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A Study To Assess The Effectiveness Of Safe Delivery Application On Knowledge Regarding Maternity Care Among The VII Semester B.Sc. Nursing Students Of College Of Nursing, Synod Hospital, Durtlang, Aizawl, Mizoram, India.

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Abstract:
Background: *Labor is a process, where women give birth to a child. The process of labor is one of the most wonderful events in women's lives, which also marks a new beginning. The anticipated period of fear immediately disappears right after the baby is born. It is also a period during which women need maximum care. The overall aim of caring a woman during labor and childbirth is to promote a positive impact on the mother and the family members while maintaining the health and also preventing the complications that can happen. The common errors such as not treating anemia during pregnancy and faulty techniques of conduction of delivery can cause serious effects on both the mother and the child. It should be identified and corrected.*
Materials and Methods: *The sampling technique employed in this study was a non-random purposive sampling technique. The sample of this study comprises of 30 nursing student studying VII Semester B.Sc. Nursing at College of Nursing, Synod Hospital, Durtlang, Aizawl, Mizoram. The questionnaire was used to assess the knowledge regarding maternity care among the students.*
Results: *The data were analyzed to find out the effectiveness of Safe Delivery Application on knowledge regarding Maternity Care among the VII Semester BSc Nursing Students of College of Nursing, Synod Hospital, Durtlang. The chi-square test did not reveal any significant relationships between pre-test knowledge levels and any of the demographic variables, including age ($p = 0.9655$), socioeconomic status ($p = 0.9722$), locality ($p = 0.2369$), prior clinical exposure ($p = 0.9722$), or prior exposures to labor ($p = 0.8581$). The trend for locality did suggest that students in towns may have a higher proportion in the Excellent category, but it was not significant ($p = 0.2369$). The implication of these findings is that demographic factors do not significantly contribute to baseline knowledge and that the Safe Delivery Application could be used reliably with all students.*
Conclusion: *The study implied that the demographic variables such as age, socio-economic background, locality, number of clinical exposures to Obstetric ward and history of encountering labor were found to have not significantly contributed to baseline knowledge and that the Safe Delivery Application could be used reliably with all students.*
Key Words: *Assess, Effectiveness, Knowledge, Safeguard, Postnatal mothers.*
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I. Introduction

In 2024, 2.3 million children died in their first 28 days of life and approximately 6,300 die every day worldwide. In the same year, approximately 2.6 million babies died during childbirth. In the same year, around 260,000 women die from complicated childbirth and pregnancy. These deaths are most likely due to the lack of skilled care quality throughout the childbirth. Health workers in many low-income countries are not adequately trained to deliver pregnant women safely. In response to this, the Safe Delivery App (SDA) has been developed, which provides animated clinical instruction videos in basic emergency obstetric and neonatal care. The main aim of the Safe Delivery Application is to improve knowledge and skills of health workers located in the periphery of the health system which will help improve quality of care and potentially save the lives of mothers and newborns. The rise of mobile technology has transformed various aspects of our lives, including healthcare. Safe delivery applications have emerged as a promising tool to improve maternal and child health outcomes by providing expectant mothers with access to vital information, support, and resources. These applications offer a range of features, including pregnancy tracking, health monitoring, emergency alerts, and educational content.

As the number of smartphone users continues to grow globally, safe delivery applications have the potential to bridge the gap in healthcare access, particularly in low-resource settings. This research aims to explore the effectiveness, usability, and impact of safe delivery applications on maternal and child health outcomes, with a focus on specific aspect of safe delivery applications. The Safe delivery app is a digital tool developed by Maternity Foundation, the University of Copenhagen and the University of Southern Denmark to strengthen healthcare workers and equip them with evidence-based and updated guidelines through their handheld devices. The app has been available since 2015 in global version. The Indian version of the app was designed in collaboration with Maternity Foundation and its partners to customize and adapt the text with Ministry of Health & Family Welfare's existing maternal and newborn health guidelines. The first version was adapted in English and relevant changes were adapted in audio and visuals, which was followed by addition of seven Indian language versions. In June 2017, pilot test was conducted in 4 districts each from Jharkhand, Madhya Pradesh, Odisha and Rajasthan. The outcomes were positive which followed its launch in December 2017 by the Honorable Union Minister of Health, Government of India. From 2018-2021, 100,000 downloaded the app in India.

