



A pre-experimental study: Impact of a structured educational intervention on knowledge related to dengue fever among adolescent girls

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Abstract

Background: In today's evolving workforce, women play pivotal roles in all sectors, yet face unique challenges in balancing their professional and personal lives. Issues such as workplace inequality, lack of family support, and limited organizational policies contribute to stress and work-life imbalance among women professionals, particularly in healthcare settings.

Methods: A quantitative, descriptive design was adopted. A total of 347 working women at IMS and SUM Hospital, Bhubaneswar, were selected using a purposive sampling technique. Data were collected using structured tools on socio-demographics, determinants of work-life balance, and workplace challenges. Analysis was conducted using descriptive and inferential statistics.

Results: Findings revealed that 71.8% of participants experienced mild determinants affecting work-life balance, 27.7% faced maximum determinants, and only 0.6% had none. Regarding challenges, 95.4% faced mild challenges, 0.9% reported maximum challenges, and 3.7% faced none. Significant associations were found between determinants and factors such as age, religion, occupation of the family head, and job concessions during pregnancy. Monthly family income and adequate sleep were significantly associated with challenges.

Conclusion: Most working women in the study faced mild determinants and challenges affecting their work-life balance. These findings highlight the need for supportive organizational policies and family involvement to promote healthier work environments for women.

Keywords: Work-life balance, working women, challenges, determinants, hospital workforce

Introduction

Dengue fever is one of the most rapidly spreading mosquito-borne viral diseases worldwide and represents a major public health concern, particularly in tropical and subtropical regions. The disease is transmitted primarily by the *Aedes aegypti* mosquito and affects millions of individuals annually. Increasing urbanization, population growth, climate change, and inadequate environmental sanitation have contributed to the rising incidence of dengue infections in developing countries. India continues to report frequent dengue outbreaks, placing a substantial burden on healthcare systems and communities [1].

The World Health Organization identifies dengue as an emerging global health threat, with increasing incidence, morbidity, and mortality across more than 100 countries. Rapid urbanization, climate change, poor sanitation, and inadequate awareness regarding preventive measures have contributed significantly to the spread of dengue infection [2].

Dengue infection ranges from mild febrile illness to severe complications such as dengue hemorrhagic fever and dengue shock syndrome, which may lead to serious morbidity and mortality if not recognized early. Since no specific antiviral treatment is widely available, prevention through vector control, early recognition of symptoms, and community awareness remains the most effective strategy to reduce disease transmission [3]. Adolescents constitute an important target group for dengue prevention programmes. School-going adolescent girls play a significant role in household health practices, environmental cleanliness, and community awareness activities. However, studies have shown that knowledge regarding dengue transmission, breeding sites, warning signs, and preventive measures among adolescents is often inadequate. Misconceptions regarding mosquito breeding and disease transmission continue to exist, highlighting the need for structured health education interventions [4].

The Health Belief Model emphasizes that individuals adopt

preventive health behaviors when they perceive susceptibility to illness, understand disease severity, and recognize the benefits of preventive actions. Educational interventions can therefore act as cues to action, improving awareness and motivating preventive practices among adolescents [5].

The working women found that conscientious and hardy individuals often engage deeply in both work and family roles, viewing stress as a challenge. For them, dual-role involvement can be positive, suggesting that managing work-family conflict requires approaches tailored to individual traits rather than a one-size-fits-all method [6].

India remains highly vulnerable to dengue outbreaks due to favorable climatic conditions and population density. Adolescents constitute an important risk group because they frequently participate in outdoor activities and often lack adequate knowledge regarding mosquito breeding control and personal protection measures. Health education during adolescence plays a crucial role in developing lifelong preventive behaviors and promoting community health awareness [7]. Knowledge regarding disease transmission and prevention is considered a key determinant in controlling dengue fever. Studies indicate that inadequate awareness about vector breeding sites, early symptoms, and preventive practices contributes to delayed treatment seeking and increased disease transmission. Therefore, structured educational interventions are essential to enhance awareness and empower adolescents to adopt preventive health behaviors [8].

