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Health and Population: Perspectives and Issues



आरोग्यम् सुखसम्पदा

राष्ट्रीय स्वास्थ्य एवं परिवार कल्याण संस्थान

स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार के अंतर्गत एक स्वायत्तशासी निकाय

The National Institute of Health and Family Welfare

An autonomous organization, under the Ministry of Health and Family Welfare, Government of India

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The Editor, Health and Population: Perspectives and Issues

The National Institute of Health and Family Welfare,

Baba Gangnath Marg, Munirka, New Delhi-110067, INDIA

E. mail: editor@nihfw.org

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Ms. Shashi Dhiman

Mr. Puranmal Meena

Technical Support

Ms. Anju Bala

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राष्ट्रीय स्वास्थ्य एवं परिवार कल्याण संस्थान
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बाबा गंगनाथ मार्ग, मुनीरका, नई दिल्ली-110067
Baba Gangnath Marg, Munirka, New Delhi – 110067

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Editorial

Plagiarism and the Practices to Avoid It
Sathuluri Ramchandra Rao*

Plagiarism is one of the important issues that educational institutions and academia are facing. This is not just for the fact that it is basically stealing someone else's work, but also because the practice is so prevalent in higher education by the faculty, researchers, doctoral students, and undergraduate students. Due to the lack of education on plagiarism among the educational institutions and unawareness on the seriousness of plagiarism, it is still in practice. Plagiarism is a gnawing issue in India's academia for years and even top academicians have fallen prey to it¹⁻³.

The word "Plagiarism" is derived from the Latin word "*plagiare*", which means to "kidnap" or "abduct". The use of the word "plagiarism" in the English language dates back to the 1600s⁴. The plagiarism has been defined in Section 2(l) of UGC Regulations 2018, "means the practice of taking someone else's work or idea and passing them as one's own"⁵. The World Association of Medical Editors (WAME) defines plagiarism as "... the use of others' published and unpublished ideas or words (or other intellectual property) without attribution or permission, and presenting them as new and original rather than derived from an existing source. This applies whether the ideas or words are taken from abstracts, research grant applications, Institutional Review Board applications, unpublished or published manuscripts in any publication format (print or electronic)"⁶.

Plagiarism can be of intentional or unintentional. Intentional plagiarism is an offence, committed deliberately, usually with awareness, using some other works partly or completely without giving adequate credit to the original authors⁷⁻⁹. Unintentional plagiarism is plagiarism that occurs when a writer fails to follow proper scholarly procedures for citation without an explicit intent to cheat⁷⁻¹⁰. Examples include the failure to cite a source, improper citation, quote an author's exact words, even if documented. We all have come across some of the most common types of plagiarism witnessed in medical and non-medical publications.

Plagiarism of ideas is reflected when the author "uses the ideas or thoughts of some others and presents as his own"^{5, 11} without giving adequate credit to the original authors. It is difficult to detect¹², but once detected, it is as serious an offence.

Plagiarism of text is also known as "word-for-word" plagiarism. This kind of plagiarism defined as "... copying a portion of text from another source without giving credit to its author and without enclosing the borrowed text in quotation marks"¹³.

The third form of plagiarism is mosaic plagiarism as "... borrowing the ideas and opinions from an original source and a few verbatim words or phrases without

*Reader, Department of Reproductive Biomedicine, NIHF, Mumirka, New Delhi

crediting the original author. In this case, the plagiarist intertwines his or her own ideas and opinions with those of the original author, creating a confused, plagiarized mass.” This is the more common form of plagiarism. For example, when the authors borrow words/sentences from the original source and do patchwork to his articles results in the patch or mosaic plagiarism¹⁴.

“Stealing or borrowing some amount of work” from his or her previously published articles refers to self-plagiarism^{5, 7, 10, 12, 13}. The example of using one’s own work partly and publishing the article in different Journals is self-plagiarism. The important key here is disclosure and transparency in doing so. As long as one lets the editors and the readers know that the work had been published elsewhere and provides the editors and the end readers know that the work had been published elsewhere and provides proper citation for them to be able to judge which portions have been reused in the new article or chapter, he is being transparent and this could be considered fair play. So, the question that often comes to mind is how much overlapping is allowed.

A member of WAME’s Ethics Committee says “with respect to the issue of how much overlap is too much...a rule of thumb that some editors have applied when considering the amount of overlap between two review articles (not book chapters) has been overlapping more than one-third of the material”¹⁵.

Plagiarism is a stain upon the legitimacy of education and research. In the Indian context, the University Grants Commission (UGC), recently, in 2018, approved the UGC (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulations, 2018⁵.

It is mandated that every Higher Educational Institutions (HEI) should establish the mechanism to enhance awareness about the responsible conduct of research and academic activities, to promote academic integrity and to prevent plagiarism. Sensitization seminars for students, faculty and other members every semester for responsible conduct in pursuit of academia as well as teach academic ethics to students should be conducted. Further, the HEIs must provide training for using plagiarism detection technology, and the institutions must establish facilities for the detection of plagiarism.

Very few academicians are aware of the methods for curbing the plagiarism. The UGC in the section 6 of UGC Regulations 2018 has outlined various ways to deter the plagiarism by the various Higher Education Institutes⁵.

In case, plagiarism is suspected and there is proof of such in HEIs, any member of the academic community may approach and report to the Department Academic Integrity Panel (DAIP). After receipt of such a complaint or allegation, the DAIP shall investigate the matter and submit its recommendation to the Institutional Academic Integrity Panel (IAIP). The IAIP shall send the report after investigation and the recommendation on penalties to be imposed to the Head of the HEI within a period of

45 days from the date of receipt of the recommendation of DAIP/complaint/initiation of the proceedings. The details on the composition of the DAIP and IAIP Panel can be found in UGC Regulations 2018⁵.

The various penalties for plagiarism have been provided in Section 12 of the UGC Regulations 2018⁵. Different penalties have been laid out for different tiers of plagiarism severity. Penalties shall be awarded only when there is no doubt that the accused has committed the act and after all other avenues of appeal have been exhausted. The accused must also be given adequate opportunity to defend himself/herself in a fair or transparent manner.

The need of the hour is how to prevent plagiarism through increased awareness and its detection. Increasing awareness of the frequency and existence of plagiarism has resulted in efforts to reduce its occurrence at many levels. Academic institutions have already incorporated writing ethics as part of the basic curriculum. All the writers must check for the text duplication unintentionally by using plagiarism detection software before submitting to any journal office^{16, 11}. Reviewers also should use plagiarism detection tools in order to avoid false publication practice by both intentional and unintentional authors. When the manuscript passes for the reviewers to the editors without identifying the copied text or idea, the editor of the journal should finalize the fate of the article based on the extent of plagiarism by using powerful plagiarism detection software.

Recent years, many journals have provided their explicit policies on this issue. Ministry of Human Resource Development (MHRD), Government of India, allows universities to use 'Turnitin' software to curb Ph.D. plagiarism¹⁷.

Plagiarism affects the scientific body of knowledge, igniting academic dishonesty, mistrust among professional people and the end users. Plagiarism results in a damaging and negative outcome and it is considered a serious matter compared to stealing. One must be aware of the adverse effects and to protect themselves by writing one's own ideas or thoughts in their own worlds with proper paraphrasing, citation, and by using quotation marks wherever necessary to avoid plagiarism.

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Assessment of Familial Co-Existence of Dual Forms of Malnutrition in Mother-Child Pairs and Associated Risk Factors in South Karnataka

Meenakshi Garg,* Deeksha Kapur** and Pawan Kumar***

Abstract

Today, nearly one-third of the global population suffers from at least one form of malnutrition: wasting, stunting, vitamin and mineral deficiency, overweight or obesity and diet-related NCDs¹. The double burden of malnutrition is characterized by the co-existence of under-nutrition along with overweight, obesity or diet-related NCDs amongst individuals, households and populations and across the life-course. The study was carried out to explore the phenomenon of dual burden of malnutrition i.e. stunted child and overweight mother (SCOWT) pairs within the same household and identify determinants of the same. This descriptive cross-sectional study was conducted in the Udupi Urban/Metropolitan Area of South Karnataka, India. Using purposive sampling, 485 households with mother and child pairs were included in the study with the mother having a BMI $\geq 23\text{kg/m}^2$ and having at least one child between 2-5 years of age. It was found that 27.4% of the households showed a Stunted Child and an Overweight/Obese Mother (SCOWT) phenomenon. Using multivariate binary logistic regression (step-wise), the significant risk factors / predictors of Stunted Child Overweight Mother (SCOWT) dual burden malnutrition households included in the final model were increasing age of the mother, lower age of mothers at marriage (<18yrs), father's occupation (unskilled workers/clerks) and increasing age of the child, keeping all the confounding variables constant. The double burden of malnutrition can be seen as a dual nutrition challenge, or an opportunity for double returns. Governments and non-governmental organizations must play an active role in promoting and protecting an environment that supports the growth and development of infants and children and facilitating community-based initiatives that aim to promote healthy eating and physical activity.