II. Material And Methods

This study was carried out on VII Semester, B.Sc. (Nursing) at College of Nursing, Synod Hospital, Durtlang, Aizawl, Mizoram.
1st September to 7th September.

Study Design: The research design adopted for the present study is a pre-experimental design to assess the effectiveness of Safe Delivery Application on knowledge regarding Maternity Care among the VII Semester, BSc Nursing Students of College of Nursing, Synod Hospital, Durtlang, Aizawl, Mizoram, India.

Study Location: College of Nursing, Synod Hospital Durtlang, Aizawl, Mizoram, India.

Study Duration: 1st September to 7th September.

Sample size: 30 students.

Sample size calculation: The sample size was estimated by selecting VII Semester B.Sc. Nursing students of College of Nursing, Synod Hospital Durtlang, Aizawl, Mizoram, India and used non-random purposive sampling technique.

Subjects & selection method: All the eligible students studying VII Semester B.Sc. Nursing are collected as the sample.

Inclusion criteria:
1. VII Semester students at College of Nursing, Synod Hospital, Durtlang who are willing to participate.
2. VII Semester students at College of Nursing, Synod Hospital, Durtlang who are available.

Exclusion criteria:
1. VII Semester students at College of Nursing, Synod Hospital, Durtlang who are willing to participate.
2. VII Semester students at College of Nursing, Synod Hospital, Durtlang who are available.
3. Students who are not studying VII Semester at College of Nursing, Synod Hospital, Durtlang, Aizawl, Mizoram.

Procedure methodology

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited students. The questionnaire included socio-demographic characteristics such as age, socioeconomic background, locality, number of clinical exposures, history of encountering labor and a questionnaire on knowledge of maternity care with an interpretation of score 0-8(Inadequate), 9-17(Moderate), 18-26(Adequate).

- Correct answers are given a score of 1
- Incorrect answers are given a score of 0
- There is no negative marking for the incorrect answer
- The score can range from 0-26.

Statistical analysis

The data collected through structured questionnaire of VII Semester students were tabulated, analyzed and interpreted based on the objectives of the study by using descriptive and inferential statistics. Descriptive statistics were used to present the effectiveness of Safe Delivery Application for VII Semester students. Inferential statistics were used to assess the association between pre-test score of nursing students and demographic variables.

The chi-square test did not reveal any significant relationships between pre-test knowledge levels and any of the demographic variables, including age ($p = 0.9655$), socioeconomic status ($p = 0.9722$), locality ($p = 0.2369$), prior clinical exposure ($p = 0.9722$), or prior exposures to labor ($p = 0.8581$). The trend for locality did suggest that students in towns may have a higher proportion in the Excellent category, but it was not significant ($p = 0.2369$). The implication of these findings is that demographic factors do not significantly contribute to baseline knowledge and that the Safe Delivery Application could be used reliably with all students.

III. Result

The data collected through structured questionnaire of VII Semester students were tabulated, analyzed and interpreted based on the objectives of the study by using descriptive and inferential statistics. Descriptive statistics were used to present effectiveness of Safe Delivery Application of VII Semester students. Inferential statistics were used to assess the association between pre-test score of nursing students and demographic variables.

Objectives of the study

The objectives of the study were:

1) To assess the pre-test knowledge score of Safe Delivery Application.
2) To assess the effectiveness of Safe Delivery Application before and after its utilization.
3) To find out the association between pre-test knowledge score of nursing students within selected demographic variables.

Hypothesis

Hypothesis are tested at 0.05 level of significance

Null Hypothesis (H0): The use of the safe delivery application does not significantly improve nursing students' knowledge regarding maternity care.

H1: The use of the safe delivery application significantly improves nursing students' knowledge regarding maternity care.