A pre-experimental study assessing mothers' knowledge on dengue prevention revealed a significant increase in post-intervention knowledge scores after implementation of a structured teaching programme, confirming the effectiveness of educational interventions [9].

Research among school students also supports the effectiveness of structured teaching programmes in improving health-related knowledge. A pre-experimental study conducted among secondary school students reported substantial improvement in knowledge levels following structured educational sessions on dengue fever [10]. Adolescence is a critical developmental period during which individuals acquire health habits and decision-making skills that influence future health outcomes. Evidence from educational intervention studies among adolescents demonstrates that structured teaching programs effectively enhance knowledge and promote positive behavioral change in various health domains [11].

Methodology

Study Approach

The research approach adopted for the study was a quantitative research approach. This approach was considered appropriate because it aimed to measure the effectiveness of a structured educational intervention on knowledge regarding dengue fever among adolescent girls using numerical data and statistical analysis.

Study Design

This study adopted a pre-experimental one-group pre-test and post-test research design.

Pre-test → Educational Intervention → Post-test

This design enabled the investigator to compare knowledge levels before and after the intervention.

Study Setting

The study was conducted in a selected school, Bhubaneswar, Odisha, India.

Rationale for Selecting the Setting:

- Availability of adolescent girls
- Administrative permission and cooperation
- Feasibility of implementing educational intervention

Study duration

The total duration of the study was 4–6 weeks, including: tool preparation and validation, Pilot study, Pre-test data collection, Implementation of structured educational intervention, Post-test evaluation.

Sampling Method

A non-probability convenience sampling technique was used to select participants who met the inclusion criteria.

Sample size

The sample size was determined using Yamane's formula.

According to Yamane's formula

$$n = N / (1 + N e^2)$$

Here n = Sample size, N = Population size, e = Level of precision (sampling error), e = 0.05** (5% margin of error at 95% confidence level).

Total number of adolescent girls in selected school (N) = 85

Level of precision (e) = 0.05

$$n = \frac{85}{1 + 85(0.05)^2}$$

$$n = \frac{85}{1 + 85(0.0025)}$$

$$n = \frac{85}{1 + 0.2125}$$

$$n = \frac{85}{1.2125}$$

$$n = 70.1$$

Therefore, 70 adolescent girls were selected as the sample for the study.

Inclusion Criteria

- Adolescent girls studying in the selected school
- Age group 13–18 years
- Present during data collection
- Willing to participate
- Able to understand English/Odia questionnaire

Exclusion Criteria

- Students absent during data collection
- Students previously exposed to formal dengue education programmes
- Students unwilling to participate

Details of the research tool

Research data were collected using three tools:

Tool-1: Consisted of 10 items. Collected background information of participants. Method: Self-report questionnaire/interview. Time required: 10 minutes. It contains Age, Class/grade, Religion, Type of family, Residence, Parents' education, Parents' occupation, Source of information about dengue, previous exposure to dengue education.

Tool-2: Structured Knowledge Questionnaire: Consisted of 30 multiple-choice questions. Domains included: Etiology, Transmission, Signs and symptoms, Prevention and control, Management and awareness. Scoring Pattern: Correct answer = 1 mark, Wrong answer = 0 mark

Interpretation

Score	Knowledge Level
0–6	Poor
7–12	Average
13–18	Good
Above 18	Excellent

Tool Standardization

The content validity of the tools assessed by five experts (one medical professional and four nursing professionals). Reliability analysis showed strong internal consistency, with split-half method values of 0.8. Pre-testing (tryout) done in hospital for clarity, ambiguity, and timing.

Study variables

Independent Variable: Structured Educational Intervention on Dengue Fever.

Dependent Variable: Knowledge level regarding dengue fever among adolescent girls.