Keywords: Double burden of malnutrition; Stunted Child and Overweight Mother; Nutrition transition; Infant and Young Child Feeding (IYCF) practices; Dietary diversity; Household food security.

The paradoxical co-existence of child under-nutrition and maternal overweight within the same household, often described as the 'dual burden of malnutrition', is relatively a new phenomenon that has been described in studies from low- and middle-income countries including Benin, Brazil, China, Haiti, Guatemala, South Africa, Malaysia and Mexico²⁻⁸.

The causes of the double burden of malnutrition relate to a sequence of epidemiological changes known as the nutrition transition, the epidemiological transition and the demographic transition.

*Assistant Professor Selection Grade and HOD, Manipal Academy of Higher Education, Manipal; Email: meenakshi.garg@manipal.edu. ** Professor, Nutritional Sciences, SOCE, IGNOU, New Delhi and *** Professor, Dept. of Community Medicine, KMC, Manipal Academy of Higher Education, Manipal.

The nutrition transition describes the shift in dietary patterns, consumption and energy expenditure associated with economic development over time, often in the context of globalization and urbanization. This change is associated with a shift from a predominance of under-nutrition in populations to higher rates of overweight, obesity and NCDs¹. The concept of nutritional transition which was extensively analyzed by Popkin et al.⁹ and Drewnowski¹⁰, covers rapid changes from a traditional, low-fat, high-fibre, plant-based diet combined with physical labour to a Westernized diet high in meat, saturated fats, sugar and energy combined with a sedentary occupation.

A driving force behind the shift from under-nutrition in childhood to over-nutrition in adulthood in LMICs is the rapid increase in economic development, globalization, and urbanization, leading to tremendous changes in lifestyle marked predominantly by changes in diet and physical activity; and under and over-nutrition occurring simultaneously among different population groups. This was also recognized in FAO's document by Kolčić on double burden of malnutrition in six LMICs: China, Egypt, India, Mexico, the Philippines and South Africa¹¹. Given the rapid urbanization and growing wealth in India coupled with changing food availability and prices, it is likely that the trend towards increased consumption of fats and processed foods will continue among the wealthier groups in India which in turn, will lead towards a diet associated with diet-related chronic diseases (DRCDs). These diets will become more desirable among lower-income groups¹².

In the last decade, increasing attention has been paid to the emergence of the double burden of malnutrition within households and a discussion paper by the World Bank attempted to review the causes of and possible solutions for the double burden at the individual, household and country levels. However, most of the discussion was devoted to the double burden at the country level, and the double burden within households was little discussed. A comprehensive assessment of the prevalence and predictors of the double burden within households across countries is thus lacking¹³.

Though a lot of research has been carried out to determine the factors responsible for the inequitable nutrient-intake of the mother-child pairs in the same household in various countries; in India, it's still a new but emerging phenomenon. Therefore, there were a lot of uncovered aspects of this subject which have been analyzed and explored through this study.

Objectives

The objectives of the current study are to:

- i) explore the phenomenon of dual burden of malnutrition i.e. stunted child and overweight mother (SCOWT) pairs within the same household; and
- ii) identify the predictors of SCOWT phenomenon within the same house-hold viz. socio-demographic factors, household food security, Infant and Young Child Feeding (IYCF) practices, maternal characteristics and other risk factors.

Methodology

A descriptive cross-sectional study was conducted in the Udupi semi-urban area of South Karnataka, India. The sample was drawn from the available population using purposive sampling. 485 households with mother and child pairs were included in the study with the mother having a BMI $\geq 23\text{kg/m}^2$ and having at least one child between 2-5 years of age. Exclusion criteria for the study were pregnant/lactating mothers, child aged 2-5 years-old with health disabilities including immunocompromised, mothers with major health disabilities and those who were overweight/obese because of underlying conditions. A face to face personal interview was conducted with each eligible mother.

Study Instruments: A semi-structured pre-validated questionnaire was used for collecting relevant information, Modified Kuppaswamy Scale 2014 for assessing SES; Standard of Living (SLI) Index; Complementary Feeding Index (CFI); FAO/WHO/UNU Factorial Method for assessing physical activity levels of mothers. WHO classification for Asians was used to classify the mother's nutritional status and WHO Anthro software (v 3.2.2) was used for determining the nutritional status of the children (according to WHO Child Growth Reference Standards, 2006-07 classification using Standard Deviation/Z scores). To determine the household food security, food frequency for 7 days was taken and then analyzed for the entire sample, using the Food Consumption Score of World Food Programme¹⁴.

Definition of SCOWT (Stunted Child Overweight Mother) household in this study: One that has a stunted child (a pre-school child between 2-5 years of age with a height-for-age Z score i.e. HAZ, less than - 2 standard deviations from the Median based on WHO Child Growth Reference Standards, 2006-07)¹⁵ and an overweight mother (with a BMI $\geq 23\text{kg/m}^2$ as per the WHO classification of BMI for Asians)¹⁶.

Statistical Analysis: All variables in this study were presented using descriptive and inferential statistics. Categorical data have been summarized as percentages and continuous data using Mean \pm SD. Univariate and multi-variate logistic regressions were utilized to ascertain the final predictors of dual burden malnutrition households after controlling for potential confounding factors. Crude and Adjusted Odds ratios and 95% confidence intervals were used to identify risk factors associated with SCOWT phenomenon. Statistical significance was set at $p < 0.05$. Final multi-variate binary logistic regression was done to model the final determinants associated with a mother-child dyad having discordant nutritional status.

One definition of the dependent variable: nutritional status of the mother-child pair which is based on anthropometric measures, was tested. The pair was coded '1' if the mother was overweight (BMI $\geq 23\text{kg/m}^2$) and the child stunted (low height for age i.e. HAZ < -2 z-score), and '0' otherwise. Data were analysed with the SPSS statistical software package version 20.0 (SPSS Inc., Chicago, IL).

Findings and Discussion

Table 1 shows that maximum (61%) mothers were from joint families. 63.1% of the families had up to 6 members whereas 18.6% had more than 8 members; and it was predominantly a Hindu population (83.9%). The mean socio-economic status (SES) score of all families was 14.37 ± 5.35 which corresponds to the 'lower middle class' as per the modified Kuppuswamy Scale 2014. Standard of Living (SLI) Index was computed based on 28 scored factors, taken from NFHS 2 and 3 Standard of Living Index components and weights. Based on the total computed scores, the mean SLI score was 37.65 ± 5.90 which falls in the lower end of high standard of living category. In a cross-sectional study conducted in households of Kuthar and Manjanady villages of Mangalore, Dakshina Kannada district, majority (70%) of the study population belonged to class IV of Kuppuswamy Scale 2014. However, based on standard of living (SLI), majority of them (62%) had a high standard of Living¹⁷.

TABLE 1
Socio-Demographic Profile of the Families(N=485)

Parameter	Frequency (N=485)	Percent
Type of Family		
Nuclear	187	38.6
Joint	296	61.0
Extended	02	0.4
Number of Family Members		
<4	126	26.0
4 To 6	180	37.1
>6 To 8	89	18.4
>8	90	18.6
Religion of the Family		
Hindu	407	83.9
Muslim	46	9.5
Christian	28	5.8
Others	4	0.8
Socio-economic Status of the Family		
Upper / I (26-29)	31	6.4
Upper Middle / II (16-25)	135	27.8
Lower middle / III (11-15)	190	39.2
Upper lower / IV (5-10)	129	26.6
Lower / V (<5)	-	-
Standard of Living Index class		
High SLI (25 to 63)	478	98.6
Medium SLI (15 to 24)	7	1.4

TABLE 2
Socio-Demographic Profile of Mothers and Children (N=485)

