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Effectiveness of School Based Health Education Intervention Knowledge and Practice Regarding 5fs Disease Transmission (Finger, Food, Fluids, Fomite and Feaces) Among Children's of Selected School

Prajkta Ranba Waghmare
Nursing Tutor, Yash Institute of Nursing and Paramedical Sciences Indapur, Pune, India

Corresponding Author: **Prajkta Ranba Waghmare**

Abstract
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Keywords: 5fs Disease Transmission, Education, tuberculosis (TB), Covid-19

Introduction

Health is a fundamental human right, integral to the overall development of individuals and societies. Optimal health is essential for achieving a high quality of life and personal success. Beyond individual responsibility, health is a national and global priority, as well as a universal social goal. Infectious diseases remain a significant global health challenge, contributing to high mortality rates, particularly in developing countries. These diseases often result from the transmission of pathogenic organisms through contaminated food, water, hands, and surfaces. Communicable diseases, defined as illnesses caused by infectious agents or their toxic products, are transmitted through direct or indirect contact between a reservoir host and a susceptible individual.[1]

Children in low- and middle-income nations are disproportionately affected by communicable illnesses, which continue to be a major worldwide health problem. A significant number of these illnesses are associated with the spread of infectious agents through the "5 F's": fingers, food, fluids, feaces, and fomites. These routes of transmission, which are frequently linked to poor sanitation, hygiene, and water availability, are essential in the spread of respiratory infections, diarrhoeal diseases, and other avoidable illnesses. Children, particularly those under five years of age, are especially vulnerable due to their developing immune systems and behaviours such as hand-to-mouth activities and limited awareness of personal hygiene practices. Addressing these pathways is essential to reducing the morbidity and mortality associated with infectious diseases in this population.[2]

Despite advancements in public health, the burden of 5F-related diseases persists due to gaps in education, infrastructure, and behaviour change interventions. Understanding the extent of knowledge among children regarding these transmission pathways is crucial for designing effective health promotion strategies. This research aims to assess the effectiveness of a structured teaching program on improving children's knowledge of the 5 F's of disease transmission in a specific community setting. The findings will provide insights into the impact of targeted educational interventions on reducing disease transmission and supporting broader public health efforts to enhance child health outcomes.[2]

The pathogenic microorganisms that cause infection, such as "bacteria, viruses, parasites, or fungus," can spread from one person to another either directly or indirectly. Infection spreads through direct contact from person to person, contact of body fluids, any secretions or even the fomite used by the infected person. The oral fecal route can be summarized into five f: - finger, food, fluid, feaces, and flies.

Background of Study

Disease Transmission:

Transmission is the process by which a pathogen spreads from one host to another. Diseases or infections are transmitted in many ways. It may be directly transmitted from one person to another, or by certain bacteria, viruses, protozoa, or fungi. Disease transmission occurs when an infectious agent is transferred from a reservoir to a susceptible host. There are several modes of transmission, including:

- Direct Contact-This occurs when there is physical contact between an infected person and a susceptible person. Examples include skin-to-skin contact, kissing, sexual intercourse, or contact with contaminated soil.
- Indirect Contact-This occurs when there is no direct human-to-human contact. Examples include contact with contaminated surfaces or objects, or to vectors such as mosquitoes, flies, mites, fleas, ticks, rodents or dogs.

Airborne-This occurs when infectious agents are carried in the air via aerosols, which are long-lasting particles. Examples include measles, tuberculosis (TB), chickenpox (Varicella), and SARS/Covid-19.

- Respiratory-This occurs when infectious agents are carried from an infected person's nose or mouth via coughing, sneezing, or through saliva and mucous. Examples include flu (Influenza).
- Vertical transmission-This occurs from mother to child, often in utero, during childbirth, or during postnatal physical contact between parents and offspring. Examples include HIV, hepatitis B, and syphilis.[8]