Demographic Variables: Age, Class/grade, Religion, Type of family, Residence, Parents' education, Parents' occupation, Source of information about dengue, Previous exposure to dengue education

Data collection procedure

Data collection was conducted in three phases:

Phase I: Pre-Test:

- Rapport established with participants
- Purpose explained
- Informed consent obtained
- Baseline knowledge assessed using structured questionnaire

Phase II: Educational Intervention

Structured Educational Programme included: Duration: 45–60 minutes

- Lecture method
- Charts and audiovisual aids

- Interactive discussion
- Demonstration of dengue prevention measures

Phase III: Post-Test

- Post-test conducted after intervention (same questionnaire).
- Assessed improvement in knowledge.

Ethical considerations

Ethical clearance obtained from Institutional Ethical Committee. Permission obtained from school authorities. Written informed consent taken from participants. Confidentiality and anonymity maintained. Participation was voluntary. Right to withdraw ensured.

Statistical Analysis

Statistical analysis was performed using SPSS version 21. Descriptive Statistics: Frequency, Percentage, Mean, Standard deviation Used to describe demographic variables and knowledge levels. Inferential Statistics: Paired t-test → to compare pre-test and post-test knowledge scores. Chi-square test → to determine association between knowledge level and demographic variables. Significance level set at $p < 0.05$.

Theoretical framework

The conceptual framework of the study is derived from the Health Belief Model, which emphasizes that health behavior change occurs when individuals develop appropriate health beliefs through education. Demographic variables such as age, class, parental education, and source of information may influence baseline knowledge regarding dengue fever. The Structured Educational Intervention serves as the independent variable and functions as a stimulus that enhances awareness about dengue transmission, symptoms, prevention, and control. The intervention provides a cue to action, motivating learning and awareness. As a result, improvement occurs in the dependent variable, namely knowledge level regarding dengue fever, measured through pre-test and post-test scores.

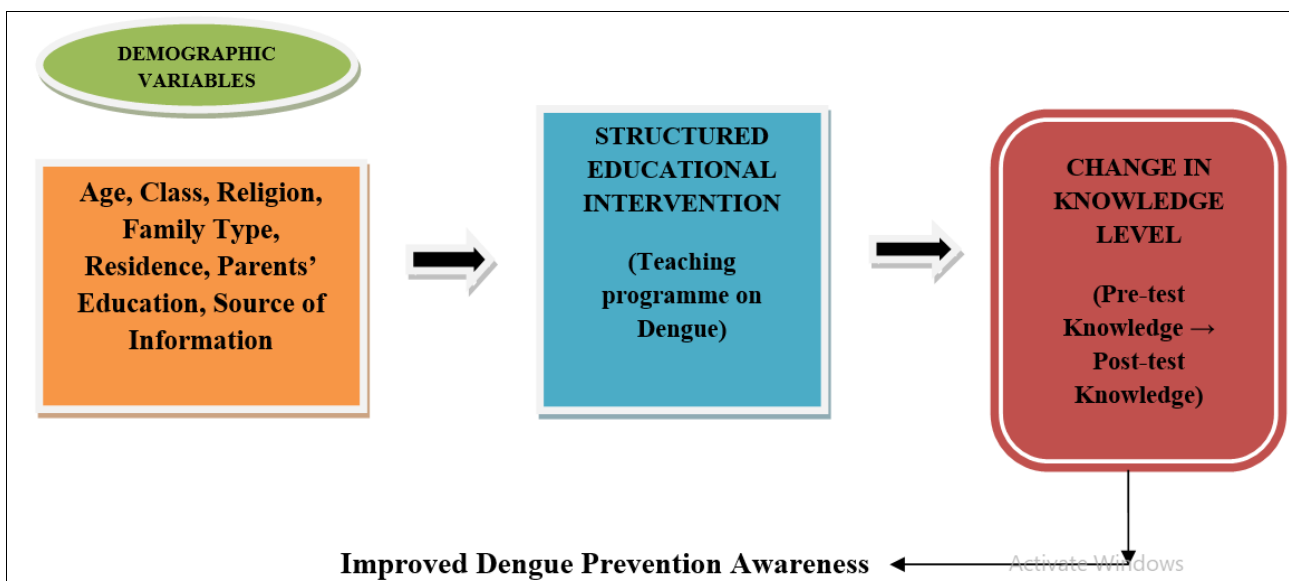


Fig 1: Health Belief Model (HBM)

