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A Journey of Trust, Learning, and Gratitude

Viral Dave

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Dear IAPSM-GC members and the Healthline family,


Serving as the Editor-in-Chief of *Healthline Journal* has been one of the most meaningful and fulfilling experiences of my academic life. As I prepare to hand over the responsibility to the new editorial team from April 2026 (Vol. 17, No. 2), I do so with a sense of gratitude, satisfaction, and humility. The faith that the IAPSM-GC fraternity placed in me was both an honour and a responsibility, and from the very beginning I remained aware that a scientific journal represents not just an editorial office but the academic character of an entire professional community.

The journey of *Healthline Journal* itself reflects the steady growth of our academic aspirations. What began in 2010 as an annual journal gradually evolved into a biannual journal in 2011 and later into a quarterly journal in 2021, demonstrating increasing scholarly participation and trust among contributors. Granting the Journal the status of a National Journal, through the coordinated and dedicated efforts of the past office bearers of IAPSM GC, was in itself a significant achievement. The adoption of an online submission and editorial management system through OJS in 2025 marked another important milestone, bringing greater transparency, efficiency, and accessibility to the publication process. Over time, the journal expanded its academic visibility and is now indexed in DOAJ, Index Copernicus, Open AIRE, and Index Medicus-SEAR, while applications for Scopus and the Emerging Sources

Citation Index (ESIC) are under consideration. Securing DOI registration with Crossref marked another significant milestone in expanding the journals reach and enhancing its visibility. The continuous support extended by the Secretary Generals of IAPSM-GC in this regard is sincerely acknowledged. These developments were never the work of an individual but the result of consistent collective efforts.

Managing a journal is both intellectually rewarding and administratively demanding. We encountered manuscript backlogs, reviewer availability issues, technical transitions, and the responsibility of maintaining publication ethics. The move to the online system required patience from authors, reviewers, and editors alike, yet it significantly improved accountability and workflow management. Throughout this process, I realized that a journal grows not only through published articles but also through relationships built on cooperation, communication, and mutual respect.

I express my sincere gratitude to Dr. K. N. Sonaliya (Former Chief Editor, *Healthline*), Dr. Bhavik Rana, and Dr. Mansi Patel (Former Associate Editors), along with the present editorial team Dr. Venu Shah, Dr. Jaydeep Ghevariya, Dr. Margi Sheth, and Dr. Gopi Kalariya for their consistent support and dedicated efforts in maintaining a smooth editorial workflow and ensuring timely publication. I sincerely acknowledge and thank all authors who trusted the journal with their work, reviewers who dedicated their valuable time, editorial board members who provided guidance, and the

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IAPSM-GC leadership for their constant encouragement. The technical and staff worked tirelessly behind the scenes, often beyond formal working hours, to resolve queries and ensure timely publication. If at any point my words or decisions caused inconvenience or hurt to anyone, I offer my sincere apologies. Editorial responsibilities sometimes demand firmness, but they should never overshadow courtesy, and I hope I was able to uphold that balance.

As every tenure concludes, the journal must continue its journey forward. Certain aspirations remain like reducing manuscript processing time further, achieving indexing in Scopus and ESCI, expanding international readership, and strengthening the reviewer network and ethical standards. I am confident that the upcoming editorial team will pursue these goals with renewed enthusiasm and fresh perspectives.

Looking back, I carry a quite satisfaction of having contributed to the journal's progress and having learned immensely along the way. *Healthline Journal* has always been a shared academic endeavor, and my association with it will continue beyond this formal role. I extend my best wishes to the new editorial team and assure them of my continued support in the growth of the journal and the activities of IAPSM-GC.

With sincere regards,

Dr. Viral Dave

Editor-in-Chief

Healthline Journal's

IAPSM-Gujarat Chapter

Awareness of Obstetric and Newborn Danger Signs Among Rural Pregnant Women in Belagavi: A Community-Based Cross-Sectional Study

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Abstract:


Introduction: Globally, as per WHO Statistics 2017, approximately 810 women die every day from preventable causes related to pregnancy and childbirth. Maternal morbidity and mortality could be prevented to a greater extent if women and their families recognize obstetric danger signs and thus reduce the delay in seeking health care at the right time. **Objectives:** The study was done to assess the awareness of key danger signs in pregnancy, labour and childbirth, postpartum (first two days after delivery) and in newborn during first seven days after delivery among rural pregnant women. **Methods:** A community based cross – sectional study was conducted among 400 pregnant women who had completed 28-week gestation in the rural field practice area of a Primary Health Centre, Belagavi, Karnataka for one year from 1st January 2019 to 31st December 2019. Stratified purposive sampling method with population proportionate sampling was used across nine sub-centers. **Results:** The mean age of the study participants was 24.3±3.6 years. Out of the 400 pregnant women in the study, 73 (18.2%) had good awareness about obstetric and newborn key danger signs. Those who were in ≥ 25 years age group (AOR:3.259, p<0.001), those who belonged to upper and middle socio-economic class (AOR:2.600, p=0.002) and multigravida (AOR:10.205, p<0.001) were positively associated with better awareness about the key danger signs. **Conclusion:** Two out of ten pregnant women were having good knowledge about the danger signs during pregnancy, labour and childbirth, postpartum and newborn. Good awareness was associated with age, socio-economic status and gravida.

Keywords: Awareness; Antenatal women; Rural; Danger signs; Newborn

Introduction:

Pregnancy is a sensitive period during which a woman may face unexpected life threatening complications leading to maternal morbidity, mortality and also affects health of newborn.^[1] Globally, as per WHO Statistics 2017, approximately 810 women die every day from preventable causes related to pregnancy and childbirth.^[2] In India, every twenty minutes a mother is dying due to pregnancy or childbirth related cause.^[3]

According to Sample Registration System (SRS) 2016-2018 data the MMR in India was 113 / 1,00,000 live births.^[4] Most of the maternal deaths occur during labour, delivery and within 24 hours post partum.^[5] One-third of the neonatal deaths occur on the first day of life and two-thirds occur during the first week after birth.^[6] Nearly 75 % of all maternal deaths are due to severe bleeding, infections, high blood pressure during pregnancy, complications from delivery and unsafe abortion.^[2]

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Danger signs are symptoms that are recognized by non-clinical personnel easily, but not the true obstetric complications. According to Thaddeus and Maine (1994), the three obstetric delays contributing to maternal mortality are: delay in seeking health care, delay in identifying and reaching the medical facility and delay in receiving adequate and appropriate treatment.^[7]

Evidence from various studies across India have shown inadequate awareness of obstetric and newborn danger signs among pregnant women. In a study conducted in 2016-18, in the urban slums of Raipur city, Chhattisgarh among 160 pregnant women and 70 recently delivered mothers, the awareness about the danger signs in all phases of pregnancy and childbirth and newborn was very poor. Only 7.4 % had awareness regarding the postpartum danger signs.^[8] Similarly, a study conducted among 170 pregnant women in Dakshina Kannada district, Karnataka in 2017, revealed that they had a very poor knowledge of the specific obstetric danger signs.^[9] These findings highlight the persisting inadequacy of knowledge regarding obstetric and newborn danger signs, across different healthcare settings. The authors highlighted that poor awareness contributed to delays in seeking care and emphasized the need for continuous health education interventions in improving maternal and fetal outcomes.^[8-9] Maternal morbidity and mortality could be prevented to a greater extent if women and their families recognize obstetric danger signs and thus reduce the delay in seeking health care at the right time.^[1]

Hence, this study was conducted primarily to assess the awareness about key danger signs in pregnancy, labour & childbirth, during first two days after delivery and in newborn during first seven days after delivery. The secondary objective of the study was to determine the socio-demographic factors associated with the knowledge about obstetric and newborn key danger signs.

Methods:

A community-based cross-sectional study was conducted among 400 pregnant women in the rural field practice area of a Primary Health Centre, Belagavi, Karnataka for one year from 1st January 2019 to 31st

December 2019. The sample size was calculated using the formula $n = 4pq/d^2$, taking the prevalence (p) of awareness of danger signs as 54.7 % and allowable error as 5 %.^[9] The rural field practice area of the Primary Health Centre consisted of nine sub - centres with a mid year population of 73,474. The total number of ANCs registered in the year 2017-2018 was 1,494. Participants were recruited using stratified purposive sampling method with population proportionate sampling across nine sub-centres. Written informed consent was obtained from all the study participants before the data collection.

Registered antenatal women who consented, had completed 28 weeks of gestational age and were permanent residents of the study area (residing at least one year preceding the survey) were included in the study. Pregnant women who did not respond after three consecutive attempts were excluded from the study.

The studies conducted earlier were mostly among pregnant women of all trimesters and postnatal women and have reported low awareness of obstetric and newborn danger signs. Community evaluations in India show that knowledge increases after targeted antenatal health education or with more antenatal visits.^[10] Hence, in the present study, pregnant women more than 28 weeks gestation age only were included as they were more likely to have had multiple ANC visits.

Ethical clearance was obtained from the Institutional Ethics Committee for Human Subjects Research of the Medical College. Data collection was done through antenatal care (ANC) camps conducted at each sub centre. The details of the number of registered pregnant women who had completed 28 weeks of gestational age for every month were collected from the Auxiliary Nurse Midwife of each sub centre. Pre validated, tested and modified questionnaire regarding socio demographic details and knowledge of key danger signs of pregnancy, labour & childbirth, postpartum and in newborn from Safe Motherhood Population Based Survey Questionnaire on monitoring of Birth Preparedness and Complication Readiness (BPCR) from the John Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) manual was used for the personal interview.^[7]

Out of 37 total danger signs, 14 were considered as key danger signs during pregnancy, labour and childbirth, postpartum (first 2 days after delivery) and newborn (first 7 days after delivery). The key danger signs during pregnancy include severe vaginal bleeding, swollen hands/face and blurred vision. The key danger signs during labor and childbirth include severe vaginal bleeding, prolonged labor (> 12 hours), convulsions and retained placenta. The key danger signs during the postpartum period include severe vaginal bleeding, foul-smelling vaginal discharge and high fever. The key danger signs in the newborn include convulsions/spasms/rigidity, difficult/fast breathing, very small baby and lethargy/unconsciousness.^[7] Multiple responses were obtained for awareness of key danger signs. Based on references from previous studies, knowledge of at least 8 key danger signs out of 14 was considered as having good awareness.^[5,11]

The data collected was coded and entered in the MS Excel sheet. Data was analyzed with Statistical Package for Social Sciences (SPSS) for Windows Trial Version 25.0. Chicago, SPSS Inc. Frequency and percentages were calculated. Multiple logistic regression was used to find association between dependent and independent variables. p value < 0.05 was considered statistically significant.

Results:

In the present study, the mean age of pregnant women was 24.3 ± 3.6 years, with age of the participants ranging from 18 to 40 years. Among the total study participants, 242 (60.5 %) were multigravida and 264 (66 %) were at less than 34 weeks of gestation. (Table 1)

The number of pregnant women aware of all obstetric and newborn key danger signs is given in Table 2. Out of the 400 pregnant women in the study, 74 (18.5 %) had good awareness and 326 (81.5 %) had poor awareness about obstetric and newborn key danger signs. The awareness about the individual key danger signs during pregnancy, labour & childbirth, postpartum and in newborn is shown in Table 3.

According to Table 4, Multivariate logistic regression showed that those pregnant women who were

Table 1: Distribution of study participants according to their socio-demographic details and gestational details (N = 400)

Socio-demographic and gestational details	n (%)
Age (in years)	
18-20	54 (13.5 %)
20-25	210 (52.5 %)
25-30	115 (28.8 %)
>30	21 (5.2 %)
Religion	
Hindu	362 (90.5 %)
Muslim	34 (8.5 %)
Christian	4 (1.0 %)
Education	
Illiterate	20 (5.0 %)
Primary (1-8 th)	79 (19.7 %)
Secondary (9-10 th)	148 (37.0 %)
Higher Secondary (11-12 th)	97 (24.2 %)
Graduate	52 (13.1 %)
Postgraduate	4 (1.0 %)
Occupation	
Homemaker	389 (97.2 %)
Self employed	7 (1.8 %)
Non government employee	4 (1.0 %)
Socio economic status (Modified BG Prasads Classification)	
Class I	29 (7.2 %)
Class II	84 (21.0 %)
Class III	117 (29.3 %)
Class IV	133 (33.3 %)
Class V	37 (9.2 %)
Gravida	
Primigravida	158 (39.5 %)
Multigravida	242 (60.5 %)
Gestational age (in weeks)	
28-30	120 (30.0 %)
30-33	144 (36.0 %)
33-36	71 (17.8 %)
>36	65 (16.2 %)

Table 2: Distribution of study participants according to knowledge of all key danger signs during pregnancy, labour & childbirth, postpartum and in newborn (N = 400)

Variable	n (%)
Knew all three key danger signs during pregnancy	36 (9.0 %)
Knew all four key danger signs during labour & childbirth	2 (0.5 %)
Knew all three key danger signs during first two days after delivery	23 (5.8 %)
Knew all four key danger signs in newborn (during first seven days after delivery)	46 (11.5 %)

Table 3: Distribution of study participants according to knowledge of individual key danger signs during pregnancy, labour & childbirth, postpartum and in newborn (N = 400)

Key danger signs	n (%)
Pregnancy	
Severe vaginal bleeding	240 (60.0)
Swollen hands / face	82 (20.5)
Blurred vision	78 (19.5)
Labor & Childbirth	
Severe vaginal bleeding	298 (74.5)
Convulsions	147 (36.7)
Prolonged labour (> 12 hours)	36 (9.0)
Retained Placenta	2 (0.5)
Postpartum (first 2 days after delivery)	
Severe vaginal bleeding	204 (51.0)
Foul smelling vaginal discharge	69 (17.2)
High fever	62 (15.5)
Newborn (first 7 days after delivery)	
Very small baby	145 (36.2)
Convulsions / spasm / rigidity	138 (34.5)
Difficult / fast breathing	127 (31.7)
Lethargy / unconsciousness	81 (20.2)

Table 4: Association between socio-demographic and gestational details and level of awareness regarding key danger signs (N = 400)

Socio demographic & gestational details	Good awareness N=74 n (%)	Poor awareness N=326 n (%)	Crude Odds Ratio (95 % CI)	Adjusted Odds ratio (95 % CI)	p value
Age (in years)					
< 25	29 (39.2)	235 (72.1)	1	1	< 0.001
≥ 25	45 (60.8)	91 (27.9)	4.007 (2.369-6.779)	2.589 (1.473-4.553)	
Education					
Illiterate	1 (1.4)	19 (5.8)	1	1	0.158
Literate	73 (98.6)	307 (94.2)	4.518 (0.595-34.297)	4.503 (0.557-36.419)	
Occupation					
Homemaker	72 (97.3)	317 (97.2)	1	1	0.397
Employed	2 (2.7)	9 (2.8)	0.978 (0.207-4.625)	0.496 (0.098-2.512)	
SES					
Lower	55 (74.3)	175 (53.7)	1	1	0.003
Upper & Middle	19 (25.7)	151 (46.3)	2.498 (1.419-4.395)	2.490 (1.350-4.592)	
Gravida					
Primigravida	5 (6.8)	153 (46.9)	1	1	< 0.001
Multigravida	69 (93.2)	173 (53.1)	12.205 (4.799-31.039)	10.462 (4.036-27.121)	

≥ 25 years age had higher odds (AOR: 3.259, 95 % CI: 1.782-5.958) of having good awareness of key danger signs compared to those < 25 years age and the difference was statistically significant ($p < 0.001$). Those who belonged to upper & middle SES had higher odds (AOR: 2.600, 95 % CI: 1.406-4.807) of having good knowledge of key danger signs compared to those who belonged to lower SES and the difference was statistically significant ($p = 0.002$). Multigravida had higher odds (AOR: 10.205, 95 % CI: 3.931-26.493) of having good awareness of key danger signs compared to primigravida and the difference was statistically significant ($p < 0.001$).

Discussion:

In this study, the most common key danger sign known during pregnancy (70.7%), during labour & childbirth (74.5%) and during first two days after delivery (51.0%) was severe vaginal bleeding. Similarly, a study conducted in 2017 in Chhattisgarh among 110 pregnant women, showed that the most common key danger sign known during pregnancy was vaginal bleeding (11.8 %).^[11] In a study in 2015 in Nagpur among 100 pregnant women, severe vaginal bleeding (50.0 %) was most commonly known among key danger signs in labour.^[12] In 2015, a study in Amritsar and Puducherry, 14.0 % & 32.7 % knew about severe bleeding as a key danger sign during first two days after delivery respectively.^[13, 14] The difference was probably because majority of the pregnant women preferred home delivery and did not anticipate any danger signs.

In the present study, 34.5 % knew about convulsions and 31.7 % were aware of difficult / fast breathing among newborn danger signs. Similarly, a Hyderabad study in 2017, among 200 antenatal women found that 38.0 % were aware of convulsions and 31.0 % knew about difficult or fast breathing.^[1] Limited participation in or ineffective communication during health education sessions may be contributing to the persistently low awareness of neonatal danger signs across regions.

Among 400 pregnant women in the present study, 18.2 % were aware of at least eight key danger signs during pregnancy, labour, postpartum and in newborn. Whereas a study done in 2017, among 672 pregnant women, in Thailand showed that 74.7 % were aware of at

least eight key danger signs which was higher probably due to different study setting and facility-based study.^[15]

In present study, those who were in ≥ 25 years age group (AOR: 3.259, 95 % CI: 1.782-5.958, $p < 0.001$), those who belonged to upper and middle SES (AOR: 2.600, 95 % CI: 1.406-4.807, $p = 0.002$) and multigravida (AOR: 10.205, 95 % CI: 3.931-26.493, $p < 0.001$) were positively associated with better awareness about the key danger signs. In a Bangalore study, education of women up to middle / high school and above was statistically significantly associated with knowledge about danger signs of pregnancy ($p = 0.008$).^[16] A study done in Mumbai among 126 pregnant women, found that there was statistically significant association between literacy and knowledge regarding the key danger signs in pregnancy ($\chi^2 = 33.031$, $p = 0.00001$) and between age-group and knowledge regarding key danger signs during pregnancy ($\chi^2 = 6.310$, $p = 0.012$).^[17] The similarity between the study findings emphasize the role of socio-demographic and obstetric factors in determining awareness levels. This highlights the need for targeted health education sessions concentrating on younger, illiterate, primigravida and lower socio-economic groups to enhance comprehensive awareness of obstetric and newborn danger signs.

Strengths & Limitations:

The strengths of this study were that it was a community based study conducted among a large sample size of rural antenatal women and the results can be generalized and a standard questionnaire was used for the personal interview. The limitations were that it was conducted only among antenatal women and did not include the postnatal women. Hence, there would have been lack of knowledge of danger signs.

Conclusion:

Two out of ten pregnant women had good awareness with knowledge regarding at least eight key danger signs during pregnancy, labour & childbirth, during first two days after delivery and in the newborn during first seven days after delivery. Those who were in ≥ 25 years age group, those who belonged to upper and middle SES and multigravida were positively associated with better awareness about the key danger signs.

Recommendations:

The pregnant women and her family members should be aware of all the key danger signs and anticipate them to reduce delay in seeking health care at the right time. The grass root level workers need to educate the pregnant women regarding the key danger signs. They need to be trained to identify the key danger signs and give adequate health education to the pregnant women regarding identification of key danger signs of pregnancy, labour and childbirth, during first two days after delivery and in newborn during first seven days after delivery to reduce the delay in seeking health care. ANC camps, posters, pamphlets, Mother & Child Protection (MCP) cards and mobile phones can be utilized for health education activities.

Declaration

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Prevalence of Hypertension among Adolescents in a Rural Area of Madurai District: A Cross-Sectional Study

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Abstract:

Introduction: Hypertension among adults is an important public health problem nowadays. Uncontrolled hypertension leads to certain complications such as chronic kidney diseases, heart failure, stroke, etc. Early screening of children and adolescents helps to identify those “at risk” of developing hypertension at a future date and also modify risk factors at earlier stage thereby preventing complications. **Objectives:** 1. To estimate the prevalence of hypertension among adolescents aged 10-19 years in Madurai district. 2. To determine the risk factors associated with development of hypertension among the study participants. **Methods:** A cross-sectional study comprising of 420 adolescents in the age group of 10-19 years in Madurai district were included by cluster sampling. Data was collected using a semi-structured questionnaire. Blood Pressure (BP) was measured and diagnosis of hypertension was made based on guidelines of American Association of Pediatrics and Indian Pediatrics. **Results:** The present study revealed a prevalence of elevated BP as 2.1% and hypertension as 10.2%. Educational status ($p=0.004$), screen time ($p=0.026$) and family history ($p=0.000$) were significantly associated with adolescent hypertension. There was a positive correlation between Age and Systolic, Diastolic BP and also between Body Mass Index (BMI) and Systolic BP. **Conclusion:** Based on study findings, around 10.2% of the adolescent population was having hypertension. Non modifiable risk factors like family history of hypertension, age and modifiable risk factors like screen time, BMI were some of the factors associated with hypertension.


Keywords: Adolescents, Hypertension, Prevalence, Risk Factors

Introduction:

Hypertension is a major cause of premature deaths globally with 1 in 4 men and 1 among 5 women are having this condition.^[1] According to World Health Organization (WHO) in 2021, an estimated 1.28 billion adults in the age group of 30 to 79 years have hypertension globally.^[2] Number of persons living with hypertension has been doubled to this number since 1990.^[3] Hypertension is directly linked to more than 8.5 million deaths worldwide approximately 30,000

deaths/day in each year.^[4] According to Ministry of Health and Family Welfare (MoHFW), hypertension contributes to about 1.6 million deaths annually in India.^[5] Recently, the global prevalence of hypertension among children and adolescents in a systematic review conducted by Song P et al was 4.32% at 6 years of age, 3.28% at 19 years of age with peak of 7.89% at 14 years of age.^[6]

According to a systematic review and meta-analysis conducted by Daniel RA et al^[7], the pooled prevalence of

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hypertension among adolescents in the age group of 10-19 years was 7.6% in 2020. Screening of adolescents during adolescence period helps to identify and also modify risk factors at earlier stage thereby preventing complications at adult stage.^[5] However, there were fewer studies covering the whole adolescent age group of 10-19 years in India. In order to understand the prevalence of hypertension in the age group of 10-19 years and other associated factors, this study was proposed.

Present study was conducted with the objectives to estimate the prevalence of hypertension among adolescents aged 10-19 years in Madurai district and to determine the risk factors associated with development of hypertension among the study participants.

Methods:

A Community based cross-sectional study was conducted among adolescents in Samayanallur area, Madurai District, South India for 1 month from March to April 2023. Apparently healthy adolescents in the age group of 10-19 years were included in this study. Pregnant adolescents, adolescents with known cause of secondary hypertension such as renal parenchymal disease, renal vascular disease, endocrine disorders and those who have taken drugs causing adolescent hypertension (corticosteroids, Non Steroidal Anti Inflammatory Drugs (NSAIDs), immunosuppressants, Oral Contraceptive Pills (OCP), oestrogen, progestins, Serotonin Norepinephrine Reuptake Inhibitors (SNRI)) and those who were not willing to participate were excluded from the study.^[8,9]

The sample size was calculated using the formula ($Z_{\alpha}^2 \times p \times q / L^2$) * design effect, Where, Z alpha=1.96 at 95% confidence interval, p=Prevalence, q=100-p, L=Allowable error, design effect=1+(cluster size-1) x rate of homogeneity. Cluster size of 15 was taken for this study as it was possible to see at least 10 study subjects per day in the field thus making 2 days visit for each cluster. Data collection was mostly done in weekdays evenings and on weekends when most of the subjects were available. Rate of homogeneity = 0.02 (proportion of hypertension in general based on systematic review and meta-analysis of cross sectional studies by Roy

Arokiam Daniel et al).^[7] Therefore, design effect = $1+(15-1) \times 0.02 = 1+0.28 = 1.28$, prevalence (p) = 23 (based on a study conducted by Rajiv Narang et al in 2018 in India)^[10], $q=100-p=100-23=77$, L= Allowable error (allowable error of 20% of prevalence was taken for this study. i.e. 20% of 23 = 4.6), substituting all the above values in the formula, the sample size was calculated as 412 and actual sample size covered was 420.

Cluster sampling was used. With the cluster size of 15, number of clusters needed = sample size / cluster size = $412 / 15 = 27.5 = 28$ clusters. Therefore, with equal cluster size of 15, sample size to be covered for 28 clusters was calculated as $28 \times 15 = 420$

Samayanallur Block PHC has 7 panchayat villages. There are total of 68 streets in 7 villages. The adolescent population (10-19 years) of 68 streets varies from a minimum of 20 to a maximum of 95 (Total of 2494 adolescents). Each street was taken as a cluster (68 clusters). Among 68 streets, 28 streets (28 clusters) were selected at random. From these 28 clusters, 15 adolescents were selected in each cluster by starting to collect the data from the first study participant from the house at the midpoint of the street and then by following right hand rule, the subsequent houses were selected till 15 adolescents were obtained in each cluster. If the house was locked during the time of data collection, data was not collected from the particular house. In each household, all adolescents in that house were covered. Similarly, for other clusters too, 15 adolescents per cluster were selected in the same way. By this way, the desired sample size was obtained.

Study Instrument: A predesigned semi-structured questionnaire consisting of basic demographic details such as age, gender, religion, education of adolescent, income of the head of the family, number of members in the family, family history of hypertension, dietary habits and pattern of eating of fruits, vegetables, tea and coffee, physical activity, sleep patterns- hours of sleep per 24 hour and TV, mobile usage details per 24 hours was used. This questionnaire was developed based on Global School Health Survey Questionnaire (which was developed by WHO) and then refined by the authors after

peer review. Blood pressure (in mmHg) was measured using mercury sphygmomanometer as digital devices systematically overestimate Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) compared to auscultation. BP was measured in sitting position with uncrossed legs in right arm at heart level. Three readings were taken with an interval of 2 minutes between each readings and average of last two readings were taken as final record of BP as per recommendations of American Association of Pediatrics and Indian Pediatrics.^[11] In obese persons appropriate cuff size was used. Height (in cm) was measured using a portable stadiometer. Weight (in kg) was measured using digital weighing machine.^[12]

Data collection was done in the study area after obtaining permission from The Institute Ethics Committee. Data was collected by house to house visit in the study area. In each selected village, a starting point was selected from the midpoint of the village and using right hand rule, adjacent houses were recruited continuously till 15 households were reached for all 28 clusters. After informed consent from the parents and assent from adolescents and completing the questionnaire, each study subject was explained about the procedure of Blood Pressure measurement using BP apparatus, weight measurement using weighing machine, and height measurement using stadiometer.

Cuff with adequate bladder length was used depending on the arm circumference in the age group of 10-19 years.^[8,11]

Operational Definitions

Adolescent: According to World Health Organization (WHO) and United Nations (UN), Stages of Adolescence are Early Adolescence - 10-13 years of age; Middle Adolescence - 14-16 years of age and Late Adolescence - 17-19 years of age.^[13]

Hypertension In Adolescents: As per Indian Academy of Paediatrics (IAP), adolescents (10-19 years) are divided into two age groups: 10-13 years and >13 years for the purpose of defining hypertension.^[8,11] (Table 1)

Body Mass Index (BMI): According to WHO^[14], based on BMI values and their Standard Deviation (SD) values, boys and girls are classified into 5 categories- Severe thinness- < -3 SD, Thinness- > -3 SD to < -2 SD, Healthy weight- > -2 SD to < +1 SD, Overweight- > +1 SD to < +2 SD, Obese- > +2 SD.

For children aged between 5–19 years, overweight is defined as BMI-for-age greater than 1 standard deviation above the WHO Growth Reference median and obesity is defined as BMI-for-age greater than 2 standard deviations above the WHO Growth Reference median.^[15]

Table 1: Category of Hypertension based on percentile for 10-13 years and >13 years

BP category	10-13 years
Normotensive	SBP/DBP <90th percentile for corresponding age, sex and 50th percentile for height in the table
Elevated BP	SBP/DBP ≥ 90th percentile to <95th percentile (or) 120/80 mmHg to <95th percentile (whichever is lower) for their corresponding age, sex and 50th percentile for height in the table
Stage-1Hypertension	SBP/DBP ≥ 95th percentile to <95th percentile+ 12mmHg (or) 130/80 mm Hg to 139/89 mmHg (whichever is lower) for their corresponding age, sex and 50th percentile for height in the table
Stage-2Hypertension	SBP/DBP ≥ 95th percentile+12 mmHg (or) e”140/90 mmHg (whichever is lower) for their corresponding age, sex and 50th percentile for height in the table
BP category	>13 years
Normotensive	<120/ <80 mmHg
Elevated BP	120/ <80 mmHg to 129/ <80 mmHg
Stage-1 Hypertension	130/80 mmHg to 139/89 mmHg
Stage-2 Hypertension	≥ 140/90 mm Hg

Socio-Economic Status: In this study, Modified B.G.Prasad scale 2023 was used to assess socio-economic status (SES).^[16]

Sleep Patterns: As per Centre for Disease Control and Prevention, adolescents require 9 - 9.30 hours of sleep every night. Adequate sleep in the age group of 6-12 years is 9-12 hours/24 hours and 13-18 years is 8-10 hours/24 hours.^[17-19]

Physical Activity: Physical activity is defined as “Any bodily movement produced by skeletal muscles that increase energy expenditure above basal level”.^[20] WHO recommends physical activity of 60 minutes of physical activity per day throughout a week.^[21,22]

Screen Time: Screen time can be defined as total time per day spent viewing screens such as TV, mobile, computer, tablet. Adolescent must spend 1 hour of physical activity (play time), time for schoolwork, meals, hobbies, adequate sleep time (8-9 hours uninterrupted sleep at night). If these are displaced due to screen time, it is excessive screentime.^[23]

Data Entry and Analysis: Data entry was done in Microsoft Excel. The data that was entered was analysed using SPSS software version 26.0. For continuous variables, Mean and Standard deviation was calculated. For categorical variables, Numbers and Percentages were calculated. After calculating the prevalence of high blood pressure, chi square test (and Fisher’s exact test wherever applicable) was applied to find out the association between hypertension and other factors. Pearson’s correlation method was used to find correlation between systolic, diastolic blood pressure and BMI and also between systolic, diastolic blood pressure and age. p value of <0.05 was considered significant in all above associations and correlations.