General Maternal Characteristics	Frequency	Percent
Current Age Years (Mean 30.79±4.219)		
20-25	41	8.5
25-30	188	38.8
30-35	186	38.4
35-40	59	12.2
40-45	11	2.3
Age Class of the Child Years (Mean 3.57 ± .945)		
2 to 3 years	152	31.4
3 to 4 years	148	30.5
4 to 5 years	185	38.1
Gender of the child		
Female	240	49.5
Male	245	50.5
Mothers' Marital Status		
Married	482	99.4
Widow	1	0.2
Divorced/Separated	2	0.4
Educational Qualification of Mothers		
Illiterate	1	0.2
Primary School /Literate	41	8.5
Middle School Certificate	50	10.3
High School Certificate	159	32.8
Intermediate / Post high school Diploma	133	27.4
Graduate/Post Graduate	100	20.6
Profession/Honours	1	0.2
Employment Status		
Non-Working	393	81.03
Working	92	18.97
Occupation of Mothers		
Home-makers	393	81.0
Unskilled workers	37	7.6
Semi-skilled workers	14	2.9
Skilled workers	7	1.4
Clerical, Shop-owner, Farmer	9	1.9
Semi-Professional / Professional	25	5.1
Occupation of Fathers		
Unemployed	12	2.5
Unskilled workers	113	23.3
Semi-skilled workers	138	28.5
Skilled workers	86	17.7
Clerical, Shop-owner, Farmer	72	14.8
Semi-Professional	25	5.2
Professional	39	8.0

Majority of the mothers (77.2%) were between 25-35 years of age and almost all were currently married (99.4%). Children were distributed almost equally among the three age categories and between the genders (Table 2). Level of education was good; almost 99.8% of women were literate with 60.2% completed 10 to 12 years of schooling followed by 20.6% graduates/post-graduates. Majority of the (81%) were homemakers and rest were employed in occupations. Among the fathers, 51.8% were unskilled and semi-skilled workers, 32.5% were skilled/clerical workers and 13.2% were semi-professionals or professionals. Key Indicators of NFHS 4 data for the state of Karnataka have reflected similar statistics. Data have shown high literacy among women where overall literacy reported from the urban area is 81.8%, 58.9% with 10 or more years of schooling; 29.3% of women currently employed. This is lower than the percentage found in this study (81%). As per the national data, out of the total working women; 9.6% was professionals, 1.4% into clerical, 4.8% into sales, 48.3% agricultural workers, 11.3% in the service sector and 20.7 per cent was production workers¹⁸.

As per WHO BMI Asian Criteria, 79.6% and 20.4% of the mothers were overweight and obese respectively (Table 3). Physical Activity Levels (PALs) assessed using the Factorial Method classifying all the activities over a period of 24hours revealed that 78.6% of the mothers followed a sedentary lifestyle and only 8.5% were moderately active. The Mean PAL of the mothers was $1.548 \pm .156$, which falls in the sedentary activity level category. Results are similar to the NFHS-4 data on Nutritional Status of Adults (age 15-49 years) for Udupi, Karnatakawhich shows that women whose Body Mass Index (BMI) is below normal ($BMI < 18.5 \text{ kg/m}^2$) are 30.1% in rural areas and 27.6% overall. Also, women who are overweight or obese ($BMI \geq 25.0 \text{ kg/m}^2$) are 19% in rural areas and 20.7% overall¹⁸.

TABLE 3
Mother's Nutritional Status Based on Their BMI and Physical Activity Level

Parameter	Mothers (N=485)	
	Frequency	Per cent
BMI Kg/Mtr² (Mean 25.66 ± 2.697)		
Overweight (23-27.99)	386	79.6
Obese (≥ 28)	99	20.4
Physical Activity Level (PAL) (Mean 1.548 ± .156)		
Very Light PAL (<1.4)	63	13.0
Sedentary PAL (1.4 To 1.69)	381	78.6
Moderate PAL (1.7 To 1.99)	41	8.5

89.5% of the mothers got married after the age of 18years with majority (63.1%) being married between 18 and 25years (Table 4).However, 10.5% of mothers got married before 18 years of age. Age at first pregnancy for almost half of the mothers (53.6%) was between 18 and 25years followed by 36.7% between 26 and 35 years, 1% delivered the 1st baby after the age of 35years and 8.7% delivered before the age of 18 years. Majority (91.5%) of mothers had up to 2 children only. 43.5% of the mothers had C-section and 48.23% had discomforts/complications during pregnancy. Most of them did not know the reason for their C-section. As per NFHS-4 data on marriage and fertility for Udupi District, Karnataka, women aged 20-24years married

before the age of 18 years were 5.0 % in rural areas and 6.3% in total which is lower as compared to the findings of this study (10.5%). This could be because of the difference in the inclusion of age category in our study. Also, women aged 15-19 years who were already mothers or pregnant at the time of the survey, were 1.2% in rural areas and 1.8% in total. Births delivered by caesarean section were 48.8% in rural areas and 47.2% overall¹⁸.

TABLE 4
Maternal Obstetric History

Maternal Factors	Frequency	Percent
Age at Marriage		
<18 years	51	10.5
18-25 years	306	63.1
26-35 years	128	26.4
Age at First Pregnancy		
<18 years	42	8.7
18-25 years	260	53.6
26-35 years	178	36.7
>35 years	5	1.0
Total Number of Pregnancies		
1	216	44.5
2	228	47.0
3	33	6.8
>3	8	1.6
Type of Delivery		
Normal	267	55.1
C-section	211	43.5
Both	7	1.4
Discomforts / Complications during Pregnancy		
No	251	51.8
Yes	234	48.2

Data of the study are also similar to the findings of an earlier study by Ghosh S which also found high rates of caesarian section deliveries (43.5%). This can be attributed to the factors as reported in a review paper according to which mothers aged 30 or more and size of the child at birth had more chances to undergo a caesarean delivery; also in mothers who had complications during pregnancy, chances of caesarean delivery are high¹⁹. According to Sanghvi et al, 50% of the mothers reported discomforts/illnesses in pregnancy, including anaemia. Overall, 9% of the mothers had complications during pregnancy²⁰.

The anthropometric data for children were entered in the WHO Anthro software (version 3.2.2). In the present study, when classified according to Height for Age Z score, 27.6% of the children were stunted, 70.3% had normal height for age and 2.1% was slightly tall for age (Table 5). The NFHS-4 data on Nutritional Status for Udupi,

Karnataka also shows that children under 5 years who are stunted (height-for-age HAZ < -2 SDs) were 19.1% in rural areas and 21.1% overall¹⁸.

TABLE 5
Nutritional Status Assessment of Children Based on Their Height for Age Z Score

Parameter	Child	
	Frequency n=485	Per cent
Height for Age (HAZ)		27.6
Stunted (<-2 Z score)	134	70.3
Normal (-2 to +2 Z score)	341	2.1
Tall (>2 Z score)	10	

76.5% of the children in this study had normal birth weight and 67.8% of the children were first born (Table 6). As per NHFS 4 data, 18% of the live births in India had a low birth weight (less than 2.5 kg), down from 22 percent in 2005-'06. In Karnataka, low birthweight (<2.5kgs) prevalence was 17.2%, which is close to the data in this study (15.3%). Data also pointed that among the births in the three years preceding the survey, 39 % of the children were of birth order one, 33 % were second-order births, 15 % were third-order births, and the rest were of birth order four or higher¹⁸.

TABLE 6
Birth Characteristics and Frequency of Illness of the Child (N=485)

General and Birth Characteristics	Frequency (N=485)	Percent
Birth Weight of the Child (Mean 2.89 ± .510)		
Low birth weight 1.5 -2.5 kg	74	15.3
Normal birth weight 2.5-3.5 Kg	371	76.5
Overweight >3.5 kg	40	8.2
Birth order of the Child		
1	329	67.8
2	141	29.1
3	11	2.3
4 - 5	4	0.8
Frequency of Illness of the Child		
once per week	106	21.9
once per two weeks	6	1.2
once per month	79	16.3
once per 6 months	294	60.6

60.6% of the children in the study had common childhood illnesses with a frequency of once in six months. However, there were a large number of children (21.9%) who fell ill once a week. Most commonly reported health problems were fever of short duration (79%), and cold and flu (68.2%). Repeated childhood infections point towards an overall poor immunity and consequently poor nutritional status. Other minor complaints were stomach ache (8.2%), skin infections (5.4%), diarrhoea (5.6%)

and vomiting (5.8%). Very similar results were reported in NFHS-4 data on childhood diseases (children under 5 years) for Udupi, Karnataka. In the current study, prevalence of diarrhoea in the two weeks preceding the study was 4.9% in rural areas and 5.1% total. Overall prevalence of symptoms of acute respiratory infection (ARI) in the two weeks preceding the survey was 5.3%. Among the children under five years, 13 % had fever in the two weeks preceding the survey¹⁸.