Results

Table 1: Distribution of subjects based on sociodemographic variables. (N= 70)

Sl. No	Sociodemographic Variables	Frequency (f)	Percentage (%)
1.	Age		
	a) 10- 12	18	25.7
	b) 13- 15	32	45.7
	c) 16- 18	20	28.6
2.	Class studying		
	a) Middle school	21	30.0
	b) High school	29	41.4
	c) Higher secondary	20	28.6
3.	Types of family		
	a) Nuclear	40	51.7
	b) Joint	24	34.3
	c) Extended	6	8.6
4.	Educational Qualification of father		
	a) No formal education	10	14.3
	b) Primary	18	25.7
	c) Secondary	22	31.4
	d) Higher secondary	12	17.1
	e) Graduate and above	8	11.5
5.	Educational Qualification of mother		
	f) No formal education	14	20.0
	g) Primary	20	28.6
	h) Secondary	19	27.1
	i) Higher secondary	11	15.7
	j) Graduate and above	6	8.6
6.	Monthly family income		
	a) Below 10,000	16	22.9
	b) 10,001- 20,000	24	34.3
	c) 20,001- 30,000	18	25.7
	d) Above 30,000	12	17.1
7.	Area of residence		
	a) Rural	38	54.3
	b) Urban	22	31.4
	c) Semi- urban	10	14.3
8.	Family history of dengue		
	a) Yes	17	24.3
	b) No	53	75.7
9.	Mosquito control measures of home		
	a) Yes	55	78.6
	b) No	15	21.4

The above table-1 revealed that Frequency (F) and percentage (%) distribution of patients according to age, class studying, religion, educational qualification of fathers

and mothers, monthly family income, area of residence, family history of dengue, mosquito control measures at home.

Table 2: Knowledge Related to Dengue Fever among Adolescent Girls (N = 70)

Sl. No	Knowledge questions	Correct n (%)	Incorrect n (%)
1.	Dengue fever is caused by	48 (68.6%)	22 (31.4%)
2.	Dengue spreads through mosquito bite	60 (85.7%)	10 (14.3%)
3.	Mosquito responsible for dengue	42 (60.0%)	28 (40.0%)
4.	Dengue mosquito bites mostly	37 (52.9%)	33 (47.1%)
5.	Stagnant water is breeding place	62 (88.6%)	8 (11.4%)
6.	Common symptom of dengue	55 (78.6%)	15 (21.4%)
7.	Severe headache occurs in dengue	46 (65.7%)	24 (34.3%)
8.	Platelet count decreases in dengue	39 (55.7%)	31 (44.3%)
9.	Dengue spreads person to person directly	41 (58.6%)	29 (41.4%)
10.	Covering water containers prevents dengue	35 (50.0%)	35 (50.0%)
11.	Use of mosquito nets prevents dengue	63 (90.0%)	7 (10.0%)
12.	Use of mosquito repellent helpful	57 (81.4%)	13 (18.6%)
13.	Use of mosquito nets prevents dengue	59 (84.3%)	11 (15.7%)
14.	Cleaning surroundings prevents dengue	61 (87.1%)	9 (12.9%)
15.	Early treatment reduces complications	54 (77.1%)	16 (22.9%)

The data presented in table-2 revealed that the highest level of knowledge among adolescent girls was observed in preventive aspects of dengue fever. The majority of participants, 63 (90.0%), correctly identified that the use of mosquito nets helps prevent dengue, representing the highest response. Similarly, 62 (88.6%) recognized stagnant water as the main breeding place of mosquitoes, and 61 (87.1%) understood that cleaning surroundings prevents dengue transmission. A high proportion, 60 (85.7%), were aware that dengue spreads through mosquito bites, while 59 (84.3%) and 57 (81.4%) participants demonstrated good knowledge regarding the use of mosquito nets and mosquito repellents as preventive measures. These findings indicate strong awareness among adolescent girls particularly in relation to dengue prevention practices.