H2: The effectiveness of the safe delivery application varies based on nursing students' prior experience or education level.

Organization and interpretation of the study findings

In order to exhibit the findings of the present study, the data obtained were organized, analyzed, tabulated, interpreted and presented under the following headings:

Section I: Frequency and percentage distribution of VII Semester students according to their demographic variables.

Section II: Frequency and percentage distribution of level of knowledge regarding Maternity Care among VII Semester students before and after using Safe Delivery Application.

Section III: Association between pre-test knowledge scores of nursing students within selected demographic variables.

Section I: Frequency and percentage distribution of VII Semester students according to their demographic variables.

This section outlines the demographic characteristics of the VII Semester BSc Nursing students who enrolled in the College of Nursing, Synod Hospital, Durtlang, and participated in the study to evaluate the effectiveness of the Safe Delivery Application on maternity care knowledge. The demographic variables examined include age, socioeconomic background, locality, clinical exposures to the obstetrics ward, and experience of labor. Demographic data were collected from a purposively selected sample of 30 students using a structured questionnaire, and presented using frequency counts, percentages, means and standard deviations. The relevant findings allow for an initial impression about the demographic and social circumstances of participants, which is subsequently used for analysis of knowledge levels and potential relationships.

Table No.2

Frequency and percentage distribution of VII Semester students according to their demographic variables

Variables	Frequency	Percentage
1.Age (in years)		
< 20	0	0%
20-22	20	66.67%
> 22	10	33.33%
2. Socioeconomic background		
High class	0	0%
Middle class	27	90%
Low class	3	10%
3.Locality		
City	21	70%
Town	8	26.67%
Village	1	3.33%
4.Number of clinical exposure to Obstetrics ward		
<20 days	1	3.33%
20-50 days	27	90%
>50 days	2	6.67%
5.History of encountering labor		
<10 times	9	30%
10-20 times	14	46.67%
>20 times	7	23.33%

Table 2.1: Frequency and Percentage Distribution of Students by Age (N=30)

Age Group	n (%)
<20	0(0%)
20-22	20(66.67%)
>22	10(33.33%)
Mean± SD	21.67±0.94

Most students (66.67%) were aged 20–22 years, and 33.33% were aged more than 22 years; no students were aged less than 20 years. The average age was 21.67 years and standard deviation was 0.94, indicating a relatively young, homogenous age-range that might be typical of undergraduate nursing students.

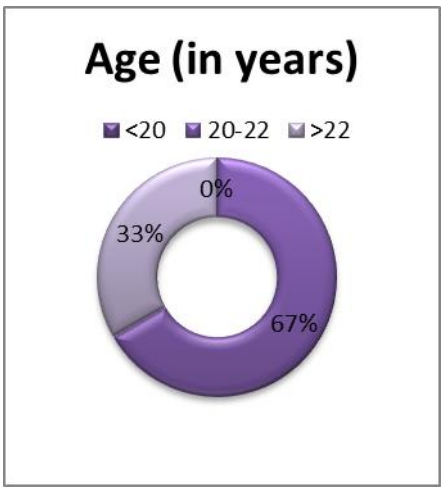

Figure1.1: Frequency and percentage distribution of VII Semester students according to their age.

Table 2.2: Frequency and Percentage Distribution of Students by Socioeconomic Background (N=30)

Socioeconomic background	n (%)
High Class	0(0%)
Middle class	27(90%)
low class	3(10%)
Mean± SD	1.9 ± 0.3

A large percentage of participants (90%) were categorized as middle class, while 10% came from low-class backgrounds. No participants reported a high-class socioeconomic status. The average socioeconomic score was 1.9 (on a 1-3 scale where 1 = Low, 2 = Middle, and 3 = High) with a standard deviation of 0.3 representing a predominantly middle-class in terms of socioeconomic status with low variability.