Table 7 reflects on all the IYCF practices followed by the mothers. Majority (65.3%) of the mothers started breast-feeding before six hours after birth with 24.7% of the mothers did early initiation of breastfeeding i.e. <2hours after birth. 99% of the children were given colostrum. Exclusive breast-feeding up to six months and timely initiation of complementary feeding was practiced by only 40.8% of the mothers. Continued breast-feeding >12 months was done by 72.8% of the mothers. Bottle-feeding was done by 45.2% the mothers. With regard to dietary diversity in 24-36 months children, majority (57.8%) were fed 2-3 food groups and only 16.9% of children were fed more than 4 food groups in the last 24hrs whereas 25.3% had only 0-1 food group. Dietary diversity in children aged 37-60 months was slightly better than the younger children with 31.4% of children were fed more than 5 food groups, 58% had 2-3 food groups and only 10.6% had 0-1 food group in the last 24hours.

Food frequency in the past 7 days (7+ times), was best for milk (77.7%) followed by other fruits/vegetables, Vitamin-A rich fruits/vegetables and foods made with oil, fat, or butter (around 40%). The poorest food frequency was for starchy staples and pulses (13.6%). Major scientific evidence also points to the fact that when complementary feeding starts, most of the children are given animal milk in addition to breast milk thinking that milk is the most nutritious food of all meeting all the nutrient requirements of children.

As per NFHS-4 data on Child Feeding Practices and Nutritional Status of Children for Udupi/Karnataka, 45% in rural areas and a total average of 48.3% children under 3 years were breastfed within one hour of birth. 58.2% in rural areas and an average of 54.2% children were exclusively breastfed till 6 months. Contrary to the recommendation that children under six months be exclusively breastfed, many children in that age group consume other liquids such as plain water (18%), other milk (11%), or complementary foods (10%) in addition to breastmilk. Children aged 6-8 months receiving solid or semi-solid food along with breastmilk were 42.8% in rural areas and 46% in average. Children aged 6-23 months receiving a minimum acceptable/adequate diet were 14.8% in rural areas and 18.5% in average (Minimum adequate diet means children receiving 4 or more food groups and a minimum meal frequency)¹⁸.

The IYCF indicators for minimum acceptable diet by breastfeeding status among children aged 6-23 months for India indicates that 94 percent received breastmilk, milk, or milk products (2+ times) during the day or night before the interview. Twenty percent of breastfed children had an adequately diverse diet since they had been given

foods from the appropriate number of food groups, while 31 percent had been fed the minimum number of times appropriate for their age. The feeding practices of only 9 percent of breastfed children aged 6-23 months met the minimum standards for all IYCF feeding practices. Ten percent of all children aged 6-23 months were fed the minimum acceptable diet. Figures among children aged 6-23 months in Karnataka showed 22.5% minimum dietary diversity, 27.5% minimum meal frequency and 8.2% minimum acceptable diet¹⁸.

To assess the compliance of key IYCF practices as recommended by WHO and UNICEF, and the factors influencing the same; a study was done in Udupi, Karnataka by Meenakshietal²¹. The study showed that the compliance to IYCF practices was low in this area, particularly the rate of exclusive breast-feeding for 6 months. It was found that mother's educational qualification had no significant impact on compliance. However, mother's knowledge showed significant association with the compliance to WHO IYCF practices. The extent of overall compliance to IYCF practices also showed statistically significant association with the knowledge of the mother ($p = .008$). Socio-economic status of the family and child's gender did not show any association with the compliance to key IYCF practices. Presence of complication during delivery was found to have a statistically significant association with the timely initiation of breast-feeding ($p=.042$) and the practice of continued breast-feeding up to 2 years ($p \text{ value} = .003$). Mother's working status was found to have a statistically significant association with the timely initiation of complimentary feeding at 6 months ($p = .040$)²¹.

Household Food Security Assessment: To determine the house hold food security, food frequency of the entire family/household for 7 days was taken and then analyzed using the Food Consumption Score of UN and WFP (World Food Program). Based on the FCS scores of families in this study, researchers found that 99% of the families of the respondents had acceptable house hold food security and it was noteworthy that none of them had poor house hold food security. The main reason for the maximum proportion of families having acceptable house hold food security is the location. As the study was done in and around the coastal region, there is daily consumption of fish by most of the families there by increasing the food consumption score.

In all the families, cereals/millet, sugar and oil were consumed daily while the other food groups had variations. Even though most of the families had daily intake of fish; intake of chicken, egg and other animal meat was found to be rare in most of the cases, at the most chicken was being consumed once a week. 24.7% of the families were consuming milk and milk products daily.

TABLE 7
Compliance to IYCF Practices/Complementary Feeding Index (CFI) Variables(N=485)

Indicator	Variable	Category	Freq.	Percent	
Early Initiation of Breastfeeding	Breast-feeding started how soon after delivery	<2hrs	120	24.7	
		2-6hrs	197	40.6	
		>6hrs	168	34.6	
Colostrum given	Colostrum given	No	5	1.0	
		Yes	480	99.0	
Exclusive Breastfeeding up to 6 months	Exclusive Breast-feeding	No	287	59.2	
		Yes	198	40.8	
Continued breastfeeding with complementary feeds	Continued Breast-feeding	<12 mon	132	27.2	
		>12 mon	353	72.8	
Bottle-feeding	Use bottles	Yes	219	45.2	
		No	266	54.8	
Timely initiation of complementary feeding	Complementary feeding was initiated on the completion of 6th months	No	287	59.2	
		Yes	198	40.8	
Dietary diversity (past 24 hours)	For children (24-36) months (n=154)				
	Sum of cereals (grains/ tubers) + pulses + milk (other than breastmilk) + GLVs and vitamin A-rich fruits + egg + others	0-1	39	25.3	
		2-3	89	57.8	
		4+	26	16.9	
	For children (37-60 months) (n=331)				
	Sum of cereals(grains/tubers) + pulses + milk + GLVs (Green-leafy vegetables) and vitamin A-rich fruits + egg + others	0-2	35	10.6	
3-4		192	58.0		
5+		104	31.4		
(Food frequency in past 7 days)	Starchy staples (grains / tubers)	0-3	224	46.2	
		4-6	195	40.2	
		7+	66	13.6	
		0-3	220	45.4	
	Pulses	4-6	199	41.0	
		7+	66	13.6	
		0-3	32	6.6	
	Milk (other than breast-milk)	4-6	76	15.7	
		7+	377	77.7	
		0-3	176	36.3	
	Meat/eggs	4-6	192	39.6	
		7+	117	24.1	
		0-3	50	10.3	
	Vitamin-A rich fruits and vegetables	4-6	242	49.9	
		7+	193	39.8	
		0-3	31	6.4	
	Other fruits/vegetables	4-6	237	48.9	
		7+	217	44.7	
		0-3	26	5.4	
	Foods made with oil, fat or butter	4-6	249	51.3	
		7+	210	43.3	
		0-2	316	65.2	
	Meal-frequency (past 24 hours)	No. of times the child was fed in the past 24 hours	3-4	117	24.1
			5+	52	10.7

As per the current status, 63.5% of the children were in the habit of eating on their own while the remaining 36.5% had to be fed either by the mother, grandmother or others. Majority (98.1%) of the mothers claimed that they served food to the child in a separate plate regardless whether s/he eats on her/his own or s/he is fed by someone. Only 1.9% of the children had food in a shared plate of an adult, mostly with the mother (Table 8).

A lot of the mothers (38.1%) preferred keeping the child at home irrespective of whether the child was registered in the Anganwadi or not. 25.4% of the parents were sending their kids to private kindergartens or playschools and only 36.5% were actually going to the Anganwadi regularly, even though 89.9% of the children were actually registered in the Anganwadi as a part of the ICDS programme. Only 10.1% of the children were not registered with the Anganwadi and were not availing of the supplementary nutrition benefits also. Reasons given for the same were poor quality of ration in the AWC and children not liking the same. The caring of the child in absence of mother at home was done mainly by the grandmothers (70.9%) and other family members / elder siblings (13.4%). 2.7% of the mothers left their child at a day care centre and 13% of them depended on other means like maids, taking the child along or sometimes, even leaving them alone at home (Table 10). As per NFHS 4, under the Integrated Child Development Services (ICDS) for children under six years, 54 percent of children received any service from an Anganwadi centre and 48 percent received food supplements. Figures for Karnataka were slightly better with 60.3% receiving any one type of service from the AWCs and 57.2% receiving food supplements. Data on micro-nutrient intake shows that 60% of the children aged 6-59 months were given vitamin A supplements in the six months preceding the survey. 44 percent of the children aged 6-23 months consumed foods rich in vitamin A in the day or night before the interview and 18 percent consumed iron-rich foods¹⁸.