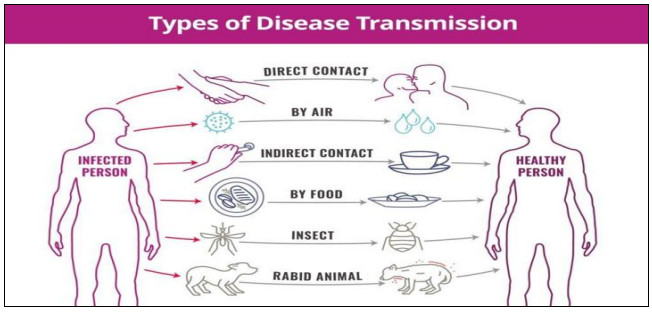

Fig 1: Types of disease Transmission

Need for Study

The health problems of a school child vary from place to place and several studies conducted in India revealed that the main morbidity conditions include infectious diseases, malnutrition, helminthiases, diseases of the skin, eye & ear and dental caries. Worldwide, the lack of clean water for drinking, cooking and washing, and the lack of sanitary waste disposal are to blame for over 12 million deaths a year, say researchers. About 1.2 billion people are at risk because they lack access to safe fresh water. India too has its share of infectious epidemics; and though mortality owing to these is decreasing, it is a significant part of the disease burden our society carries. The disease burden like9·7 million deaths in India, for obvious reasons like poor sanitation, lack of access to fresh water, poor hygiene, etc., which are common in the most developing countries.[12]

According to studies of Water Supply and Sanitation Collaborative Council, five thousand children die every day due to infectious diarrhoea, which is caused primarily by inadequate sanitation. Seventeen percent of under-five deaths are attributable to diarrhoeal diseases, making it the second largest killer of children, after pneumonia. Diarrhoea is also a major contributor to malnutrition and stunting. Diarrhoeal diseases are often described as water-related, but more accurately should be known as excreta- related since the pathogens derive from faecal matter. The "faecal-oral cycle" describes the principal routes of transmits of infectious diarrhoeal disease. This cycle is fuelled by the "five f's": fluid (drinking contaminated water); fields (the contamination of soil and crops with human faecal matter); fingers (unwashed hands preparing food or going into the mouth); food (eating contaminated food); and flies (spreading disease from feaces to food and water or directly to people – particularly problematic where openair defecation is the norm).[13]

Objective of Study

1. To assess the pre - test and post -test knowledge scores & practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children.
2. To assess the effectiveness of pre - test and post - test knowledge scores & practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children.
3. To find out the association of pre - test knowledge scores & practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children with their selected socio demographic variables.

Hypothesis

H0: There is no significant difference in the knowledge regarding 5Fs disease transmission among children before and after the implementation of the school based health education intervention.

H1: There will be significant difference between the mean pre-test and post-test knowledge scores & practice regarding 5 Fs (food, finger, fluids, flies and feaces) disease transmission in children.

H2: There will be significant association between the pre-test level of knowledge and practice regarding 5 Fs (food, finger, fluids, flies and feaces) disease transmission in children with their selected socio-demographic variable.

Methodology and Material

The research methodology includes the strategies to be used to collect and analyse the data to accomplish the research objectives. It has crucial implications for the validity and credibility of the study findings. The methodology of research indicates the general pattern for organizing the procedure of gathering valid and reliable data for an investigation. The present chapter deals with a brief description of methodology adopted for the study. The contents included in this chapter are research approach, research design, variables under study, the data collection procedure, description of the treatment, pilot study and the plan for data analysis for the present study.

Research Apporach

The choice of the research approach constitutes one of the major decisions, which must be made in conducting a research study as the approach taken on a research project can greatly affect its outcome. The research approach is the broad basic procedure for collecting data in a particular research situation. Research approach is a systematic,

objective method of discovery with empirical evidence and rigorous control. The research approach spells out the basic strategies that the researcher adopts to develop information that is accurate and interpretable. The control is achieved by holding conditions constant and varying only the phenomenon under study.

The research strategy is critical to the success of the study. The suitable research method is determined by the study purpose and the goals of the investigation. In this study research approach used by researcher is Quantitative approach.

Research Design

Research design is the overall plan for obtaining answer to the questions being studied for handling some of the difficulties encountered during research process.[51]

The research design adopted for the study was pre - experimental research design (pre-test and post-test one group design).