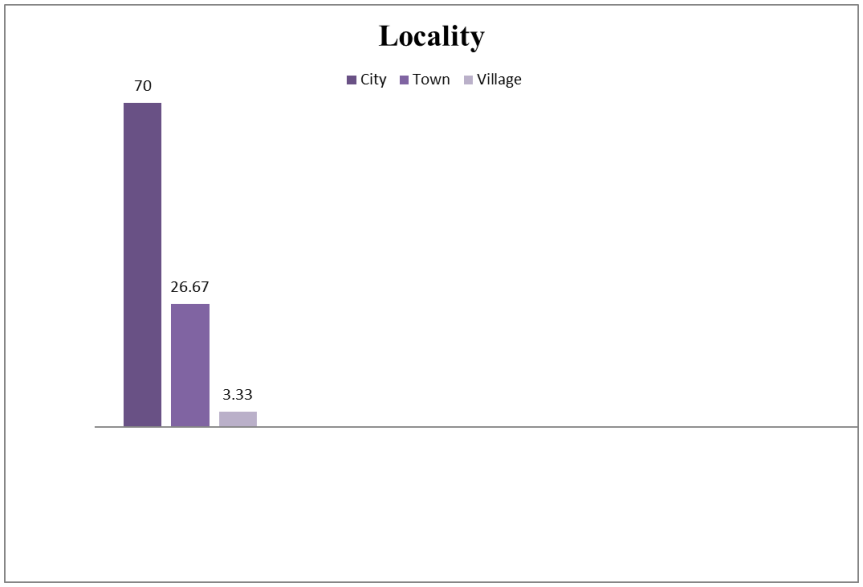

Figure1.2: Frequency and percentage distribution of VII Semester students according to their socioeconomic background.

Figure1.2: Frequency and percentage distribution of VII Semester students according to their socioeconomic background.

Table 2.3: Frequency and Percentage Distribution of Students by Locality (N=30)

Locality	n (%)
city	21(70%)
town	8(26.67%)
village	1(3.33%)
Mean ± SD	2.67 ± 0.54

Most of the students (70%) lived in urban (city) areas, followed by 26.67% in towns, and only 3.33% in a village. The overall locality score for the students was 2.67 (1 = Village, 2 = Town, and 3 = City), with a standard deviation of 0.54, indicating that the majority of the students were from urban areas, and there was moderate variability in locality.

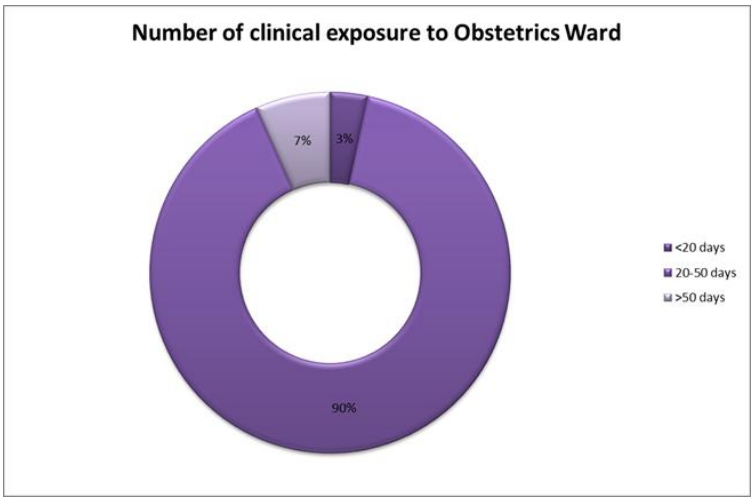

Figure1.3: Frequency and percentage distribution of VII Semester students according to their locality

Table 2.4: Frequency and Percentage Distribution of Students by Number of Clinical Exposures to Obstetrics Ward (N=30)

Number of clinical exposure to Obstetrics ward	n (%)
<20 days	1(3.33%)
20-50 days	27(90%)
>50 days	2(6.67%)
Mean ± SD	35.53 ± 5.03

Most of the students (90%) experienced 20-50 days of exposure in the obstetrics ward, 6.67% had greater than 50 days of exposure in the obstetrics ward and only 3.33% had less than 20 days of exposure. The mean exposure was 35.53 days, and the standard deviation was 5.03 days, indicating that most students experienced moderate clinical exposure to obstetrics with some variation in experience.