Majority (94.8%) of the mothers did not do any special dietary modifications for their children and fed them the same food as was being consumed by the rest of the family. Only 5.2% of the mothers made some additions in the child's diet. The most common and popular additions were Ghee, Boost/Complan, Ragi /other millets, Almonds, Vegetables, Sprouts/pulses, Oil, Cerelac/Manna Health Mix, Butter/Sugar/Jam/ Ketchup, Besan Laddu, Eggs or Fish.

Phenomenon of Dual Burden of Malnutrition i.e. Stunted Child and Overweight Mother (SCOWT) within the Same Household

As per this study, 27.4% of the households had a Stunted Child and an Overweight/Obese Mother (SCOWT). 70.3% of the households had normal HAZ children and overweight/obese Mother and just 11 households (2.3%) had children with HAZ >2 standard deviations from the median and overweight/obese mothers (Table 9).

TABLE 8
Child Rearing Practices and Child's Eating Habits (N=485)

Child Rearing Practices	Frequency	Percent
Currently does the child eat on its own		
No	177	36.5
Yes	308	63.5
Activity of the child while eating food		
Sitting at place for food	327	67.4
Watching TV/Playing games on Mobile, Computer	55	11.3
Playing or walking around	103	21.2
How is the food given to the child?		
In a separate plate	476	98.1
In a shared plate with an adult	9	1.9
Any special dietary modifications for the child compared to family food		
No	460	94.8
Yes	25	5.2
Child at Home/AWC/Private Kindergarten		
Home care	185	38.1
Anganwadi	177	36.5
Private Kindergarten	123	25.4
Care of the child in mother's absence		
Grandmother	344	70.9
Elder sibling	11	2.3
Any other family member	54	11.1
Day care center	13	2.7
Others	63	13.0

TABLE 9
Phenomenon of Stunted Child and Overweight Mother (SCOWT)

Category	Frequency	Percent
Stunted Child Overweight Mother	133	27.4
Normal HAZ Child Overweight Mother	341	70.3
Tall HAZ Child Overweight Mother	11	2.3
Total	485	100.0

Data from NFHS 4 on stunting among children < 5years by mother's nutritional status also show this trend and concludes that when mothers were over-weight (BMI>25kg/mtr²), 27% of under 5 children were stunted (based on percentage below -2SD)¹⁸. Similarly, data from NFHS 3 also confirmed that there are differences in the nutritional status between adults and children within the same family. In families where the mother was over-nourished, 31% of the under 5 children were stunted²².

A study done in South Karnataka by Meenakshi et al., explored the dual forms of malnutrition existing in the same household among 30 mother-child pairs (mothers with children in the age group 1-3 years). Nutritional status was assessed by WHO criterion (BMI for Asians $\geq 23\text{kg/mtr}^2$ for mothers and weight-for-age z-scores <-2 for children). Results of this study showed a 23% prevalence of underweight child overweight mother households (UCOWM)²³.

Comparing nationally representative surveys from 42 developing countries, Garrett & Ruel, found the prevalence of dual burden households ranging from as low as 2 per

cent in Ethiopia to as high as 71 per cent in Egypt²⁴. A study conducted in urban Kenya by Shauna, found a large proportion of mothers who were overweight (43%) or obese (37%) had stunted children. This is not unique to Kenya. Multiple burdens of malnutrition within the same household have been observed in other countries worldwide²⁵.

TABLE 10
Logistic Regression: to Determine Final Predictors of Scowt Dual Burden Malnutrition Phenomenon

Stunted Child Overweight Mother (SCOWT) (n=485) Variables in the Equation	Univariate Logistic Regression				Multivariate Logistic Regression (stepwise)			
	p value	Crude Odds Ratio	95% C.I. for crude OR		P value	Adjusted Odds Ratio	95% C.I. for Adjusted OR	
			Lower	Upper			Lower	Upper
Age of the Mother in years	.034*	1.053	1.004	1.104	.009**	1.085	1.021	1.154
Marriage_Age_Class (18-25years – Reference)		1				1		
Marriage_Age_Class (<18 years)	<.001**	4.181	2.236	7.817	.003**	3.064	1.475	6.366
Marriage_Age_Class (26-35years)	.441	.824	.503	1.349	.202	.675	.370	1.234
Occupation of Father (Professional – Reference)		1				1		
Unemployed	.256	.431	.101	1.842	.067	.176	.027	1.127
Unskilled worker	.003**	.295	.134	.651	.012*	.325	.135	.784
Semi-skilled worker	.091	.531	.255	1.107	.058	.443	.191	1.029
Skilled worker	.744	.880	.408	1.897	.718	.853	.359	2.024
Clerical, Shop-owner, Farmer	.005**	.282	.116	.687	.003**	.217	.080	.588
Semi-Professional	.356	.609	.213	1.744	.156	.434	.137	1.375
Special Modification of food for child (Yes (ref.) v/s No)	.240	.596	.252	1.413	.027*	.287	.095	.870
CFI_Early Initiation of Breast Feeding (<2hrs – Reference)		1				1		
CFI_Early_Initiation_BF(2-6hrs)	.157	.663	.375	1.171	.004**	.389	.204	.740
CFI_Early_Initiation_BF(>6hrs)	.174	1.368	.870	2.151	.673	1.118	.666	1.878
CFI_Freq of Meat/Eggs/Fish for child/week (7+ times-Ref.)		1				1		
CFI_FFQ of Meat/Eggs/Fish for child/week (0-3 times)	<.001**	.296	.176	.498	.005**	.430	.238	.777
CFI_FFQ of Meat/Eggs/Fish for child/week (4-6 times)	<.001**	.337	.205	.555	.004**	.431	.242	.770
Age of the child (years)	<.001**	1.800	1.431	2.265	<.001**	1.736	1.329	2.267
Milk & Milk products (FCS – Freq./7days)	<.001**	.671	.578	.779	<.001**	.727	.617	.856

Nagelkerke R2 value: 0.271 i.e. 27.1% impact / variation effect (- Significant at 5% level, **- Significant at 1% level)*

A study by Doak et al. explored the dual burden of infant and child (5–23 months) under-nutrition and maternal over-weight and obesity in 446 mother–infant dyads in the Western Highlands of Guatemala. The prevalence of stunting (38%) and maternal

overweight/obesity (45%) were high but just 17% of the mother-child pairs were dual burden²⁶.

Table 10 shows the results of a multi-variate binary logistic regression (forward step-wise) which was performed to identify the final predictors of Stunted Child Overweight Mother (SCOWT) dual burden malnutrition households, keeping the confounding variables constant. So, in this study, based on the logistic regression, the significant risk factors of SCOWT households included in the final model are increasing age of the mother (adj. OR=1.08), lower age of mothers at marriage (<18yrs) (adj. OR=3.064) and increasing age of the child (adj. OR=1.736). Odds of SCOWT phenomenon are significantly lower in households where fathers were unskilled workers (adj. OR=.325) or working as clerks/petty shop owners/farmers (adj. OR=.217) as compared to those households where the father's occupation fell in the professional category, after adjusting for all other predictors included in the model. This could be interpreted to say that as the income of the households' increases in relation to father's occupation, the risk of SCOWT dual burden households also increases. Protective factors identified were modification of child's diet i.e. good dietary diversity (adj. OR=.287), early initiation of breastfeeding i.e. within 2-6hrs after birth (adj. OR=.389), higher frequency of meat/eggs/fish for child/week during complementary feeding (adj. OR=.431) and higher frequency of consumption of milk and milk products by the family per week as a part of Food Consumption Score i.e. good household food security (adj. OR=.727). The overall model fit was 0.271 (Nagelkerke's R^2) which implies that the predictor (independent) variables included in the final regression model have a 27.1% impact/variation effect on the SCOWT phenomenon.