The preparation of research design, appropriate for particular research problem involves the consideration of the following:

1. Objectives of the research study.
2. Method of data collection.
3. Source of information.

Schematic Representation of Research Design

Pre Test	Intervention	Post Test
O1	X	O2

Keys

O1 - Pre-test assessment of knowledge and practice score X – Intervention school-based health education

O2 - Post-test assessment knowledge and practice score

Research Setting

Research setting is the specific place where the study is conducted. The selection of setting is done on the basis of feasibility of the study, availability of the subject and co-operation of authorities.

Setting is the physical location and condition in which data collection takes place in the study. In this study, research setting is selected school.

Population

Population refers to the entire population in which the researcher is interested and to which he or she would wish to make generalization of the study results.

The term target population refers to any definable group of individuals who are experiencing a problem or need.

In this study, target population of the study was be children from school.

The accessible population refers to the aggregate of cases that confirm the designated criteria and that are accessible as subjects of the study.

The accessible population for the present study was children who are studies in selected school of Solapur district.

Sample and Sampling Technique

A sample refers to a subset of individuals selected from the population in a deliberate and planned manner to represent the characteristics of the larger group. It allows the researcher to study a smaller group to infer findings about the broader population.

In this study, the sample comprises school children from selected schools who are exposed to school-based health education interventions on the 5Fs of disease transmission (Finger, Food, Fluids, Fomite, and Feaces).

Sample Size

Sample size: Sample size is defined as, “Number of people who participate in a study”. Sample size was 60 children selected from school of Solapur district.

Method of Selection of Study Subjects

Inclusion Criteria

1. Children who are able to communicate in Marathi or English.
2. Children who are willing to participate in the study.
3. Children who are available during the data collection period.
4. Children within the specified grade levels of the selected school(s).
5. Children whose parents or legal guardians provide written consent for participation in the study.

Exclusion Criteria

1. Children who are physically or mentally compromised, such as those with severe cognitive or developmental disabilities that may hinder their ability to engage effectively in the intervention or assessments.
2. Children who are not available during the time of data collection.
3. Children who do not provide assent or whose parents/legal guardians do not provide consent for participation in the study.

Sampling Technique

It refers to the process of selecting a portion of the population to represent the entire population Non-Probability Purposive sampling technique was used to select the samples in the study.

Validity of tool:

Thus, according **Burns and Grave** (2005), "the degree to which an instrument properly reflects the abstract material under evaluation is used to assess an instrument's dependability."

Result

Analysis & Interpretation of Data

In order to go on to some findings in line with the study questions, the chapter presents the analysis, organising, and summarising the data gathered. The interpretation approach can be viewed as a satisfactory explanation of the precise meaning of the data supplied for the chosen study's goals and objectives.

The interpretation of the study's data analysis results is the main topic of this chapter. This chapter shows the study's results, talks about the extensive statistical analysis, and draws conclusions regarding whether or not to accept the hypotheses. The review and analysis of the study's findings, along with all of its objectives and hypotheses, are covered in later chapters. The data must be processed and analysed in conformity with the purpose-specific framework when developing a research strategy. In order to interpret and address the research scholar's questions, it aims to provide a pertinent synopsis and arrangement of data.

The process of systematically using factual and intelligent systems to illustrate, define, summarise, and evaluate information is known as data analysis. The process of "classifying, ordering, manipulating, and summarising data to obtain answer to research questions" is known as data analysis. Simplifying the data into an understandable form is the aim of the analysis in order to investigate and test the research problem. The researcher has broken down the data into its constituent parts in order to answer research questions and hypotheses.

The analysis of tabular data may reveal the actual significance of a study's findings. Polit and Hungler define data analysis as the systematic organisation, synthesis, and application of research data to test research hypotheses. Data gathered from nurses serves as the foundation for data interpretation and analysis. According to the study's goals, both descriptive (in terms of frequency, percentage, mean, median, mode, and SD) and inferential (t-test, chi-square, and Fisher Exact test) statistics were used for data analysis and interpretation.