Results:

Table 2 shows that 197 (46.9%) were in the age group of 10-12 years, 233 (55.5%) were boys and 187 (44.5%) were girls. Majority of the study participants 264 (62.9%) were middle school students. Nearly half of the study participants 196 (46.7%) belong to socio economic status(SES) class 4.

Among the study participants, 368 (87.6%) were normotensive persons. Around one-eighth 52 (12.38%) of 420 study participants had High BP. Among those who had High BP levels, 9 participants (17.3%) falls in the stage of elevated BP levels, 32 participants (61.5%) were Stage 1 hypertensive persons and 11 participants (21.2%) had Stage 2 hypertension.

Mean systolic BP of the study participants was 98.65 ± 14.15 mmHg. The mean systolic BP of boys and girls were 97.52 ± 15.00 mmHg and 100.06 ± 12.91 mmHg respectively. The mean systolic BP of boys and girls were compared by unpaired t test, and this was not statistically significant with t value of -1.837 and p value of 0.067.

Table 2 : Socio-demographic details of the study population (N=420)

Socio-demographic variables	Frequency (%)
Age Category	
10-12 years	197 (46.9%)
13-15 years	163 (38.8%)
16-19 years	60 (14.3%)
Gender	
Boys	187 (44.5%)
Girls	233 (55.5%)
Religion	
Hindu	391 (93.1%)
Christian	19 (4.5%)
Muslim	10 (2.4%)
Education	
Primary School (Class 1-5)	5 (1.2%)
Middle School (Class 6-8)	264 (62.9%)
High School (Class 9-12)	141 (33.5%)
Intermediate/Diploma	10 (2.4%)
Socioeconomic Status	
Upper middle class (Class II)	43 (10.2%)
Middle class (Class III)	108 (25.7%)
Lower middle class (Class IV)	196 (46.7%)
Lower class (Class V)	73 (17.4%)

Table 3: Association between Sociodemographic Details and Blood Pressure (N=420)

Variables	Normotensive (%) [n=368, 87.62%]	Elevated BP (%) [n=9, 2.14%]	Hypertension (%) [n=43, 10.24%]	Total (%)	Fischer's exact test value	p value
Age Category (years)						
10-12	169 (85.7%)	3 (1.5%)	25 (12.8%)	197 (100%)	4.839	0.277
13-15	144 (88.3%)	6 (3.7%)	13 (8%)	163 (100%)		
16-19	55 (91.6%)	0	5 (8.4%)	60 (100%)		
Gender						
Boys	209 (89.7%)	5 (2.1%)	19 (8.2%)	233 (100%)	2.478	0.290
Girls	159 (85.1%)	4 (2.1%)	24 (12.8%)	187 (100%)		
Socio-economic Status						
Class-II	37 (86.05%)	0	6 (13.95%)	43 (100%)	7.327	0.538
Class-III	95 (88%)	3 (2.8%)	10 (9.2%)	108 (100%)		
Class-IV	174 (88.8%)	5 (2.6%)	17(8.6%)	196 (100%)		
Class-V	62 (84.9%)	1 (1.4%)	10 (13.7%)	73 (100%)		
Educational Status						
Primary school	2 (40%)	2 (40%)	1 (20%)	5 (100%)	18.208	0.004
Middle school	232 (87.9%)	2 (0.8%)	30 (11.3%)	264 (100%)		
High school	125 (88.7%)	5 (3.5%)	11 (7.8%)	141 (100%)		
Intermediate/ diploma	9 (90%)	0	1 (10%)	10 (100%)		
Family History of Hypertension						
Present	24 (41.4%)	6 (10.3%)	28 (48.3%)	58 (100%)	132.647	0.000
Absent	344 (95%)	3 (0.8%)	15 (4.2%)	362 (100%)		

Mean diastolic BP of the study participants was 68.25 ± 11.63 mmHg. The mean diastolic BP of boys and girls were 64.72 ± 12.15 mmHg and 65.90 ± 10.94 mmHg respectively. The mean diastolic BP of boys and girls were compared by unpaired T-test, and this was not statistically significant with t value of -1.033 and p value of 0.302.

Table 3 shows that Normotensives (55, 91.6%) were higher in the age group of 16-19 years and lower in the age group of 10-12 years (169, 85.7%). Elevated BP (6, 3.68%) was higher in the age group of 13-15 years whereas hypertension (25, 12.8%) was higher in the age group of 10-12 years. This difference was not statistically significant (p value= 0.277). Among boys, 19 (8.2%) were hypertensives and among girls, 24 (12.8%) were hypertensives. However, this difference was not statistically significant (p value= 0.290). Hypertensives (6, 13.95%) were higher in class-2

category followed by other categories. This difference was not statistically significant (p value = 0.538). Elevated BP (2, 40%) and hypertension (1, 20%) were higher among primary school students. This difference was statistically significant (p value= 0.004). Effect size of Cramer's V value was 0.219 (Large size). Elevated BP (6, 10.3%) and hypertension (28, 48.3%) were higher among those who had family history of hypertension. This difference was statistically significant (p value= 0.000). Effect size by Cramer's V value was 0.562 (Large size).

Table 4 shows that hypertensives (8, 13.3%) were higher among those who sleep 6-8 hours/day than those who sleep 8-10 hours (30, 10.1%) and 10-12 hours/day (5, 7.8%). This difference was not statistically significant. (p value= 0.414). Elevated BP (2, 5%) and hypertension (8, 20%) was higher among those who had used TV, mobile more than 2 hours/day in the last 1

Table 4: Association between Sleep, Screen time, Physical Activity, Dietary habits and Blood Pressure (N=420)

Variables	Normotensive (%) [n=368, 87.62%]	Elevated BP (%) [n=9, 2.14%]	Hypertension (%) [n=43, 10.24%]	Total (%)	Fischer's exact test value	p value
Hours of sleep per day in last 1 month (Hours/day)						
6-8	52 (86.7%)	0	8 (13.3%)	60 (100%)	3.687	0.414
8-10	260 (87.8%)	6 (2.1%)	30 (10.1%)	296 (100%)		
10-12	56 (87.5%)	3 (4.7%)	5 (7.8%)	64 (100%)		
Hours of TV, mobile usage per day in last 1 month (Hours/day)						
<2	338 (89%)	7 (1.8%)	35 (9.2%)	380 (100%)	6.653	0.026
>2	30 (75%)	2 (5%)	8 (20%)	40 (100%)		
Hours of physical activity per day in last 1 month (Hours/day)						
<1	299 (88.2%)	8 (2.4%)	32 (9.4%)	339 (100%)	3.299	0.448
1-2	45 (88.2%)	1 (2%)	5 (9.8%)	51 (100%)		
>2	24 (80%)	0	6 (20%)	30 (100%)		
Number of times of fruit and vegetable intake per day in last 1 month (Times/day)						
<2	362 (87.4%)	9 (2.2%)	43 (10.4%)	414 (100%)	0.620	1.000
>2 Times/day	6 (100%)	0	0	6 (100%)		
Number of times of intake of tea, coffee per day in last 1 month (Times/day)						
<2	355 (88.3%)	9 (2.2%)	38 (9.5%)	402 (100%)	5.173	0.079
>2	13 (72.2%)	0	5 (27.8%)	18 (100%)		

month. This difference was statistically significant. (p value= 0.026). Effect size by Cramer's V value was 0.125 (Small size). Hypertension (6, 20%) was higher among those who had physical activity more than 2 hours/day in last 1 month than those who had physical activity in the duration of 1-2 hours/day (5, 9.8%) and less than 1 hour/day (32 (9.4%)). This difference was not statistically significant (p value= 0.448). Elevated BP (9, 2.2%) and hypertension (43, 10.4%) were higher among those who had taken fruits and vegetables less than 2 times/day than those who had taken fruits and vegetables more than 2 times/day in which 6 (100%) of them were normotensives. This difference was not statistically significant (p value= 1.000). Hypertension (5, 27.8%) was higher among those who had intake of tea and coffee more than 2 times/day in the last 1 month than those who had tea, coffee intake less than 2 times/day (38, 9.5%). This difference was not statistically significant (p value=0.079).

Age showed a significant positive correlation with both systolic and diastolic blood pressure. Systolic BP had a moderate positive correlation with age (r= 0.337, p < 0.001), while diastolic BP showed a weaker but significant correlation (r = 0.214, p < 0.001). Body Mass Index (BMI) was also positively correlated with systolic BP (r = 0.222, p < 0.001). However, the correlation between BMI and diastolic BP was weak and not statistically significant (r = 0.054, p = 0.267).

Discussion:

In present study, the prevalence of elevated BP was 2.14% (n=9) and hypertension was 10.24% (n=43). This is similar to findings of a systematic review conducted by Augusto cesar Ferreria de Moraes in 10-19 years of age which shows prevalence of hypertension to be 11.2%. A study conducted in Texas has shown prevalence of elevated BP among 10-17 years was 16.3%, higher than our study.^[24] The findings of a cross-sectional study

conducted in Surat by Nirav Buch among 5-18 years of age shows that prevalence of hypertension was 6.48% and another cross-sectional study conducted by Kaushik Nag in Burdwan, West Bengal among 13-18 years had shown that prevalence of hypertension was 5.7% which are lower than our study.^[25,26]

In present study, girls have higher prevalence of elevated BP and hypertension than boys (14.9% vs 10.3%). This is similar to a cross-sectional study conducted by Pandve H et al^[27] in 2021 in which girls have higher prevalence of hypertension than boys (14.29% vs 13.89%).

In present study, there was significant positive correlation between BMI and systolic BP with correlation coefficient of + 0.222 and BMI and diastolic BP with correlation coefficient of + 0.054. A cross-sectional study conducted by Kavitha B in Puducherry and a study done by CURES-52 (Chennai Urban Rural Epidemiological Study) in adults shows that body mass index (BMI) was found to be strongly associated with hypertension.^[28,29]

In this study, there was significant positive correlation between systolic, diastolic blood pressure and age with correlation coefficient values of + 0.337 and + 0.214 respectively in our study. This shows as age increases, systolic BP and diastolic BP increases. In a study in Centre region of Cameroon and in a study done by CURES-52 in adult population, age was found to be strongly associated with hypertension.^[29,30]

In present study, majority of 87.8 % persons who sleep 8-10 hours/day were normotensives and this difference was not statistically significant. A systematic review conducted by Emanuela de Souza et al^[31] has shown that short sleep duration of less than 8 hours was associated with high blood pressure in adolescence.

In current study, Elevated BP 5% and hypertension 20% was higher among those who used TV, mobile more than 2 hours/day in last 1 month and this difference was statistically significant. A 5-hour increment per week in hours of sedentary behavior (television/Internet) was

associated with a 17% increased likelihood of high systolic BP which supports our study findings.^[32]

Cent percent of the participants who had taken fruits and vegetables more than 2 times/day were normotensives in our study. A cross-sectional study conducted by Ragupathy et al^[33] has shown that consumption of low vegetables/fruits was one of the significant risk factors for hypertension among Indian population. In this study, hypertension was higher among those who had intake of tea and coffee more than 2 times/ day in last 1 month (27.8%). A study conducted by Jacob Schor shows that there was statistically significant positive association between coffee intake and risk of hypertension which supports our study.^[34]

In present study, elevated BP 10.3% and hypertension 48.3% were higher among those who had family history of hypertension and this difference was statistically significant. A study in Central Jakarta, Indonesia has shown that family history of hypertension was significantly associated with hypertension.^[35]

Strengths & Limitations of the study:

This study was done using Global School Health Survey (GSHS) Questionnaire that is of high standard. The study was done in field area at home settings and without use of white coat during data collection, thus in children white coat hypertension and office-based hypertension was avoided which might have given false results and can be generalizable to entire population. The study was done using cluster sampling method, thus covering larger population. The blood pressure measurements were compared with the standard tables recommended by AAP (American Academy of Pediatrics) and IAP and hence higher reliable.

Since this was a cross-sectional study, a causal relationship could not be established between the risk factors with adolescent hypertension, which could be done by a case control study, cohort study or a randomized control trial. Other factors such as substance abuse, academic performance of the students were not included in this study, which might have confounding effects on blood pressure.

Conclusion:

The prevalence of elevated BP was 2.14% (n=9) and hypertension was 10.24% (n=43) among adolescents. Age was positively correlated with both systolic BP and diastolic BP. BMI were positively correlated with systolic BP and diastolic BP. Factors like educational status, screen time, and family history of hypertension had a significant association with the prevalence of adolescent hypertension.

Recommendations:

The high prevalence of elevated BP and hypertension in adolescent population states an urgent need for periodic screening atleast yearly once regularly in the schools, or through camps in nearby areas. Awareness regarding hypertension and its complications at the school level should be taught to children through teachers in a way acceptable and understandable to them as a measure of primordial prevention and to encourage a healthy lifestyle, integrating with AYUSH for weekly yoga classes to reduce stress.

Declaration

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Conflict of Interest: Nil

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“Sensitization-Immersion-Reflection”: A Structured Approach to AETCOM learning in Phase-2 MBBS Students

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Abstract:

Introduction: The AETCOM (Attitude, Ethics, and Communication) framework underscores the notion that transforming behavior can lead to meaningful changes in attitudes of medical students. **Objective:** 1. To evaluate the effectiveness of the Sensitization–Immersion–Reflection (S-I-R) framework in improving Phase-II MBBS students' understanding and application of AETCOM competencies. 2. To assess the impact of the S-I-R framework on enhancing reflective thinking and ethical reasoning among participants **Methods:** This was a post-test only mixed-methods study design to evaluate the effectiveness of the S-I-R approach in enhancing students' understanding and application of AETCOM competencies. Study included a sensitization session through interactive-large group teaching followed by role-plays, case-discussions, and cinemeducation to deepen understanding. The understanding of the students were further assessed in the Reflection Phase through guided reflective writing. Quantitative data collected through a structured-questionnaire, while qualitative insights were obtained from thematic analysis of reflective writing. **Results:** A total of 105 out of 125 students participated in the study. The immersion phase showed a mean score of 16.95 ± 1.30 (out of 20), indicating high engagement and competency graded across various domains. The assessment showed substantial inter-rater reliability (Cohen's $\kappa = 0.76$). In the Reflective phase thematic analysis of the student narratives revealed major ethical domains including patient autonomy and consent 76/105 (72%), communication in care 74/105 (70%), confidentiality and privacy 71/105 (68%), compassionate care 69/105 (66%), patient dignity and comfort 67/105 (64%), and medical errors and accountability 59/105 (56%). **Conclusion:** The S-I-R approach effectively enhanced bioethics knowledge shifted attitudes toward ethical practice, and provided valuable feedback on the AETCOM module.


Keywords: AETCOM, Medical Ethics, Reflective Learning, S-I-R Approach.

Introduction:

Medical errors, unexpected adverse outcomes, cases of malpractice, and perceived inappropriate behavior by health care staff often result when medical personnel do not have appropriate workplace relationships and display inadequate communication.^[1] Similarly, whenever health care personnel display

inappropriate professional behavior, it usually gets disproportionate attention from society and the media alike, maligning the entire medical profession.

Historically, soft skills were imparted implicitly within the curriculum. However, the advent of the Competency Based undergraduate Medical Education Curriculum (CBME) in 2019 introduced a structured

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AETCOM module aimed at equipping medical graduates with the knowledge, skills, and attitudes essential for professional excellence which is now supposed to be taught and assessed like knowledge and skill domain.^[2]

The integration of AETCOM within the MBBS curriculum is vital for nurturing holistic medical professionals who are not only technically proficient but also empathetic, ethically grounded, and articulate communicators. The explicit teaching of ethical principles, coupled with experiential learning opportunities, is essential to cultivate professionalism among medical students.

The development of communication skills for undergraduates is a challenge and requires faculty development, students' readiness to be able to reflect on a setting, the ability to reflect on their own reflections during the curriculum and learn from the process itself. It is important that the approach should be an amalgamation of a learning process, reflective writing, and assessment aspects rather than just a document draft.

The Sensitization Immersion Reflective Writing (S-I-R) approach presents an innovative and structured methodology for teaching AETCOM.^[3] This approach involves:

Sensitization (S): Introducing students to key concepts in attitude, ethics, and communication.

Immersion (I): Engaging them deeply in real world scenarios to internalize these principles.

Reflective Writing (R): Encouraging introspection to consolidate learning and foster professional growth.

The study is to design a standard approach for teaching Ethical and legal issues surrounding patient autonomy, patient rights, and shared responsibilities and informed consent to the students with an emphasis on reflections.

Methods:

The study employed a post-test only design complemented by qualitative reflective writing, adopting Sensitization–Immersion–Reflection (S-I-R) framework. It was conducted over a three-month period and included Phase II MBBS students who were present and consented to participate. Out of 125 students, 105

participated in the study. Current study included complete enumeration of the phase II MBBS students, so we included all the students attending the class.

Approach to the study:

The study was conducted in three phases: Sensitization, Immersion and Reflection.

Phase I- Sensitization

The Sensitization phase was conducted in two one hour sessions delivered through large group teaching. Topics included ethical and legal issues related to competencies 2.5, 2.6, and 2.7 of the AETCOM Module which deals with patient autonomy, patient rights, and shared responsibilities. Specific focus areas included: Refusal of care, Do Not Resuscitate (DNR) orders, Withdrawal of life support, Informed consent for surgical procedures

Phase II-Immersion

The sensitization phase was followed by Immersion phase which involved Experiential Learning and Self-Directed Learning in the form of Role Play, Awareness Video Creation, Real Life Case Discussions, Cinemeducation, Small Group Discussions on Situational Cases as specified in Table 1. Students were divided into 11 groups: 5 groups of 11 students and 6 groups of 10 students. The students were divided based on their roll numbers assigned in class. The following topics were given based on ethical concepts as per AETCOM module as shown in Table 1.

The group activities were assessed using structured rubric consisted of four domains (innovation, clarity of concept, individual participation & teamwork, and ethical reasoning) as described in Table 2, each scored on a 5-point Likert scale (1–5), with a maximum total score of 20 per group. The rubric was developed based on AETCOM competency descriptors and reviewed by senior faculty members for content validity.

To enhance reliability, six faculty members independently evaluated each group. Scores were compared and any discrepancies were resolved through mutual discussion, thereby enhancing the reliability of the assessment. Inter rater reliability was assessed using Cohen's Kappa coefficient, which demonstrated substantial agreement ($\kappa=0.72$).

Table :1 Topics based on ethical concepts given in the Immersion phase

Groups	Topic/Case scenario	Ethical Concept
I.	A doctor shares patient information in a WhatsApp group	Confidentiality
II.	Resuscitation of a DNR patient for organ Donation	Patient rights
III.	Character 'Anand bhai' in the Movie "Munna bhai MBBS"	Patient rights
IV.	Patient diagnosed to have HIV, request the doctor to keep the information confidential Your approach!	Confidentiality
V.	Doctor withholds information assuming patient cannot afford treatment	Beneficence and Non maleficence
VI.	Doctor prefers palliative care for a patient with Grade 4 carcinoma but the family is optimistic with the advanced medical options available and wants to opt for aggressive therapy	Beneficence and Non maleficence
VII.	Awareness video on the socio cultural stigma in medical fields (in respect to patient autonomy)	Socio cultural stigma affecting patients autonomy
VIII.	Medico-legal aspects of discrimination based on Movie "Philadelphia"	Medico legal aspects of patient discrimination
IX.	Relational autonomy or undue pressure? Family's role in decision making	Shared responsibility
X.	Ankur Arora Murder case	Justify Truth telling
XI.	Patient with head injury post RTA refuses treatment	Informed consent & Patient rights
XII.	Preference of treatment in case of scarcity of resources (two patients with similar presentation)	Non discrimination

Table 2: Distribution of score based on domains for evaluation of the immersion activities

S.No	Domain*	Descriptor	Score Range
1.	Innovation and Creativity	Originality of the approach; use of engaging methods (e.g., role play, visuals, audio-visual elements); creative interpretation of ethical issues	0-5
2.	Clarity of Ethical Concept	Accurate understanding and articulation of the ethical principle; application to the case scenario; relevance and depth	0-5
3.	Individual Participation & Teamwork	Active involvement of group members; balanced contribution; collaboration and respect in discussion/ presentation	0-5
4.	Justification and Ethical Reasoning	Logical reasoning and justification for the stand taken; ability to consider multiple perspectives and ethical dilemmas	0-5

*Each domain was scored on a 5-point scale (1 = Needs Improvement, 5 = Excellent), resulting in a total possible score of 20 per group.

Phase III-Reflection

The immersion session was followed by guided reflection using the framework: *What happened? So what? What next?* an approach aligned with Gibbs Reflective Cycle, which emphasizes structured reflection on experience through description, evaluation, and planning for future action.

The reflective writing was based on a movie "WIT" which explores ethical dilemmas related to informed

consent, empathy, patient rights and communication. Students' reflections were analyzed using an inductive thematic analysis approach.^[12] The steps included familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The codes, subthemes, and final themes identified from the reflective narratives are summarized in the results section.

Statistical Analysis

Quantitative data were analyzed using descriptive statistics. Test scores were expressed as mean ± standard deviation and percentage scores. Group rubric scores were similarly summarized using mean and standard deviation. Domain specific interpretation was evaluated within the cognitive domain using a rubric, with higher scores indicating better knowledge acquisition and integration. Inter rater reliability was calculated using Cohen’s kappa coefficient.

The post session assessment comprised 15 Multiple Choice Questions(MCQs) (single best answer format) designed to evaluate students’ understanding of key AETCOM competencies (2.5–2.7). The questions addressed core ethical principles, including autonomy, beneficence, nonmaleficence, confidentiality, and informed consent. Each correct response was awarded one mark, yielding a maximum possible score of 15. All instructional and assessment components of the study were aligned with AETCOM module objectives and underwent review by the Medical Education Expert Committee to establish content validity.

Ethical Considerations:

The study was conducted after obtaining approval from the Institutional Ethics Committee (IEC Approval No: ESICMC/SNR/IEC-F638/09-2024). As this study involved Phase II MBBS students, special care was taken to ensure voluntary participation and protection of student interests. Written informed consent was obtained from all participants after explaining the purpose of the

study, the nature of the intervention, and the use of assessment and reflective data for research purposes. Students were clearly informed that participation or non-participation would not influence their academic evaluation or internal assessment marks. Confidentiality and anonymity were strictly maintained throughout the study. The data were subjected to inductive coding by two independent researchers. Given that reflections involved discussion of sensitive ethical dilemmas, psychological safety was ensured by creating a non-judgmental learning environment. Participation in reflective writing was voluntary, and students were allowed to withdraw their narratives from analysis if they wished.

Results:

A total of 105 students of the total batch of 125 students from Phase 2 MBBS students participated in the study. The mean age of students was 20.34 ± 1.22 years.

Given the complexity of assessing ethical issues and the inherent variability among teachers and examiners a combination of evaluation methods were employed: Questionnaire based analysis, Group performance assessments (Quantitative component) and Guided reflection (Qualitative Component).

Quantitative data including MCQ test scores, structured rubric scores from group assessments, and Likert-scale questionnaire responses were entered into Microsoft Excel and cross-checked for completeness and accuracy. Incomplete or improperly filled questionnaires were excluded from analysis. The dataset

Table 3: Performance of students across individual domains in group activity (maximum score per domain = 5)

S.No	Domain	Mean score (maximum score=5)*	Remarks
1.	Innovation & Creativity	4.23 ± 0.85	Majority of students scored above the midpoint, indicating good originality and creative engagement
2.	Clarity of Concept	4.40 ± 0.73	This domain recorded the highest mean score, reflecting strong conceptual understanding
3.	Individual Participation and Teamwork	3.85 ± 0.80	Scores indicate satisfactory teamwork and participation across groups.
4.	Opinions and Justifications	3.73 ± 1.03	This domain showed relatively greater variability, suggesting differences in students’ ability to critically justify viewpoints.

*Scores are presented on a 5-point rubric scale (0–5). Values represent mean ± standard deviation.

was screened for data entry errors, missing values, and outliers prior to statistical analysis.

The assessment of role plays was based on a structured rubric comprising four domains, each scored on a 5-point scale (range: 0–5), with a maximum total score of 20 per group as described in Table 2. The overall average score was 16.95 ± 1.30 marks (out of 20). Domain wise mean scores (each calculated out of a maximum of 5) are presented in Table 3.

Reflective Writing Analysis

The role-play sessions were followed by reflective writing. Reflective narratives were independently analyzed by two faculty members trained in qualitative research methods and actively involved in AETCOM teaching. Coding discrepancies were resolved through iterative comparison and consensus discussion to ensure analytical rigor and to minimize potential researcher bias.

Reflexivity was maintained throughout the qualitative process. The researchers involved in teaching the module acknowledged their dual role as educators and investigators. Efforts were made to remain aware of preconceptions while interpreting student reflections.

Reflective writings were analyzed using the thematic analysis approach.^[12] Initial codes were generated inductively from the data, collated into subthemes, and subsequently organized into overarching themes through investigator consensus. The analysis focused on identifying recurring ethical issues emerging from students’ reflections on the movie “*WIT*” as presented in Table 4.

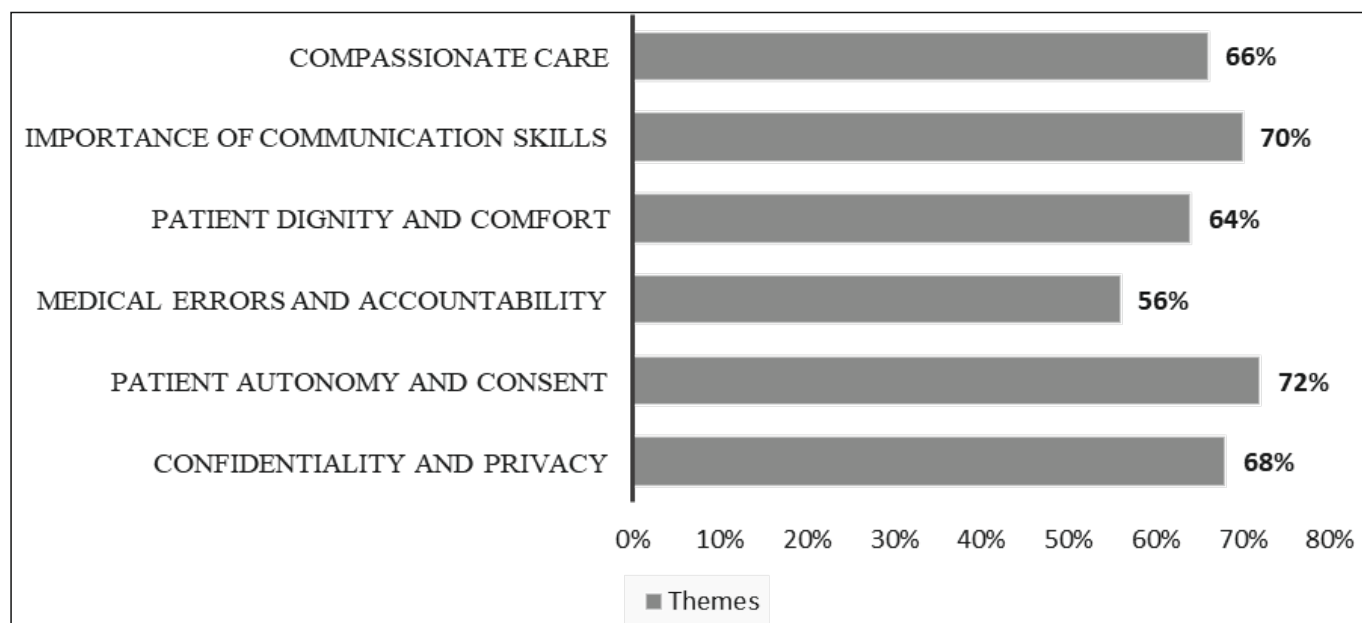
Thematic analysis of the reflective narratives identified six overarching ethical domains: confidentiality and privacy, patient autonomy and informed consent, accountability in medical errors, compassionate care, preservation of patient dignity, and effective communication in clinical practice. Figure 1 shows the percentage of student reflections containing references to each identified theme. The values represent the frequency of occurrence of each theme across the total sample of narratives (N= 105).

Patient autonomy and informed consent emerged as the most frequently identified theme in reflective narratives (72%, 76/105), followed by communication in clinical care (70%, 74/105), confidentiality and privacy (68%, 71/105), compassionate care (66%,

Table 4: Reflections on Ethical Themes based on the movie 'WIT'

Codes	Subthemes	Themes
Absence of a female Chaperon while examination by a male doctor Privileged communication	Privacy during the medical examination Lack of safeguards for sensitive information	Confidentiality and Privacy
Lack of information on chaperon options; doctor lets the patient to decide; Non elaborative consent	Patient’s right to make decisions Incomplete Informed Consent Process	Patient Autonomy and Consent
High dose drug administration	Medication dispensing error	Medical Errors and Accountability
Lack of empathy Supportive nurse interactions	Emotional detachment by caregivers Positive emotional support	Compassionate care
Uncomfortable position during medical examination Neglected post-examination care	Lack of dignity during care Inadequate post-procedural support	Patient’s dignity and comfort
Unexplained side effects of treatment Pros and cons of treatment not explained, proper explanation about the condition Lack of disclosure regarding patient’s deterioration	Poor Aftercare communication, Pre treatment discussion Incomplete Provider transparency Provider transparency	Communication in care

Figure 1: Percentage Distribution of Major Ethical Themes Identified in Student Reflective Narratives (N = 105)



69/105), preservation of patient dignity and comfort (64%, 67/105), and medical errors and accountability (56%, 59/105). These findings indicate that students most commonly engaged with issues related to autonomy, communication, and confidentiality during reflective analysis.