Makiko et al., report that Indonesia is also facing household-level double burden malnutrition. Maternal-child double burden occurred in 30.6% of total households whereas paternal-child double burden was only in 8.4%. After controlling for confounding factors, children in the highest quartile of the 'high-animal products' dietary pattern had a lower risk of maternal-child double burden (Adjusted OR: 0.46, 95% CI: 0.21–1.04) than those in the lowest quartile²⁷. The 2015-16 NFHS 4 survey asked women and men how often they consume various types of food (daily, weekly, occasionally, or never). Milk or curd is consumed daily by 45 percent of women and weekly by 23 percent of women but 7 percent never consume milk or curd and 25 percent consume milk or curd only occasionally. Very few women consume chicken, meat, fish, or eggs on a daily basis, although about one-third of them consume these types of food weekly.¹⁸

Another cross-sectional study in rural Indonesia by Mahmudiono, et al. demonstrated that higher intakes of animal products was protective against SCOWT but the lack of animal protein-intake was more indicative of dietary diversity than a valid indicator for food insecurity. This evidence suggests that at the household level, in the absence of food insecurity and economic deprivation, modifiable factors such as food distribution and dietary diversity were associated with the high prevalence of double

burden of malnutrition in this third quintile group, relative to the others. Stunted children in households that suffer from the double burden of malnutrition are less likely to be facing food insecurity.²⁸

Arimond and Ruel used data from 11 Demographic and Health Surveys (DHS) to examine the association between dietary diversity and height-for-age Z-scores (HAZ) for children 6–23 months old. Bi-variate associations between dietary diversity and HAZ were observed in 9 of the 11 countries. Dietary diversity remained significant as a main effect in 7 countries in multivariate models, and interacted significantly with other factors (e.g., child age, breast-feeding status, urban/rural location) in 3 of the 4 remaining countries. Thus, dietary diversity was significantly associated with HAZ, either as a main effect or in an interaction, in all but one of the countries analyzed²⁹. Intra-family differences in nutritional status have been reported in a paper on Nutrition and Child Survival in India. Data from surveys conducted by the National Nutrition Monitoring Bureau have shown that over the years, there has been a steep increase in the proportion of families where adults are getting adequate food but pre-school children's energy needs are not met³⁰. These data confirm the fact that in India, poverty and lack of food in the household are no longer the major cause of under-nutrition in children. Ramachandran found that poor infant and young child feeding, poor intra-family distribution of food and poor health care are the major determinants of under nutrition in pre-school children.³¹

Dang and Meenakshi report that this phenomenon, referred to as the intra-household dual burden of malnutrition, merits further study since it is clearly not an indication of socio-economic inequalities in the aggregate, nor of inadequate access to food at the household level (since adults are over-nourished) but rather reflects inequalities within the household in the distribution of food and other health resources. In India, very few studies have examined this phenomenon³². Recognizing this paradoxical phenomenon (co-existence of both underweight and overweight members in the same household) is important for creating strategies that respond to the differential needs of individuals within the same household rather than considering the household as a whole.³³

Conclusion

The co-existence of two types of malnutrition problems in the same household is a challenge for the design and implementation of effective public health interventions. Thus, it is important to identify potentially modifiable risk factors.

'Time poverty' has been used to describe the situation of African women whose production and domestic (unpaid) work leaves little time for leisure or even for child care or for participating in development activities³⁴. In extreme poverty, food insecurity often translates into energy-sufficient and even excessive but poor quality diets. Obesity of poverty is observed in industrialized countries as well as in developing countries undergoing the nutrition transition.³⁵

The double burden of malnutrition can be seen as a dual nutrition challenge or an opportunity for double returns. As per the recent WHO policy brief on double duty actions for nutrition, some examples may include policies to ensure access to optimal maternal and ante-natal nutrition and care; the protection, promotion and supporting of breast-feeding including exclusive breastfeeding during the first 6 months, and appropriate complementary feeding in the first 2 years of life; programmes that foster healthy diets in pre-schools, schools, public institutions and workplaces; measures and policies that improve food security and ensure access to healthy foods by all individuals and families. The double burden of malnutrition offers a focused point for integrated intervention on all forms of malnutrition.³⁶

There is paucity of data on dual burden of malnutrition in India. Similar studies on large scale across the nation can help establish the extent of the paradox of dual burden malnutrition households (overweight adults and undernourished children) and their determinants. This will help in modifying existing policies and programmes for action as well as prevention.

Improving the obesogenic environment in urban areas of the developing world may be challenging. Governments and non-governmental organizations must play an active role in promoting and protecting an environment that supports the growth and development of infants and children and facilitating community-based initiatives that aim to promote healthy eating and physical activity. But the other major challenge for countries in transition is to reduce socioeconomic and health disparities among population groups. Caballero rightly says that until we close these gaps, we will continue to find malnourished children in the arms of overweight mothers.³⁷

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Capacity Building of Health Care Providers in Disaster Management: a Challenge

Sanjay Singh,* A. K. Sood** and Utsuk Datta***

Abstract

Disaster management was relief-centric before the enactment of Disaster Management (DM) Act 2005. This act mandates all departments to imbibe holistic approach in the management of disasters in India. There are many dimensions of disaster preparedness like constituting the disaster management committee, developing the disaster management plan, ensuring the availability of equipment and other logistics, mock drills, Standard Operating Procedures (SOPs) etc. Capacity building of the health care providers is also one of the important dimensions to put effective response during the disasters. A study was conducted in Delhi to assess the capacity building of the medical and nursing staff in the hospital and Quick Response Team (QRT) in-charges, one of the members of QRT and District Programme Officers (DPOs) of district health department. Out of the eleven districts, two districts were selected by using simple random sampling method. In both the districts, one hospital in each district and total twenty-two health facilities of district health department were selected. Primary data were collected through the interview schedule. The study findings showed that 67.3% of the respondents of the district health department were trained in Cardio Pulmonary Resuscitation, 53.1% in Basic Life Support and Triage, and only 4.1% of them were trained in Psycho-social care whereas 54.1% of the hospital respondents were trained in ACLS/BLS, 45.9% in Triage, 42.6% in Emergency Medical Response and only 11.5% in Integrated Disease Surveillance Programme and Psycho-social care. Based on the study findings, it was concluded that the training status of health care providers in both the hospitals as well as in both the district health departments were found to be less than 50% in some areas even after 12 years of enactment of the Disaster Management Act. It is recommended that there is a need for continual efforts to impart capacity building training to health care providers in various aspects of disaster management.

Keywords: Disaster Management Act 2005; Disaster Management, Delhi; Capacity Building; Quick response team; Triage.

Disasters are not new to mankind. Many disasters have been mentioned in the ancient literatures also¹. As per the United Nations International Strategy for Disaster Reduction (UNISDR)², disaster is defined as a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental loss and impacts which exceeds the ability of the affected community or society to cope using its own resources.

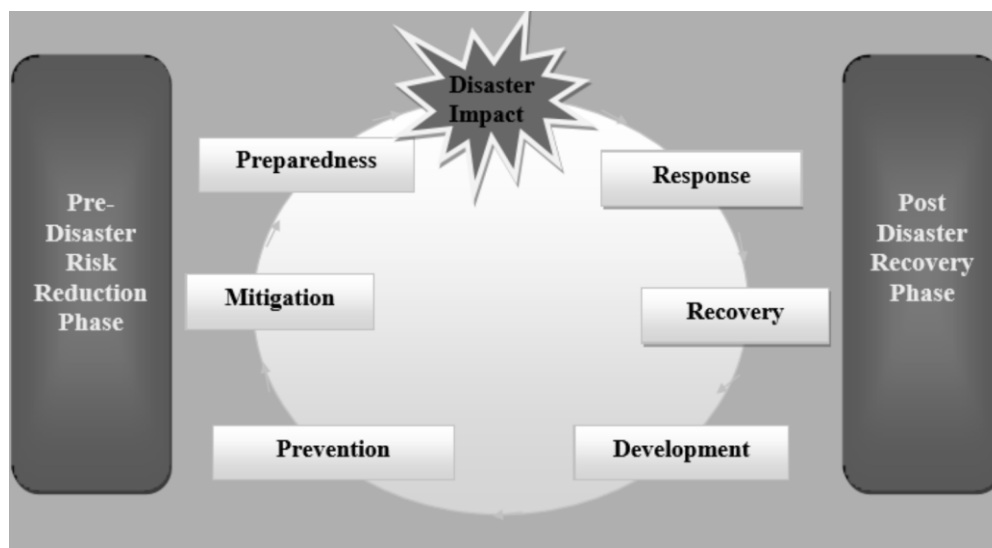
India due to its geographical variation is vulnerable to many disasters. The vulnerability atlas which was prepared by the Building Materials Technology Promotion Council (BMTPC)³, shows that 59% of the Indian land is vulnerable to earthquakes, 8.5% is vulnerable to cyclones, 5% is vulnerable to floods, 10.9% is

* MD (CHA) Student, NIHFW. Email:-drsanjaysingh76@gmail.com ** Professor, NIHFW and *** Professor, Department of Education and Training, NIHFW, Munirka, New Delhi.

vulnerable to severe earthquakes (intensity Medvedev-Sponheuer-Karnik (MSK) Scale IX or more), 17.3% is vulnerable to MSK VIII (similar to Latur / Uttarakashi), and 30.4% is vulnerable to MSK VII (similar to Jabalpur quake). Along the 7516 kilometres (kms) coastline, about 5700 kms are vulnerable to storm surge, cyclones and tsunami⁴. Floods in the Indo-Gangetic- Brahmaputra plains are an annual feature in which hundred lives are lost, millions are rendered homeless and lakhs of hectares of crops are damaged⁵.