Section I

Table 1: Demographic Profile

n=60

Demographic Variables	F	%
Age in years		
6-8 years	17	28.33
9-11 years	19	31.67
12-24 years	24	40.00
Gender		
Male	33	55.00
Female	27	45.00
Other	0	0.00
Class		
1st -3rd	15	25.00
4th -6th	21	35.00
7th-8th	24	40.00
Type of School		
Government	25	41.67
Private	35	58.33
Residential area		
Urban	37	61.67
Rural	23	38.33
Family Income		
Below Rs 10,000	12	20.00
Rs 10,000-Rs 30,000	19	31.67
Above Rs 30,000	29	48.33
Parental Education level		
No formal education	11	18.33
Primary school	10	16.67
Secondary school	22	36.67
Graduate or above	17	28.33
Source of drinking water at home		
Filtered	20	33.33
Boiled	17	28.33
Untreated	23	38.33
Type of toilet facility at home		
Open defecation	17	28.33
Shared community toilet	19	31.67
Private toilet	24	40.00
Participation in school health programs		
Yes	35	58.33
No	25	41.67

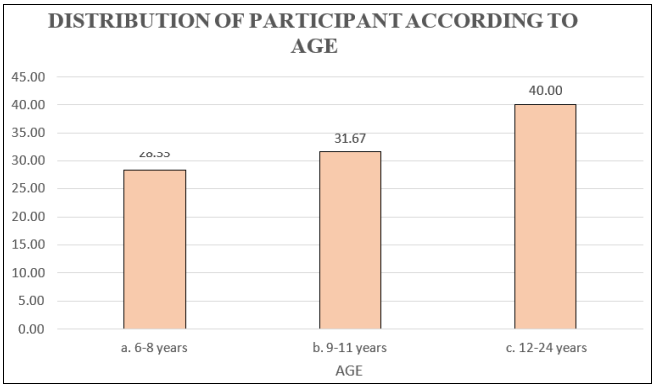

Fig 1: Percentage wise distribution according to Age

The majority of individuals fall within the 12–24 years age group, representing 40% of the population with 24 individuals. This indicates that the largest share of the population belongs to this age range. The 9–11 years age group follows with 31.67% (19 individuals), while the 6–8 years age group makes up the smallest proportion at 28.33% (17 individuals). Thus, the data highlights that the 12–24 years group is the dominant age category among the population studied.

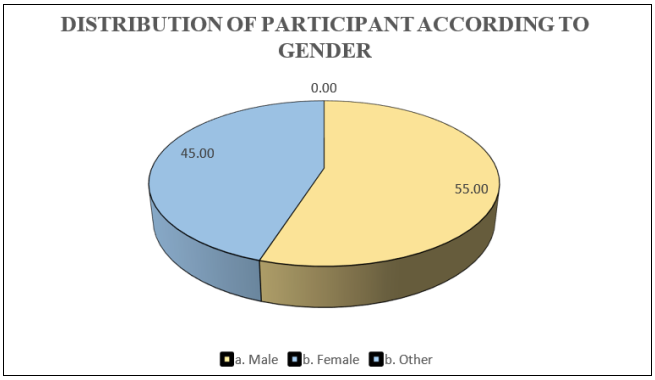

Fig 2: Percentage wise distribution according to Gender

The data on gender distribution shows that the majority of individuals are male, accounting for 55% of the population, with 33 individuals represented. Females make up 45% of the population, with 27 individuals. Notably, no individuals identified as "Other," resulting in 0% representation for this category. This indicates that males form the largest group within the population studied.

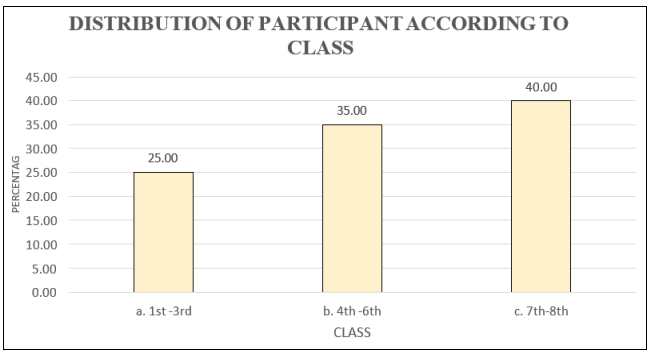

Fig 3: Percentage wise distribution according to Class

The data on class distribution reveals that the majority of individuals belong to the 7th–8th grade level, comprising 40% of the population with 24 individuals. The 4th–6th grade level follows, representing 35% of the population with 21 individuals. The smallest group is the 1st–3rd grade level, accounting for 25% of the population with 15 individuals. This indicates that the 7th–8th grade level constitutes the largest proportion of the population studied.