Quantitative Assessment of Ethical Attitudes: To further explore students’ ethical orientations, quantitative responses to structured questionnaire items were analyzed in relation to the themes identified through reflective narratives.

Patient Autonomy and Informed Consent

Consistent with the prominence of autonomy in reflections (72%), 98.9% (n = 104) agreed that informed consent must always be obtained, and 70.8% (n = 74) strongly agreed that patient wishes should be respected. However, 50% (n = 53) indicated that physicians may sometimes act in what they perceive to be the patient’s best interest irrespective of patient opinion, suggesting persistence of paternalistic tendencies.

Confidentiality and Privacy

In alignment with reflective findings (68%), 94% (n = 99) agreed that physicians have a duty to safeguard patient information. Additionally, 93.5% (n = 98) disagreed with conducting intimate examinations without informed consent, and 70.6% (n = 74) disagreed

that one patient’s privacy may be compromised for the benefit of a larger group. Furthermore, 90.8% (n = 95) indicated that a male doctor should not examine a female patient without a female attendant, reflecting sociocultural influences on perceptions of privacy.

Communication and Patient Dignity

Seventy percent (n = 74) agreed that communication in patient care must be conducted appropriately. A large majority (96%, n = 101) disagreed that listening to patients’ views is unimportant, and 82% (n = 86) disagreed that full disclosure of treatment details is unnecessary, indicating strong endorsement of patient-centered communication and dignity.

Compassionate Care

Compassionate care, identified in 66% of reflections, was further supported by 92% (n = 97) agreeing that physicians must respect human life and dignity. However, 71% (n = 75) believed that doctors may refuse care to uncooperative or violent patients, indicating nuanced views regarding professional obligations.

Medical Errors and Accountability

Although accountability appeared in 56% of narratives, 79.6% (n = 84) disagreed with the statement that doctors cannot be held responsible for prescribed therapies, demonstrating recognition of professional

accountability. Some students also supported refusal of treatment in situations where patients declined care on religious or social grounds, reflecting ethical complexity in clinical practice.

Representative Verbatims Under Identified Themes:

Patient Autonomy and Informed Consent:

“Explaining the entire procedure and possible outcomes to the patient is essential. Only when patients are fully informed can they make decisions that reflect their own values and wishes.” (Participant 67)

Communication and Compassionate Care:

“Effective communication is as important as medical knowledge. If we do not explain things properly, the patient may feel anxious or ignored.” (Participant 12)

“Listening patiently to the patient’s concerns builds trust. Even when the prognosis is poor, empathy and kindness should never be compromised.” (Participant 74)

Post-Session Knowledge Assessment:

The post-session assessment (maximum score = 15) demonstrated a mean score of 12.4 ± 1.8 out of 15, corresponding to 82.7% of the maximum possible score.

As the study did not include a pre-test or control group, results are presented using descriptive statistics only.

Discussion:

The findings of this study highlight the effectiveness of Sensitization sessions followed by immersion activities like role play, video making and group presentations combined with reflective writing in fostering ethical understanding among Phase II MBBS students. This mixed methods approach not only engaged students actively but also encouraged them to internalize and apply ethical principles to practical situations.

The use of experiential learning strategies, including role plays and cinemeducation, emerged as a notable component of the S-I-R framework. A majority of students (86%, n = 90/105) reported that these methods enhanced their confidence and promoted

teamwork during ethical discussions and clinical scenario analysis. In a study conducted by Ghosh and Bir,^[4] the focus was on the practical aspect while evaluating the effectiveness of AETCOM implementation. They emphasized that OSPE stations utilizing AETCOM specific checklists incorporating roleplay activities, simulated patients and direct observations are deemed more appropriate for accurately assessing AETCOM outcomes, Whereas in the study conducted by Sharma et al^[5] also indicated that the majority of the students after the session, that is, 82.6%, acknowledged that roleplay activities during the session not only helped to convey the message more comprehensively to the audience but also made the session more captivating.

In a study conducted by Sethi et al^[6] it was found that (100%) students agreed that communication skills are important in doctor patient relationship; 49 (83.05%) students agreed that roleplay facilitated their learning of communication skills; a similar finding was also observed in the present study 86% (n = 90/105) felt it helped in boosting confidence and teamwork, some students felt it time consuming whereas students also commented that: *“Learning from my own peers was entertaining and highly educational as I was able to give my full concentration”*.

Many participants expressed that such interactive exercises would contribute to their development as better doctors and ultimately improve the quality of patient care in the future.

More over the present study also included Cinemeducation which provided the opportunity to learn the ethical and psychosocial subjects which are related to medicine by observing and reflection on the films. As per the feedback of students, cinemeducation helped to clarify unclear questions and opened up new perspectives by making the public health connection to the film

Incorporating AETCOM and medical ethics into the undergraduate curriculum contributes to the development of communication skills among students. By emphasizing the importance of clear, empathetic communication and active listening, students learn to

effectively convey complex medical information, address patients' concerns, and navigate challenging conversations with sensitivity and professionalism.

In a study done by Krishnan et al^[7] study, role play received significantly better responses than Small Group Discussion(SGD) in seven out of nine questions in the perception questionnaire. From the students' perspective, role play was considered more useful as a tool for learning skills of communication. Comparable findings were noted by Tayem et al^[8] in their study on peer role play where students reported that they felt more confident in communicating all elements of drug therapy to the patients and had a better understanding of how to communicate the information in a prescription in a simple language that the patient could understand

Despite the effectiveness of Role play, it had its own challenges. One of the challenges faced in this study was the initial unwillingness of a few students towards acting of the assigned roles. Role play requires more time to write the script and allotting the characters and takes time for rehearsals

Narratives and reflective writings are important tools for learning attitudinal and ethical issues. It is a metacognitive process that creates greater understanding of self and situations and prepares for an informed future action.^[9] It aids to recognize the importance of being able to frame a problem before trying to solve it. It allows the person, to be able to stand back from himself/herself and question his/her behaviours and attitudes.

In a study done by Tikare et al^[10] use of reflective narratives, to help medical students learn the importance of being an empathetic clinician, communicator and professional. Similar observations were shared by another study by Zayapragassarazan et al^[11] which emphasized the need for adopting experiential learning strategies, use of technology in teaching, learning and assessment.

The reflective writing exercises in our study, which encouraged students to analyze real life scenarios, yielded responses that demonstrated a deep understanding of ethical principles and their application in real life.

The reflective writings provided rich qualitative insight into students' understanding of ethical issues. Patient autonomy (72%, n = 76/105) and communication skills (70%, n = 74/105) emerged as the most dominant themes, indicating that these aspects resonated strongly with students.

These themes demonstrate students' ability to connect ethical principles with practical clinical scenarios. Reflections revealed a nuanced understanding of informed consent, patient rights, socio-cultural stigma, professional communication, and compassionate care. The findings reinforce that ethics education should extend beyond theoretical instruction and be embedded within clinical exposure, guided discussion, and reflective practice. Such integration helps translate ethical principles into lived professional values.

The structured S-I-R methodology appears particularly effective compared to traditional didactic methods.

Student Feedback

An informal feedback survey revealed that the interactive approach using real-life-inspired scenarios and movie-based themes substantially enhanced learning. 85% (89/105) of participants reported that role plays helped them better understand ethical dilemmas.

Students feedback on importance of Medical Ethical and Legal issues:

A vast majority of students (97.8%, n = 103/105) perceived ethical knowledge as essential for becoming a better doctor. Additionally, 96% (n = 101/105) emphasized the importance of discussing ethical issues with patients during clinical rounds alongside clinical management.

Most participants (79.8%, n = 84/105) agreed that promoting ethical conduct among medical students would help strengthen public trust in the medical profession. Nearly half (49.5%, n = 52/105) identified lack of ethical knowledge as a major cause of assaults on doctors, with an additional 44% (n = 46/105) considering it a possible contributing factor.

Representative Student Verbatims on the Importance of Medical Ethics:

“Yes, I would consider understanding ethical and legal issues as it can help individuals avoid disputes and protect their rights. Ethical values can help people understand the consequences of their actions and promote a sense of responsibility and accountability. Ethical decisions can also demonstrate respect, fairness, and caring, and can help people make better decisions. “

“Having an understanding of ethical and legal issues is super important! It helps us navigate complex situations, make informed decisions, and ensure that we’re treating others fairly and responsibly. It’s like having a compass that guides us in doing the right thing and upholding the values of justice, integrity, and respect. Plus, it helps us avoid legal troubles and maintain trust in our relationships and professions. So, it’s pretty valuable!”

Representative Student Verbatims about structured “SIR” approach:

The feedback was assessed on a Likert scale from 1-5, 1- being Strongly disagree and 5 - being strongly agree:

Out of 105 participants, 92 students (87.6%) reported that ethics and law teaching was interesting this year, while 84 students (80.0%) stated that the teaching style motivated them to explore bioethics further and enhanced their understanding of the complexities involved in medical practice.

Feedback on Immersion techniques: A total of 45.2% (n = 47/105) of students perceived role play as an effective instructional strategy. However, a subset of participants considered it time consuming. In comparison, 37.6% (n = 39/105) expressed a preference for cinemeducation, while 15.1% (n = 16/105) identified group discussions as a more suitable learning approach.

Representative Student Verbatims on Immersion activities:

“Learning from my own peers was entertaining and highly educational as I was able to give my full concentration”.

“In role plays we are allowed to present our understanding and then assessed by the professors. Hence it helps us understand where exactly we need to grow in ethical perspective. This also helps us improve our communication skills, teamwork”.

On the contrary some students referred it was time consuming:

“Role play requires more time to write the script and allotting the characters and takes time for rehearsals.”

“In roleplays we try our best to portray whatever I idea we have by ourselves but in cinemeducation, we get to see different opinions and aspects of the same situation or decision, it portrays all the aspects very clearly and we can easily understand it. The WIT movie which we saw made me understand the concept of medical ethics in very clear and amazing way.”

Evaluation of Teaching Modalities for Understanding Ethical Concepts:

Regarding better understanding of ethical concepts (rated on a 5-point Likert scale), cinemeducation received the highest positive ratings, with 84.1% (n = 88/105) of students reporting improved understanding. This was followed by role plays at 74% (n = 78/105) and group discussions at 56% (n = 59/105).

Furthermore, 83.9% (n = 88/105) of students recommended that cinemeducation be incorporated as a routine teaching strategy, while 15% (n = 16/105) felt it could be included occasionally in the curriculum.

Representative Student Verbatims on teaching methodologies in understanding Ethical concepts:

“Movies impart long term memory”

“In roleplays we try our best to portray whatever idea we have by ourselves but in cinemeducation, we get to see different opinions and aspects of the same situation or decision, it portrays all the aspects very clearly and we can easily understand it. The wit movie which we saw made me understand the concept of medical ethics in very clear and amazing way.”

“Cinemeducation has the higher ground when it comes to capturing the viewers attention.”

Representative Student Verbatims of Effect on attitude of students towards ethical concepts:

Students showed an improved understanding of ethical concepts and made them more empathetic and compassionate:

“Now I have better understanding and communication with patients”

“I understood the importance of patients perspective in all the medical procedures from the diagnosis, investigations, treatment and prognosis. It also made me aware of common medicolegal cases and dilemmas encountered in medical profession. My attitude has changed in terms of emphasizing on patient education and four pillars in medical ethics.”

“I used to ask the history directly to the patients, but now I understand that I need to build the rapport with the patient and he should feel safe while sharing his problem with me”

Students also elicited that their way of communication was also improved after the sessions:

“We can understand the correct way of communication as it is very important in patient doctor relationship”

“I have learnt to properly communicate with patients in different scenarios. Through cases, role plays etc. I have learnt and am learning the efficient ways of communicating by appropriate choice of words, our tone and our attitude and behaviour towards patients, doctors and other healthcare workers. To be respectful by my words and to be able to convey the message or what I am trying to explain in a simple yet understanding way.”

Strengths and Limitations of the intervention:

A key strength of this study is the integration of quantitative assessment with qualitative thematic analysis, enabling a comprehensive evaluation of student learning and reflective engagement with ethical principles. However, the study has certain limitations. Being conducted at a single institution may limit generalizability, and the absence of a control group restricts attributing outcomes solely to the S-I-R intervention. A formal sample size calculation was not

performed as the entire available cohort was included. Time constraints within scheduled academic hours limited role-play enactment and detailed debriefing, and participation of only consenting and present students may introduce selection bias. The assessment focused on short-term outcomes, without evaluating long-term retention or application in clinical practice. Additionally, qualitative findings based on self-reported reflections may be influenced by social desirability bias, and despite using a structured rubric, some subjectivity in role-play assessment cannot be entirely excluded.

Conclusion:

The study demonstrates that a brief sensitization phase, coupled with strong immersion through experiential learning and effective reflective writing, enhances students' understanding of medical ethics. It fosters their ability to navigate ethical dilemmas, strengthens communication skills, and develops professional attitudes essential for holistic medical practice.

The integration of the S-I-R approach offers a novel and structured method to impart ethical and communication competencies, moving beyond traditional didactic teaching. By actively engaging students through role plays, cinemeducation, and reflective exercises, this approach bridges the gap between theoretical knowledge and its application in real-world medical scenarios.

Declaration

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Conflict of Interest: Nil

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Burden and Determinants of Generalized Anxiety Disorder and Depression Among Antenatal Females in an Urban Area of North India: A Cross-Sectional Study

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Abstract:

Introduction: Anxiety and depression are the most common mental health disorders experienced during pregnancy having a reported between 8.7% and 65% in India. Antenatal depression has been linked to negative health-related behaviors and adverse outcomes among the pregnant females and their neonates. **Objective:** The present study was designed with the primary aim of determining the prevalence and determinants of depression and generalized anxiety disorder (GAD) among antenatal females. **Methods:** A community-based, cross-sectional study was carried out between February 2023 to August 2024 among 220 antenatal females selected through simple random sampling. A pre- tested semi-structured interview schedule, GAD-7 (Generalized Anxiety Disorder-7) and PHQ-9 (Patient Health Questionnaire-9) scales were used for data collection. Descriptive statistics were applied for quantitative data and chi square test was applied to the categorical data. **Results:** There were 216 participants and among them, 26.9% had some degree of depression. Mild, moderate and severe anxiety were seen in 25.9%, 5.6% and 2.8% of the participants, respectively. Factors like advanced maternal age, lower socioeconomic status, nuclear family structure, lifetime and current experiences of domestic violence, unwanted pregnancy, advanced gestation and a male child preference were significantly associated (p value <0.05) with antenatal depression and anxiety. **Conclusion:** A high prevalence of antenatal depression and anxiety was associated with various socio-demographic and obstetric factors. The use of screening tools was found to be a feasible method to identify antenatal depression and anxiety.


Keywords: Anxiety, Depression, Mental Health, Prevalence

Introduction:

Although mental health is an important component of health, it often remains neglected. Over the past few years, mental health has been recognized as a priority area in public health policies worldwide and has been included in Sustainable Development Goals (SDGs). In India, an estimated 14.3% of the population is reported to

suffer from mental health disorders, with depression and generalized anxiety disorder being the most common and having a prevalence of 3.3% each.^[1]

Pregnancy is a physiological state in which a female experiences various bodily and hormonal changes, which may lead to fear, confusion, stress and mental health disorders. Anxiety and depression are the most

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common mental health disorders experienced during pregnancy, and they may adversely affect maternal and fetal outcomes.^[2] The prevalence of co-morbid anxiety and depression among pregnant women has been reported to range from 9.5% to 13.5% in the a study conducted in Ethiopia.^[3] The prevalence of common mental disorders during pregnancy is reported between 8.7% and 65% in India.^[4-9] Even in non-pregnant females, the reported prevalence of depression in India is high (15%).^[10]

Perinatal depression is influenced by a number of risk factors, including increased somatic symptoms, exposure to intimate partner violence, lack of social support, unintended pregnancy and high rates of depression are also observed among those having a prior history of depression. Antepartum depression has been linked to negative health-related behaviors and adverse outcomes, including poor nutrition, increased substance use, inadequate prenatal care, pre-eclampsia, low birth weight, preterm delivery, postpartum depression, and suicide. Women who experience depression in the antenatal period often continue to experience depressive symptoms in the postpartum period, with over 54% of those with postpartum depression reporting onset of depressive episodes before or during pregnancy.^[11]

Addressing mental health during pregnancy is important to improve both maternal and neonatal outcomes. The community, in general, remains unaware of their mental health status, especially when the symptoms are of mild to moderate severity. However, the majority of existing evidence on burden of antenatal anxiety and depression in India comes from the hospital based studies which may not reflect the true community prevalence. Such situation calls for an in-depth community-based inquiry during the antenatal period to screen for these disorders and their timely and adequate management. There are different validated scales available globally that can be used in community settings to screen for common mental health disorders and classify the severity of disease.^[12,13]

The present study was designed with the primary aim of determining the prevalence and determinants of depression and generalized anxiety disorder (GAD) among antenatal females.

Methods:

Study area and characteristics: This community-based cross-sectional study was carried out in the urban field practice area of the Department of Community Medicine, Kalpana Chawla Government Medical College, Karnal, Haryana, which caters to a population of approximately 50,000 (as reported in the annual survey by field workers). The study was carried out for one and a half years, from February 2023 to August 2024, among antenatal females in the study area.

Sample size: The sample size was estimated on the basis of the prevalence of antenatal depression among hospital attendees in the study conducted by Babu *et al.* (2018)^[7]. Using this prevalence (8.7%) at the 95% confidence interval and 4% absolute precision, the sample size was determined to be 198. After adjusting for an anticipated 10% non-response rate, the final sample size for the study was 220.

Study tool: A pre-tested semi-structured interview schedule was used for data collection. The interview schedule consisted of three parts: the first part included questions pertaining to demographic information, and the second part included trimester-wise health and physical examination details. One of the socio-demographic determinants taken was Domestic violence, which encompasses any act that (a) harms or injures or endangers the health, safety, life, limb or well-being, whether mental or physical, and includes causing physical, sexual, verbal and/or emotional abuse and economic abuse; or (b) harasses, harms, injures or endangers the aggrieved person with a view to coerce her or any other person related to her to meet any unlawful demand for any dowry or other property or valuable security; or (c) has the effect of threatening the aggrieved person or any person related to her by any conduct mentioned previously; or (d) otherwise injures or causes harm, whether physical or mental, to the aggrieved person (The Protection of Women from Domestic Violence Act, 2005).^[13] The third part had a structured schedule to collect information about anxiety and depression using the Generalized Anxiety Disorder 7-item scale (GAD-7) and Patient Health Questionnaire (PHQ-9), which are validated screening scales for

anxiety and depression, respectively.^[12-15] Both of these tools are Likert response-based and use a scoring system to assess the severity of anxiety and depression. In the GAD-7 scale, scores 0-4, 5-9, 10-14 and 15-21 signify minimal, mild, moderate and severe anxiety. As per PHQ-9, a score of 1-4 signifies no/minimal depression (taken as no depression in the representation in the text), 5-9 signifies mild depression, 10-14 signifies moderate depression, 15-19 signifies moderately severe depression, and 20-27 signifies severe depression.^[12,14-16]

The list of currently pregnant females (nearly 600) was obtained from UPHC and field-level workers. The study participants were randomly selected using the random number generator software. The selected participants were visited at home by the authors along with the frontline workers, and data collection was performed after the initial rapport was built up.

Data analysis: The data was entered into MS Excel, and SPSS v23 was used for data analysis. The quantitative data were expressed as the mean and standard deviation, and the categorical data were expressed as percentages. The chi-square test and Fisher’s exact test (wherever applicable) were used to estimate the association between variables, as necessary. A p-value of <0.05 was considered statistically significant.

The inclusion criteria: All pregnant females in any trimester of pregnancy, who had resided in the study area for at least the last six months and who were willing to provide consent.

The exclusion criteria: those who were already taking medication for any psychiatric morbidity.

Ethical considerations: Prior approval was obtained from the Institutional Ethics Committee, KCGMC, Karnal. Written consent was obtained from the participants to participate in the study. The confidentiality and anonymity of the participants were maintained during the process of the study, including the final report. Any participant who screened positive for GAD and/or depression was referred to the Department of Psychiatry, Kalpana Chawla Government College, Karnal, for further management.

Results:

A total of 216 pregnant females consented to participate in the study, thus accounting for a 98% response rate. The mean age of the study participants was 25.2±4.76 years (Range 18-40 years). The majority (95.4%) of participants were housewives, the native place of the majority (66.2%) of participants was an urban area, and 1.4% of the participants were diagnosed with any chronic disease. The majority (79.6%) had done their pregnancy registration within 12 weeks of gestation.

Table 1: Socio-demographic characteristics of the study participants (N=216)

Variable	Frequency (%age)
AGE (in years)	
≤25	123 (56.9)
26-35	89 (41.2)
>35	4 (1.9)
Education	
Illiterate	9 (4.2)
Up to the middle school	33 (15.3)
Secondary and Higher Secondary	134 (62)
Graduate and above	40 (18.5)
Socio-economic Status	
BPL	121 (56)
APL	95 (44)
Type of Family	
Nuclear	95 (44)
Joint	121 (56)
Migration Status	
Migrated	23 (10.6)
Non-migrated	193 (89.4)
Lifetime Experience of Domestic Violence (DV)	
No	160 (74.1)
Yes	56 (25.9)
Experienced DV in the last three months	
No	200 (92.6)
Yes	16 (7.4)
Experienced DV in current pregnancy	
No	209 (96.8)
Yes	7 (3.2)

Table 1 presents the socio-demographic characteristics of the study participants. Among the participants, the majority (56.9%) were less than or equal to 25 years old, and nearly 2% were older than 35 years. The majority of the study participants (95.4%) were housewives. Sixty-two per cent of the antenatal women were educated until secondary or higher secondary, followed by graduates and above (18.5%), up to middle school (15.3%), and 4.2% were illiterate. Fifty-six per cent of the participants were below the poverty line, and an equal proportion of participants lived in joint families. Approximately two-thirds (66.2%) of the participants were native to urban areas. 10.9% of the pregnant women were migrants.

Approximately one-fourth (25.9%) of the participants reported lifetime experience of domestic violence (DV), whereas 7.4% had experienced DV in the last three months and 3.2% in their current pregnancy.

Table 2 shows that the current pregnancy was reported as wanted by the majority (91.2%) of the antenatal women. Approximately 45.4% of the pregnant females reported a family preference for male children.

Table 2: Obstetric characteristics of the study participants (N=216)

Variable	Frequency (%)
Current pregnancy intent	
Wanted	197 (91.2)
Unwanted	19 (8.8)
Male child preference in the family	
Yes	98 (45.4)
No	118 (54.6)
Period of gestation (trimester)	
First	44 (20.4)
Second	108 (50)
Third	64 (29.6)
Parity Status	
Primigravida	102 (47.2)
Multigravida	114 (52.8)
Abortion History (n=114)	
No	96 (44.4)
Yes	18 (8.3)

Half of the participants were in the second trimester of pregnancy, 29.6% were in the third trimester, and the remaining 20.4% were in the first trimester. More than half (52.8%) of the participants were multigravida. A history of abortion was reported by 8.3% of the participants.

Figure 1 shows that 65.7% of the participants had minimal GAD, and nearly a quarter had mild (25.9%) GAD.

Figure 2 shows the grading of depression among the study participants according to the PHQ-9. Approximately three-fourths (73.1%) of the participants did not suffer from depression. Mild, moderate and moderately severe depression were found in 19.9%, 5.1% and 1.9% of the antenatal females, respectively.

Table 3 shows that the migrants had a higher proportion of minimal anxiety (43.5%), which was statistically significant. The participants having age between 26-35 years, those belonging to nuclear

Figure 1: Generalised Anxiety Disorder (GAD) Classification of study participants (N=216)

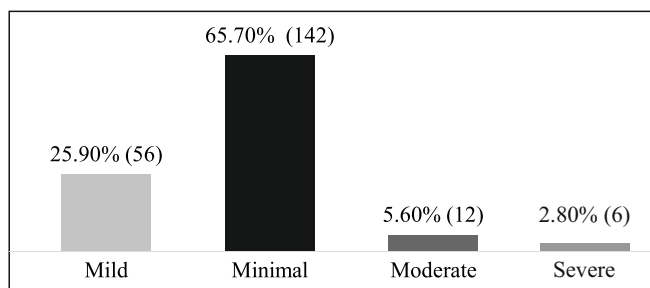


Figure 2: Depression Grading As Per PHQ-9 Among Study Participants (N=216)

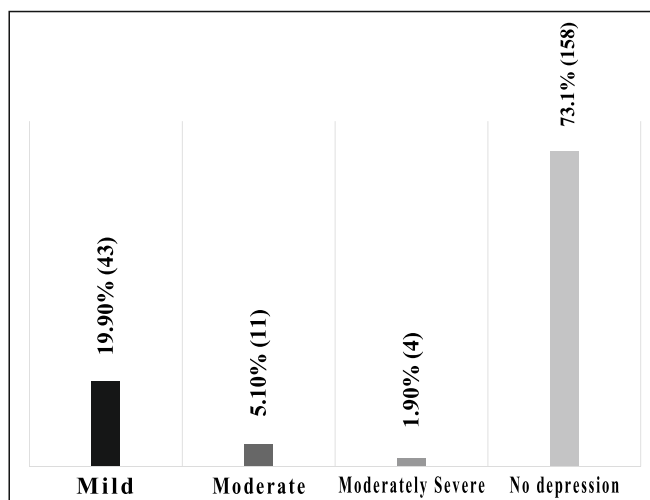


Table 3: Distribution of anxiety grades according to socio-demographic and obstetric characteristics of participants (N=216)

Variable	Minimal	Mild	Moderate	Severe	p-value
	[n=142] n(%)	[n=56] n(%)	[n=12] n(%)	[n=6] n(%)	
Age (in years)					
≤25	87 (70.7)	29 (23.6)	4 (3.3)	3 (2.4)	0.046*
26-35	54 (60.7)	26 (29.2)	7 (7.9)	2 (2.2)	
>35	1 (25)	1 (25)	1 (25)	1 (25)	
Education					
Illiterate	3 (33.3)	4 (44.4)	1 (11.1)	1 (11.1)	0.060*
Up to the middle school	20 (60.6)	9 (27.3)	3 (9.1)	1 (3)	
Secondary and Higher Secondary	91 (67.9)	36 (26.9)	6 (4.5)	1 (0.7)	
Graduate and above	28 (70)	7 (17.5)	2 (5)	3 (7.5)	
Socioeconomic status					
BPL	76 (62.8)	33 (27.3)	8 (6.6)	4 (3.3)	0.750*
APL	66 (69.5)	23 (24.2)	4 (4.2)	2 (2.1)	
Migration Status					
Migrated	8 (34.8)	10 (43.5)	4 (17.4)	1 (4.3)	0.031*
Non-migrated	134 (69.4)	46 (23.8)	8 (4.2)	5 (2.6)	
Type of Family					
Nuclear	41 (43.2)	42 (44.2)	9 (9.5)	3 (3.1)	<0.001*
Joint	101 (83.4)	14 (11.6)	3 (2.5)	3 (2.5)	
Lifetime Experience of Domestic Violence (DV)					
No	106 (66.3)	47 (29.3)	5 (3.1)	2 (1.3)	0.003*
Yes	36 (64.3)	9 (16.1)	7 (12.5)	4 (7.1)	
Experienced DV in the last three months					
No	137 (68.5)	53 (26.5)	7 (3.5)	3 (1.5)	<0.001*
Yes	5 (31.2)	3 (18.8)	5 (31.2)	3 (18.8)	
Experienced DV in current pregnancy					
No	141 (67.4)	52 (24.9)	11 (5.3)	5 (2.4)	0.009*
Yes	1 (14.3)	4 (57.1)	1 (14.3)	1 (14.3)	
Current pregnancy intent					
Wanted	133 (67.5)	52 (26.4)	8 (4.1)	4 (2)	0.006*
Unwanted	9 (47.3)	4 (21.1)	4 (21.1)	2 (10.5)	
Male child preference in the family					
Yes	55 (56.1)	35 (35.7)	6 (6.1)	2 (2.1)	0.018*
No	87 (73.7)	21 (17.8)	6 (5.1)	4 (3.4)	
Period of gestation (trimester)					
First	31 (70.5)	10 (22.7)	2 (4.5)	1 (2.3)	0.009*
Second	81 (75)	22 (20.4)	3 (2.8)	2 (1.8)	
Third	30 (46.9)	24 (37.5)	7 (11)	3 (4.6)	
Parity Status					
Primigravida	64 (61.6)	31 (29.8)	5 (4.8)	4 (3.8)	0.463*
Multigravida	78 (69.6)	25 (22.3)	7 (6.3)	2 (1.8)	
Abortion History (n=114)					
No	63 (65.7)	28 (29.2)	4 (4.1)	1 (1)	0.027*
Yes	6 (33.3)	9 (50)	2 (11.1)	1 (5.6)	

*Fisher's Exact Test

Table 4: Distribution of depression grades according to socio-demographic and obstetric factors (N=216)

Variable	No Depression (n=158) n(%)	Mild (n=43) n(%)	Moderate (n=11) n(%)	Moderately (n=4) n(%)	p-value
Age (in years)					
≤25	86 (69.9)	30 (24.4)	6 (4.9)	1(0.8)	0.019*
26-35	71 (79.8)	10 (11.2)	5 (5.6)	3 (3.4)	
>35	1 (25)	3 (75)	0 (0)	0 (0)	
Occupation of participant					
Housewife/homemaker	154 (74.6)	41 (20)	9 (4.4)	2 (1)	0.003*
Labourer	2 (40)	1 (20)	1 (20)	1 (20)	
Employed in the private sector	2 (40)	1 (20)	1 (20)	1 (20)	
Education					
Illiterate	6 (66.7)	2 (22.2)	1 (11.1)	0 (0)	0.492*
Up to the middle class	21 (63.6)	8 (24.2)	2 (6.1)	2 (6.1)	
Secondary and Higher Secondary	98 (73.1)	28 (20.9)	6 (4.5)	2 (1.5)	
Graduate and above	33 (82.5)	5 (12.5)	2 (5)	0 (0)	
Socioeconomic status					
BPL	81 (67)	31 (25.6)	8 (6.6)	1 (0.8)	0.026*
APL	77 (81)	12 (12.6)	3 (3.2)	3 (3.2)	
Migration Status					
Migrated	10 (43.5)	8 (34.8)	4 (17.4)	1(4.3)	0.002*
Non-migrated	148 (76.7)	35 (18.1)	7 (3.6)	3 (1.6)	
Type of Family					
Nuclear	61(64.2)	27 (28.4)	4 (4.2)	3 (3.2)	0.015*
Joint	97 (80.2)	16 (13.2)	7 (5.8)	1 (0.8)	
Ever experienced Domestic Violence (DV)					
No	124 (78)	26 (16.4)	7 (4.4)	2 (1.2)	0.039*
Yes	34 (59.7)	17 (29.8)	4 (7)	2 (3.5)	
Experienced DV in the last three months					
No	151 (75.5)	37 (18.5)	9 (4.5)	3 (1.5)	0.016*
Yes	7 (43.8)	6 (37.5)	2 (12.5)	1 (6.2)	
Experienced DV in current pregnancy					
No	155 (74.5)	41 (19.8)	9 (4.3)	3 (1.4)	0.012*
Yes	3 (37.5)	2 (25)	2 (25)	1 (12.5)	
Current pregnancy intent					
Wanted	142 (72.1)	42 (21.3)	11 (5.6)	2 (1)	0.022*
Unwanted	16 (84.2)	1 (5.3)	0 (0)	2 (10.5)	
Male child preference in the family					
Yes	62 (63.3)	26 (26.5)	8 (8.2)	2 (2)	0.015*
No	96 (81.4)	17 (14.4)	3 (2.5)	2 (1.7)	
Period of gestation (trimester)					
First	34 (77.2)	8 (18.2)	1 (2.3)	1 (2.3)	0.025*
Second	87 (80.6)	16 (14.8)	3 (2.8)	2 (1.8)	
Third	37 (57.8)	19 (29.6)	7 (11)	1(1.6)	
Parity Status					
Primigravida	75 (73.5)	19 (18.6)	6 (5.9)	2 (2.0)	0.932*
Multigravida	83 (72.8)	24 (21.1)	5 (4.4)	2 (1.7)	
Abortion History (n=114)					
No	67 (69.8)	22 (22.9)	5 (5.2)	2 (2.1)	0.582*
Yes	16 (88.9)	2 (11.1)	0 (0)	0 (0)	

*Fisher's Exact Test

families, those with a history of domestic violence (lifetime experience, in the previous three months or during the current pregnancy) were found to have higher proportions of mild anxiety (29.2%, 44.2%, 16.1%, 18.8% and 57.1%, respectively), and these associations were highly statistically significant.