Disaster management is not a single entity. It is a combination of various activities taken during different phases of disaster management. This continuum of activities for the management of disasters is called as disaster management cycle⁶(Figure1).

FIGURE 1
Disaster Management Cycle



Disastermanagement cycle⁶ has the following three phases:

- 1) Pre-disaster: Steps taken before a disaster to reduce the potential harm to human, material or environment. Pre-disaster phase has the following activities:
 - a) Prevention and Mitigation- Reducing the risk of disasters involves activities which either reduce or modify the scale and intensity of the threat faced or by improving the conditions of elements at risk.
 - b) Preparedness-The process of preparedness embraces measures that enable governments, communities and individuals to respond rapidly to disaster situations and to cope with them effectively. Preparedness includes for example, the formulation of viable emergency plans, development of warning systems, maintenance of inventories, public awareness, education and the training of personnel.

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- 2) During disaster: It is to ensure that the needs and provisions of victims are met to alleviate and minimize suffering.
 - a) Response- This refers to the first stage response to any calamity which includes setting up of control rooms, putting the contingency plan in action, issue warning, action for evacuation, taking people to safer areas, rendering medical aid to the needy, etc.
 - 3) Post-disaster: Steps taken after a disaster, to achieve rapid and durable recovery. It also has following activities:
 - a) Recovery- Recovery is used to describe the activities that encompass the three overlapping phases of emergency relief, rehabilitation and reconstruction.
 - b) Development- It includes long-term prevention and disaster-reduction measures like construction of embankments against flooding and irrigation facilities as drought proofing measures.

Disaster management was relief-centric in India until the enactment of Disaster Management (DM) Act 2005.⁷ This act mandates every department at the central, state and district-level to manage the disasters in a holistic manner.⁸ To achieve this objective, every department is required to take certain necessary preparatory measures. These preparatory measures include constituting the disaster management committee, developing the disaster management plan, ensuring the availability of equipment and other logistics, mock-drills, Standard Operating Procedures, etc.⁹ Capacity building of the health care providers is also one of the important preparatory measures to put effective response during the disasters.⁶

Every hospital and health department at the district level should make a disaster management plan. Hospital disaster management plans should include capacity building of medical and para-medical staff. They should be trained in certain areas like trauma and psycho-social care, mass casualty management and triage.¹⁰ Chief Medical Officer (CMO) is responsible for the preparation of medical preparedness plan at the district level.¹¹ He/she is required to take preventive measures, to keep the department prepared and capacity development of medical and para-medical staff as well as of community volunteers. Many aspects of training have been highlighted by the National Disaster Management Authority (NDMA) like BLS (Basic Life Support), CPR (Cardio-Pulmonary Resuscitation), CBRN (Chemical Biological Radiological and Nuclear), Triage, ACLS (Advanced Cardiac Life Support), Bio-Medical Waste management (BMW) and IDSP (Integrated Disease Surveillance Programme) in the guidelines on medical preparedness and mass casualty management.¹¹

Many disasters/disaster like situations have occurred in Delhi also. Recurrent flood due to Yamuna or Sahibi river, few episodes of earthquake, fire incidents, buildings' collapse, terrorist attacks, riots and radiation exposure are few examples of disaster/disaster-like situations which happened in Delhi.¹² A gas leak incident from a chemical container was reported in Tughlakabad area in Delhi on 6th May 2017 in which more than 300 students of two schools were affected.¹³ Delhi also being the

nation capital, remains on high alert so often. Therefore, peripheral health facilities of health department at the district-level and hospitals in Delhi should always be prepared to manage any eventuality. Among the many preparatory measures, capacity building of the health care providers is one of the priority activities of state health department. This study had assessed the capacity building of medical and para-medical staff who were part of Quick Response Teams (QRT) in the district health facilities; District Programme Officers (DPOs) working in district health offices; and doctors and nurses working in various emergencies of identified departments in the hospitals.

Objectives

The objectives of this study were to:

- i) assess the training status of medical and nursing staff (who were directly dealing with the patients coming to casualty and various emergencies of identified departments in the hospital) working in the hospital and QRT in-charges, one of the other members of QRTs and DPOs working in district health department.
- ii) seek the opinions/suggestions of medical and para-medical staff (working in hospital, peripheral health facilities and district health department) who were interviewed for their training status; and opinion of their senior officers for the improvement of disaster management capacity in their respective area of working.

Methodology

The descriptive study design was used for the study. Out of eleven districts in Delhi, two districts were selected using simple random sampling method. The designated hospitals in both the districts were enlisted and one hospital in each district was selected using simple random sampling method (only state government hospital was taken into consideration). The total health facilities of district health departments in both the districts were enlisted separately and by using simple systemic random sampling method, 22 health facilities in both the districts were included in the study. From the two hospitals chosen (one from each district), one hospital (hospital-1) was tertiary care hospital with more than 1450 beds and the second hospital (hospital-2) was 300-bedded hospital. Six departments which play the major role in the disaster management, like Medicine, Surgery, Gynaecology & Obstetrics, Orthopaedics, Paediatrics, and Accident & Emergency were selected for the study. Senior hospital administrators, nodal officer for disaster management, Head of the Department (HOD)/Acting HoD of each mentioned department, In-charges of emergency, essential and other allied services like ambulance, blood bank, drug store/equipment store/pharmacy, emergency laboratory, emergency operation theatre, kitchen, media/communication, mortuary, emergency radiological service, security and sanitation and minimum one Senior Resident (SR), one Junior Resident (JR)/Medical Officer (MO), one Nursing Staff (NS) (working in various emergencies of identified

departments) were interviewed in each hospital. In the health department at the district level, Chief District Medical Officer (CDMO), Additional Chief District Medical Officer (ACDMO), nodal officer disaster management and District Programme Officers looking after programme of IDSP, Immunization and Bio-Medical Waste management were considered for the study. At the level of health facilities, Quick Response Team (QRT) in-charges (medical officers) and one of the members of the QRT (either pharmacist or Public Health Nurse/Auxiliary Nurse Midwife or dresser/nursing orderly) have been taken as respondents in the study.

Primary data were collected by interview with the identified respondents by using pre-tested and validated interview schedule. Secondary data were collected from the offices of the concerned officers which include various guidelines, disaster management plan, circulars and orders. The study was conducted during October 2017—March 2018. Ethical approval was taken from the National Institute of Health and Family Welfare (NIHFW) prior to data collection. Only those participants who gave consent, were interviewed.

Inclusion Criteria: Only the health facilities of the Delhi government health department at the district-level and Delhi government hospitals were included in the study as the health department of Delhi Government is the primary agency for trauma care and counselling. In hospitals, doctors (senior residents, junior residents/medical officers) and nurses (nursing sisters/staff nurses) who were working in the various emergencies of identified departments, were only assessed for the training status. In the health facilities (dispensaries and polyclinics) of district health department, medical officers who were the in-charge of QRTs and one of the other members of QRTs and DPOs working in the district health department, were assessed for the training status. In the hospital, medical and nursing staff working in various emergencies, first come in contact with any disaster situation and in the health facilities at the district-level, it is the QRT and DPOs which responds first whenever asked by the higher authorities. Mohalla clinics were not considered in the study as they did not have QRTs. Respondents who had recently joined or working for less than 3 months, were not interviewed

Findings

The findings were analysed as per the objectives of the study. The training status of respondents of the district health department and hospitals has been presented separately as given below.

Training Status of Respondents Working under District Health Department

Health facilities of the district health department have one identified QRT in each facility with the availability of a disaster kit. The in-charge of this QRT was medical officer working in the health facility and members were one pharmacist, one Public Health Nurse (PHN)/Auxiliary Nurse Midwife (ANM) and one of the supporting staff

from amongst the Dressers/Nursing Orderly/SafaiKaramchari-cum-Chowkidar. In-charge of the QRT (medical officer) and one of the members (either pharmacist or PHN/ANM or dresser) were interviewed in the health facilities of the district health department.

Total 49 respondents were interviewed in both the districts including District Programme Officers (DPOs). Amongst them, 67.3% were trained in CPR, 61.5% in Bio-Medical Waste Management, 53.1% in BLS and Triage, 38.8% in IDSP, 8.2% in CBRN & Emergency Medical Response (EMR) and only 4.1% in Psychosocial care. QRT incharges were more trained in BMW Management, BLS, Triage and IDSP. Training in CBRN, EMR and Psycho-social care were the lowest (Table 1).

