) and urban (61.62%, n=726) populations. The statistically significant variables were age groups at $P<.05$, States and UT at $P<.001$ and education level at $P<0.001$.

Section 2: Knowledge level towards Hand hygiene among the rural and urban population:

The knowledge score among rural and urban population is differentiated by using independent T test. From this it was found that urban population have considerably good knowledge than rural population on hand hygiene.

Table 1. Independent t-test for Hand hygiene knowledge

Region	N	Mean	Std. deviation	Std.error Mean
Rural	452	9.79	2.138	.101
Urban	726	10.07	2.136	.079

The above table indicates that the urban respondents have better knowledge towards HH than rural respondents. (10.07±2.136 vs 9.79±2.138).

Multiple regression analysis:

Backward multiple regression was conducted to identify the most parsimonious combination of region (rural, urban), age group (10-30 years, 30-60 years and >60 years), gender(female, male), state and UT (Andhra Pradesh, Karnataka, Tamilnadu, Kerala, Telangana, Andaman and nicobar, Puducherry, Lakshadweep), household (2, 3, 4, >4 members), education level (10 and below 10, intermediate, UG, PG, Ph. D) in predicting the knowledge score. The assumptions of linearity, data multi co linearity, homoscedasticity and distribution of residuals and the options of influential cases were checked and met, after conducting backward regression, the model that included males, urban, Tamilnadu, 2 members(house hold) was the most parsimonious combination [F (4,1173) =26.139, *P*<.001 (0.000127), adjusted R^2 = 0.016]. The final model suggested that urban had a significant higher knowledge score by 0.279 than rural after adjusting for males, Tamilnadu, 2 members (house hold).

Table 2. Possible predictors on knowledge towards Hand hygiene using regression analysis (final model)

Variables entered	Unstandardized coefficients Beta	std error	*t*	Sig.	Adjusted R^2	F value(df)(sig.)
(Constant)	9.500	.202	47.044	.00	.016	F(4,1173)=26.139,
Males	.273	.126	2.170	.23		*P*<.001

Urban	.279	.128	2.188	.20
Tamilnadu	-.612	.335	-1.828	.06
Household(2)	-.646	.194	-3.323	.001

Dependent variable: Total correct in knowledge towards Hand Hygiene

Section: 3 Practice towards Hand hygiene among the rural and urban population:

From the Independent t-test it was found that urban residents are preferably practicing more hand hygiene practices than rural population.

Table 3. Independent t-test for Hand hygiene practice:

Region	N	Mean	Std.deviation	Std.error Mean
Rural	452	10.77	2.280	.107
Urban	726	11.25	1.991	.074

The above table indicates that the urban respondents are practicing Hand hygiene in a better way than rural respondents. (10.77±2.280 vs 11.25±1.991).

Multiple regression analysis:

Backward multiple regression was conducted to identify the most parsimonious combination of region (rural, urban), age group (10-30 years, 30-60 years and >60 years), gender(female, male), state and UT (Andhra Pradesh, Karnataka, Tamilnadu, Kerala, Telangana, Andaman and nicobar, Puducherry, Lakshadweep), household (2, 3, 4, >4 members), education level (10 and below 10, intermediate, UG, PG, Ph. D) in predicting the practice score. The assumptions of linearity, data multi co linearity, homoscedasticity and distribution of residuals and the options of influential cases were checked and met, after conducting backward regression, the model that included household(2), urban, household(3), 10 and below 10, intermediate was the most parsimonious combination [$F(5,1172)=37.928$, $P<.001$, adjusted $R^2 = 0.032$]. The final model suggested that urban had a significant higher practice score than rural population.