There was no statistically significant association between anxiety grades and the education level, socioeconomic status, and parity status of the participants.

A statistically significant association was found between anxiety grades and unwanted pregnancies, male child preference in the family, duration of pregnancy and abortion history of participants.

It was observed in Table 4 that there was a statistically significant association between depression grade and the participants' age. The highest proportion of participants with no, mild, moderate and moderately severe depression was found in the 26–35 year age group (79.8%), >35 years (75%), 26–35 years (5.6%) and 26–35 years (3.4%), respectively.

Participants who were below the poverty line had higher rates of mild or moderate depression (25.6% and 6.6%, respectively). Migrants were also found to have a higher proportion of mild (34.8%), moderate (17.8%) or moderately severe depression (4.3%).

Those participants who had nuclear families and had a history of domestic violence in the last three months or in the current pregnancy were found to have a statistically significantly higher proportion of depression. No statistically significant associations were found between the grade of depression and education level.

Among the participants with unwanted pregnancies, 10.5% had moderately severe and 26.5% had mild depression, and the association was statistically significant. A longer duration of pregnancy was also significantly associated with different grades of depression. In the third trimester of pregnancy, 29.6% of the participants had mild, and 11% had moderate depression.

No significant association was observed between depression grade and the parity status or history of abortion.

Discussion

The antenatal period is characterized by physical, physiological and many hormonal changes in the body. Although females visit health centers for ANC service utilization, screening for common mental disorders is not performed routinely, even though the conditions might be adversely affecting both the mother and the fetus. The current study, therefore, aimed to estimate the burden of depression and anxiety among antenatal women using the validated screening tools PHQ-9 and GAD-7, respectively.

The majority of participants in the current study were up to 25 years of age, were housewives, were educated to secondary and higher secondary levels, lived below the poverty line, and lived in joint families. Nearly a quarter of the participants had experienced domestic violence in their lifetime. Among the obstetric characteristics, most of the participants were in their second trimester of pregnancy. Nearly half of the participants were expecting their first child and reported a male child preference in the family. Approximately 9% of the current pregnancies were unwanted, and 8.3% had a previous history of abortion.

The current study revealed that 26.8% of the participants had some degree of depression, and among these, 1.9% had moderately severe depression. No participant was found to have severe depression. Systematic review of studies done in Indian settings by Arora *et al.*^[17], and Sahoo *et al.*^[18] reported that the prevalence of antenatal depression was between 9.18% and 65%, and between 3.8% and 65%, respectively. The prevalence of depression in the current study lies within the range reported by these systematic reviews. Similar proportions of depression as the current study were reported in studies by Kantipudi *et al.*^[5] (22%), Prabhu *et al.*^[19] (21.98%), and Rehman *et al.*^[20] (26%). Lower percentages of depression were reported in studies by Gupta *et al.*^[21] (11.8%), Rayapureddy *et al.*^[22] (16.7%), Kamali *et al.*^[23] (14.62%), and Babu *et al.*^[7] (8.7%). These variations in the study results can be attributed to the

different scales used to assess depression across these studies, which use different sets of questions and cutoff points for classification, and to the different study settings (hospital vs. community-based setting) and characteristics of the study participants. Studies conducted across the globe also report that the prevalence of antenatal depression is between 11.9% and 65%.^[3,24-26]

Some hospital-based studies and studies performed among high-risk groups reported higher prevalence of depression, ranging between 32% and 42%.^[2,27,28] These studies also used different assessment scales than the current study did to estimate depression. As hospital-based studies are likely to involve a greater burden of patients with complications and co-morbidities, this could be a likely factor for the higher prevalence of depression reported in these studies.

Various demographic and obstetric factors, such as increasing maternal age, lower socioeconomic status, nuclear family structure, lifetime or current experience of domestic violence, unwanted pregnancy, advanced gestation and male child preference, were significantly associated with depression in the current study. Similar associations have been reported in studies by Kantipudi *et al.*^[5] (22%), Prabhu *et al.*^[19] (21.98%), Rehman *et al.*^[20] (26%), Gupta *et al.*^[21] (11.8%), Rayapureddy *et al.*^[22] (16.7%), Kamali *et al.*^[23] (14.62%), Babu *et al.*^[7], Sahoo *et al.*^[18], Bedaso *et al.*^[24], and Dadi *et al.*^[26]. These studies also revealed the role of social support in depression, with a lack of social support being significantly associated with depression.

Antenatal anxiety has been reported less commonly in the literature. The current study revealed that 65.7% of the participants had minimal anxiety, 25.9% had mild anxiety, 5.6% had moderate anxiety, and 2.8% had severe anxiety based on GAD-7 scale. In a systematic review of Indian studies, Sahoo *et al.*^[18] reported that the prevalence ranged from 13%-55%. Kantipudi *et al.*^[5] and Tripura *et al.*^[3] also used the GAD-7 scale in their hospital-based studies and reported that the prevalence of antenatal anxiety was 23% and 70%, respectively. Studies by Rayapureddy *et al.*^[22] (31.2%), Thomas *et al.*^[30] (22.6%), and Ruban *et al.*^[27] (48.5%) reported lower

prevalence of antenatal anxiety than the current study. Studies performed in various countries have reported that the prevalence of antenatal anxiety between 4.2% and 35%.^[3,24,25,29,31] The current study reported a higher prevalence of antenatal anxiety. Usually, in hospital settings, a higher patient load might lead to less time being devoted to each patient. In our community-based study, we could invest more time with the participants, leading to their increased engagement in the study process and better response to the tool used. Tripura S *et al.*^[2] conducted their study in a high-risk pregnancy population, leading to a higher prevalence of anxiety among such females due to awareness of the problem and its consequences.

Among the demographic and obstetric factors, those significantly associated with antenatal anxiety were maternal age, nuclear family structure, lifetime and current experiences of domestic violence, unwanted pregnancy, advanced gestation, male child preference and previous history of abortion.

In the present study, participants living in nuclear families were more likely to have depression and anxiety, which might be due to the limited social support associated with the nuclear family system. Moreover, domestic violence could also result in marital disharmony and decreased partner support, leading to the risk of depression and anxiety. These findings emphasize the need to raise awareness about the role of spouses in successful and smooth pregnancies, as well as to establish culturally appropriate peer support groups to effectively navigate the challenges of pregnancy.

Male child preference is a significant phenomenon in the Indian subcontinent, specifically in the area in which the study has been undertaken, and is affected by the child sex ratio in this area. Such a preference in the family may pose a constant stressor for the expecting mother and might lead to anxiety about the outcome of pregnancy. These findings focus on increasing awareness of gender equality.

Pregnancy at an advanced age may be due to late marriage or difficulty conceiving, which might lead to stress, stigma, a greater number of consultations and the use of hormonal treatment methods, which could lead to

a greater level of depression. In the current study, nearly half of the participants were expecting a child for the first time. A greater proportion of antenatal depression and anxiety in the current study might be due to lack of prior exposure to childbirth, fear of pain and unforeseen complications during childbirth. These findings suggest that females should be made aware of birth preparedness and complication readiness.

Limitations and strengths:

Unlike previous hospital-based studies, the current study was a community-based study and estimated the burden of antenatal anxiety and depression. The investigators collected data through home visits, which could have been beneficial for early identification of antenatal anxiety and depression, as females generally tend to overlook symptoms/signs of any morbidity. In addition, the process of conducting the study also created awareness of these conditions among the participants and their community. However, the cross-sectional nature of the study could not establish any causal relationship between the variables under study, thereby implying further research to establish temporality and causality. PHQ-9 and GAD-7 are validated screening tools and rely on self-reported symptoms without clinical diagnostic confirmation, which might be a source of bias. Since, regression analysis was not performed, reported associations need to interpret cautiously.

Conclusion:

The current study revealed that more than a quarter (26.9%) of the antenatal females had some degree of depression, and more than a third had mild, moderate or severe anxiety. Socio-demographic and obstetric factors like advanced maternal age, lower socioeconomic status, nuclear family structure, lifetime and current experiences of domestic violence, alcohol abuse and smoking by the husband, unwanted pregnancy, advanced gestation and a male child preference were significantly associated with depression and anxiety among them. The use of screening tools to identify depression and anxiety is a feasible method for improving pregnancy and fetal outcomes.

Declaration

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Conflict of Interest: Nil

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Association of Physical Activity with Metabolic Syndrome among Patients Attending Diabetes Out-Patient Department of a Tertiary Care Hospital in Kolkata, India

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Abstract:


Introduction: Metabolic syndrome, or MetS is a major cause of morbidity and mortality among diabetic patients. Physical activity could be beneficial in preventing the various components of MetS. **Objectives:** To evaluate the association of physical activity with glycemic control and presence of MetS among the study population and to estimate the burden of metabolic syndrome in patients attending the diabetes out-patient department (OPD) of a tertiary care hospital in Kolkata. **Method:** An observational study with a cross-sectional design was conducted on 384 patients with diabetes mellitus seeking healthcare service from the Diabetes OPD of a tertiary care hospital of Kolkata from 8th April to 8th June 2023, using a predesigned, pretested and structured schedule that included the International Physical Activity Questionnaire. The participants were selected by a consecutive sampling technique. Face-to-face interviews, review of records and anthropometry were carried for data collection. **Results:** Among the 384 participants, 57.8% had inadequate physical activity. Patients performing adequate vigorous physical activity had a higher odds ratio of having ideal/satisfactory glycaemic control. Adequate moderate (OR 0.595, 95% CI 0.361-0.983, p 0.043) or vigorous (OR 0.139, 95% CI 0.049-0.395, p <0.001) physical activity had a significantly lower odds ratio of having MetS. **Conclusion:** Performing physical activity for adequate duration helps in attaining satisfactory glycemic control and preventing MetS in diabetic patients.

Keywords: Diabetes Mellitus Type 2, Exercise, International Physical Activity Questionnaire, Metabolic Syndrome, Outpatients

Introduction:

Metabolic syndrome (MetS), also known as “Syndrome X” or “insulin resistance syndrome”, includes a group of metabolic abnormalities like central obesity, hypertriglyceridemia, low levels of high-density lipoprotein (HDL) cholesterol, hyperglycemia, and hypertension.^[1] This syndrome is often associated with

diabetes mellitus and the risk of cardiovascular diseases, stroke and premature death. Risk factors for this syndrome are obesity/overweight, sedentary lifestyle, genetic predisposition, ageing and lipodystrophy.^[1] MetS can be diagnosed if any three of the following five criteria are fulfilled, viz, elevated waist circumference, hypertriglyceridemia, reduced HDL-C, hypertension

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and uncontrolled fasting glucose.^[2] These features can be efficiently managed through lifestyle modification involving an appropriate balance of physical activity and caloric intake.^[2]

Noubiapet et al.^[3] in their meta-analysis of global data from the general adult population observed that the prevalence of MetS varied from 12.5% to 31.4% globally. The prevalence of MetS was reported as 24.5% (22.5–26.6) for a fasting plasma glucose ≥ 5.6 mmol/L in this study.^[3] Bhalwar reported that the age-adjusted prevalence of MetS was 25% (31% in women and 18.5% in men) in urban populations of India.^[4] As per the systematic review and meta-analysis of data from the adult Indian population by Krishnamoorthy et al^[5] in 2020, the burden of MetS was 30%. Meher et al^[6] stated that 1.1% women and 0.7% men in West Bengal had metabolic syndrome. MetS is a common finding in patients with diabetes mellitus, as reported in previous studies.^[7-9] India is often regarded as the “Diabetic Capital of the World”. As per NFHS-5 data, 13.5% women and 15.6% men in India have diabetes mellitus.^[10] In West Bengal, the prevalence of diabetes mellitus among women and men was recorded as 17.5% and 21.3% respectively.^[11] Thus, MetS is an important public health problem in India and West Bengal.

Physical activity has been known to reduce the risk of both type 2 diabetes mellitus and MetS in adults.^[12,13] As per WHO recommendations, at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate and vigorous-intensity activity throughout the week is recommended for adults with type 2 diabetes mellitus.^[14] There is a dearth of studies explaining the role of physical activity in MetS, especially among diabetic patients in India. Thus, this study was conducted to estimate the burden of metabolic syndrome in patients attending the diabetes out-patient department (OPD) of a tertiary care hospital in Kolkata; to identify the participants with inadequate physical activity and; to evaluate the association of physical activity with glycemic control and presence of MetS among the study population.

Methods:

Study type, design, settings and duration: Descriptive type of observational study with cross-sectional design was conducted in the Diabetes OPD of Institute of Post-Graduate Medical Education & Research and Seth Sukhlal Karnani Memorial Hospital (IPGME&R and SSKMH), Kolkata, from 8th April 2023 to 8th June 2023.

Study population and selection criteria: The study was conducted on patients with diabetes mellitus seeking healthcare services from the Diabetes OPD of a tertiary care hospital, Kolkata. The study included patients aged between 18–65 years with diagnosed type 2 diabetes mellitus who were able to present their laboratory investigation reports (FBS, PPBS, Serum HDL and Serum Triglycerides) on samples taken within the last 3 months from the date of data collection. Pregnant and lactating women and those unable to respond to the questions due to their mental instability were excluded from the sample.

Sample size estimation and sampling technique: Sample size was estimated as 374 using Cochran’s formula $[Z^2p(p-1)/l^2]$, where Z is the standard normal deviate (taken as 1.96 at 95% CI), p is the prevalence of MetS in diabetic patients [taken as 50.7% from a study by Lira et al^[15] and l is relative error (10%)]. The final sample size was calculated as 411 after considering a non-response rate of 10%. The patients were selected through a consecutive sampling technique. As the total number of days for data collection was 24, so as to achieve the required sample size, 18 participants, fulfilling eligibility criteria, were selected consecutively every day from the OPD.

Study tools, techniques and methods of data collection: The patients were approached after they consulted the physician at the Diabetes OPD. They were explained the purpose of the study and were assured that the data provided by them would be anonymous and confidential. A predesigned, pretested and structured schedule including the International Physical Activity Questionnaire (IPAQ)^[16] was employed to collect data from the participants by interview. In addition, anthropometric measurements (height, weight, waist circumference), measurement of blood pressure and

review of records (previous OPD prescriptions and laboratory investigation reports) were also done.

Study variables: While the dependent variable was the presence of MetS in diabetic patients, the independent variables included socio-demographic characteristics, clinical profile related to diabetes (duration, family history, current glycemic control) and adequacy of physical activity (using IPAQ).

Operational definition

1. MetS–As per National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria, MetS is present if any three of the following five criteria are fulfilled, viz, elevated waist circumference (≥ 102 cm in men, ≥ 88 cm in women), elevated triglycerides (≥ 150 mg/dL), reduced HDL-C (< 40 mg/dL in men, < 50 mg/dL in women), elevated blood pressure (≥ 130 mm Hg systolic BP or ≥ 85 mm Hg diastolic BP) and elevated fasting glucose (≥ 100 mg/dL).^[2]
2. Glycemic control –As per ICMR guidelines, it can be defined as a fasting blood sugar (FBS) < 126 mg/dl and a post-prandial blood sugar (PPBS) < 181 mg/dl for patients on medication for type 2 diabetes mellitus.^[17]
3. Adequate physical activity –Patients with type 2 diabetes mellitus should engage in at least 150 minutes of moderate-intensity aerobic physical activity; or 75 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of these activities throughout the week as per WHO recommendations.^[14]

Statistical analysis: Data were then tabulated in Microsoft Office Excel 2019 (Microsoft Corp, Redmond, WA, USA), and analysis was done using Statistical Package for the Social Sciences (IBM, New York City, USA) Version 25.0. Descriptive statistical measures were employed to summarize the data. The dependent variables did not follow normal distribution (Kolmogorov-Smirnov test: p value = < 0.001 ; Shapiro-Wilk test: p value = < 0.001). Data were checked for multicollinearity; Variance Inflation Factor was found to be less than 10 and tolerance was greater than 0.1. Thus, binary logistic regression was employed to ascertain the

relationship between the dependent and the independent variables. A p-value of < 0.05 was considered significant.

Ethics statement: Data collection was initiated after approval from the Institutional Ethics Committee (IEC) (IEC/2023/211, dt. 08/04/23). Informed written consent of the suitable participants in the local language was taken prior to enrolment. Left thumb impression was taken from the illiterate participants in place of signature in the presence of an impartial witness

Results:

The final sample included 384 patients with type 2 diabetes (non-response 6.6%). Majority of the participants were in the age group of 50-59 years (34.3%), were males and were married. Most of them were educated up to the primary level (46.9%) and belonged to Class IV socio-economic status (32.2%) as per the Modified BG Prasad Scale, updated in October 2023.^[18][Table 1]

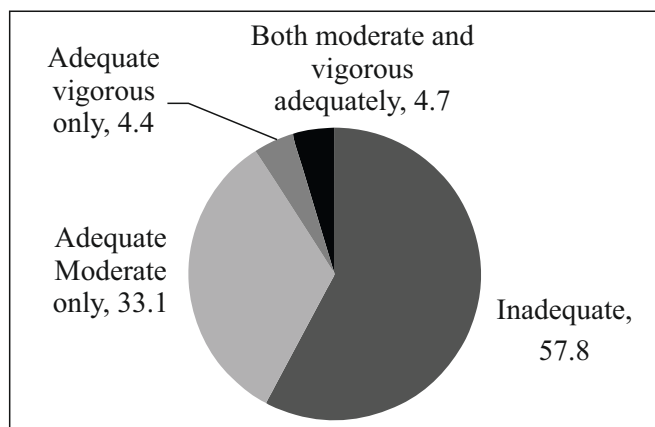
Table 1: Distribution of study participants according to their socio-demographic characteristics (N=384)

Socio-demographic variables	Number (%)
Age group (in completed years)	
18-29	15 (3.9)
30-39	43 (11.2)
40-49	117 (30.5)
50-59	132 (34.4)
60 & above	77 (20.1)
Gender	
Male	202 (52.6)
Female	182 (47.4)
Education	
Illiterate	66 (17.2)
Literate	39 (10.2)
Primary	180 (46.9)
Middle & Secondary	43 (11.2)
Higher Secondary & above	56 (14.6)
Marital Status	
Married	341 (88.8)
Single	16 (4.2)
Widow/ Widower	27 (7.0)
Socio-economic status (As per Modified BG Prasad Scale, October 2023)	
Class V	94 (24.5)
Class IV	124 (32.3)
Class III	81 (21.1)
Class II	52 (13.5)
Class I	33 (8.6)

Table 2: Distribution of study participants according to their diabetes profile (N=384)

Diabetes profile	Number (%)
Duration of diabetes	
<1 year	62 (16.1)
1-5 years	123 (32.0)
6-10 years	91 (23.7)
>10 years	108 (28.1)
Family history of diabetes	
Yes	174 (45.3)
No	210 (54.7)
Current glycemic control	
Ideal/Satisfactory	57 (14.8)
Unsatisfactory	327 (85.2)

Figure 1: Distribution of the study population according to the adequacy of physical activity performed by them. (N=384)



Based on IPAQ, it was noted that 57.8% had inadequate physical activity. [Figure 1]

Figure 2: Distribution of the study population according to the presence of MetS. (N=384)

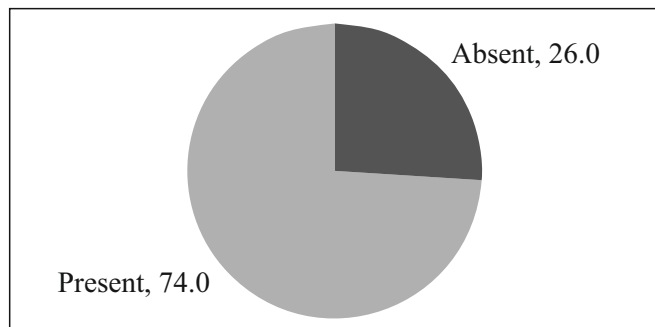


Table 2 shows the diabetes profile of the participants. Most of the participants were diabetic for more than 10 years. Strikingly, 85.2% patients did not have satisfactory glycemic control in spite of taking medications.

MetS was observed in 74% participants. Among the 284 participants with MetS, 60.2% had elevated blood pressure, 42.2% had increased waist circumference, 56.3% had uncontrolled FBS, 64.1% had hypertriglyceridemia and 45.3% had low HDL-C. [Figure 2]

Binary logistic regression was employed to check the association of physical activity with glycemic control and the presence of MetS. Patients performing adequate vigorous physical activity had a higher odds ratio of having ideal/satisfactory glycemic control (OR 3.141, 95% CI 1.024-9.633, p 0.045). Adequate moderate (OR 0.595, 95% CI 0.361-0.983, p 0.043) or vigorous (OR 0.139, 95% CI 0.049-0.395, p <0.001) physical activity had a significantly lower odds ratio of having MetS. Engaging in vigorous physical activity for an adequate duration was protective against having elevated blood pressure (OR 0.094, 95% CI 0.029-0.301, p <0.001) or having increased waist circumference (OR 0.021, 95% CI 0.062-0.795, p 0.021). Patients performing a combination of moderate and vigorous physical activity had a significantly lower odds ratio of developing hypertriglyceridemia (OR 0.335, 95% CI 0.122-0.918, p 0.034).

Discussion:

Physical activity is well known to have countless health benefits. Numerous studies have been conducted in the past to study the role of physical activity in the prevention of various non-communicable diseases. This research is different as it lays emphasis on the role of physical activity in the prevention of MetS in patients with established diabetes mellitus.

The percentage of diabetic patients on medication with unsatisfactory glycemic control was much higher in the present research (85.2%) compared to studies conducted by Bereda^[19] in ambulatory clinic in Ethiopia

(60.7%); Borgharkar et al^[20] in urban healthcare facilities across 26 states and union territories in India (76.6%) and; Pan et al^[21] in an urban health centre of West Bengal (37.5%). This could be because the study area in the current survey is a tertiary care hospital where complicated cases are referred for management from the peripheral institutions.

The problem of inadequate physical activity in the current study (57.8%) was almost double the observation of Wang et al^[22], where 28.6% Chinese diabetic patients performed low physical activity. This belief was strengthened by the findings of Paulin et al^[23] in Tamil Nadu, where similar to our study, 56% diabetics were physically inactive.

In the study by Lira et al^[15] in urban primary health centres of Floriano, 50.7% diabetic patients had MetS. The burden of MetS among type 2 diabetics was much higher in our work (74%); the research by Essafi et al^[24] at the Endocrinology, Diabetology, and Nutrition department of the Hassan II University Hospital in Fez (78.4%) and; the cross-sectional study by Singh et al^[25] in Varanasi (more than 70%). In the present survey and the Fez-based study^[24], high blood pressure was the most common abnormality in type 2 diabetes patients with MetS. This suggests that patients with type 2 diabetes are more prone to develop hypertension. Complimenting the observations of Park et al^[26] in Korea and Banerjee et al^[27] in Durgapur, the current research reported a positive relation between physical activity and glycemic control.

Lee et al^[28] in their analysis of data from the Korean National Health and Nutrition Examination Survey, 1999–2012 noted that physical inactivity was associated with fasting glucose, HDL cholesterol, and waist circumference among diabetics with MetS. Alike our study, El Bilbeisi et al^[29] also employed IPAQ for assessment of physical activity among type 2 diabetes patients with MetS in Palestine. This study portrayed that the level of physical activity has a relationship with triglycerides, HDL-cholesterol and blood pressure.^[29] An Indian study by Goyal et al.^[30] using the Global Physical Activity Questionnaire revealed that physical inactivity

was associated with hypertriglyceridemia in males and with raised hip circumference, blood pressure, triglycerides and FBS in females. The current study established the role of adequate physical activity in preventing hypertension, increase in waist circumference and hypertriglyceridemia. But, our research failed to confirm the association of physical activity with HDL-cholesterol and FBS which was evident in other studies.^[29,30] Moreover, this research confirmed that physical activity is protective against MetS in patients with type 2 diabetes. Thus, patients with type 2 diabetes should engage in adequate physical activity to prevent the onset of MetS which might result in morbidity and mortality.

Limitation:

The survey helped in furnishing evidence in favour of physical activity in diabetics. Still, the research had few limitations, viz, shorter duration of study, inclusion of patients from a single OPD and lack of intervention to address the issue of physical inactivity.

Conclusions:

A substantial number of diabetic patients in Kolkata suffer from MetS. A major chunk of diabetic patients do not engage themselves in adequate physical activity. Performing moderate-to-vigorous physical activity for an adequate duration helps in preventing MetS in diabetic patients. Vigorous physical activity is also beneficial in attaining glycemic control.

Recommendation:

A major chunk of diabetic patients do not engage themselves in adequate physical activity. Performing moderate-to-vigorous physical activity for adequate duration helps in preventing MetS in diabetic patients. Vigorous physical activity is also beneficial in attaining glycemic control.

Declaration

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Conflict of Interest: Nil

Use of AI: Nil

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Utilization of Benefits under Nikshay Poshan Yojana by Tuberculosis Patients: A Cross-Sectional Study in Ahmedabad city, Gujarat, India

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Abstract:


Introduction: Nikshay Poshan Yojana (NPY) was launched in 2018 to meet nutritional needs of tuberculosis patients. **Objectives:** 1. To assess the utilization pattern of monetary benefits under NPY among tuberculosis (TB) patients. 2. To explore the determinants of correct utilization of monetary benefits among TB patients. **Method:** It was a cross-sectional study conducted among TB patients (480) across 32 TB units of Ahmedabad. Fifteen TB patients from each TB unit who had received monetary benefits under the NPY were selected purposively and information regarding Direct Benefit Transfer (DBT) utilization were collected through one-on-one interviews. Statistical analysis was done using SPSS, employing chi square statistics and logistic regression to identify the predictors of utilization. **Results:** Among all the participants, only 394 (82%) patients utilized the received monetary benefit. Six (1%) participants didn't utilise the monetary benefit despite receiving it while 80 (17%) participants were unaware about the received monetary benefits. Among those who utilized the monetary benefit, 289 (73.3%) participants used it for nutritional supplementation while 105 (26.7%) used it for non-nutritional purposes. Previously treated TB patients (AOR=0.164; p<0.001) and presence of food insecurity (AOR=2.322; p<0.001) were found to be the main determinants of correct utilization of monetary benefit. **Conclusion:** A significant proportion of beneficiaries utilized DBT for nutritional purposes, but a considerable number either spent on non-nutritional needs or were unaware about the received benefit. Type of TB case and food security status were found to be the key predictors of intended utilization of benefits received.