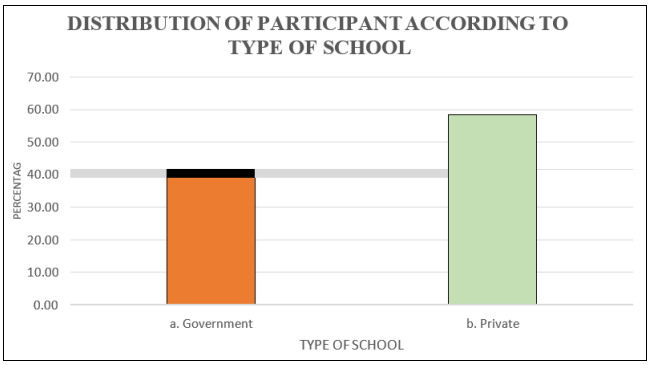

Fig 4: Percentage wise distribution according to Type of school

The data on the type of school attended shows that the majority of individuals, 58.33% (35 individuals), are enrolled in private schools. In comparison, 41.67% (25 individuals) attend government schools. This indicates that private schools are the predominant choice among the population studied.

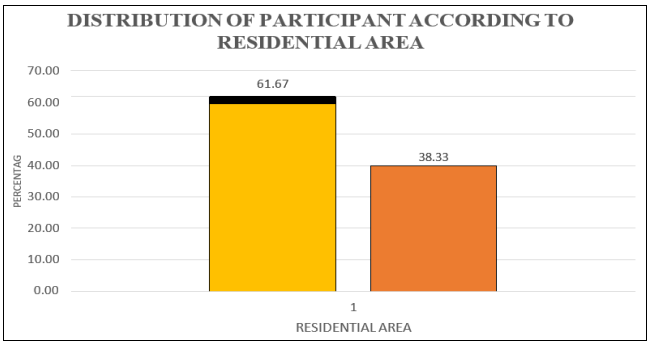

Fig 5: Percentage wise distribution according to Residential area

The data on residential areas reveals that the majority of individuals, 61.67% (37 individuals), reside in urban areas. In contrast, 38.33% (23 individuals) live in rural areas. This indicates that urban areas are the predominant residential setting among the population studied.

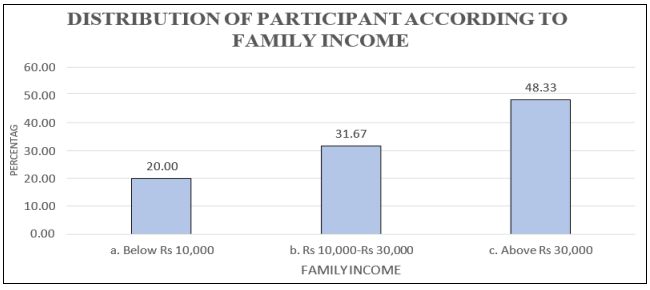

Fig 6: Percentage wise distribution according to Family Income

The data on family income shows that the majority of individuals, 48.33% (29 individuals), belong to families with an income above Rs 30,000. This is followed by 31.67% (19 individuals) from families earning between Rs 10,000 and Rs 30,000. The smallest group, 20% (12 individuals), consists of families with an income below Rs 10,000. This indicates that families with incomes above Rs 30,000 form the largest proportion of the population studied.