Table 3: Knowledge Level Distribution with frequency and percentage. (N= 70)

Knowledge Level	Frequency (n)	Percentage (%)
Poor Knowledge	12	17.1%
Average Knowledge	34	48.6%
Good Knowledge	24	34.3%

The table- 3, findings indicate that most adolescent girls possessed average knowledge regarding dengue fever, while a considerable proportion demonstrated good awareness about transmission, symptoms, and preventive measures.

Table 5: Comparison of Mean Knowledge Scores.

Test	Mean Score	Standard Deviation	Mean Difference	Paired t value	p-value
Pre-Test	9.82	3.41	4.14	12.45	<0.001*
Post-Test	13.96	2.18			

Significant at p < 0.05 level

The table-5 shows that before the intervention, most adolescent girls had average and poor knowledge regarding dengue fever. After implementation of the structured educational intervention, the proportion of participants with good knowledge increased markedly from 17.2% to 65.7%, while poor knowledge decreased from 37.1% to 8.6%. The

However, gaps were observed in knowledge related to mosquito biting time and complications of dengue, highlighting the need for structured educational intervention.

Table 4: Comparison of Pre-Test and Post-Test Knowledge Scores on Dengue Fever among Adolescent Girls. (N = 70)

Sl. No	Level of Knowledge	Pre-Test n (%)	Post-Test n (%)
1.	Poor Knowledge	26 (37.1%)	6 (8.6%)
2.	Average Knowledge	32 (45.7%)	18 (25.7%)
3.	Good Knowledge	12 (17.2%)	46 (65.7%)

The table -4 shows that the distribution of knowledge levels among adolescent girls showed a marked improvement following the educational intervention. In the pre-test assessment, the majority of participants, 32 (45.7%), had average knowledge, while 26 (37.1%) demonstrated poor knowledge and only 12 (17.2%) possessed good knowledge regarding dengue fever. After the intervention, the post-test results revealed a significant positive change, with 46 (65.7%) participants achieving good knowledge, 18 (25.7%) having average knowledge, and only 6 (8.6%) remaining in the poor knowledge category. These findings indicate that the structured educational programme was effective in enhancing the knowledge level of adolescent girls regarding dengue fever.

increase in mean knowledge score from 9.82 to 13.96 indicates a significant improvement. The paired t-test value demonstrates that the educational intervention was statistically effective in improving knowledge related to dengue fever.

Table 6: Association of challenges between post-test knowledge level and selected demographic variables. (N=70)

Sl. No.	Demographic data	Chi-Square	Df	P Value
1	Age	4.12	4	0.390
2	Class studying	6.84	4	0.145
3	Types of family	3.26	4	0.515
4	Educational Qualification of father	10.72	8	0.218
5	Educational Qualification of mother	13.96	8	0.083
6	Monthly family income	9.88	6	0.130
7	Area of residence	11.24	4	0.024
8	Family history of dengue	8.24	2	0.017
9	Mosquito control measures at home	12.53	2	0.002

Table- 6 shows that Chi-square analysis revealed that there was no statistically significant association between post-test knowledge level regarding dengue fever and selected socio-demographic variables such as age ($\chi^2 = 4.12$, df = 4, p = 0.390), class studying ($\chi^2 = 6.84$, df = 4, p = 0.145), type of family ($\chi^2 = 3.26$, df = 4, p = 0.515), educational qualification of father ($\chi^2 = 10.72$, df = 8, p = 0.218), educational qualification of mother ($\chi^2 = 13.96$, df = 8, p = 0.083), and monthly family income ($\chi^2 = 9.88$, df = 6, p = 0.130), as all p-values were greater than 0.05.