Keywords: Food insecurity, Nikshay Poshan Yojana, Tuberculosis

Introduction:

Tuberculosis (TB) remains a pressing public health challenge in India, with millions of new cases being reported annually. India is one of the top five countries worldwide with highest TB burden, contributing 26% of all cases globally.^[1] TB is considered a barometer of social welfare—a social disease with medical aspects. To achieve the goal of “TB Elimination by 2025”, a patient-centric service delivery system is crucial to address social determinants.^[2]

The non-medical risk factors that increase susceptibility of TB include undernutrition, poor housing conditions, overcrowding, poor quality of life, and addiction to smoking and alcohol.^[3] Among these, undernutrition shares a bidirectional relationship with TB: it increases the risk of latent infection progressing to active disease, while active TB further worsens nutritional status. Undernutrition is directly linked to food insecurity, which is defined as a condition in which lack of consistent physical or economic access to

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sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life.^[4] Food insecurity is multifactorial issue, common among TB patients in resource-poor settings, adversely affecting treatment adherence and outcomes. Evidence from within the country indicates that providing nutritional support to TB patients can improve treatment outcomes.^[2]

To address this relationship between undernutrition and poor treatment outcome, the Government of India launched the “Nikshay Poshan Yojana (NPY)” in April 2018. This scheme provides nutritional support incentives to all tuberculosis patients through a Direct Benefit Transfer (DBT) mechanism, wherein monetary benefits are transferred directly to the patient’s bank accounts. Possession of bank account is mandatory to receive cash benefit.^[5]

Under this scheme, first instalment of Indian Rupees (INR) 1000 for the initial two months is disbursed immediately after treatment initiation. Subsequent instalments (INR 1000 for every two months) are released only if the patient has completed preceding two months of treatment. Furthermore, a benefit (INR 500 per month) continues as long as the patient remains on the anti-TB treatment.^[5] Additional incentives are provided for treatment extensions and drug-resistant TB.^[6]

Challenges such as absence of bank accounts among patients, lack of awareness about the scheme among patients seeking private healthcare settings and procedural delays hinder the effectiveness of the scheme.^[7]

Existing literature largely focuses on the coverage of benefit, while research on utilization of these benefit remains limited. This study aims to identify gaps by finding the utilization pattern of received monetary benefits under NPY and explore the determinants of correct utilization.

Methods:

It was a cross-sectional study conducted in all the TB units in Ahmedabad (32 TB units: 23 under the Ahmedabad Municipal Corporation (AMC) and 9 in the

Ahmedabad district region) between August 2023 and July 2024. The sample size was calculated using the formula:

$$N=4pq/L^2$$

where ‘p’ is the estimated proportion of NPY coverage (79.4%) as mentioned in the TB India report (2022)^[5] and ‘L’ represents the allowable margin of error (5%) at 95% confidence interval. To ensure adequate representation across all tuberculosis units, 15 patients were selected purposively from each tuberculosis unit, resulting in a total sample of 480.

Inclusion Criteria: Individuals who had received at least one instalment of the benefit were included in the study.

Exclusion Criteria: Individuals less than 18 years of age and those who declined to participate in the study were excluded.

Study Tool and Data Collection Technique

A pre-structured and pre-validated questionnaire was utilized for data collection. The questionnaire was administered through face-to-face interviews conducted in the local vernacular language. All responses were recorded using pen-and-paper method. The questionnaire gathered information on sociodemographic characteristics, food security status, clinical details and utilization pattern of NPY monetary benefit among study participants.

Food security was evaluated using Six-Item Short Form Economic research service.^[8] Participants reported their household food consumption over the preceding 12 months. The household’s raw score was determined total number of affirmative responses to the six items. A raw score of 0-1 indicated food security. Raw scores of 2-4 and 5-6 were classified as “low food security” and “very low food security,” respectively; both were categorized as food insecure. Although, the data collection tools were not subjected to pilot testing; however, their internal consistency was assessed using Cronbach’s alpha on collected study sample, yielding a value of 0.784, which indicates its acceptable reliability. Data was entered in Microsoft Excel and analysed through IBM Statistical Package for the Social Sciences (SPSS), version 27.

Ethical approval was obtained from the Institutional Review Board (IRB) (NHLIRB/2023/Jan/09/No.6), and necessary permissions were secured from the health departments of AMC and Ahmedabad district.

Statistical Analysis

Descriptive analyses were performed to summarize the sociodemographic characteristics, educational attainment, type of tuberculosis case and food insecurity status. Chi square statistics & univariate logistic regression was employed to assess statistically significant associations. All variables with p-value <0.05 in the univariate analysis were included and adjusted for in the multivariate logistic regression model to identify the predictors of correct benefit utilization.

Results:

A total of 480 patients were enrolled in the study. Most of the participants (250, 52%) were aged 21-40 years with a mean age of 37.34 years (SD ±16.5). The study population demonstrated a relatively balanced sex distribution, with 264 (55%) male and 216 (45%) female participants.

A majority, (370, 77.1%) of the participants had attained at least primary education, and 154 (32.1%) had completed higher secondary education or above. Nearly half (235, 49%) of the participants were financially dependent on their family members, including housewives, students and individuals who became unemployed after the diagnosis. Among those who were financially dependent, 40 (17%) were daily wage earner. A history of migration was reported by only 57 (11.9%) participants. Furthermore, 253 (52.7%) out of 480 participants belonged to the families facing food insecurity. (Table1)

Programmatic Characteristics and Direct Benefit Transfer Parameters of Study Participants

The majority of tuberculosis cases were pulmonary (360, 75%) and newly diagnosed (326, 68%). Most patients (432, 90%) were promptly registered in the Nikshay portal and initiated antituberculosis treatment on the same day as their diagnosis. Only 58 (12%) beneficiaries received full DBT amount corresponding to the duration of their treatment. Although bank account

Table 1: Sociodemographic Characteristic of Study Participants (N=480)

Characteristics	Categories	Frequency (%)
Age groups (in years)	<20	44 (9.2)
	21-40	251 (52.3)
	41-60	149 (31)
	>60	36 (7.5)
	Mean=37.3±16.6 years	Median=35 years
Gender	Male	264 (55)
	Female	216 (45)
Migration history	Yes	57 (11.9)
	No	423 (88.1)
Education	Graduate/ Post graduate	80 (16.7)
	Higher secondary	74 (15.4)
	Secondary	78 (16.3)
	Primary	138 (28.8)
	Illiterate	110 (22.9)
Financial Dependency	Yes	235 (49)
	No	245 (51)
Change in occupation (became unemployed)	Yes	56 (11.7)
	No	214 (44.6)
	NA	210 (43.8)
Addiction	Yes	106 (22.1)
	No	374 (77.9)
Household with food insecurity	Yes	253 (52.7)
	No	227 (47.3)
Type of TB	Newly Diagnosed	324 (67.5)
	Previously treated	156 (32.5)

ownership was nearly universal among participants, 144 (30%) reported using a relative’s bank account to receive benefits.

Utilization Pattern of Direct Benefit Transfer by Study Participants

Among 480 participants, 289 (60%) indicated that financial benefit received through DBT was correctly spent on food purchases while 105 (22%) utilized the benefit for non-food-related expenses, including house rent, clothing, recreational activities and other household needs. Among remaining participants, 80 (17%) were unaware that the benefit had been deposited into their accounts, however 6 (1%) participants were

aware of the funds but did not utilize them. Since, 86 (18%) participants were unaware of the deposit and did not use the money, they were excluded from the analysis to identify the pattern and predictors of the utilization of NPY for nutritional purpose. A significant association

was found between correct utilization of benefit for food purchases and factors such as age over 35 years ($\chi^2=4.210$; $p=0.04$), a history of previously treated TB years ($\chi^2=30.784$; $p<0.001$) and presence of food insecurity ($\chi^2=13.473$; $p<0.001$). (Table 2)

Table 2: Association of Different Factors with the Utilization of the DBT under NPY Scheme (N=394)

Variable	Category	Utilized for	Utilized for other	Chi square	p value
		food (N=289)	activities (N=105)		
		n (%)	n(%)	(χ^2) value	
Age Group (Years)	≤ 35	148 (69.2)	66 (30.8)	4.210	0.04
	>35	141 (78.3)	39 (21.7)		
Gender	Male	171 (75)	57 (25)	0.753	0.385
	Female	118 (71)	48 (29)		
Migration history	Yes	47 (82.5)	10 (17.5)	2.827	0.09
	No	242 (72)	95 (28)		
Education	Illiterate	58 (76.3)	18 (23.7)	0.424	0.515
	Literate	231 (72.6)	87 (27.4)		
Financial Dependency	Yes	137 (71)	56 (29)	1.083	0.298
	No	152 (75.6)	49 (24.4)		
Type of TB case	Newly diagnosed	177 (65)	95 (35)	30.784	<0.001
	Previously treated	112 (92.8)	10 (8.2)		
Addiction	Yes	61 (72.6)	23 (27.4)	0.029	0.864
	No	228 (73.5)	82 (26.5)		
Food insecurity	Present	165 (81.3)	38 (18.7)	13.473	<0.001
	Absent	124 (65)	67 (35)		

Table 3: Predictors for Utilization of Monetary Benefit under NPY (N=394)

Variable	Utilization of Monetary Benefits of NPY		COR (95% CI)	AOR (95% CI)	P value
	Food	Other activities			
	(N=289)	(N=105)			
		n (%)	n (%)		
Age Group (years)					
≤35	148 (69.1)	66 (30.9)	1 (Referent)	1 (Referent)	0.051
>35	141 (78.3)	39 (21.7)	0.602 (0.392-0.981)	1.622 (0.998-2.635)	
Type of TB					
Previously treated	112 (91.8)	10 (8.2)	1 (Referent)	1 (Referent)	<0.001
Newly diagnosed	177 (65)	95 (35)	0.166 (0.083-0.333)	0.164 (0.081-0.330)	
Food Insecurity					
Absent	124 (65)	67 (35)	1 (Referent)	1 (Referent)	<0.001
Present	165 (81.3)	38 (18.7)	2.346 (1.479-3.721)	2.322 (1.432-3.764)	

COR was determined using univariate binary logistic regression. For each independent variable which showed significant association in univariate analysis, the AOR was calculated after adjusting for other independent variables. COR: Crude odds ratio, AOR: Adjusted odds ratio, CI: Confidence interval

As shown in Table 3, the type of tuberculosis case and household food security status were found to be the predictors of correct (intended) utilization of monetary benefit. After adjusting for other covariates, newly diagnosed tuberculosis patients were significantly less likely to utilize the benefit for food purchases compared to those with history of previous tuberculosis treatment (adjusted odds ratio [AOR]: 0.164; 95% CI: 0.081-0.330; $p < 0.001$). Additionally, participants experiencing household food insecurity were significantly more likely to use the financial assistance for food purchases (AOR=2.322; 95% CI: 1.432-3.764; $p < 0.001$) as compared to food secure households.

Discussion:

Majority of the study participants (52.3%) were aged between 21 to 40 years, with males comprising 55% of the sample which was in contrast with the findings of Rabeensa KT *et al*^[9] where majority (47%) of the participants belonged to the age group 31-50 years and 65% of the participants were males. In the present study, 22.9% of the participants were illiterate which was somewhat different from the findings by Barve *et al*^[10] and Rabeensa KT *et al*^[9] where 14% of the participants were illiterate. The present study had 67.5% of the participants being newly diagnosed TB patients which was different to the findings by Rabeensa KT *et al*^[9] where 84% of the participants were newly diagnosed TB patients. This study provides valuable insights into the pattern and predictors of utilization of the monetary benefits received by tuberculosis patients.

Among the 394 participants who utilized the funds, 289 (73%) reported using money exclusively for nutritional purposes which was consistent with the findings by Barve *et al*^[10] and Rabeensa KT *et al*^[9] where 71% and 73% of the participants utilized the monetary benefits for nutritional purposes respectively but differing from those reported by Kavimalar T *et al*^[11] where just 26% of the participants used the benefits for nutritional supplementation.

Of the total participants, a mere 12% of them received the full benefit corresponding to their treatment duration, the remainder received only a partial amount. It

was in contrast to the findings by Kavimalar T *et al*^[11] where 20% of the participants received the full benefit. The lack of notification services by the banking institution and limited access to passbook records resulted in 80 (17%) participants being unaware that financial benefits had been deposited into their bank accounts which is consistent with the findings of a previous study conducted by Bakhru D *et al*^[12], where 30% of the participants were unaware about the receipt of NPY benefits.

This study indicated that 253 (53%) participants i.e. more than 50% of the patients experienced food insecurity which contrasts with the findings of a previous study conducted by Ayiraveetil R *et al*^[13] where 34.1% participants experienced household food insecurity which indicated that approximately one-third of the tuberculosis patients experienced food insecurity at the time of diagnosis. This study was one of its kind where previously diagnosed TB patients and food insecurity were found to be the main predictors of utilization of funds for nutritional purposes. This finding can be supported by the fact that recent diagnosis of TB in individuals is often linked with fear, stigma, unawareness and anxiety often leading to confusion regarding the purpose of received monetary benefits thus leading to its utilization for needs other than nutritional supplementation. Similarly, food insecurity fundamentally being a household-level issue, often results in financial benefits getting distributed among family members, potentially reducing the allocation exclusively for individual patient's nutritional needs. Therefore, direct referral pathways to programs like Pradhan Mantri Tuberculosis Mukh Bharat Abhiyaan, could be beneficial.^[14]

Though not included in our study objectives, key implementation challenges identified included budget constraints and procedural delays for program staff. Additionally, patients frequently encountered issues related to bank accounts, with both healthcare providers and patients reporting problems due to insufficient documentation.

Limitation:

This study focused only on purposively selected participants of all TB units in Ahmedabad. Thus, it does not have fair representation of all the TB patients overall in determining the utilization pattern. Information gathered was primarily based on respondent's point of view, which may have recall bias.

Conclusions:

The study provides an assessment of utilization patterns, and determinants influencing the use of monetary benefits provided under NPY among TB patients in Ahmedabad district. The financial benefit received under NPY was primarily utilised for meeting the nutritional needs by 289 (60%) of the participants, while 105 (22%) utilized the benefit for non-food-related expenses. Food insecurity (AOR: 2.322; $p < 0.001$) and the type of TB case (AOR: 0.164; $p < 0.001$) were the main predictors of correct utilization of the monetary benefits which highlights the need of prior education about NPY for intended utilization of the benefits for nutritional supplementation.

Recommendation:

Targeted educational interventions and counselling by service providers like TB health visitor, field level workers at the time of diagnosis and throughout the treatment course can empower patients and their caregivers to allocate & utilize benefits appropriately contributing to improved nutritional status, treatment adherence and successful tuberculosis outcome.

Declaration

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Conflict of Interest: Nil

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Evaluation of Universal Immunization Program (UIP) in Botad District, Gujarat, India: A Cross-Sectional Study

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Abstract:


Introduction: The Universal Immunization Program (UIP) is a key public health intervention aimed at reducing morbidity and mortality from vaccine-preventable diseases. Despite substantial national progress in India, regional disparities in coverage and implementation still persist. **Objective:** To evaluate the implementation of the Universal Immunization Program in Botad district. **Methods:** A cross-sectional study was conducted in Botad district (Gujarat) from 2023 to 2025. Ten Primary Health Centres (8 rural and 2 urban) were selected using stratified random sampling, and 30 villages were chosen through WHO cluster sampling. Data were collected using structured checklist for facility assessments, immunization session observations, interviews, and household surveys of 150 children aged 12–23 months, 30 antenatal women, and 30 adolescents. Evaluation indicators included human resource availability, training status, microplanning, cold chain management, session quality, supervision, and immunization coverage. **Results:** The evaluation revealed absence of routine immunization training for healthcare workers in the past three years. Only 30% of PHCs had complete routine immunization microplans, supervision plans were available only in 10% of facilities. Cold chain maintenance was satisfactory. However, session observations identified gaps in safe injection practices (40%), post-vaccination observation (10%), and delivery of four key messages (20%). Full immunization coverage among children aged 12–23 months was 79.3%. Td coverage was 100% among pregnant women, while among adolescents it was 60% for Td1 and 40% for Td2. **Conclusion:** UIP implementation in Botad district showed moderate coverage and satisfactory cold chain management but was limited by gaps in training, supervision, microplanning, and session quality.

Keywords: Cold chain, Evaluation, Gujarat, Immunization, Universal Immunization Program

Introduction:

Immunization is widely recognized as one of the most cost-effective and successful public health interventions, capable of preventing significant morbidity and mortality from infectious vaccine preventable diseases. In India, the Universal Immunization Program (UIP), launched in 1985, represents one of the largest public health initiatives

globally, targeting approximately 26 million newborns and 30 million pregnant women annually.^[1] About 1.3 crore routine immunization sessions are planned annually and to ensure quality and safety, vaccines are stored at more than 30,000 cold chain points across India.^[1] The program has achieved notable milestones, including the elimination of polio and maternal and neonatal tetanus in 2015.^[1] As a result of consistent

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efforts through routine immunization activities and focused immunization drives across country, India has achieved full immunization coverage of 76.4% in 2019-21.^[2]

Despite these advances, many children and pregnant women in India still remain partially vaccinated and unvaccinated. Vaccine-preventable diseases such as measles, diphtheria, pertussis, and rubella remain prevalent, indicating persistent gaps in immunization delivery, especially in hard-to-reach and underserved populations. Additionally, operational barriers including gaps in proper microplanning and Head Count Survey (HCS), human resource shortages, inadequate training, weak supervision, cold chain failures and logistical constraints often impede optimal UIP implementation.^[2]

Quality of healthcare services can be systematically evaluated using the Donabedian framework, which consists of three components: input (structure), process, and outcome. Input refers to the resources and organizational settings required for healthcare delivery, such as hospital facilities, equipment, and the qualifications of healthcare personnel. Process refers to the activities involved in providing care, including diagnosis, treatment, preventive services, and interactions between healthcare providers and patients. Outcome refers to the results of medical care on the patient's health, such as recovery, improvement in health status, survival, and patient satisfaction.^[3] This framework can be applied to the evaluation of an immunization programme by assessing the availability of vaccines and trained staff (input), proper vaccine delivery and cold-chain maintenance (process), and the resulting immunization coverage (outcome).

District-level performance for immunization coverage varies considerably across the country. According to the National Family Health Survey-5 (NFHS-5), only 65.1% of children aged 12–23 months in Gujarat's Botad district were fully immunized.^[4] As Botad district was formally established on August 15, 2013,^[5] till date, no comprehensive evaluation of UIP implementation has been conducted in this region. This study was aimed to fill that gap by systematically evaluating the input, process, and outcome components of UIP in Botad district.

Methods:

A community-based cross-sectional study was conducted in Botad district, Gujarat, from 2023 to 2025. Botad district comprises of Botad city and four talukas and is served by 4 Urban Primary Health Centres (UPHCs) and 18 Primary Health Centres (PHCs). For input and process evaluation stratified random sampling was used to select ten health facilities (2 UPHCs and 8 PHCs) from the district ensuring equal representation from each taluka. For outcome evaluation, 30 villages from district were selected using World Health Organization's (WHO) 30 cluster sampling technique. From selected clusters (villages), house to house survey was conducted using the spinning bottle method to determine direction of visit of house. From each village, 7 participants were selected: 5 children aged 12-23 months, 1 antenatal woman and 1 adolescent (10-19 years). This yielded a total sample size of 210. Those study participants who were not willing to give consent for this study, were excluded.

For facility assessment, at PHC and UPHC data was collected using a structured checklist to evaluate availability of human resource, training status, routine immunization (RI) microplanning, cold chain infrastructure and management and record keeping. From each PHC/UPHC, one sub-centre (SC) was selected conveniently and data regarding SC level RI microplanning was reviewed and ongoing RI session site were visited. A structured observation checklist was used at session site, to assess session setup, vaccine handling, adherence to safe injection practices, waste disposal methods etc. Caregivers and antenatal women at session sites were interviewed regarding session awareness, satisfaction, and service experience. Data was collected by observation, interview and record review.

To assess immunization coverage (Outcome), investigator conducted house to house visit in selected villages with help of ASHA of the respective village and data regarding immunization status was collected from vaccination card and recall method. Reason for partial or non-immunization were asked to beneficiaries or caretakers. Children who had received BCG, 3 doses of Oral Polio Vaccine (OPV), 3 doses of pentavalent and 1

dose of Measles-Rubella (MR) vaccine by 12 months of age were considered fully immunized (Definition according UIP guidelines in 2024). Children who initiated vaccination but did not complete the age-appropriate immunization were drop out or partially immunized and children who did not receive any vaccine were considered as left out or unimmunized. Coverage of the Tetanus toxoid-diphtheria (Td) vaccine among adolescents was assessed based on receipt of the vaccine at 10 and 16 years of age, as per the UIP schedule. Similarly, Td vaccination coverage among antenatal women was assessed based on whether they received the Td vaccine according to the UIP schedule. This includes women who received both doses of Td one month apart during the current pregnancy, those who received the first dose and are yet to complete the four-week interval for the second dose, or those who received a Td booster dose as recommended.

Data was analysed using Microsoft Excel and Jamovi software (version 2.4.7). Descriptive statistics such as frequencies, proportions, and percentages were computed. This study was approved by Institutional Review Board (IRB) with approval number EC-1297/2023. Informed consent of participants was taken before data collection and confidentiality was maintained.

Results:

Input & Process evaluation:

At the selected PHC/UPHCs, 8 out of 10 sanctioned Medical Officers were present, however none of them had received UIP training in the past three years. Only 4 of 10 FHS were available, and none of them were trained.

All 10 cold chain handlers/pharmacists were present, however, only 50% had received training and none had training certificates. Among frontline workers, 46 of 52 FHWs were present, with 54% trained, while all 53 MPHWs were present but all untrained. (Table 1)

PHC maps with sub-centre demarcation were available in 9 of 10 facilities. However, only 3 PHCs had complete RI micro plans from all SCs. ANM rosters plans were available in 6 PHCs. Supervision plans were documented in only 1 PHC, and updated coverage monitoring charts were present in only 3 (Table 2). Among 10 PHCs, 8 had matching records of planned versus conducted sessions. Two PHCs lacked session records entirely. Supervision of sessions was largely undertaken by AYUSH Medical Officers (50%), with only 10% supervised by MBBS Medical Officers. Master lists of villages/ high-risk areas (HRAs) and RI micro plans were available at all SCs. Maps with village names were present in 70% of sites, but beneficiary lists, estimation plan of vaccines and logistics, and drop out/left out children list were largely absent at SC level.

Regarding cold chain management, all facilities had functional Ice Lined Refrigerator (ILR) and Deep Freezers (DF) and at 90% of the facilities ILRs & DFs were levelled and protected from sunlight. At 80% facilities, it was placed on wooden platforms, and all had functional stabilizers and thermometers. Vaccines and ice packs were properly arranged in 90% of facilities, and the First-In-First-Out principle was followed in 90% of facilities. No expired or unusable vaccines were found. (Table 3) Date and time of reconstitution was written on open vials. Entries of vaccines and logistics

Table 1: Availability of human resources and training status for UIP at PHC & UPHC Level (N = 10)

Cader	Sanctioned	Currently available	Trained for UIP in last three year	Certificate of training /record
Medical officer (MO)	10	8 (80%)	0	0
Female Health Supervisor (FHS)	10	4 (40%)	0	0
Vaccine and cold chain handler (VCCH)/ Pharmacist	10	10 (100%)	5 (50%)	0
Female Health Worker (FHW)	52	46 (88%)	25 (54%)	22 (88%)
Multi-Purpose Health Worker (MPHW)	53	53 (100%)	0	0
Accredited Social Health Activists (ASHA)	227	225 (99%)	0	0

(PHC= Primary Health Centre, UPHC= Urban Primary Health Centre)

Table 2: Routine immunization micro-plan Assessment at PHC & UPHC Level (N = 10)

Component	Available n (%)
Map of PHC showing SCs/ANM area demarcation	9 (90%)
Completed RI micro-plans	3 (30%)
SC/ANM area workload and session plan	7 (70%)
ANM roster plan	6 (60%)
Vaccine distribution plan including Alternate Vaccine Delivery (AVD)	2 (20%)
Vaccine and logistics estimation for PHC/UPHC	3 (30%)
Supervision plan at PHC/UPHC	1 (10%)
Latest coverage monitoring chart	3 (30%)

Table 3: Cold chain findings at PHC & UPHC Level (N=10)

Indicator	n (%)
CCE away from sunlight	9 (90%)
CCE placed on wooden platform	8 (80%)
CCE at least 10cm away from wall	10 (100%)
CCE Locked	2 (20%)
CCE connected with functional stabilizer	10 (100%)
CCE plugged permanently to the socket	10 (100%)
CCE has a functional thermometer available	10 (100%)
Frost less than 5 mm	10 (100%)
Ice packs are arranged in crisscross pattern in DF	10 (100%)
Vaccines are stacked neatly in ILR	9 (90%)
Vaccines are placed in basket	10 (100%)
Vaccines are arranged in first-in-first-out order in ILR	9 (90%)
Any unusable vaccine (Expired/VVM with Discard point) found	0

(PHC= Primary Health Centre, UPHC= Urban Primary Health Centre, CCE= Cold Chain Equipment, VVM= Vaccine Vial Monitor)

were updated in the electronic Vaccine Intelligence Network (eVIN) 90% of facilities. Adverse Event Following Immunization (AEFI) kits were available at all PHCs.

In session site monitoring, all 10 observed sessions were conducted as per the RI microplan. Vaccines were transported in vaccine carriers with conditioned ice packs, and reconstitution times were correctly recorded at all sessions. However, safe injection practice was followed in only 40% of sessions, and biomedical waste management was fully compliant in only 50%. Key health messages were communicated in only 20% of

sessions, and post-vaccination observation for 30 minutes was ensured in only 10% of sessions. Anaphylaxis kits were available in all (100%) sessions. Regarding beneficiaries' interview at session site, all selected beneficiaries reported learning about the session through ASHAs. Satisfaction about immunization services was 100% among antenatal women and caregivers of vaccinated children.

Outcome (Immunization Coverage) evaluation:

Among 150 children of 12-23 months of age, 54% were males and 46% were females and vaccination cards were available for 96% of children. Full immunization

Table 4: Immunization coverage among children aged 12-23 months (N=150)

Immunization status	n (%)
Fully Immunized	119 (79.3 %)
Partially Immunized (drop out)	25 (16.7%)
Unimmunized (left out)	6 (4%)

coverage among children was 79.3% and rest were partially or unimmunized (Table 4). The common reasons for left out or drop out were illness of child (38.71%), family resistance (22.58%), and fear of side effects (19.35%). Other reasons included fear of multiple injections, and lack of perceived need of immunization.

Among the 30 selected antenatal mothers, Td vaccine coverage was 100%, with all mothers having received Td1, Td1 and Td2, or a Td booster dose as per their eligibility. Among 30 adolescents, 18 (60%) had received Td 1 dose. And out of 5 adolescents eligible for Td 2 dose, 2 (40%) had received the vaccine. Common reasons for not taking Td vaccine among adolescents were inappropriate health worker behaviour (53.33%), lack of knowledge about vaccination sites (33.33%), and fear of side effects (13.33%).

Discussion:

Training of healthcare staff is important for improvement in immunization program performance by developing essential competencies, including professional attitudes, appropriate vaccine administration techniques and documentation practices. However, in present study it was found that only about 50% of VCCHs and FHWs were trained for UIP in last 3 years while, rest of the healthcare staff and ASHAs were untrained. Similar findings were observed in study by Kumar P, et al. (2023)^[6] in Dehradun, in which the ASHAs had never undergone any training regarding routine immunization. Frontline health workers are often overburdened with multiple program-related duties and reporting targets, which restricts their availability for training and capacity-building activities.

Inadequate microplanning and weak supervision are critical bottlenecks for success of immunization program. In present study, only 30% of PHCs had

complete RI microplans, 70% had session plan and supervision plans were almost absent (90%). Patel T, et al. (2011)^[7] in their study in Anand (Gujarat) also found that 93.2% of the PHCs had no supervision plan. Similarly, collaborative study conducted across various states of India also revealed poor results regarding planning for immunization i.e. a map of the catchment area was available in only 39% of the PHCs, estimation of number of beneficiaries and logistics as a part of microplan was limited to 61% of 10 PHCs, ANM roster plan was available at 88% of the PHCs and the AVD plan was available in only 61% of the PHCs.^[8] However, study conducted on Urban Health Centres (UHCs) of Ahmedabad by Nogas J et al. (2024)^[9] found that all UHCs were having microplans and session plans but other aspects like catchment areas and dropout charts were not present at many UHCs.

Some good findings like functional ILRs and DFs, functional stabilizers and thermometers and proper placement of ILR/DFs were observed in all PHCs. Study conducted in Anand district also reported similar findings for cold chain management.^[7] This could be due to training of VCCHs in cold chain management.

All the immunization sessions were conducted as per RI microplan. Despite high beneficiary satisfaction, session observations revealed notable gaps in critical components of service delivery, including safe injection practices, biomedical waste management, counselling and communication of four key messages, and post-vaccination observation of beneficiaries. Similar findings were reported in studies conducted by Parmar A et al (2014)^[10] in Vadodara, Panika RK et al (2018)^[11] in Damoh (Madhya Pradesh) and Nath L et al (2015)^[12] in Haridwar (Uttarakhand). These consistent findings across diverse settings suggests systemic issues with lack of training of health workers in immunization practices.