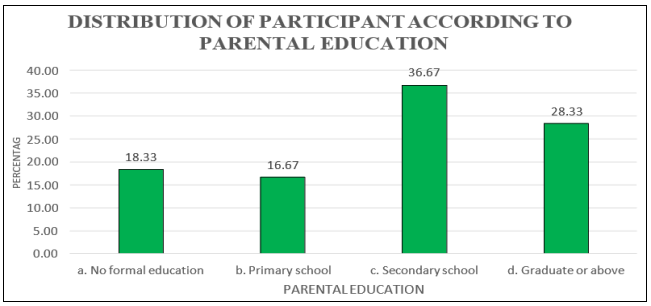

Fig 7: Percentage wise distribution according to Parental education

The data on parental education level indicates that the majority of parents, 36.67% (22 individuals), have completed secondary school education. This is followed by 28.33% (17 individuals) who are graduates or have attained higher levels of education. Parents with no formal education account for 18.33% (11 individuals), while 16.67% (10 individuals) have completed primary school. This suggests that secondary school education is the most common educational attainment among parents in the population studied.

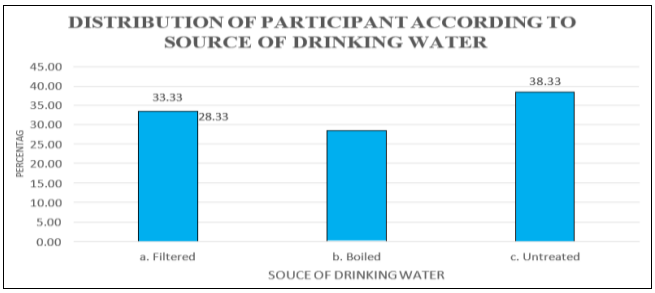

Fig 8: Percentage wise distribution according to Source of drinking water

The data on the source of drinking water at home reveals that the majority of households, 38.33% (23 households), use untreated water for drinking. This is followed by 33.33% (20 households) that rely on filtered water and 28.33% (17 households) that use boiled water. This indicates that untreated water is the most common source of drinking water among the households studied, highlighting potential health and safety concerns.

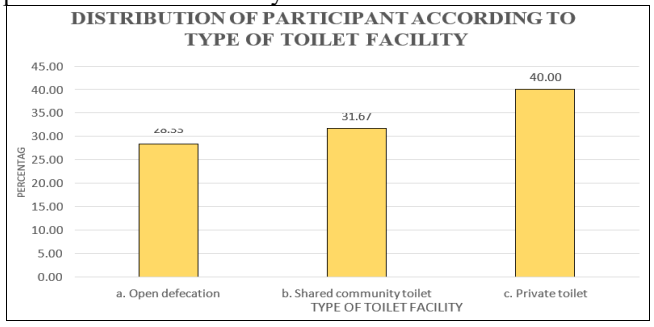

Fig 9: Percentage wise distribution according to Type of toilet facility

The data on toilet facilities at home indicates that the majority of households, 40% (24 households), have private toilets. This is followed by 31.67% (19 households) that use shared community toilets, while 28.33% (17 households) practice open defecation. This suggests that private toilet facilities are the most common among the households studied, though a significant portion still relies on shared facilities or lacks access to proper sanitation.

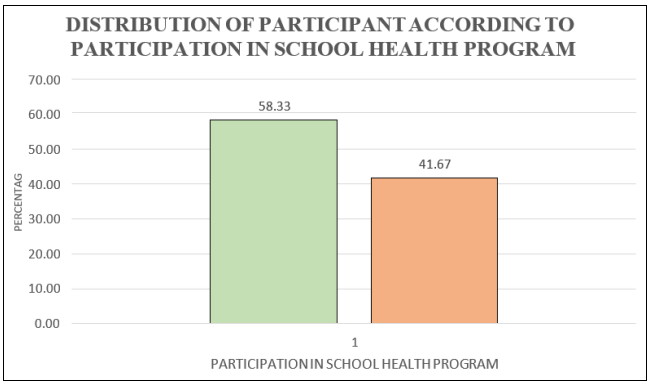

Fig 10: Percentage wise distribution according to Participation in school health program

The data on participation in school health programs reveals that the majority of individuals, 58.33% (35 individuals), participate in these programs. In contrast, 41.67% (25 individuals) do not participate. This indicates that school health programs are widely attended by the population studied, with more than half of the individuals actively engaging in them.