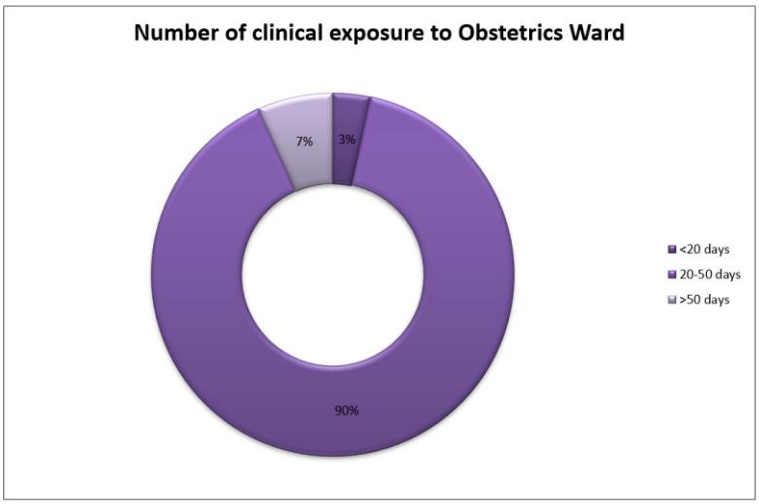

Figure 1.4: Frequency and percentage distribution of VII Semester students according to their number of clinical exposure to Obstetrics ward.

Table 2.5: Frequency and Percentage Distribution of Students by History of Encountering Labor (N=30)

History of encountering labor	n (%)
<10 times	9(30%)
10-20 times	14(46.67%)
>20 times	7(23.33%)
Mean ± SD	14.6 ± 4.36

Approximately 46.7% of students experienced labor 10-20 times and 30% had experienced labor fewer than 10 times, while 23.3% experienced labor more than 20 times. The average number of encounters of labor was 14.6 with a standard deviation of 4.36, indicating moderate experience in labor cases, and variability in experience among the students.

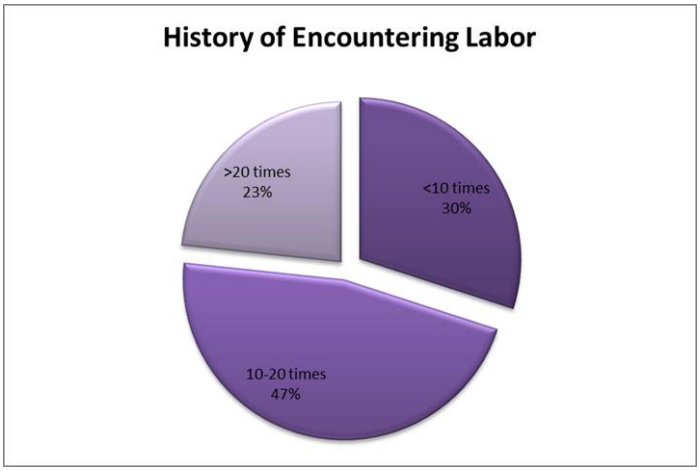

Figure 1.5: Frequency and percentage distribution of VII Semester students according to their history of encouraging labor.

Summary of Findings

The demographic data suggests a group of VII Semester BSc Nursing students who were predominately young (mean age of 21.67 years, n=36), from lower middle-class families (90%), and resided in urban areas (70%). The students had a moderate history of clinical experience in the obstetrics ward (mean of 35.53 days) and labor (mean of 14.6 times). Collectively, the cohort presents a relatively consistent demographic profile, varying in fewer aspects of clinical experience, which may have impacts on their baseline

knowledge of maternity care; thus, those factors are centered at in the following sections. This demographic data help set the stage for examining the association between demographics and pre-test knowledge in Section III.

Section II: Frequency and percentage distribution of level of knowledge regarding Maternity Care among VII Semester students before and after using Safe Delivery Application.