The 79.3% full immunization coverage in present study was higher than the NFHS-5 estimate for Botad district (65.1%), which could be due to small sample size in present study compared to NFHS survey. However it remains below the national target of achieving more than

90% full immunization coverage^[1]. Studies conducted to assess full immunization coverage among children across various regions of Gujarat, India also revealed similar findings.^[13–15] Failure to achieve the national target shows the persistence of gaps related to service delivery, follow-up of dropouts, and lack of parental awareness about immunization.

The observed 100% Td vaccine coverage among pregnant women may be attributed to strong antenatal care services utilisation, effective integration of Td vaccination into routine ANC services, and high awareness among beneficiaries and health workers. However, Td vaccination coverage was suboptimal among adolescents, with Td1 and Td2 coverage of 60% and 40%, respectively. Similar gaps have been reported by Singh A et al. (2000)^[16] in Haryana, where coverage for the first and second doses of tetanus-containing vaccine among adolescent girls was 26.7% and 44.3%, respectively. This could be attributed to limited programmatic focus on adolescents and poor health seeking behaviour.

Conclusions:

This evaluation identified several systemic gaps affecting the performance of the Universal Immunization Program (UIP) in Botad district, including deficiencies in human resource training, supportive supervision, routine immunization microplanning, and service delivery. Full immunization coverage among children aged 11–23 months was 79.3%. Td immunization coverage was 100% among antenatal women, while coverage among adolescents was 40-60%.

Limitations:

The limitations of this study include reliance on participant recall and available records for data collection, as well as the exclusion of migrant populations from the coverage assessment. Furthermore, the relatively small sample size used for estimating immunization coverage may have contributed to the higher coverage observed in this study.

Recommendations:

Based on the findings, it is recommended to strengthen training by providing mandatory Universal Immunization Program (UIP) courses for all health cadres—including Medical Officers, Field Health Supervisors, cold chain handlers, FHWs, MPHs and ASHAs with regular re-training and certification. Microplanning should be enhanced at every PHC and sub-centre through the development and use of comprehensive RI microplans that track dropouts, left-out children, vaccine distribution, and supervision schedules. Additionally, targeted strategies are needed to improve Td vaccine coverage among adolescents.

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Declaration

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Temporal Trends and Geographic Variation in Cervical Cancer Cases (2005-2023): Insights from State Cancer Institute of Western India

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Abstract:


Introduction: Cervical cancer remains a significant global public health concern, with a disproportionate burden observed in low- and middle-income countries. **Objective:** To study epidemiological profile of the cervical cancer cases at the Gujarat Cancer & Research Institute (GCRI) over 19-year period (2005–2023). **Method:** This descriptive cross-sectional study utilized cancer registry data and electronic medical records from the GCRI. The study included all histologically confirmed (23,573) cervical cancer cases registered between January 2005 and December 2023. Annual trends in case registrations, age distribution, and geographic distribution (district level within Gujarat and state level across India) were analyzed. **Results:** Data shows annual registrations of cervical cancer peaks at 1,446 in 2014 before a marked decline to 614 in 2023 (APC= -4.94%). The mean age at diagnosis was 49.4±11.31 years, with the 40–49 age group representing the highest vulnerability (33.72%). While 27.92% of patients migrated from outside Gujarat- primarily from Rajasthan (15.88%) and Madhya Pradesh (9.22%) the intra-state burden was highest in the Ahmedabad district (19.43%). Significant geographic variance was observed, with registrations ranging from 7.00% in Sabarkantha to as low as 0.07% in the Dang district. **Conclusions:** This 19-year epidemiological analysis of cervical cancer cases at the GCRI reveals marked decline in hospital-based registrations since 2015. However, the persistent geographic inequities identified throughout the study period highlight critical need for targeted outreach and intensified screening in underserved regions. These longitudinal findings underscore the importance of strengthening preventive interventions to align with the World Health Organization's 2030 cervical cancer elimination targets.

Keywords: Cervical Cancer; Epidemiology; Geographic Distribution; India; Temporal Trends

Introduction:

Cervical cancer is a serious public health condition on an international scale, particularly in low- and middle-income nations where affordable preventive healthcare is not available. It was estimated that there

were 661,044 new cases of cervical cancer diagnosed in the world in 2022, and approximately 348,186 deaths due to the disease, making it the fourth most frequent cancer and the fourth most common cause of cancer death among women globally, according to the

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International Agency for Research on Cancer (IARC).^[1] An age-standardized incidence rate (ASIR) of 14.1 per 100,000 women and an age-standardized mortality rate (ASMR) of 7.1 per 100,000 women-years were reported.^[1]

In India, cervical cancer remains a significant public health problem. The country reported 123,907 new cases and 77,348 deaths in 2022 and accounted for nearly one-fifth of global incidence and nearly one-fourth of global mortality.^[1] It continues to be the second most prevalent cancer among Indian women, after breast cancer, with an ASIR of 18.0 and an ASMR of 11.4 per 100,000 females. The global Age-Standardized Incidence Rate (ASIR) was 18.11 per 100,000 population in 1990, showing a declining trend of 15% in incidence and 31% in mortality by 2021.^[2] although there has been a declining trend. Over recent decades, the global decline in cervical cancer prevalence and mortality has been attributed to the introduction of HPV vaccination, widespread screening initiatives, and increased awareness.^[1,3]

However, regional disparities persist, particularly in sub-Saharan Africa, Central America, and South-East Asia, including India, where screening coverage, vaccination rates, and access to treatment facilities remain uneven.^[1] Bruni et al.^[3] reported that, with state-led interventions in India, ASIR and ASMR declined by 21.3% and 32.3% respectively between 1990 and 2019.^[4] Yet, this decline has not been uniform across all Indian states, and the national trend remains far from achieving the Sustainable Development Goal (SDG) of reducing premature mortality from cancer by one-third by 2030.^[1,3]

The Gujarat Cancer & Research Institute (GCRI), located in Ahmedabad, has been functioning as a State Cancer Institute since its establishment in 1961. It is an apex cancer institute focused on providing evidence-based treatment, clinical research, and specialized education. As a tertiary referral facility, it manages complex cancer cases through a multidisciplinary approach and integrated patient care services and plays a pivotal role in India's healthcare system.^[5]

The study aims to analyses temporal trends and geographic variation in cervical cancer cases registered

at a State Cancer Institute in Western India from 2005 to 2023.

Methods:

Study Design and Setting: This descriptive cross-sectional study was conducted at The Gujarat Cancer & Research Institute (GCRI), Ahmedabad — It serves as a primary state cancer institute and is the designated center for oncological research in Gujarat. Established as a collaborative institution under the Government of Gujarat and the Gujarat Cancer Society, The GCRI serves as a tertiary care referral centre for oncology patients across the state and neighbouring regions. The institute provides comprehensive cancer care through its multidisciplinary departments, and maintains extensive, systematically archived patient records, facilitating robust long-term analyses of cancer incidence, trends, and geographic distribution.

Data Source: Data for this study were obtained from the hospital-based cancer registry and the electronic medical records system maintained by the GCRI. All cases of histopathology confirmed cervical cancer registered between January 2005 and December 2023 were identified and included for analysis.

Data Analysis: Data were compiled in Microsoft Excel and analyzed using descriptive statistical methods. Annual Percentage Change (APC) was calculated to quantify the relative increase or decrease in cervical cancer incidence trends over the study period (2005–2023). The APC was determined using the following formula: $APC = (V_{\text{current}} - V_{\text{previous}} / V_{\text{previous}}) * 100$. Where V_{current} represents the number of cases in a given year and V_{previous} represents the cases in the preceding year.^[6] Annual Percentage Change trends were plotted graphically to identify longitudinal patterns. Age-wise, district-wise, and state-wise distributions were tabulated and visualized. Figures and graphs were generated to illustrate these trends across the defined time intervals.

Ethical Considerations: This study utilized de-identified secondary data extracted from hospital records and was conducted in accordance with established ethical standards and the principles of the Declaration of Helsinki (2013). Patient confidentiality and data privacy were rigorously maintained throughout the study.

Approval for this study was obtained from the Institutional Review Committee (IRC) [IRC/2025/P-97 granted on September 24, 2025]. Patient Consent was exempted by the Institutional Review Committee (IRC) as this study utilized de-identified secondary data extracted from hospital records.

Results:

Temporal Trends and Case Frequency

Between 2005 and 2023, The Gujarat Cancer & Research Institute (GCRI) recorded 23,573 histologically confirmed cases of cervical cancer. The data revealed a non-linear temporal trend: annual registrations rose from 1,204 in 2005 to a peak of 1,446 in 2014. Subsequently, a notable decline was observed, reaching 614 cases in 2023. The Annual Percentage

Change (APC) indicated a downward trajectory of -4.94% per year over the last decade. A notable sharp decline occurred in 2020, where cases dropped to 724 - a 28.3% decrease from the 2019 baseline of 756.

The results present the temporal trends in annual incidence, along with demographic and geographic distributions analysed by age group, district, and state.

Age Metrics and Demographics:

The mean age at diagnosis was 49.4 years (SD ± 11.31), with cases spanning from 21 to over 60+ years. The 40–49 age group represented the highest vulnerability, accounting for 33.72% (n = 7,951) of cases, followed by the 50–59 cohort at 26.97% (n = 6,361). Nearly 16% of the total cases were identified in women under the age of 40.

Figure 1: Annual Percentage Change and Longitudinal Trends of Cervical Cancer cases registered at The GCRI (2005–2023)

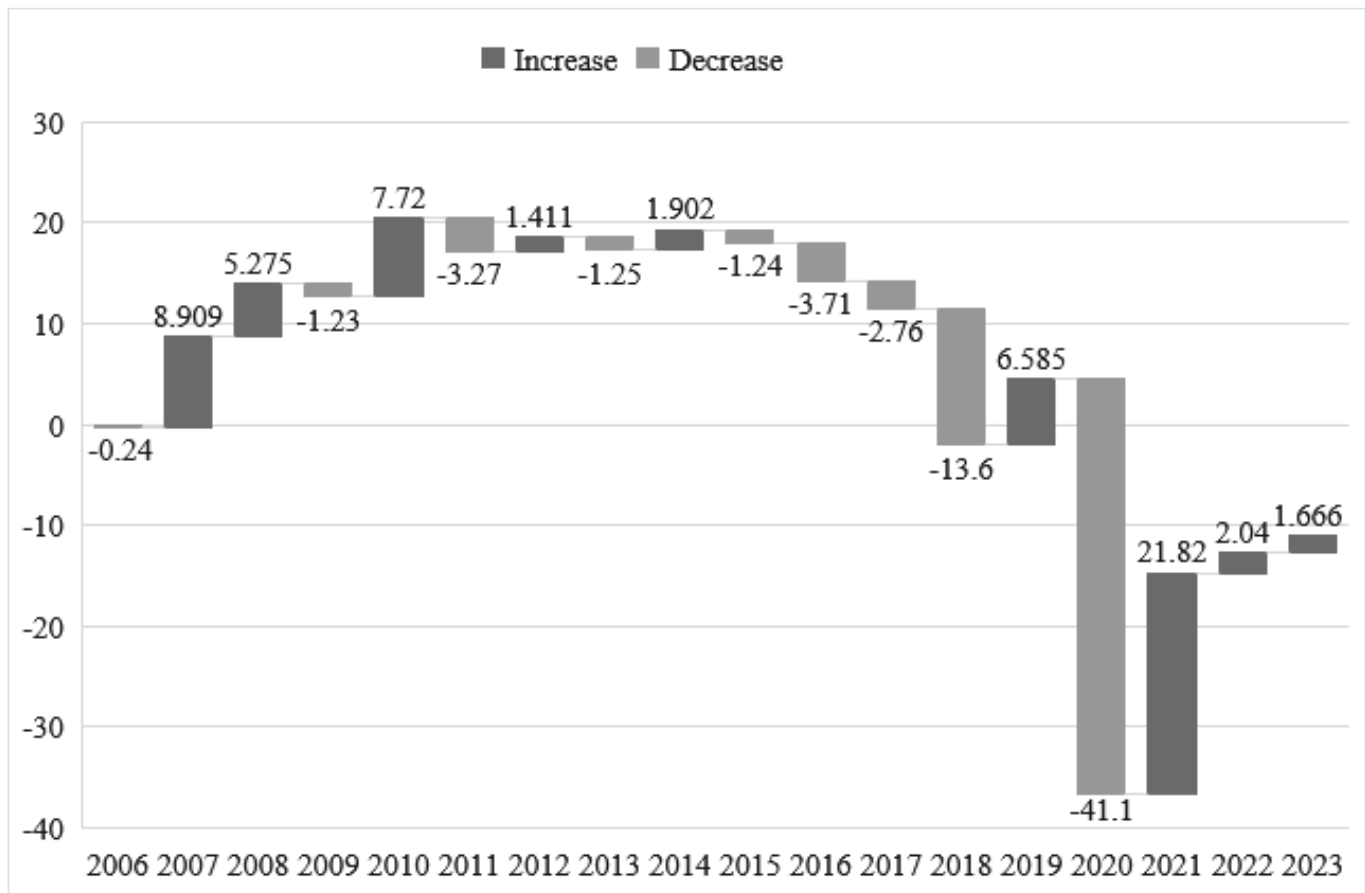
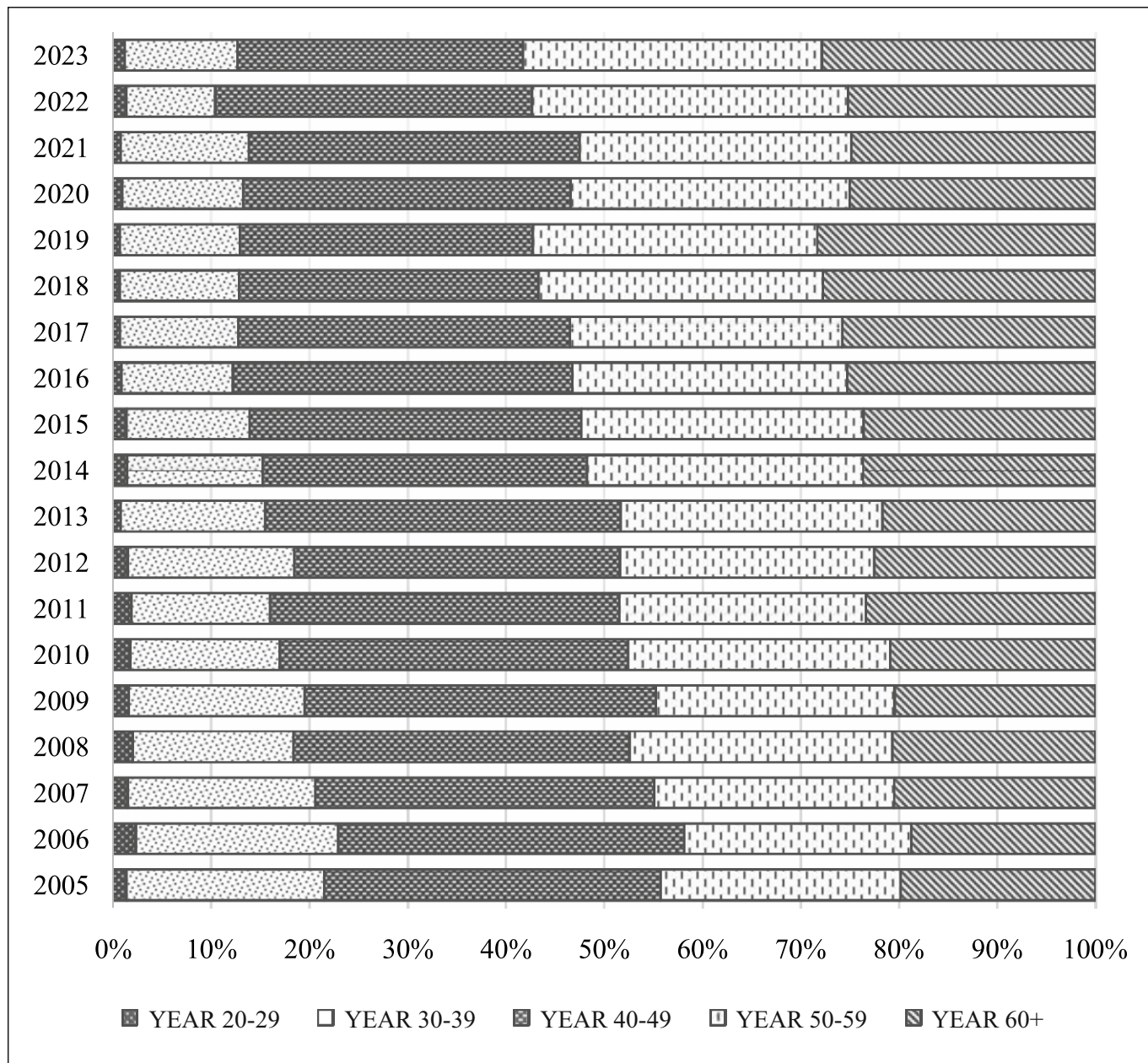


Figure 2: Proportional Age Distribution of Cervical Cancer Cases by Year (2005–2023) at The GCRI (2005–2023)



Geographic Distribution and Referral Patterns:

Inter-state Migration:

A significant proportion of the study population, totalling 6,580 cases (27.92%), originated from outside the state of Gujarat, underscoring the institute’s role as a primary tertiary referral center for Western and Central India. The highest inter-state contribution was observed from Rajasthan, which accounted for 3,746 cases (15.88%), followed by Madhya Pradesh with 2,176 cases (9.22%).

Beyond these primary contributing regions, a collective total of 658 cases (2.79%) were recorded from other Indian states. This merged cohort includes registrations from Uttar Pradesh (n=354; 1.50%), Maharashtra (n=125; 0.53%), and the remaining cases from various other states across the country.

Intra-state Migration:

Of the 15,944 total registered cases within Gujarat, the Ahmedabad district demonstrated the highest institutional burden, accounting for 19.43% (n = 4,277)

Figure 3: State-wise Distribution of Cervical Cancer Cases in India (2023)

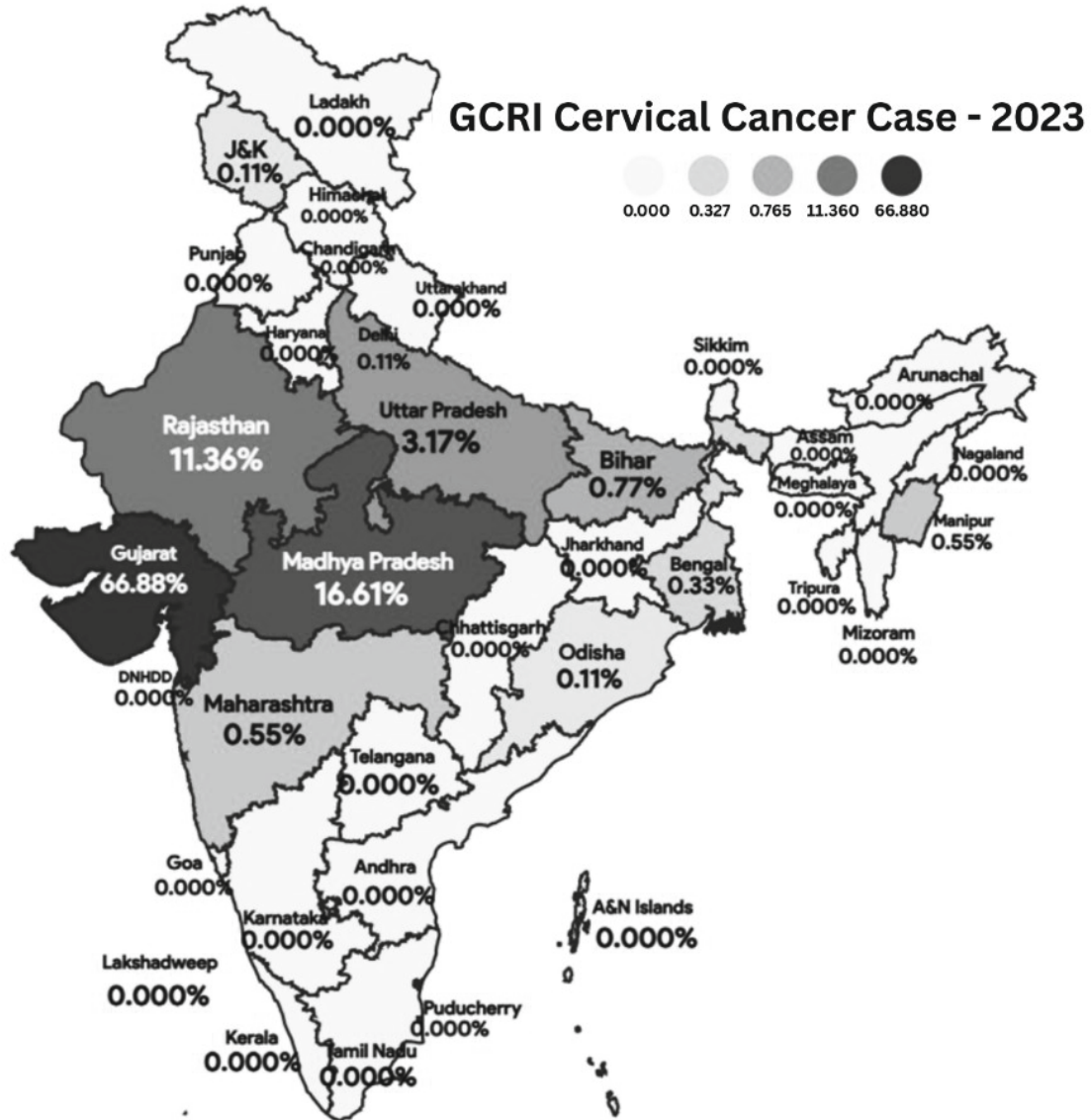


Figure 4: District-wise Distribution of Cervical Cancer Cases in Gujarat (2010 & 2015)

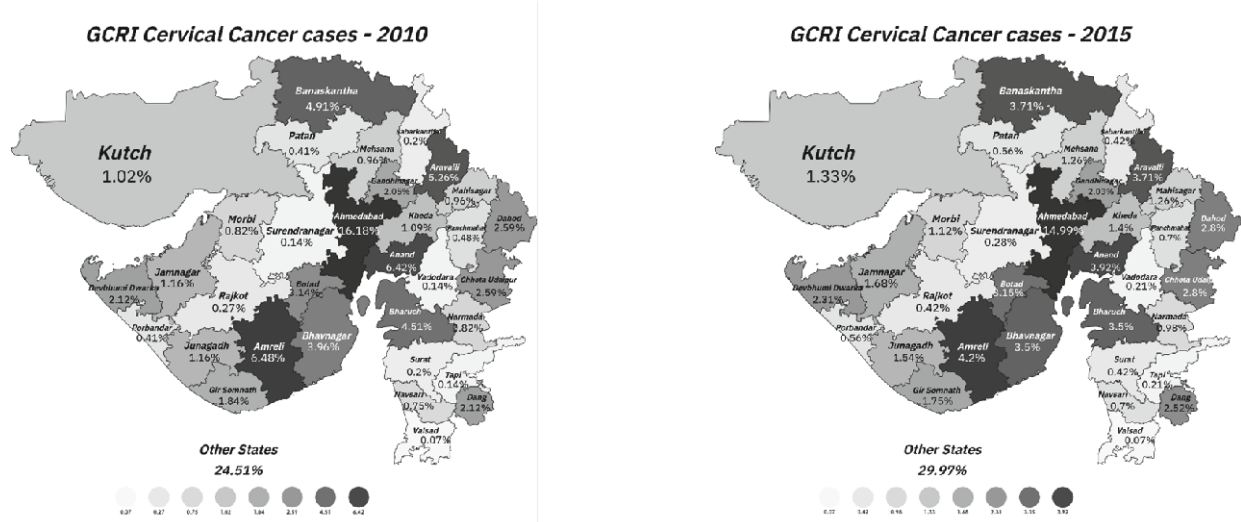
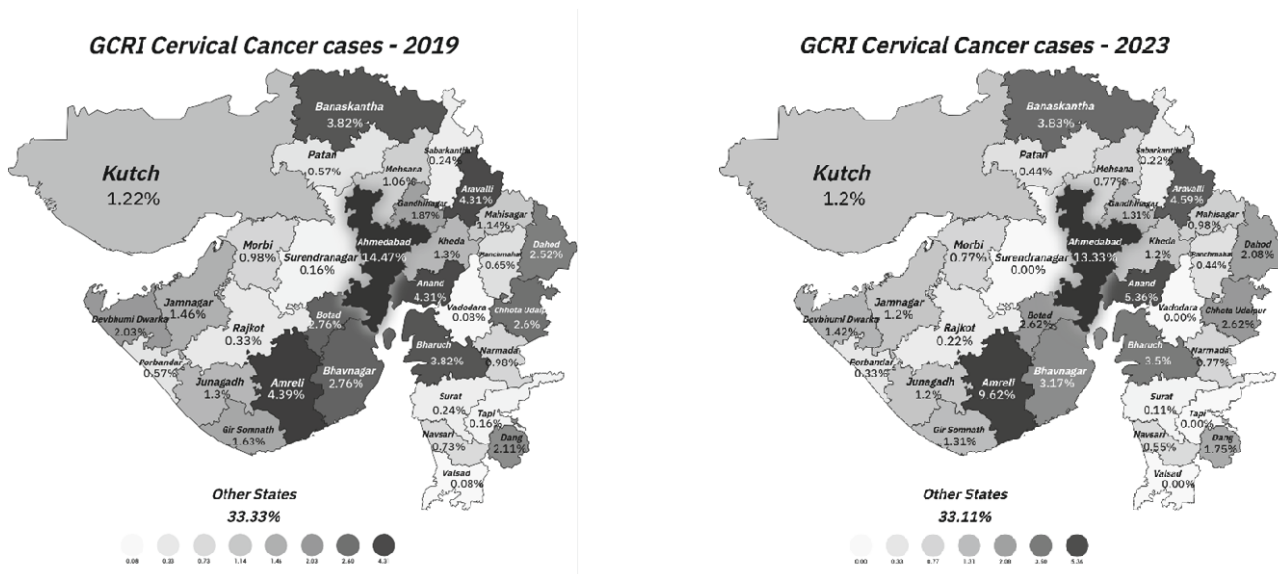


Figure 5: District-wise Distribution of Cervical Cancer Cases in Gujarat (2019 & 2023)



of the intra-state caseload. Other major contributors included Sabarkantha (7.00%), Panchmahal (6.33%), Kheda (6.04%), and Vadodara (5.44%). Substantial registrations were also recorded from Mehsana (4.92%), Dahod (4.69%), Gandhinagar (4.51%), Banaskantha (3.51%), and Anand (3.08%).

The remaining 23 districts—including Bhavnagar (2.48%), Junagadh (2.00%), and Surat (1.65%) among others—collectively accounted for 28.56% of the total registrations. This cohort includes the lowest reporting districts, specifically Tapi (0.10%; n = 21) and Dang (0.07%; n = 15), reflecting the geographic variance in patient presentation during the 2005–2023 study period.

Discussion:

This 19-year retrospective analysis of 23,573 histologically confirmed cervical cancer cases at the Gujarat Cancer & Research Institute (GCRI) provides a robust epidemiological portrait of the disease in Western India. Our primary finding reveals a non-linear temporal trend: a sharp increase in annual registrations from 1,204 cases in 2005 to a peak of 1,446 cases in 2014, followed by a significant stabilizing decline, reaching 614 cases in 2023.^[7,8] The Annual Percentage Change (APC) indicates a successful downward trajectory in the last decade (−4.94% per year), potentially reflecting the impact of decentralized screening and early intervention programs across the state.

Comparative Analysis and Temporal Evolution

The initial surge in cases observed between 2005 and 2014 is likely not an indicator of rising biological incidence, but rather an improvement in diagnostic reach and referral infrastructure within Gujarat.^[9] This trend mirrors findings in other Indian regions; for instance, hospital-based data from Chennai demonstrated that improved diagnostic methods and specialized infrastructure are critical drivers of registration volume.^[9] However, the subsequent decline toward 2023 aligns with global reports of reduced cervical cancer burdens in regions with maturing screening initiatives.^[8,10,11] Nationally, the National Cancer Registry Programme (NCRP) has noted a significant decrease in cervical cancer incidence rates across most Population-Based Cancer Registries (PBCRs), with the APC decreasing by −3.5% in Chennai, −3.0% in Delhi, −2.4% in Mumbai, and −1.9% in Bangalore.^[7]

Interestingly, while regions like Bihar have seen a sharp 27% decline in cervical cancer registrations between 2015 and 2016, our data shows a more gradual, sustained stabilization.^[12] A critical observation in our cohort is the significant decline in 2020 to 724 cases, representing a 28.3% drop from the 2019 baseline. This discordance with biological trends is a direct consequence of the COVID-19 pandemic’s disruption of elective oncology screenings and transport barriers - a

finding concordant with international literature on the “diagnostic deficit.”^[7,11] Globally, while absolute annual deaths increased by 52% between 1990 and 2019 due to population growth, the Age-Standardized Death Rate (ASDR) fell from 8.48 to 6.51 per 100,000.^[8]

Age Distribution and Peak Vulnerability

The demographic analysis shows a mean age at diagnosis of 49.4 years (SD ± 11.31), spanning 21 to 60+ years. This is strikingly consistent with data from North East India (median age 48) and Bihar (median age 50).^[12,13] The most affected cohort in our study is the 40–49 age group (33.72%), followed by the 50–59 group (26.97%).