Section II a: Finding related pre test knowledge score regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children

Table 2: Related to pretest level of Knowledge

Level of Knowledge Pre Test	f	%	Mean	SD
Poor (0 - 7)	31	51.67	8.05	3.49
Average (8-14)	26	43.33		
Good (15-20)	3	5.00		

The above table shows findings related pretest level of Knowledge. Majority of 51.67% were Poor knowledge, 43.33% were having Average knowledge and 5% were having Good Knowledge. Mean is **8.05** with SD_+**3.49**.

Section II

Section II b: Finding related post test knowledge score regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children

Table 3: Related to post test level of Knowledge

Level of Knowledge Post Test	f	%	Mean	SD
Poor (0 - 7)	0	0.00	13.50	2.62
Average (8-14)	33	55.00		
Good (15-20)	27	45.00		

The above table shows findings related post test level of Knowledge. Majority of 55% were Average knowledge and 45% were having Good Knowledge. Mean is **13.50** with SD_+**2.62**.

Section III

Section III a: Finding related to Pre test level of Practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children

Table 4: Related to Pre test level of Practice

Level of Practice Pre Test	f	%	Mean	SD
Poor Practice (0 - 7)	33	55.00	7.43	2.82
Average Practice (8-14)	25	41.67		
Good Practice (15-20)	2	3.33		

The above table shows findings related Pre test level of Practice. Majority of 55% were Poor Knowledge, 41.67% were having Average knowledge and 3.33% were having Good Knowledge. Mean is **7.43** with SD_+**2.82**.

Section III b: Finding related to Post test level of Practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children

Table 5: Related to Post test level of Practice

Level of Practice Post Test	f	%	Mean	SD
Poor Practice (0 - 7)	0	0.00	14.20	2.42
Average Practice (8-14)	29	48.33		
Good Practice (15-20)	31	51.67		

The above table shows findings related Post test level of Practice. Majority of 51.67% were Good Knowledge and 48.33% were having Average knowledge. Mean is **14.20** with SD_+**2.42**.

Section IV

Section IV a: finding related effectiveness of the pre - test and post - test knowledge scores regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children

Table 6: Related to assess the effectiveness of knowledge regarding 5F's of disease transmission among children

Knowlwdge Effectiveness	Mean	SD	DF	T test calcaluated value	P value	Remark
Pre test	8.05	3.49	59	10.5603	0.0001	Significant
Post test	13.5	2.62	59			

The results show that the knowledge of participants improved significantly after the intervention. In the pre-test, the average score was **8.05**, with a variation of **-+3.49**. After the intervention, the average score increased to **13.5**, with less variation of **-+2.62**. The t-test value of **10.5603** and a p-value of **0.0001** indicate that this improvement is statistically **Significant**. In simpler terms, the program or intervention was effective in increasing the participants' knowledge.

Section IV b: finding related effectiveness of the pre – test and post – test Practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children

Table 7: Related to assess the effectiveness of Practice regarding 5F's of disease transmission among children

Practice Effectiveness	Mean	SD	DF	T test calcaluated value	P value	Remark
Pre test	7.43	2.82	59	13.7708	0.0001	Significant
Post test	14.2	2.42	59			

The results show a significant improvement in participants' practice after the intervention. In the pre-test, the average score was **7.43**, with a variation of **-+2.82.** After the intervention, the average score increased to **14.2**, with a smaller variation of **-+2.42**. The t-test value of **13.7708** and the p-value of **0.0001** show that this improvement is statistically **Significant**. In simple terms, the program or intervention successfully improved the participants' practice.

Section V

Section V a: finding related to the association with selected demographic variables and pre test knowledge score

Table 8: Below table shows the association between selected demographic variables & level of knowledge regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children are not associated with demographic variables at a significant level of 0.05.

The analysis shows no significant relationship between demographic variables and the measured outcomes. For all categories, including age, gender, income, education, and participation in school health programs, the p-values are above 0.05. This means that these factors did not significantly influence the results. In short, the demographic characteristics had little to no impact on the effectiveness of the intervention.