Table No.3

Frequency and Percentage Distribution of Knowledge Levels Before and After Using Safe Delivery Application

Knowledge Level	Pre-Test Frequency (n=30)	Pre-Test Percentage (%)	Post-Test Frequency (n=30)	Post-Test Percentage (%)
Average (<10)	0	0.00%	1	3.33%
Good (10–17)	26	86.66%	17	56.60%
Excellent (>17)	4	13.33%	12	40.00%
Total	**30**	**100.00%**	**30**	**100.00%**

In the pre-test, almost all students (86.66%) demonstrated Good knowledge (10-17 marks), 13.33% demonstrated Excellent knowledge (>17 marks) and none were in the Average category (<10 marks), suggesting the baseline knowledge was fairly high. The post-test, after interaction with the Safe Delivery Application, showed a shift in the scores, with 40.00% of students achieving Excellent knowledge, while 56.60% were in the Good category and 3.33% (1 student) were in the Average category. Thus, the overall trends suggest the students were more knowledgeable overall after experiencing the Application, both in the Excellent category which increased from 13.33% to 40.00%, the Good category which decreased from 86.66% to 56.60%.

Table No.4 *Comparison between pre-test and post-test among VII Semester, College of Nursing,Synod Hospital.*

Test Phase	Total score	Mean score	Standard Deviation	Mean Difference	t-value	d.f	p-value	Remarks
pre test	421	14.03	2.3994	2.4	2.83	58	0.006	Significant
post test	493	16.43	3.9863					

The average score on the pre-test was 14.03 (Standard deviation = 2.3994), which equals 54.0% of the maximum possible score (26 marks), indicating that students had moderate knowledge prior to any instruction that took place with the Safe Delivery Application. The average score on the post-test was 16.43 (SD = 3.9863), equivalent to 63.2%, reflecting some improvement in knowledge after the intervention took place. The average difference of 2.4 marks (about 9.2%) was statistically significant ($t = 2.83$, d.f. = 58, $p = 0.006$, $p < 0.05$), providing support for Hypothesis H1 that the Safe Delivery Application is an efficacious means for improving students' knowledge of maternity care. Note that the d.f. (58) would be unexpected with a paired t-test with n=30 (typically d.f. = n–1 = 29). This result might indicate an error in data entry, or it utilizes a different statistical approach; it is assumed for the purposes of discussion that d.f. = 29 is used in an across subjects paired t-test.