Mechanistically, this peak in the 40s suggests a long-term persistence of high-risk HPV infection, typically acquired in the second or third decade of life; HPV types 16 and 18 account for approximately 70% of total cases worldwide.^[8,14] Notably, our findings contrast slightly with regions like Kerala and Mumbai, where the peak age group is often slightly older (52.6 years in Mumbai).^[10] The presence of nearly 16% of cases in women under 40, alongside a noted increase in the 30–39 years cohort, lends weight to the hypothesis that early socio-cultural factors—such as early marriage and high parity—remain significant drivers of early-onset carcinoma.^[12,15]

Geographic Reach and Regional Disparities

Our data highlights GCRI’s role as a critical regional hub, with 27.92% of the total caseload originating from outside Gujarat. This “referral footprint” is dominated by Rajasthan (15.88%) and Madhya Pradesh (9.22%). This pattern suggests that tertiary centers in Gujarat fill a critical void for oncology services in the neighboring central and northern belts of India.^[16] Within Gujarat, the caseload is heavily concentrated in Ahmedabad (18.13%), potentially indicating a “proximity bias,” whereas the significantly lower numbers in tribal districts like Dang (0.06%) likely indicate under-reporting or geographic barriers to care.

Socioeconomic and Educational Barriers

Severe disparities exist across educational lines. A hospital-based study in North East India found that

43.5% of cervical cancer patients were illiterate, demonstrating that poor health literacy is a significant barrier to early diagnosis.^[13] This is mirrored internationally in Brazil, where unknown tumor staging was 16% higher in public health system patients compared to those with private insurance.^[11] Global data further supports this, showing that High Socio-Demographic Index (SDI) areas have significantly lower incidence rates (6.83 per 100,000) compared to low SDI areas (31.5 per 100,000).^[8]

Limitations:

This hospital-based study may not fully reflect the true population burden of cervical cancer in Gujarat, as referral patterns and access to care can influence case registration. District-level disparities may also be affected by underdiagnosis and limited screening coverage in rural and tribal areas. Additionally, disruptions during the COVID-19 pandemic likely contributed to the sharp decline in cases in 2020–2021. Finally, changes in diagnostic and reporting practices over the years may have impacted temporal trends. Despite these limitations, the study provides important long-term insights into cervical cancer epidemiology in Western India.

Conclusion:

This 19-year analysis demonstrates a clear decline in cervical cancer cases registered at GCRI, particularly after 2015, indicating the positive impact of strengthened screening efforts and the introduction of HPV vaccination in Gujarat. The shift toward younger age groups and earlier-stage diagnoses further highlights improvements in awareness and access to care. However, persistent geographic disparities—especially in rural and tribal districts—underscore the need to enhance equitable screening coverage and outreach services. Strengthening primary-level preventive strategies, expanding HPV vaccination, and improving referral pathways will be essential to sustain progress and align with the WHO’s 2030 cervical cancer elimination targets. Continued monitoring and research are crucial to address gaps and ensure that reductions in disease burden are achieved across all population groups.

Recommendation:

Based on the study findings, targeted interventions are required in districts with consistently low case reporting, particularly rural and tribal regions, to address probable underdiagnosis and limited access to screening. Continued reinforcement of HPV vaccination and screening efforts is essential to maintain the decline observed after 2015. Strengthening referral pathways from high-burden districts such as Ahmedabad, Surat, Rajkot, and Vadodara can further enhance timely diagnosis. Ongoing monitoring of geographic and age-specific trends should be prioritized to guide focused public health strategies.

Declaration

Funding: Nil

Conflict of Interest: Nil

Use of Artificial Intelligence: LLM were used only for improving grammar, language clarity, and formatting of the manuscript. All scientific content, data analysis, interpretations, and conclusions were conceptualized, validated, and approved by the authors.

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Prevalence and Determinants of Workplace Violence Against Resident Doctors: A Cross-Sectional Study in a Tertiary Care Teaching Hospital, Gujarat, India

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Abstract:

Introduction: Workplace violence (WPV) against health sector personnel has become an alarming phenomenon worldwide. The largest online survey conducted by the Indian Medical Association in the year 2017 noted that violence against doctors can be a dominant stressor among doctors. **Objectives:** To estimate the prevalence and describe various determinants of workplace violence against resident doctors. **Methods:** A cross-sectional study was conducted from April to October 2023 at tertiary care teaching hospital, Surendranagar, Gujarat which was selected by convenient sampling. Resident doctors (N = 189) from all the departments who were willing to participate were interviewed personally using a pre-designed, pre-tested, semi-structured questionnaire. The Descriptive and Inferential statistics were used. **Results:** The prevalence of WPV among resident doctors during the past 12 months was 41.26%. Most incidents were psychological in nature (75.64%), primarily perpetrated by patients' relatives (62.82%), and occurred predominantly in emergency departments (55.13%). Out of all victims of WPV, only 34.62% had reported to authority. The common reasons for WPV found were lack of adequate security personnel (56.61%), prolonged duty hours and excessive workload (55.56%), and unrealistic expectations by the patient/relatives (55.03%). Most participants believed that sufficient security personnel (61.38%) and strengthening of existing law (58.20%) could prevent WPV. The study found a highly statistically significant association between the resident doctor's branch and WPV. **Conclusions:** Nearly half of the resident doctors experienced WPV, mainly due to inadequate security, excessive workload, and unrealistic patient/relatives' expectations. However, only one-third reported the incidents, highlighting the need for effective redressal mechanisms.


Keywords: Cross-Sectional Studies, Gujarat, Physical violence, Psychological violence, Tertiary care teaching hospital, Workplace violence

Introduction:

Workplace violence (WPV) has become an alarming phenomenon worldwide. Workers in the health profession are especially vulnerable to WPV. According to WHO, WPV is defined as “Incidents where staff are abused, threatened or assaulted in circumstances related to their work, including commuting to and from work, involving an explicit or implicit challenge to their safety,

well-being or health.”^[1] Up to 38% of healthcare workers experience physical violence during their careers. Additionally, in disaster or conflict settings, they may be specifically targeted in acts of collective or politically motivated violence.^[2]

The Indian Medical Association (IMA) conducted the largest online survey in 2017, which found that 80% of doctors in the country are stressed out in their

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profession, and violence against doctors is one of the major contributors to this stress. The study reported that the prevalence of fear of violence among doctors was 46.3%.^[3]

Over the past decade, WPV against healthcare workers in India has been a persistent, systemic, and expanding issue. However, violence has increased even more since the COVID-19 pandemic, making India one of the unsafe nations for medical professionals. The number of assaults against healthcare workers in India has increased dramatically from 49 in 2017 to 155 in 2020, according to data from the Safeguarding Health in Conflict Coalition.^[4] Existing literature also indicates that first-line physicians or training residents experience the highest rates of WPV.^[5] According to Indian studies, the prevalence of WPV ranged from 40.8% to 78%.^[5-8]

The central and state governments are making ongoing attempts to address this issue. However, WPV continues to get worse.^[9] Although research has been done in several Indian states, Gujarat has so far produced relatively few works of literature. Therefore, we have conducted the study to estimate the prevalence and describe various determinants of WPV against resident doctors.

Methods:

A Cross-sectional study was conducted among resident doctors of a tertiary care teaching hospital in Surendranagar Gujarat, which was selected by a convenient sampling technique. All resident doctors (N = 211) currently working during the study period from April to October 2023 were included in the study by complete enumeration method (census method). The resident doctors who were not willing to participate in the study were excluded. Every study participant was informed about the purpose and entire process of the study in the local language (Gujarati), and their written consent was taken.

Data collection was done by Personal interview using a pre-designed, pre-tested, semi-structured questionnaire (WPV in the Health Sector by WHO) with appropriate modifications.^[10] In-depth interviews of victims who have not reported WPV are conducted to

find out to revealed underlying reasons. Content Validity Index (CVI) was used to assess the content validity of the questionnaire through a non-face-to-face approach. An online content validation form was sent to eight experts with clear instructions to facilitate the content validation process. The CVI for our questionnaire items was 0.94, indicating high content validity (minimum acceptable limit of 0.78).

The study Questionnaire contains sociodemographic details and determinants of WPV, such as type, frequency, place, perpetrators, reporting, precursor reasons, and perceived preventive measures.

Data were entered in Microsoft Excel version 2021. The Descriptive (Mean, SD, Percentage, etc.) and Inferential (Chi-Square test, Fisher exact test) statistics were analysed using the Statistical Package for Social Sciences (SPSS) version 26. Prior approval was taken from the Institutional Ethics Committee before the study was initiated.

Result:

In the present study, out of 211 resident doctors at tertiary care teaching hospital in Surendranagar, 189 participated. The mean age of study participants was 26.82 ± 1.67 years. Among them, 107 (56.61%) were male and 82 (43.38%) were female.

Figure 1 depicts that out of the total, 78 (41.26%) of study participants have experienced the WPV in the past one year. The psychological WPV was experienced by 59 (75.64%) of victims, while 2 (2.56%) were physically abused, and 17 (21.79%) had experienced both types of WPV. (Figure 1)

Figure 1: Prevalence of WPV against resident doctors in the past one year (N = 189) & Type of WPV (N = 78)

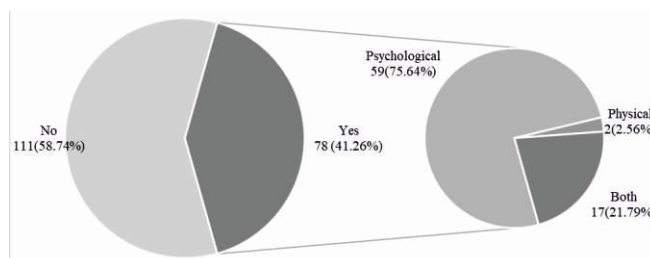


Table 1 : Association of socio-demographic characteristics with WPV. (N = 189)

Variable	WPV		Total, n (%)	χ^2 (p-value)
	Yes (78), n (%)	No (100), n (%)		
Gender				
Female	30 (38.46)	52 (46.85)	82 (43.39)	1.31 (0.252)
Male	48 (61.54)	59 (53.15)	107 (56.61)	
Branch				
Basic Sciences	6 (7.69)	38 (34.23)	44 (23.28)	18.41 (0.0001)
Medicine & Allied	42 (53.84)	46 (41.44)	88 (46.58)	
Surgery & Allied	30 (38.46)	27 (24.32)	57 (30.16)	
Designation				
1 st year resident doctor	19 (24.36)	37 (33.33)	56 (29.63)	4.93 (0.176)
2 nd year resident doctor	30 (38.46)	29 (26.12)	59 (31.22)	
3 rd year resident doctor	19 (24.36)	35 (31.53)	54 (28.57)	
Senior resident doctor	10 (12.82)	10 (9.01)	20 (10.58)	

Table 2 : Characteristics of Workplace violence (N=78)

Variable	n (%)
Frequency in the Last Year	
1	2 (2.56)
2	14 (17.95)
3	8 (10.26)
4	6 (7.69)
≥5	48 (61.54)
Place of WPV*	
Emergency Department	43 (55.13)
Ward	32 (41.03)
ICU	22 (28.21)
OPD	20 (25.64)
Department	17 (21.79)
Resident Rooms	16 (20.51)
College	5 (6.41)
OT	5 (6.41)
Laboratory	2 (2.56)
Time of WPV	
Day Hours	27 (34.62)
Night Hours	27 (34.62)
Both	24 (30.77)
Type of Perpetrator*	
Relatives of the Patient	49 (62.82)
Senior	45 (57.69)
Patients Themselves	18 (23.08)
Other Hospital Staff	14 (17.95)
General Population	9 (11.54)
Colleagues	7 (8.97)
Juniors	2 (2.56)

*Multiple responses were collected

Figure 2: Name of reporting authority for workplace violence (N= 27)

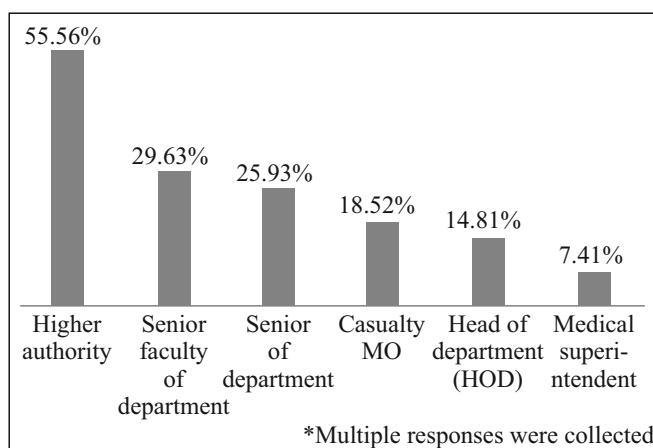


Figure 3: Reasons for not reporting the Workplace violence (N = 51)

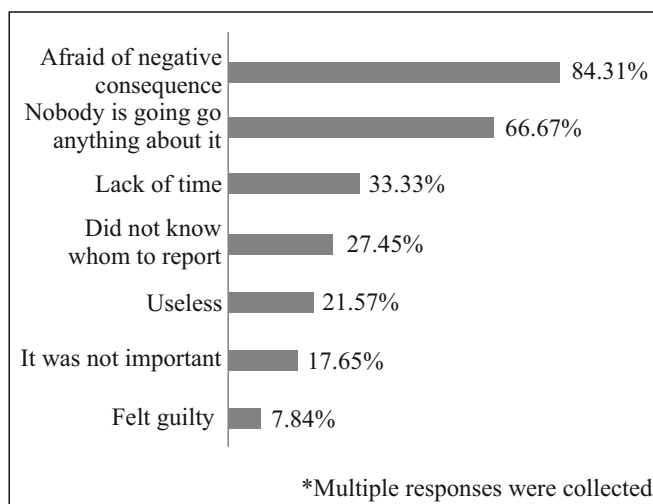


Table 2 : Precursors for Workplace violence. (N = 189)

Precursors*	n (%)
Lack of adequate security personnel	107 (56.61)
Prolonged duty hours and excessive workload	105 (55.56)
Unrealistic expectations by patients/relatives	104 (55.03)
Deficient implementation of legislation/laws	65 (34.39)
Patient overload	55 (29.10)
Perpetrator under the influence of alcohol	54 (28.57)
Psychological issues in patients/relatives	49 (25.93)
Longer waiting periods	41 (21.69)
Delay in treatment initiation	37 (19.58)
Poor communication by doctors	36 (19.05)
Other (e.g., senior's ego, facility issues)	33 (17.46)

*Multiple responses were collected

Table 3 : Perceived preventive measures for Workplace violence (N = 189)

Preventive Measure*	n (%)
An adequate number of security personnel	116 (61.38)
Strengthening of existing law	110 (58.20)
Protocol for reporting WPV and further action	88 (46.56)
Restricting the number of visitors and visiting hours	73 (38.62)
An adequate number of medical professionals	69 (36.51)
Proper management of patients	62 (32.80)
Availability of a counsellor	61 (32.28)
Improving infrastructure	56 (29.63)
Other (e.g., anti-ragging committee, fixed duty hours)	10 (5.29)

*Multiple responses were collected

Out of total study participants 44 (23.28%) was working in basic sciences, while 88 (46.58%) in Medicine & allied, and 57 (30.16%) in Surgery & allied branches. As for their current level of training, 56 (29.63%) were first-year residents, 59 (31.22%) were in their second year, 54 (28.57%) were in their third year, and 20 (10.58%) were senior residents. (Table 1).

Table 1 shows the association of sociodemographic characteristics with WPV, in which the branch of the resident doctor was found highly statistically significant association with WPV, while the gender and year of residency (designation) did not show a statistical association.

The present study found that 48 (61.54%) victims have faced ≥ 5 WPV in the past one year, followed by 14 (17.95%) victims who have faced twice in the past one year. Around 43 (55.13%) of victims had faced WPV at the emergency department, followed by 32 (41.03%) in wards. The perpetrators of WPV were Relatives of patients in 49 (62.82%), followed by Seniors in 45 (57.69%), and Patients themselves in 18 (23.08%). (Table 2)

In present study, only 27 (34.62%) victims had reported the WPV. Out of them 15 (55.56%) was reported to the Higher authority of the institute, followed by 8 (29.63%) to the senior faculty of the department. In-

depth interviews of victims who have not reported WPV (51) revealed that 43 (84.31%) of them are Afraid of negative consequences, and 34 (66.67%) believe that nobody is going to do anything about it. (Figure 2,3)

Out of total study participants 107 (56.61%) were mentioned Lack of adequate security personnel as precursor reason for WPV while 105 (55.56%) were answered Prolonged duty hours and excessive workload also Unrealistic expectation by the patient/relatives was mentioned by 104 (55.03%) study participants. (Table 3)

Adequate number of security personnel, strengthening of existing law, and developing a protocol for reporting WPV and for further action were the suggested preventive measures for WPV by 116 (61.38%), 110 (58.20%), and 88 (46.56%) of study participants, respectively. (Table 4)

Discussion:

Workplace violence is an increasingly recognized occupational hazard among healthcare professionals globally, particularly for resident doctors. The present study found that 41.26% of resident doctors reported experiencing WPV. This finding aligns with a study by Anand et al.^[7] in Delhi, which reports a prevalence of 40.8%. Several study across India finds the prevalence slightly higher than our study, like 55.6% in Sharma et al.^[6], 69.5% in Singh et al.^[8], 54.6% in Grover et al.^[5] and 78.26% Ori et al.^[11]

Regarding associated factors, although designation did not show a statistically significant association, a significant correlation was observed between the branch of specialization and WPV ($p < 0.001$), with medicine and allied branches being more affected. This is consistent with the findings by Singh et al.^[8], who reported higher WPV rates among frontline departments such as emergency medicine. Similarly, Grover et al.^[5] found that younger, less experienced doctors were more vulnerable to violence, which parallels the trend observed in our data, though not statistically significant.

The most common type of violence reported in this study was psychological or verbal abuse (75.64%), while physical violence was less frequently encountered. This is consistent with studies conducted in the emergency department (ED) of Morocco reported verbal violence in 77% of cases^[12], Anand et al.^[7] (75.4%), Kumar et al.^[13] (67%) and Gadapati et al.^[14] (41.6%).

The majority of victims of WPV were from Medicine and allied branches (53.84%) in our study, which coincides with the study result of Grover et al.^[5] (68.3%) and Kumar et al.^[15] (51.4).

Present study also identified the emergency department (55.13%) as the most common location for WPV. Similar findings were observed in the multicentric study in Uttar Pradesh by Singh et al.^[8]. Relatives of patients (62.82%) were the most common perpetrators of WPV in this study. This is in agreement with studies by Grover et al.^[5] (51.7%) and Anand et al.^[7] (53.6%).

In the present study, only 34.62% of victims had reported the WPV; out of these, 55.56% were reported to the Higher authority of the institute. 65.38% of victims had not reported the WPV, and the major reason behind this was being Afraid of negative consequences (84.31%) and believing that nobody was going to do anything about it (66.67%). Which was in contrast with the study by Grover et al.^[5], which found that 38.9% did not report incidents, primarily due to lack of time (52.0%), and due to the belief that reporting was useless (52.0%), and thought that reporting would be a hassle (41.3%).

In terms of precipitating factors, present study findings show that lack of adequate security personnel (56.61%), prolonged duty hours and excessive workload (55.56%), and unrealistic expectations of patients and relatives (55.03%) were the most cited reasons. These results echo those reported by Sharma et al.^[6] in Gujarat and Anand et al.^[7]. In Delhi, both highlighted overburdened systems and unmet patient expectations as key triggers for violence.

Adequate number of security personnel, strengthening of existing law, and developing a protocol for reporting WPV and for further action were the suggested preventive measures for WPV by 61.38%, 58.20%, and 46.56% of study participants, respectively, in the present study. This was aligned with the result of the study by Singh et al.^[8] which shows more hospital staff (56.3%), better management of the system (50.8%), security and law (48.1%), and more medicine supply (31.1%) can prevent the WPV.

Conclusion:

This study highlights that WPV is a significant concern among resident doctors working in a tertiary care teaching hospital in Gujarat, with a prevalence of 41.26%. The majority of incidents were psychological or verbal, and most frequently occurred in the emergency department. Patients relatives were identified as the primary perpetrators. Despite the concerning frequency of such events, only one-third of the affected doctors reported the incidents, indicating substantial under-reporting, likely due to fear of negative consequences and lack of effective institutional redressal mechanisms. Contributing factors included inadequate security, excessive workload, and unrealistic expectations from patients or their relatives. Although there was no significant association between WPV and gender or designation, residents working in medicine and allied branches were more frequently affected.

Recommendations:

Based on the findings, Lack of adequate security personnel and Prolonged duty hours and excessive workload are major reasons for WPV. So, strengthening laws, Adequate number of medical professional and enforcing hospital policies for mandatory incident reporting and healthcare worker protection is essential. Adequate security personnel should be deployed in high-risk areas like emergency departments and wards. Optimizing duty hours are also necessary.

Finally, future studies should include other stakeholders such as nurses, laboratory staff, and administrative personnel to develop a more comprehensive understanding of WPV in healthcare settings.

Limitations:

Being a single-centre study conducted by convenient sampling in one tertiary care hospital, the results may not be generalizable to other institutions or regions. The cross-sectional study prevents the establishment of causal relationships. Additionally, recall bias or under-reporting, particularly problematic in the case of verbal or minor incidents. Study includes the resident doctors perspective which is lack in patient and relative side perspective and study also not included other stakeholder such as nurses, laboratory staff, and administrative personnel.

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Challenges Faced by Community Health Officers in Delivering Comprehensive Primary Health Care at Ayushman Arogya Mandir in a Rural Area of West Bengal: A Cross-Sectional Study

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Abstract:


Community Health Officers (CHOs), play pivotal role in delivering Comprehensive Primary Health Care (CPHC) at Ayushman Arogya Mandir (AAM) are facing several workplace challenges which may hinder their effective functioning and influence service delivery outcomes. **Objectives:** 1. To find-out challenges faced by CHOs delivering CPHC 2. to assess primary stressor and key areas of improvement of services as reported by them. **Method:** Cross-sectional study was conducted among 152 CHOs working at sub-centre level AAMs of Howrah Sadar subdivision, West Bengal by complete enumeration method. Data were collected by pretested, semi-structured self-administered questionnaire. Descriptive statistics were used and for analytical part Chi-square test and logistic-regression performed. **Results:** Among the study participants, 39.5% had residence >10km from workplace, 61.2% reported non-availability of water at working place, 38.2% reported poor sanitation, 44.7% reported net connectivity problem and 30.3% reported scarcity of essential medicines at their AAMs. Around 84% felt that improvement in infrastructure, 72% perceived increased manpower would lead to improvement of services. Primary stressor was reported to be related to health care service delivery by 71%. Primary stressor significantly associated with age group ($p < 0.0001$), education ($p = 0.003$) and residential distance ($p = 0.02$) and age group was significant predictor ($p = 0.002$) of primary stressor. **Conclusion:** Inadequate infrastructures and lack of logistic supports were major challenges faced by CHOs on delivering health services. Increasing manpower and infrastructure development was to be helpful for improving healthcare services according to CHOs. Work related stress of CHOs was significantly associated with age, healthcare service delivery, educational qualification, and distance from their residence.

Keywords: Ayushman Arogya Mandir, Community Health Officer, Job Challenges, Primary Health Care, Rural Health

Introduction:

Community Health Officers (CHOs), also known as Mid-Level Health Providers (MLHPs), are non-physician healthcare providers trained to deliver a wide

range of essential primary healthcare services at the community level. They are expected to lead the primary care team at Sub-Centre Ayushman Arogya Mandir, provide clinical management and basic ambulatory care,

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ensure continuity of care, and act as an important coordination link between the community and the health system.^[1] By strengthening frontline health services, CHOs play a crucial role in improving access, quality, and coverage of primary healthcare, particularly in rural and underserved settings.

The Government of India launched the Ayushman Bharat programme in February 2018 as a flagship initiative to strengthen primary healthcare delivery across the country. A key component of this initiative is the establishment of Ayushman Arogya Mandir by transforming existing Sub-Health Centres and Primary Health Centres to provide Comprehensive Primary Health Care closer to the community, with the guiding principle that “time to care” should not exceed 30 minutes.^[2] These centres aim to expand the scope of services beyond maternal and child health and communicable disease control to include prevention, screening, and management of non-communicable diseases, mental health services, ophthalmology, ENT, oral health, geriatric and palliative care, trauma care, along with health promotion and wellness activities.^[3]

To operationalise this expanded service delivery model, CHOs have been positioned at Ayushman Arogya Mandir and provided induction and refresher training to deliver both public health and selected clinical services.^[4] National assessments of Ayushman Arogya Mandir have demonstrated that the deployment of CHOs has strengthened service availability and readiness at the primary care level, thereby improving access to comprehensive health services.^[5] However, studies have also highlighted that the effectiveness of CHOs is closely linked to the availability of adequate infrastructure, logistics, and workforce support at the facility level.^[6]

Understanding the nature of these challenges is therefore essential for strengthening the primary healthcare system and achieving universal health coverage goals. Although several studies have examined the functioning of Ayushman Arogya Mandir in different states of India, evidence from rural areas of West Bengal remains limited. Hence, the present study was conducted with objectives to find-out the challenges faced by Community Health Officers working at rural Ayushman

Arogya Mandirs in delivering Comprehensive health care & to assess the primary stressor and the key areas of improvement of services as reported by them.

Methods:

A cross-sectional observational study was conducted among Community Health Officers working at Sub Centre level Ayushman Arogya Mandir in five blocks namely BallyJagacha, Domjur, Panchla, Sankrail, and Jagatballavpur under Howrah Sadar Subdivision of West Bengal from 1st August 2025 to 30th September 2025 by complete enumeration method. Howrah Sadar Subdivision comprised 5 blocks and among 5 blocks Bally Jagacha & Domjur are the Rural Field Practice areas of Calcutta National Medical College. Conveniently Howrah Sadar Sub Division was selected.

Out of 160 CHOs 152 gave informed consent for participation as study subjects and after getting ethical permission from Institutional Ethics Committee & permission from appropriate authorities, data were collected by pretested semi-structured self-administered questionnaires containing socio-demographic profile, availability of health facility resources and medical equipment, logistic support, training, self-reported of job satisfaction, work related stressor & areas of improvement, maintaining anonymity and confidentiality of the study participants. The questionnaire was pretested among a small group of CHOs working outside the study area, and necessary modifications were undertaken to improve clarity and relevance before final data collection. Data compilation and analysis were done by IBM SPSS version 23. For descriptive statistics presented by appropriate tables & graphs and inferential statistics ie association between socio-demographic profiles and self-reported primary stressor assessed by chi square test and also logistic regression carried out for which socio-demographic factors are significant influencers taking consideration p value <0.05 as statistically significant.

Ethical approval was obtained from Institutional Ethics Committee of Calcutta National Medical College-EC-CNMC/2025/642 dated 12.07.2025.

Operational definitions

Community Health Officer (CHO): Community Health Officers, also known as Mid-Level Health Providers, are non-physician healthcare providers trained to deliver a wide range of essential primary healthcare services and are responsible for leading the primary care team at Sub-Centre Ayushman Arogya Mandir.^[7]

Ayushman Arogya Mandir Ayushman Arogya Mandir are upgraded Sub-Health Centres or Primary Health Centres established under the Ayushman Bharat programme to provide Comprehensive Primary Health Care, including promotive, preventive, curative, rehabilitative, and palliative services.^[8]

Primary Stressor-Predominant factors which CHOs were felt making hindrance or overburdened in day to day comprehensive health care delivery services provided by them at Ayushman Arogya Mandir. Here factors are healthcare delivery related i.e., infrastructure inadequacy, shortage or deficiency of logistic support, overburden of workload, mobility support and administrative related stress are time bound target demands, non-availability of services related benefits specially leave & support from higher authority in crisis period.

Results:

A total of 152 Community Health Officers (CHOs) working at Ayushman Arogya Mandir were included in the study.

Majority of the CHOs (59.9%) belonged to the 20-35 years age group, while 40.1% were aged between 35-50 years. Females constituted 88.2% of the study population. About professional experience, most of the participants (88.2%) had 1-3 years of experience as CHOs. (Table 1)

Considering total health service delivery experience, 62.5% had 1-3 years of experience, followed by 21.1% with ≥ 7 years of experience. In terms of educational qualification, 69.7% of CHOs were

GNM-qualified, whereas 30.3% had completed B.Sc. Nursing. Majority of the participants (60.5%) resided within 10 km of their workplace. (Table 1)

The availability of logistic support at Ayushman Arogya Mandir is illustrated in Table 2. Continuous availability of water supply was found to be not available in many centres (61.2%). Internet connectivity (44.7%) and sanitation facilities (38.2%) were also reported to be inconsistent. Electricity supply (35.6%) and signage facilities (44.7%) were also not uniformly available across all centres. Laptops, essential medicines and medical instruments showed variable availability, indicating major challenges faced by CHOs in delivering Comprehensive Healthcare services. (Table 2).

Majority of CHOs (71%) reported that their primary stressor was due to healthcare delivery related while others (21%) said primary stressors was Administrative type.(Figure 1).