Table 4: Possible predictors on practice towards Hand hygiene using regression analysis (final model)

Variables entered	Unstandardized coefficients		*t*	Sig.	Adjusted R^2	F value(df)(sig.)
	Beta	std. error				
(Constant)	10.968	.111	98.367	.00	.032	F(5,1172)=37.928, *P*<.001
Household(2)	-5.75	.191	-3.006	.003		
Urban	.388	.127	3.061	.002		
Household(3)	.339	.189	1.798	.07		
10th &below 10^{th}	-.610	.220	-2.771	.006		
Intermediate	-.607	.198	-3.064	.002		

Dependent variable: Total correct in practice towards Hand hygiene

4. DISCUSSION:

In the current study, responses were received from the population residing in rural and urban areas of South India. A total of 1178 individual responses were selected for analysis of results. Majority of the studies on hand hygiene were majorly conducted in Health care workers, Hospital staff and specific groups, but in our study respondents were not restricted to a single group.

In this study, the urban respondents have good knowledge towards hand hygiene than rural population (Mean 10.07 and 9.79 respectively).The knowledge was relatively low for some items related to hand washing hand rubbing increased bacterial count after using warm air dryer and Paper towels has good ability to remove bacteria from hands. Almost majority of respondents have agreed that hand hygiene is a part of personal hygiene from the results of multiple regression, it was shown that there was association between the demographic variables and the male respondents in a household of 2 members residing in urban regions of Tamilnadu had relatively better knowledge on hand hygiene behavior when compared with other demographic variables.

The findings of the current study were similar to the study performed by Suen et al.[11] in Hong Kong, China 2019 but the particular finding related to hand washing with soap is high than current study the reason may be the way of questioning or the participants might have more knowledge regarding hand washing than the respondents in the current study but the multiple regression results of Suen et al. are not similar with our study as the females had more knowledge but in the current study males had preferably more knowledge than females, the reason might be the difference in the number of female respondents in both the studies.

Ashwini et al [12] performed a study in Davangere rural population in November 2019. The findings of study are not similar with our study for some practices like before and after caring of sick person, after blowing nose, coughing and sneezing. The findings are markedly high in the current study as it was conducted during Covid19 pandemic and the reason may be due to wide promotion on hand hygiene practices.

A study conducted by Water Aid India in 2017 where the rural population from the states of Bihar, Chhattisgarh, Rajasthan, Odisha interviewed about hand washing practices at critical

times [13]. The findings of study were similar with our study except for the practice before, during and after preparing food, which were found to be high in our study.
Pandve HT et al. [14] performed a study on hand washing practices in rural community of Pune, India in 2015. The findings of study are agreed with our study by this it is found to be evident that hand hygiene practices are to be promoted in the rural communities.
S K Ray et al. [15] performed a study on hand washing practices in urban and rural communities in and around Kolkata, West Bengal 2009. The findings of the study are not similar with our study for some practices like before, during and after preparing food, after using toilets, in contrast with the current study majority of the participants in the S K Ray et al study are not using the right practices for hand drying.

5. CONCLUSION:

The study results shown that urban residents have preferably more knowledge than rural residents. Misconceptions related to the concepts that are associated with Hand Hygiene were noted amongst the public. The findings of this study can provide information to region specific health promotion activities. Creative campaigns and awareness programs should be conducted to attain persistent improvement in Hand hygiene practices.

6. LIMITATIONS AND RECOMMENDATIONS OF THE STUDY:

The current study has some limitations primarily because it is an online survey where many of the general population which includes illiterates can't have access to participate in our study. In this study, snowball technique was used and it may not represent entire population and respondents may give biased information as hand hygiene is a socially desirable and morally laden behavior. So, it is recommended to conduct future studies in a logical way where the respondent's knowledge and practices on hand hygiene can be assessed more accurately. A wide range surveys have to be conducted to know the factors that may cause variation in hand hygiene practices among underdeveloped, developing and developed countries.

CONSENT:

Before data collection an informed consent was collected from participants electronically, the participants who have given their consent and filled the form were included in the study.

ETHICAL APPROVAL:

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

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ABBREVIATIONS

HH: Hand Hygiene
WHO: World Health Organization
CDC: Centers for Disease Control and Prevention
UNICEF: United Nations Children's Fund
SPSS: Statistical Package for the Social Sciences