Table 8

n=60

Demographic Variables	Average	Good	Poor	DF	CHi Table value	Chi calculated	P value	Remark
Age in years								
6-8 years	7	0	10	4	9.488	3.396	0.494	Not Significant
9-11 years	6	1	12					
12-24 years	13	2	9					
Gender								
Male	14	1	18	4	9.488	0.701	0.951	Not Significant
Female	12	2	13					
Other	0	0	0					
Class								
1st -3rd	6	0	9	4	9.488	3.269	0.514	Not Significant
4th -6th	7	1	13					
7th-8th	13	2	9					
Type of School								
Government	8	1	16	2	5.991	2.618	0.27	Not Significant
Private	18	2	15					
Residential area								
Urban	14	1	22	2	5.991	2.826	0.243	Not Significant
Rural	12	2	9					
Family Income								
Below Rs 10,000	7	0	5	4	9.488	2.438	0.656	Not Significant
Rs 10,000-Rs 30,000	7	2	10					
Above Rs 30,000	12	1	16					
Parental Education level								
No formal education	6	0	5	6	12.592	3.509	0.743	Not Significant
Primary school	3	0	7					
Secondary school	9	1	12					
Graduate or above	8	2	7					
Source of drinking water at home								
Filtered	8	0	12	4	9.488	3.655	0.455	Not Significant
Boiled	8	0	9					
Untreated	10	3	10					
Type of toilet facility at home								
Open defecation	7	0	10	4	9.488	3.396	0.494	Not Significant
Shared community toilet	6	1	12					
Private toilet	13	2	9					
Participation in school health programs								
Yes	14	2	19	2	5.991	0.413	0.814	Not Significant
No	12	1	12					

Table 9

n=60

Demographic Variables	Average Practice	Good Practice	Poor Practice	DF	Chi Table value	Chi calculated	P value	Remark
Age in years								
6-8 years	3	0	14	4	9.488	7.885	0.096	Not Significant
9-11 years	8	1	10					
12-24 years	14	1	9					
Gender								
Male	13	2	18	4	9.488	0.83	0.934	Not Significant
Female	12	0	15					
Other	0	0	0					
Class								
1st -3rd	1	0	14	4	9.488	11.919	0.018	Significant
4th -6th	10	1	10					
7th-8th	14	1	9					
Type of School								
Government	8	0	17	2	5.991	2.873	0.238	Not Significant
Private	17	2	16					
Residential area								
Urban	14	1	22	2	5.991	0.804	0.669	Not Significant
Rural	11	1	11					
Family Income								
Below Rs 10,000	6	0	6	4	9.488	3.399	0.493	Not Significant
Rs 10,000-Rs 30,000	7	2	10					
Above Rs 30,000	12	0	17					
Parental Education level								
No formal education	7	0	4	6	12.592	4.713	0.581	Not Significant
Primary school	3	1	6					
Secondary school	7	1	14					
Graduate or above	8	0	9					
Source of drinking water at home								
Filtered	6	1	13	4	9.488	6.363	0.174	Not Significant
Boiled	5	0	12					
Untreated	14	1	8					
Type of toilet facility at home								
Open defecation	3	0	14	4	9.488	7.885	0.096	Not Significant
Shared community toilet	8	1	10					
Private toilet	14	1	9					
Participation in school health programs								
Yes	13	2	20	2	5.991	1.078	0.583	Not Signifi cant
No	12	0	13					

Section Vb: Finding related to the association with selected demographic variables and pre test Practice score

Table 9: Above table shows the association between selected demographic variables & level of Practice regarding 5 F's of disease transmission (Food, Finger, Fluid, Fomite, Feaces) among children are associated with only Q.3 Class are associated with demographic variables at a significant level of 0.05 others are not associated.

The analysis shows that most demographic factors, including age, gender, family income, and others, did not significantly affect practice outcomes. However, **class level** had a **significant impact**, with students in different grades showing different levels of practice effectiveness. In short, class level was the only factor that influenced practice outcomes.

Conclusion

This chapter discusses the frequency and percentage distribution of sample characteristics, knowledge and practice levels, pre-test, mean, standard deviation, and "t" test scores, as well as the effectiveness and correlation between the pre and post tests, i.e., the relationship between demographic variables along with knowledge and practice.

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