Table 1: Study participants according to their sociodemographic profile (N= 152)

Sociodemographic variables	Category	Frequency (%)
Age group (years)	20-35	91 (59.9)
	35-50	61 (40.1)
Gender	Male	18 (11.8)
	Female	134 (88.2)
Educational qualification	GNM	106 (69.7)
	B.Sc. Nursing	46 (30.3)
Years of experience as CHO	1-3	134 (88.2)
	4-6	18 (11.8)
	≥7	32 (21.1)
Total healthcare experience (years)	1-3	95 (62.5)
	4-6	25 (16.4)
	≥7	32 (21.1)
Distance from residence to workplace (km)	<10	92 (60.5)
	≥10	60 (39.5)

Table 2 : Availability of Logistic support with CHO at Ayushman Arogya Mandir (N=152)

Logistic support	Availability of Logistics support			
	Always Frequency (%)	Most of the time Frequency (%)	Rarely Frequency (%)	Never Frequency (%)
Medical Equipment	90 (59.2)	39 (25.7)	22 (14.5)	1 (0.6)
Essential Medicine	51 (33.6)	55 (36.3)	46 (30.1)	-
Net Connectivity	68 (44.7)	16 (10.5)	31 (20.4)	37 (24.4)
Laptop	98 (64.5)	13 (8.6)	1 (0.6)	20 (26.3)
Sanitation	64 (42.1)	30 (19.7)	27 (17.8)	31 (20.4)
Signage facility	84 (55.3)	-	23 (15.1)	45 (29.6)
Electric supply	61 (40.1)	37 (24.3)	27 (17.8)	27 (17.8)
Water supply	50 (32.9)	3 (2)	6 (3.9)	93 (61.2)

Figure 1: Primary stressor as reported by study participants (N=152)

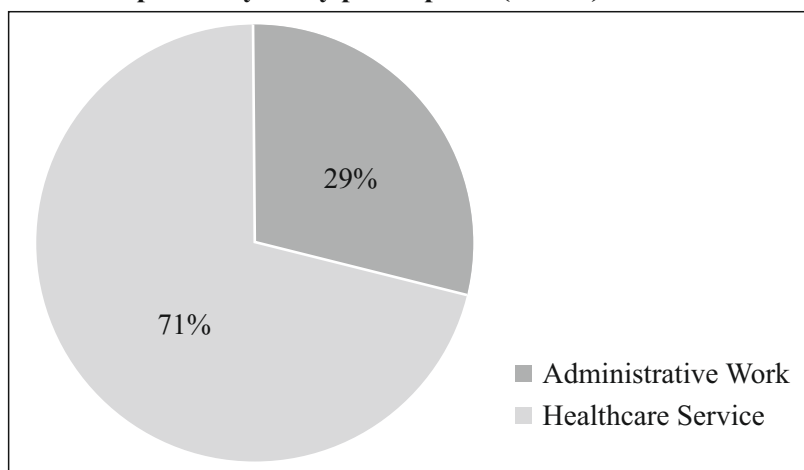


Table 3: Association between socio-demographic variables and primary stressor among Community Health Officers (N = 152)

Sociodemographic variable	Primary stressor		χ^2 value	p value
	Administrative work n (%)	Healthcare service n (%)		
Age group (Years)				
20-35	13 (14.3)	78 (85.7)	21.95	<0.001
35-50	31 (37.7)	30 (62.3)		
Educational qualification				
B.Sc. Nursing	21 (45.6)	25 (54.4)	8.95	0.003
GNM	23 (21.7)	83 (78.3)		
Distance from residence to workplace (Km)				
<10	33 (35.9)	59 (64.1)	5.43	0.02
≥10	11 (18.3)	49 (81.7)		
Gender				
Male	2 (11.1)	16 (88.9)	3.16	0.076
Female	42 (31.3)	92 (68.7)		
Years of experience as CHO (Years)				
1-3	37 (27.6)	97 (72.4)	0.98	0.322
4-6	7 (38.9)	11 (61.1)		

The association between selected socio-demographic variables and the primary stressor among CHOs was presented in Table 3. A statistically significant association was observed between age group and primary stressor, with younger CHOs reporting higher healthcare service related stress ($p < 0.001$).

Educational qualification also showed a statistically significant association ($p = 0.003$), with GNM-qualified CHOs reporting higher levels of healthcare service related stress compared to B.Sc. Nursing graduates. Distance from residence to workplace was significantly associated ($p=0.03$) with stressor type, with CHOs residing within 10 km more frequently reporting healthcare service related stress. Gender and years of experience as a CHO did not show a statistically significant association with primary stressor. (Table 3)

Logistic regression showed younger age is significant ($p=0.0019$) predictor of work related stress in relation to older age group. (Table 4)

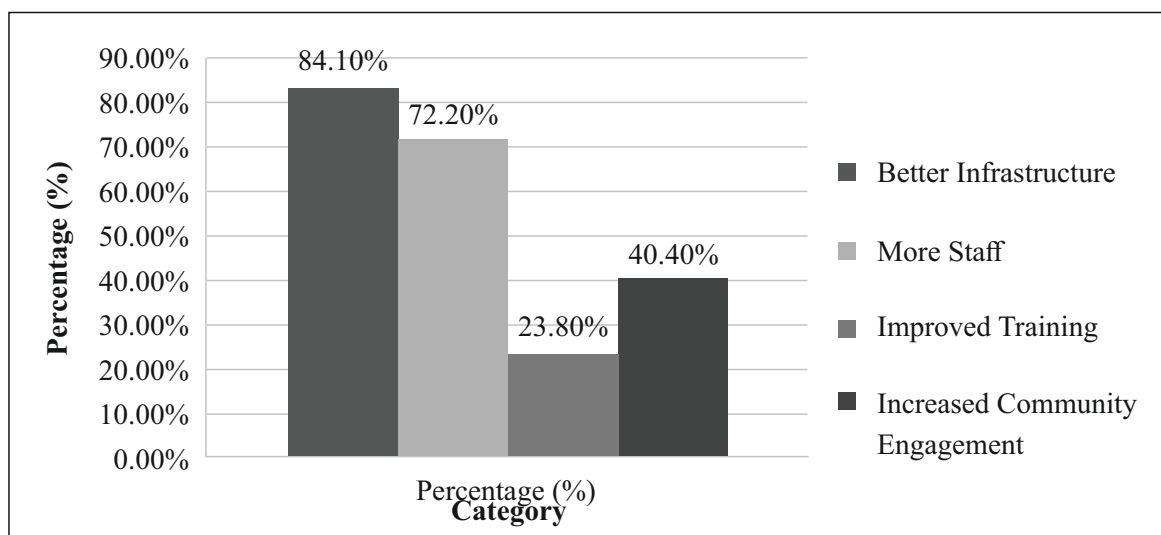
The availability of medical equipment at Ayushman Arogya Mandir was assessed. Most centres had routine examination instruments such as digital thermometers, blood pressure monitors, stethoscopes, weighing machines, height measurement scales and glucometers. However, diagnostic tools such as pulse oximeters (15.1%), hemoglobinometers (15.1%) and urine analysis strips (33.6%) were less consistently available, highlighting deficiencies in diagnostic capacity at the primary care level.

The study participants reported areas of requiring improvement at Ayushman Arogya Mandir are shown in Figure 2. Most of the CHOs (84.1%) felt that better infrastructure was the most important area requiring improvement. This was followed by the need for more staff, as reported by 72.2% of the participants. Further, 40.4% of CHOs emphasized the need for increased community engagement, while 23.8% felt that improved training was necessary for better service delivery at Ayushman Arogya Mandir.

Table 4: Logistic regression of primary stressor among Community Health Officers with sociodemographic variables (N = 152)

Sociodemographic profile	p value	AOR(95% CI)
Age (Ref 20-35 yrs)	0.0019	11.337 (2.700 - 58.860)
Gender (Ref. Male)	0.213	0.225 (0.055 - 2.238)
Education (Ref.- Bsc Nursing)	0.057	0.327 (0.112 - 1.016)
Distance of workplace from residence (Ref. ≤ 10 km)	0.619	0.901 (0.321 - 2.066)

Figure 2 : Key areas of improvement as reported by study subjects (N-152)*



*multiple response.

Discussion:

In the present study, 88.2% of CHOs are female, and the majority (59.9%) fall within the 20-35 age group. These findings align closely with Thakuria et al^[9], who studied CHOs in Sonitpur, Assam, reporting that 85% of their respondents were female and 70% were aged between 20 and 30 years and same demographic profile is consistent with findings from Sahoo S. et al^[10], who similarly reported a predominantly female CHO workforce in eastern India, with most participants below 40 years of age.

In the present study the major challenges were deficiencies in basic infrastructure particularly uninterrupted water supply, adequate sanitation facilities, and reliable internet connectivity were identified as major operational challenges at Ayushman Arogya Mandir. Comparable observations were reported by Verma R. et al^[11], who noted that although electricity availability was generally satisfactory, inconsistencies in water supply and internet services.

With respect to medical equipment, routine examination instruments were largely available across Ayushman Arogya Mandirs; however, in the present study it was found several centres lacked essential diagnostic tools such as pulse oximeters, hemoglobinometers, and urine analysis strips and this might be the significant limitation to provide the services the centres made for. Similar findings were documented by Singh A. et al.^[12], who reported adequate availability of basic instruments but insufficient diagnostic capacity at primary healthcare facilities.

In the current study it was found that the CHOs felt strengthening of infrastructure and recruitment of adequate staff as the most critical areas requiring improvement for expected level of comprehensive health care delivery. This finding aligns with the study by Nair K.R. et al.^[13], which identified shortages of human resources and poor infrastructure.

From the current study it was found that age emerged as a significant independent determinant of healthcare service related primary stress. Multivariate logistic regression analysis demonstrated that younger CHOs had significantly affected by service-related stress

compared to their older counterparts ($p = 0.0019$). This strong association underscores age as a key predictor of occupational stress among CHOs. This may be due to limited professional experience, higher performance expectations, and challenges in adapting to multifaceted service delivery roles. Similar observations were reported by Rao S. et al^[14], who found that younger healthcare workers experienced higher work-related stress.

Furthermore, CHOs with a General Nursing and Midwifery qualification reported higher levels of healthcare service related stress than those with a B.Sc. Nursing qualification possibly due to differences in training exposure, clinical preparedness, and confidence in handling expanded responsibilities. This finding is consistent with Patil A. et al^[15], who reported greater stress among nursing personnel with lower professional qualifications.

Distance between residence and workplace was also significantly associated with stress in the present study, with CHOs residing closer to their workplace reporting higher stress levels. This contrasts with findings by Kumar M. et al^[16], who reported increased stress among healthcare workers with longer commuting distances. The discrepancy may be explained by contextual factors such as increased service expectations, greater community accessibility, and reduced work life boundaries for CHOs residing closer to the served population.

In contrast, gender and duration of service as a CHO did not show a significant association with occupational stress. Similar findings were reported by Dutta S. et al^[17], who observed no significant relationship between gender, years of experience, and stress among frontline health workers.

Limitations of the study:

The present study was conducted in a limited geographic area covering selected blocks of Howrah Sadar subdivision and hence the findings may not be generalized to all Community Health Officers across the state or country. The study relied on self-reported responses, which may be subject to reporting and social desirability bias. Additionally, the cross-sectional nature

of the study limits the ability to establish causal relationships between workplace factors and perceived stressors. The statistical outcomes could have been precise if sample was size large.

Conclusion:

It can be concluded from the present study that CHOs felt that inadequate infrastructure, lack of uninterrupted water supply and internet connectivity, and non-availability of essential medical equipment were major challenges in comprehensive health care delivery at Ayushman Arogya Mandir. Work related stress of CHOs was significantly associated with age, educational qualification, and distance from their residence.

CHOs perceived that health care delivery services might be at par by infrastructure improvement adequate manpower recruitment with regular basis reorientation training. Addressing these challenges is critical for strengthening primary healthcare delivery and ensuring the successful implementation of the Ayushman Bharat Health and Wellness Centre initiative.

Recommendations:

Based on the findings of the study it is recommended at least basic infrastructure ie water supply, sanitation facility, net connectivity should be available in all Ayushman Arogya Mandirs for smooth running the services. Ensuring continuous availability of essential medical equipment and diagnostic tools should be prioritized to improve quality of care. Supportive supervision, regular induction and refresher training programmes should be conducted to enhance clinical and

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Declaration

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Use of AI: Nil

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Impact of Caesarean Delivery on Early Initiation of Breastfeeding in Health Facilities in India: A Secondary Data Analysis Using NFHS-5 Data

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Abstract:

Introduction: Early initiation of breastfeeding (EIBF) is crucial for neonatal survival and wellbeing. Caesarean section (C-section) is known to delay EIBF due to reduced opportunity for mother-infant contact. **Objective:** To assess the association between C-section and Early initiation of breastfeeding (EIBF) in institutional deliveries in India. **Methods:** Secondary data analysis of NFHS-5 data (2019–21) was conducted. Statistical analysis was performed using R programming version 4.5.2. The exposure variable studied was type of delivery (Caesarean or Vaginal), main outcome was Early Initiation of Breastfeeding. **Results:** Early Initiation of Breastfeeding (EIBF) was observed in 47% of 127,969 institutional births and was found to be lower following C-section (aOR 0.51, 95% CI: 0.48–0.54). Maternal education, birth weight, ANC visits, and urban residence positively correlated with EIBF. **Conclusion:** C-section was significantly associated with delay in Early Initiation of Breastfeeding. Active support and targeted intervention for mother-baby dyad could potentially increase EIBF rates.

Keywords: Breastfeeding, Caesarean, Initiation, Maternal, NFHS.

Introduction:


Breastfeeding has many health benefits for both the mother and infant. Breast milk contains all the nutrients that infants need in the first six months of life. Breastfeeding protects against diarrhoea and common childhood illnesses such as pneumonia and may also have longer-term health benefits.^[1] It is recommended that breastfeeding should be initiated within first one hour after delivery.^[1]

Caesarean or C-section rates in India have been rising, with reported overall prevalence of 21% at national level, which is higher than the World Health Organization recommended level of 15%.^[2] As per evidence from 58 low-to-middle income countries, Women who had caesarean deliveries were more likely to have delayed initiation of breastfeeding.^[3]

Caesarean births are known to delay Early Initiation of Breastfeeding (EIBF) due to various reasons which include, anaesthesia, pain, separation, hormonal disturbance etc.^[3–5] Primary studies in India have reported lower Early initiation of breastfeeding rates after Caesarean delivery.^[3–5] NFHS-5 (2019–21) provides nationally representative data to assess early initiation of breastfeeding and its determinants across the country. This study explores the NFHS-5 dataset to assess rates of early initiation of breastfeeding at All-India level and its association with mode of delivery, in particular, Caesarean delivery.

Methods:

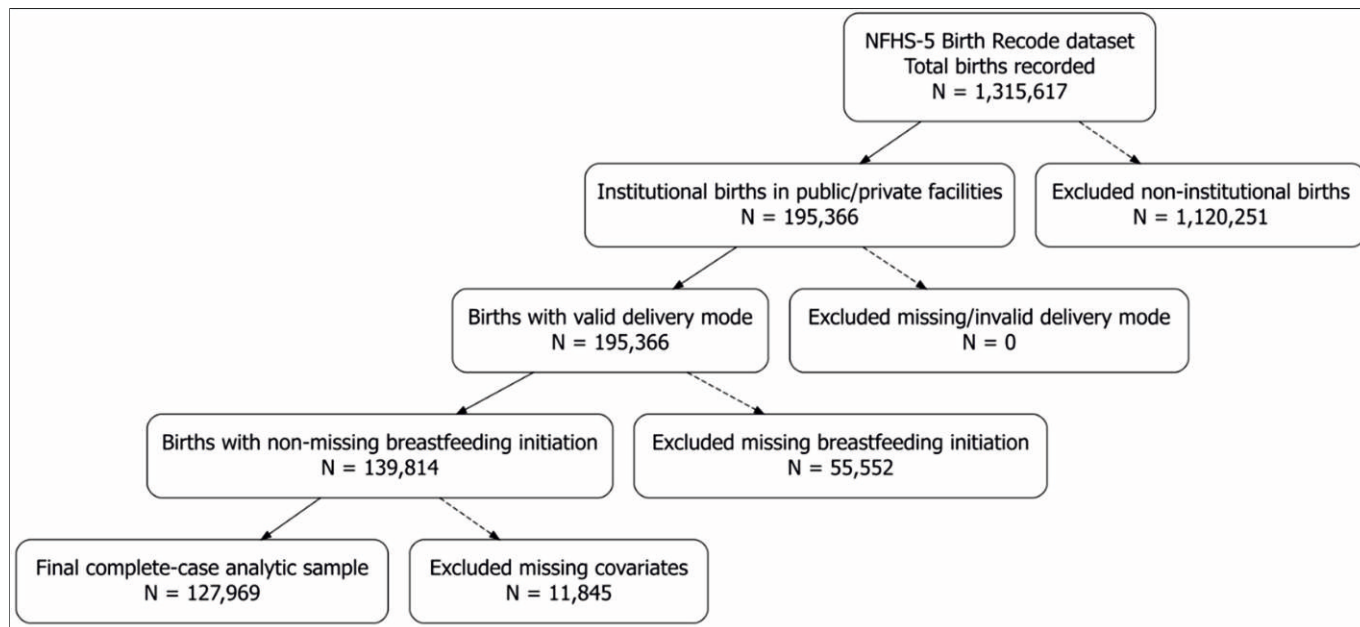
A secondary data analysis was conducted using the NFHS-5 (2019–21) birth recode dataset. Women aged 15–49 years with institutional births in the preceding two

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Figure 1: Flow diagram for the final sample selection for the analysis

years were included in the analysis. The outcome measure studied was early initiation of breastfeeding (EIBF) within the first hour post-delivery.

The primary exposure studied was mode of delivery (Caesarean or Vaginal). The other covariates studied were Maternal age, education, parity, ANC visits, birthweight, wealth index, residence and facility type. The dataset was obtained from International Institute of Population Sciences, Mumbai.

Observations with values missing in either the outcome variable, exposure variable and covariates which were included in the regression analysis were excluded using a complete-case approach. Special codes used in the NFHS dataset to denote missing or implausible values were then recoded as missing prior to analysis. The final sample consisted of 127,969 institutional births with complete information on all variables included in the study. (Figure 1)

Statistical analysis was performed in using R programming version 4.5.2.^[6] All analyses were conducted using appropriate sampling weights to account for the complex survey design of NFHS-5, including clustering, stratification, and unequal probability of selection. Rao-Scott corrected chi-square, design-based Kruskal–Wallis test, and survey-weighted

multivariable logistic regression analysis were conducted. A survey-weighted multivariable logistic regression in the form: General Linear Model (early initiation of breastfeeding ~ c-section + facility type + c-section*facility type + covariates, family = binomial) was used to adjust for confounders and calculate adjusted Odds Ratios. Adjusted Odds Ratios (aORs) with 95% confidence intervals were calculated. Effect modification was assessed by including an interaction term between mode of delivery and facility type in the survey-weighted multivariable logistic regression model. As NFHS is an anonymized and publicly available dataset, the study was exempted from review by Institutional Ethics Committee (GMCIEC/2025/360).

Results:

Data for a total of 1,27,969 women aged 15-49 years who had a live birth in the preceding two years and had complete data for all the variables under study was analysed. Out of the 1,27,969 live births, 101529 (79.3%) were vaginal births, while 26440 (20.6%) delivered through C-section. Women who delivered through C-section had higher education, were in the higher wealth index quintile, had higher Antenatal (ANC) visits, and were more likely to be from urban areas. (Table 1)

Table 1: Characteristics of Institutional Births by Mode of Delivery (NFHS-5)

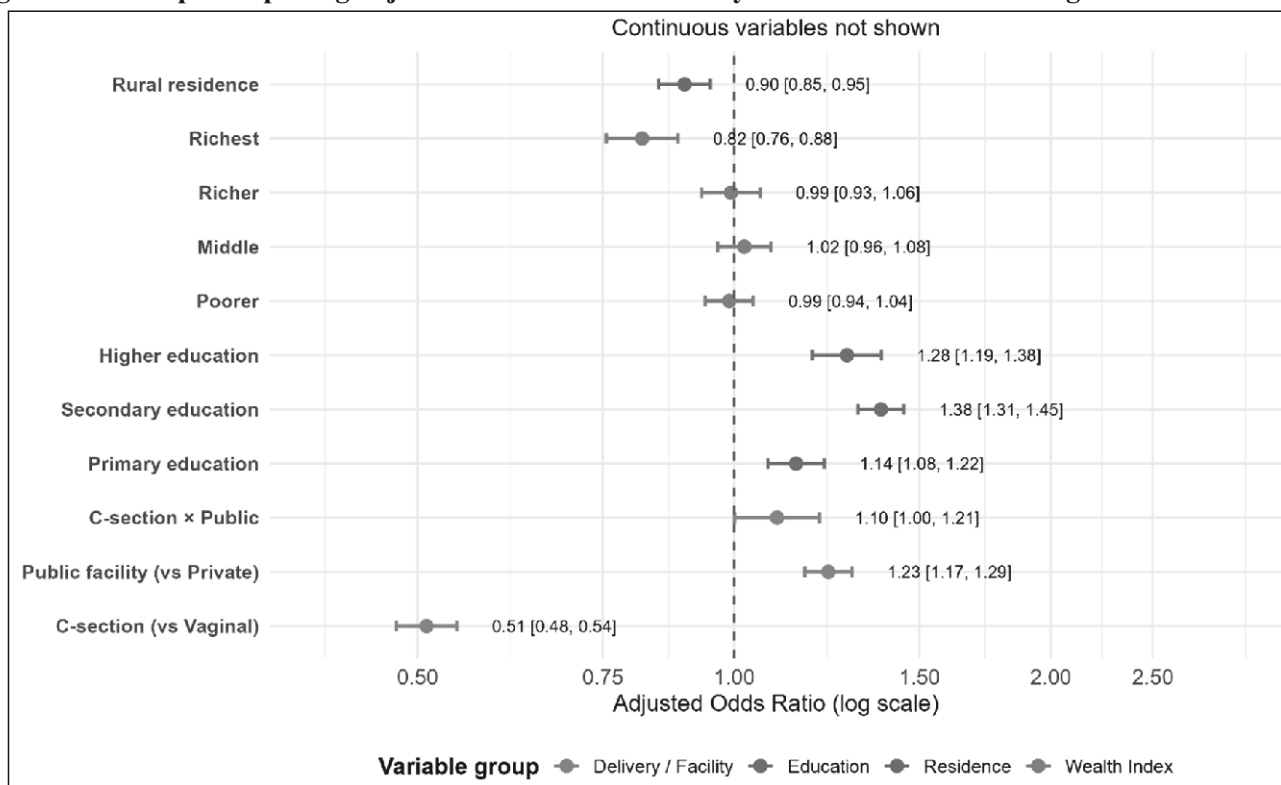
Characteristic	Vaginal N = 101,529*	C-Section N = 26,440*	p-value [#]
Early initiation of breastfeeding	49,213 (50%)	11,479 (36%)	<0.001
Mother's age (years)	26.4 (4.9)	27.0 (4.8)	<0.001
Education level			<0.001
No education	22,547 (23%)	2,985 (9.3%)	
Primary	13,176 (13%)	2,784 (8.7%)	
Secondary	51,260 (52%)	18,228 (57%)	
Higher	11,449 (12%)	8,151 (25%)	
Wealth index			<0.001
Poorest	19,210 (20%)	1,842 (5.7%)	
Poorer	21,743 (22%)	3,798 (12%)	
Middle	21,252 (22%)	6,903 (21%)	
Richer	19,777 (20%)	9,191 (29%)	
Richest	16,449 (17%)	10,414 (32%)	
Place of residence			<0.001
Urban	29,276 (30%)	15,103 (47%)	
Rural	69,156 (70%)	17,045 (53%)	
ANC visits	5.1 (4.9)	6.9 (5.3)	<0.001
Parity	2.16 (1.27)	1.69 (0.84)	<0.001
Facility type			<0.001
Private	25,687 (26%)	20,552 (64%)	
Public	72,745 (74%)	11,595 (36%)	

*n (%); Mean (SD), #Pearson's χ^2 : Rao & Scott adjustment; Design-based Kruskal Wallis test

Table 2: Adjusted Odds Ratios for Early Initiation of Breastfeeding

Characteristic	aOR	95% CI	p-value
Mode of delivery			
Vaginal	—	—	
C-Section	0.51	0.48, 0.54	<0.001
Facility type			
Private	—	—	
Public	1.23	1.17, 1.29	<0.001
Education level			
No education	—	—	
Primary	1.14	1.08, 1.22	<0.001
Secondary	1.38	1.31, 1.45	<0.001
Higher	1.28	1.19, 1.38	<0.001
Wealth index			
Poorest	—	—	
Poorer	0.99	0.94, 1.04	0.7
Middle	1.02	0.96, 1.08	0.5
Richer	0.99	0.93, 1.06	0.8
Richest	0.82	0.76, 0.88	<0.001
Place of residence			
Urban	—	—	
Rural	0.90	0.85, 0.95	<0.001
Mode of delivery * Facility type (interaction)			
C-Section * Public Facility	1.10	1.00, 1.21	0.048

Abbreviations: CI = Confidence Interval, aOR = Adjusted Odds Ratio

Figure 2: Forest plot depicting adjusted Odds Ratios for Early initiation of Breastfeeding

Early Initiation of Breastfeeding (EIBF) was observed in 47% of 127,969 institutional births. The proportion of Early Initiation of Breastfeeding (EIBF) was lower in the Caesarean group (36%) compared to the Vaginal delivery group (50%). This difference was statistically significant ($p < 0.001$). Other factors which were significantly associated with early initiation of breastfeeding were, mothers age, mothers' education, wealth index, place of residence, number of Antenatal visits, parity and facility type. (Table 1)

Table 2 describes the adjusted Odds Ratios (aORs) obtained through multivariable logistic regression. Although we included the continuous variables like age, parity, birth weight and ANC visits in the model, we have not depicted them in the table as their interpretation is difficult. Women who had a C-section delivery were 0.51 times less likely to initiate early breastfeeding compared to vaginal delivery. Early Initiation of Breastfeeding was 1.23 times more likely in public health facility, 0.82 times less likely in richest wealth index quintile. Statistically significant interaction was observed between mode of delivery and facility type (aOR 1.10; 95% CI 1.00–1.21; $p = 0.048$), this indicates that the

negative association between caesarean delivery and early initiation of breastfeeding was slightly weaker in public facilities than in private facilities.

The effect of the primary exposure (C-section delivery) and other covariates on early initiation of breastfeeding is depicted in a forest plot (figure 2). C-section, richest wealth index quintile, and rural residence appear to the left of the null value line (OR=1) indicating that these factors are negatively associated with early initiation of breastfeeding.

Discussion:

The present secondary data analysis of a nationally representative large NFHS dataset confirms the negative association of C-section with early initiation of breastfeeding in India. This is consistent with several primary studies in recent literature.^[3-5,7] Reasons for delayed EIBF have been described in literature to include, anaesthesia, pain, separation, hormonal disturbance etc.^[3-5] Public facility births showed higher rates of early breastfeeding. This probably indicates that national programme guidelines which promote early breastfeeding initiation are probably being followed more meticulously in public sector than in private sector.

Promotion of breast milk substitutes etc. is more likely to occur in private facility than in a public facility.

Maternal education, and higher number of ANC visits were strong positive predictors of EIBF this has been corroborated by contemporary studies from Gujarat and Odisha, which show similar trends.^[4,5] This association is plausible. Both higher maternal education and more ANC visits should naturally translate to higher awareness of importance of EIBF. Higher socioeconomic status was linked to both higher C-section rates as well as delayed EIBF and is documented by other studies in India.^[4,5] Generally higher education which leads to higher health awareness should have led to higher rate of EIBF, however in our study and other studies in India higher socioeconomic status was associated with lower rate of EIBF. This finding may be related to higher number of Caesarean births in private facilities, where guidelines for EIBF may not be followed meticulously. Higher socioeconomic status may also increase access to breast milk substitutes which may promote delayed EIBF. The study of effect moderation indicated that effect of C-section in delaying EIBF was weaker in public than in private facility. This again can be possibly attributed to better adherence to guidelines in public sector and possible promotion of milk substitutes etc. in private facilities.

Alternatively, some studies have reported a dramatic improvement in EIBF rates through quality improvement interventions post C-section delivery.^[8,9] This indicates that focused and targeted intervention post C-section could lead to better EIBF rates.

Limitation:

This study is based on secondary data analysis and is thus limited by quality, completeness and consistency of data.

Conclusions:

Caesarean section deliveries appear to significantly reduce the odds of early breastfeeding initiation in Indian institutional setting. Underlying factors like decreased mother-baby contact, pain, post-operative complications etc. could possibly be playing an underlying role. The underlying or indirect factors for this association need to be further studied and addressed to develop interventions to increase early initiation of breastfeeding rates.

Recommendation:

Active support and targeted intervention for mother-baby dyad, post C-section could potentially increase EIBF rates. Key maternal factors identified in the study should be considered for developing these targeted interventions.

Declaration

Funding: Nil

Conflict of Interest: Nil

Use of AI: Quillbot software was used for grammar check only. Github copilot is integrated with R studio and R programming which assisted in code writing and debugging.

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Corrigendum

Article titled "Assessment of Empathy among Health Professional Students in a Government Medical College in South India" published in Volume 15, Issue 3 (doi: 10.51957/Healthline_647_2024)

The authors wish to report a post-publication correction concerning the use of a copyrighted instrument in the above-mentioned article.

At the time of study conduct and manuscript submission, the Jefferson Scale of Empathy (JSE) was used without obtaining prior permission from the copyright holder. This constitutes a breach of copyright requirements. The responsibility for this oversight rests solely with the authors.

Following identification of this issue after publication, the authors contacted the copyright holder. Upon review, the copyright holder confirmed that the instrument had been used without modification and that the scoring procedures applied were appropriate.

To correct the scholarly record and ensure transparency, the following statement is hereby added to the article:

"The Jefferson Scale of Empathy (JSE) was used in this study without obtaining prior permission from the copyright holder. This represents a breach of copyright requirements. The authors subsequently contacted the copyright holder, who confirmed that the instrument had been used without modification and scored appropriately."

The authors regret this non-compliance and apologize to the copyright holder, the journal, and its readership. This corrigendum is issued in accordance with ethical publishing standards to maintain the integrity of the scholarly record.

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