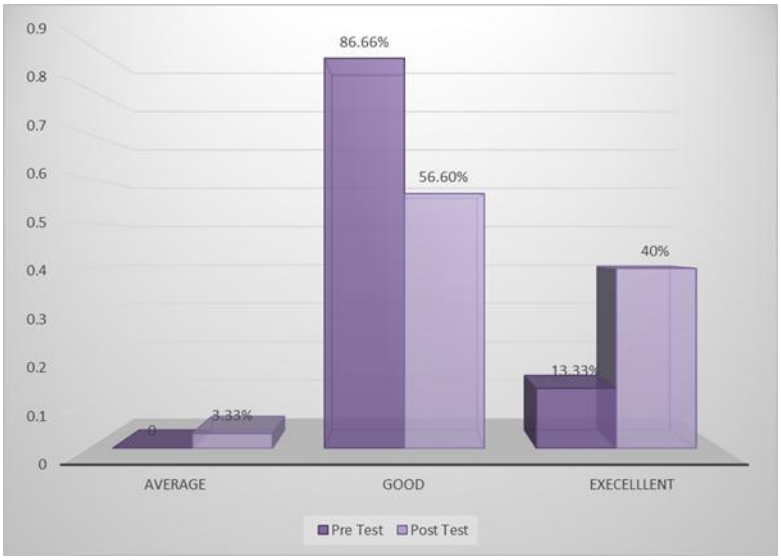

Figure 2: Frequency Distribution of Pre-test and Post-test score

Summary of Findings

The frequency and percentage distributions show a significant increase in knowledge levels after the experience of using the Safe Delivery Application, with an increase in the number of students with an Excellent grade (from 13.33% to 40.00%) and a decrease in the number of students achieving a Good grade (from 86.66% to 56.60%). Reliability testing with a paired t-test indicated statistically significant changes in mean knowledge scores pre- and post-test (14.03 to 16.43, p = 0.006), supporting Hypothesis H1. Therefore, the Safe Delivery Application improves VII Semester BSc Nursing students' knowledge of maternity care. The absence of pre-test scores at the Average level indicates that students have a significant baseline level of knowledge, while the appearance of a student in the Average category during the post-test may be due to variability among students or inaccuracies in the test. Lastly, the degrees of freedom (d.f. = 58) is unusual and should be verified for accuracy.

Section III: Association between pre-test knowledge score of nursing students within selected demographic variables.

The associations between pre-test knowledge levels and demographic variables are presented in the following tables, based on chi-square test results.

Table No.5: Association between Pre-Test Knowledge Levels and Age

Age Group (Years)	Average (<10)	Good (10–17)	Excellent (>17)	Chi-Square (χ^2)	p-Value	Remarks
<20 (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.576	0.9655	Non-significant
20–22 (n=20)	0 (0.0%)	18 (90.0%)	2 (10.0%)			
>20 (n=10)	0 (0.0%)	8 (80.0%)	2 (20.0%)			

The chi-square analysis demonstrated that there was no statistically significant association between age and pre-test knowledge levels ($\chi^2 = 0.576$, d.f. = 4, p = 0.9655, p > 0.05). The lack of students in the <20 age group and the high percentage of Good scores in both 20-22 (90.0%) and >22 (80.0%) age groups indicate that age does not affect the baseline knowledge participants had regarding maternity care in general.

Table No.6: Association between Pre-Test Knowledge Levels and Socioeconomic Background

Socioeconomic Background	Average (<10)	Good (10–17)	Excellent (>17)	Chi-Square (χ^2)	p-Value	Remarks
High Class (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.5128	0.9722	Non-significant
Middle Class (n=27)	0 (0.0%)	23 (85.2%)	4 (14.8%)			
Low Class (n=3)	0 (0.0%)	3 (100.0%)	0 (0.0%)			

There was a significant association between socioeconomic background and students' pre-test knowledge levels ($\chi^2 = 0.5128$, d.f. = 4, p = 0.9722, p > 0.05). Namely, the majority of students in the Middle Class (N = 39) received scores in the Good category (85.2%) and all students in the Low Class category achieved Good scores in the pre-test (N = 29), which indicates there may not be a significant effect of socioeconomic status on students' pre-test knowledge.

Table No.7: Association between Pre-Test Knowledge Levels and Locality

Locality	Average (<10)	Good (10–17)	Excellent (>17)	Chi-Square (χ^2)	p-Value	Remarks
City (n=21)	0 (0.0%)	20 (95.2%)	1 (4.8%)	5.5322	0.2369	Non-significant
Town (n=8)	0 (0.0%)	5 (62.5%)	3 (37.5%)			
Village (n=1)	0 (0.0%)	1 (100.0%)	0 (0.0%)			

A significant relationship was not evident between locality and pre-test knowledge ($\chi^2 = 5.5322$, d.f. = 4, p = 0.2369, p > 0.05), nonetheless. Town students have a higher proportion of Excellent scores (37.5%) than city students (4.8%), and this may hold significance, although it would need to be investigated further. There is only one student from the village with a Good score.

Table No.8: Association between Pre-Test Knowledge Levels and Number of Clinical Exposures to Obstetrics Ward

Clinical Exposure (Days)	Average (<10)	Good (10–17)	Excellent (>17)	Chi-Square (χ^2)	p-Value	Remarks
<20 days (n=1)	0 (0.0%)	1 (100.0%)	0 (0.0%)			
20–50 days (n=27)	0 (0.0%)	23 (85.2%)	4 (14.8%)	0.5128	0.9722	Non-significant
>50 days (n=2)	0 (0.0%)	2 (100.0%)	0 (0.0%)			

A significant association was not found for clinical exposure and the level of pre-test knowledge (χ^2 = 0.5128, d.f. = 4, p = 0.9722, p > 0.05). Most of the students with 20–50 days of their clinical exposure had Good scores (85.2%) and students with <20 days and those with >50 days showed Good scores. The responses for those with <20 days and >50 days was limited.