The statistically significant association between post-test knowledge level and area of residence ($\chi^2 = 11.24$, df = 4, p = 0.024), family history of dengue ($\chi^2 = 8.16$, df = 2, p = 0.017), and availability of mosquito control measures at home ($\chi^2 = 12.53$, df = 2, p = 0.002), as the p-values were less than 0.05. This indicates that environmental exposure and preventive practices significantly influenced the knowledge level regarding dengue fever among adolescent girls.

Discussion

A pre-experimental study was conducted to assess the effectiveness of a structured teaching programme on knowledge regarding dengue fever among children aged 10–18 years. Using a one-group pre-test and post-test design with purposive non-random sampling, data were collected from 60 participants through a structured interview schedule. The findings revealed a significant improvement in knowledge scores from a pre-test mean of 14.03 (SD = 4.19) to a post-test mean of 22.80 (SD = 1.54) after the intervention, indicating the effectiveness of the educational programme^[12].

A quantitative study employing a pre-experimental one-group pre-test and post-test design was conducted among 30 rural participants selected through a random sampling technique. A semi-structured questionnaire was used to assess the level of knowledge regarding dengue fever. The findings showed an improvement in knowledge scores, with the mean pre-test score being 7.56, which increased to 11.3 in the post-test following the intervention^[13].

A quantitative pre-experimental study using a one-group pre-test and post-test design was conducted among 60 individuals attending selected Primary Health Centres in Puducherry to evaluate the effectiveness of an educational intervention programme on knowledge and practices related to dengue fever. Participants were selected through convenience sampling, and the intervention was delivered through a 30-minute PowerPoint presentation. Post-test assessment was carried out on the eighth day using the same tool. The results showed a significant improvement in both knowledge and practice scores, with mean knowledge scores increasing from 17.60±4.34 to 26.25±3.94 and practice scores from 39.37±3.25 to 44.08±5.34 ($p < 0.001$). A significant association was also observed between post-test knowledge scores and educational status, indicating that the educational intervention was effective in enhancing dengue prevention awareness^[14].

Implications of the study

The findings of the study indicate that educational intervention programmes are effective in improving knowledge and practices related to dengue fever prevention among the community. Health education provided through structured teaching methods can significantly enhance awareness regarding disease transmission, preventive measures, and early management of dengue fever. The study highlights the important role of healthcare professionals, especially nurses and public health workers, in organizing community-based health education programmes at Primary Health Centres. Improved knowledge and practices among individuals can contribute to better community participation in mosquito control activities and reduction of dengue incidence. Therefore, regular educational interventions should be incorporated into routine public health services to promote disease prevention and health promotion.

Limitation

- The study was conducted using a pre-experimental one-group pre-test and post-test design without a control group, which limits comparison and generalization of results.
- The sample size was small and restricted to participants attending selected Primary Health Centres, which may not represent the wider population.

Conclusion

The study concluded that the educational intervention programme significantly improved the knowledge and practices regarding dengue fever among people attending selected Primary Health Centres. The significant increase in post-test scores demonstrates the effectiveness of structured health education in enhancing awareness and preventive behaviors. Hence, educational intervention programmes are an essential strategy for controlling and preventing dengue fever at the community level.

Conflicts of interest

The writer reports no conflicts of interest.

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Ethics Approval

Ethical clearance obtained from Institutional Ethical Committee. Permission obtained from school authorities. Written informed consent taken from participants. Confidentiality and anonymity maintained. Participation was voluntary. Right to withdraw ensured.

Data Availability

The data is available and can be accessed with a reasonable request.

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