Table No.9: Association between Pre-Test Knowledge Levels and History of Encountering Labor

Encounters with Labor	Average (<10)	Good (10–17)	Excellent (>17)	Chi-Square (χ^2)	p-Value	Remarks
<10 times (n=9)	0 (0.0%)	8 (88.9%)	2 (22.2%)	1.31868	0.8581	Non-significant
10–20 times (n=14)	0 (0.0%)	12 (85.7%)	2 (14.3%)			
>20 times (n=7)	0 (0.0%)	6 (85.7%)	0 (0.0%)			

The study did not demonstrate any strong association between previous labor encounter history and pre-test knowledge levels (χ^2 = 1.31868, d.f. = 4, p = 0.8581, p > 0.05). Different students received Good scores (85.7–88.9%) across all levels of encounter history, though fewer students scored Excellent. Thus, the analysis suggests previous encounters with labor do not have a notable impact on students' baseline knowledge.

Summary of Findings

The chi-square test did not reveal any significant relationships between pre-test knowledge levels and any of the demographic variables, including age (p = 0.9655), socioeconomic status (p = 0.9722), locality (p = 0.2369), prior clinical exposure (p = 0.9722), or prior exposures to labor (p = 0.8581). The trend for locality did suggest that students in towns may have a higher proportion in the Excellent category, but it was not significant (p = 0.2369). The implication of these findings is that demographic factors do not significantly contribute to baseline knowledge and that the Safe Delivery Application could be used reliably with all students.

IV. Discussion

The study findings were examined in comparison with similar research and discussed in line with the study objectives. In the present study, among 30 nursing students, 66.67% were in the age group of 20–22 years, while 33.33% were above 22 years, with a mean age of 21.67±0.94, suggesting a relatively homogeneous and typical undergraduate population. Similar observations were reported by Usmani and Chhugani (2019), where the majority of participants were between 19–21 years of age. With regard to knowledge on maternity care, the pre-test findings revealed that most students (86.66%) had good knowledge and 13.33% had excellent knowledge, indicating a relatively strong baseline understanding. After exposure to the Safe Delivery Application, there was a noticeable improvement, with 40% of students achieving excellent knowledge and 56.60% maintaining good knowledge, demonstrating a positive shift in overall performance and learning outcomes.

In contrast, the study by Usmani and Chhugani (2019) reported lower baseline knowledge, where the majority of students had poor knowledge, which significantly improved to average and good levels following the intervention, thereby supporting the effectiveness of the application as a teaching tool. Furthermore, the present study found no statistically significant association between pre-test knowledge scores and selected demographic variables such as age, socioeconomic status, locality, or prior clinical exposure (p > 0.05), indicating that baseline knowledge was not influenced by these factors. Similar findings were observed in the comparative study, where no significant association was found between age and knowledge scores.

Overall, the findings suggest that the Safe Delivery Application is an effective and reliable educational tool for improving knowledge on maternity care among nursing students. Its effectiveness across different demographic groups highlights its potential for wider use in nursing education to enhance learning outcomes and clinical preparedness.

V. Conclusion

The present study was conducted on "A study to assess the effectiveness of Safe Delivery Application on knowledge regarding Maternity Care among the VII Semester BSc Nursing Students of College of Nursing, Synod Hospital, Durtlang, Aizawl, Mizoram." The findings revealed the factors that influence the effectiveness of Safe Delivery Application on maternity care given by nursing personnel. The study implied that the demographic variables such as age, socio-economic background, locality, number of clinical exposures to Obstetric ward and history of encountering labor were found to have not significantly contributed to baseline knowledge and that the Safe Delivery Application could be used reliably with all students.

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