TABLE 1
Training Status of QRT In-Charges, QRT Members and DPOs

Training Topics	QRT Incharges (n=22) (%)	QRT Members (n=22) (%)	DPO (n=5) (%)	n =49 (%)
CPR	14 (63.6)	14 (63.6)	5 (100)	33 (67.3)
BMW Management	16 (72.7)	11 (50)	5 (100)	32 (61.5)
BLS	14 (63.6)	8 (36.4)	4 (80)	26 (53.1)
Triage	17 (77.3)	5 (22.7)	4 (80)	26 (53.1)
IDSP	13 (59.1)	5 (22.7)	1 (20)	19 (38.8)
CBRN	1 (4.5)	1 (4.5)	2 (40)	4 (8.2)
EMR	1 (4.5)	1 (4.5)	2 (40)	4 (8.2)
Psychosocial care	1 (4.5)	1 (4.5)	0 (0)	2 (4.1)

CPR: Cardio-Pulmonary Resuscitation, BMW: Bio Medical Waste, BLS: Basic life Support, IDSP: Integrated Disease Surveillance Programme, CBRN: Chemical Biological Radiological and Nuclear, EMR: Emergency Medical response, QRT: Quick Response team, DPO: District Programme Officer

Duration of service of these staff are analysed in Table 2. Duration of service of 26.5% of the respondents was from 1 year to 5 years but rest of the respondents (73.5%) were working in the health facilities for more than 5 years. Mean duration of service was 15.2 years.

TABLE 2
Duration of Service (Years) of Respondents of District Health Department

Total Duration of Service	QRT In-charges (n=22)	QRT Members (n=22)	DPO (n=5)	n =49 (%)	Mean &SD
1-5	10	1	2	13 (26.5)	Mean=15.2 SD =10.5
6 -10	3	2		5 (10.2)	
11-15	7	0	1	8 (16.3)	
16-20	1	7	1	9 (18.4)	
21-25	1	4	1	6 (12.2)	
26-30	0	1		1 (2)	
31-35	0	6		6 (12.2)	
36-40	0	1		1 (2)	

CDMO: Chief District Medical Officer, ACDMO: Additional Chief District Medical Officer, QRT: Quick Response team, DPO: District Programme Officer, SD: Standard Deviation

Training Status of Respondents Working in Hospitals

The doctors like senior residents, junior residents/medical officers and nursing sisters/staff nurses working in the casualty and different department's emergencies were interviewed on their training status. Total 40 doctors and 21 nursing staff were assessed for their training status. Among the total respondents, 82% were trained in Bio-Medical Waste (BMW) management, 67.2% in ALCS/BLS, 45.9% in triage and 42.6% in Emergency Medical Response (EMR). Lower training status was observed in CBRN at 14.8%, and the lowest in IDSP and Psycho-social care at 11.5% for both. The nurses were less trained in Psycho-social care, IDSP, CBRN, triage and EMR than the doctors (Table 3).

TABLE 3
Training Status of Junior Residents/Medical Officers/Senior Residents and Nursing Staff

Training Topics	JRs/SRs/MOs (n=40) (%)	NS (n=21) (%)	n=61 (%)
BMW Management	30 (75)	20 (95.2)	50 (82)
ACLS/BLS	27 (67.5)	14 (66.7)	41 (67.2)
Triage	22 (55)	6 (28.6)	28 (45.9)
EMR	20 (50)	6 (28.6)	26 (42.6)
CBRN	6 (15)	3 (14.3)	9 (14.8)
IDSP	7 (17.5)	0 (0)	7 (11.5)
Psychosocial care	5 (12.5)	2 (9.5)	7 (11.5)

JR: Junior Resident, MO: Medical Officer, NS: Nursing Staff, SR: Senior Resident, BMW: Bio Medical Waste, BLS: Basic life Support, IDSP: Integrated Disease Surveillance Programme, CBRN: Chemical Biological Radiological and Nuclear, EMR: Emergency Medical Response, ACLS: Advanced Cardiac Life Support

TABLE 4
Duration of Service of Respondents of in Both the Hospitals (in Months and Years)

Duration of Service	JR/MO	NS	SR	n=61 (%)
More than 3 months to 6 months	4	0	3	7 (11.5)
More than 6 months to 1 year	4	0	1	5 (8.2)
1 to 2 years	5	0	6	11 (18)
2 year to 3 year	9	0	1	10 (16.4)
More than 3 year to 5 year	1	2	1	4 (6.6)
6 to 10 year	4	5	0	9 (14.8)
11 to 15 year	1	4	0	5 (8.2)
16 to 20 year	0	2	0	2 (3.3)
21 to 25 year	0	1	0	1 (1.6)
26 to 30 year	0	5	0	5 (8.2)
31 to 35 year	0	2	0	2 (3.3)
36 to 40 year	0	0	0	0 (0.0)

DMS: Deputy Medical Superintendent, HOD: Head of the Department, JR: Junior resident, MO: Medical officer, NS: Nursing Staff, Sr. Senior resident, SD: Standard Deviation.

Duration of service of these staff is reflected in Table 4. Majority of the junior residents/medical officers and senior residents had been working for more than six

months in the hospital/casualty. 80.3% of the doctors and nursing staff had been working for over a year. All the nursing staff was working in the hospital for more than 3 years. Though the period of service of junior residents and senior residents was lesser as compared to the period of service of nursing staff but working in casualty and handling various emergencies and being the first responder in the emergency medical and surgical conditions, their training in Triage, ACLS/BLS, CBRN and Psycho-social care is of paramount importance.

Opinions/Suggestions of Respondents

The opinions/suggestions of the medical and nursing staff (working in the hospitals, peripheral health facilities and district health department) were sought on their training status. Opinion of their senior officers for the improvement of disaster management capacity in their respective areas of working was also sought. These senior officers were Deputy Medical Superintendent (DMS), Head of the Department (HOD)/Acting HOD, in-charges of various allied services, nodal officer disaster management at the hospital level and Chief District Medical Officer and Additional Chief District Medical Officer at the level of district health department. Major suggestions of the respondents of district health department and hospital respondents are given in Table 5 and 6 respectively.

The respondents of the district health department gave many suggestions for the improvement of the management of disasters at the district level. Suggestions include training and refresher training of staff, availability of equipment, availability of medicine, sufficient staff availability, better coordination and mobile medical team at the district-level but majority of the respondents (57.7%) opined that training and refresher training of health care providers should be held regularly (Table 5).

TABLE 5
Major Suggestions of Officers/Officials of District Health Department for the Improvement of Department in Disaster Management

Suggestions for Improvement	Response of Respondents				
	QRT In-charges	QRT members	DPOs	CDMO/ACDMO	n=52 (%)
	(n=22) (%)	(n=22) (%)	(n=5) (%)	(n=3)(%)	
Training and refresher training every three years	15 (68.2)	12 (54.5)	2 (40)	1 (33.3)	30 (57.7)
Availability of equipment	13 (59)	10 (45.1)	1 (20)	0 (0)	24 (46.2)
Availability of medicine	11 (50)	3 (13.6)	0 (0)	0 (0)	14 (26.9)
Sufficient staff availability	5 (22.7)	4 (18.2)	1 (20)	0 (0)	10 (19.2)
Better coordination	5 (22.7)	0 (0)	0 (0)	0 (0)	5 (9.6)
Mobile medical teams as district team for 24x7	1 (4.5)	1 (4.5)	1 (20)	2 (66.7)	5 (9.6)

CDMO: Chief District Medical Officer, ACDMO: Additional Chief District Medical Officer, QRT: Quick Response team, DPO: District Programme Officer, SD: Standard Deviation.

Suggestions of 91 respondents including 30 senior health officers were sought from both the hospitals for the improvement of management of disasters but only 53

respondents gave suggestions out of which 52.8% (majority of them were senior hospital administrators) opined for regular training and refresher training of all the staff working in the hospital.

TABLE 6
Suggestions of Hospital Respondents to Improve Disaster Management

Suggestions for Improvement	Response of Respondents				
	SR (n=8)	JR/MO (n=10)	NS (n=5)	DMS/HOD/ Incharge (n=30)	n=53 (%)
Training & refresher training to all staff	6	3	2	17	28 (52.8)
Ensure better patient staff ratio	3	4	5	5	17 (32.1)
Sufficient equipment including mobile equipment	5	5	2	3	15 (28.3)
More mock-drill and participation of each staff	1	2		11	14 (26.4)
Stakeholder's awareness about disaster plan	3	4		5	12 (22.6)
Better coordination		1	2	8	11 (20.8)
Availability of sufficient medicine	1	5			6 (11.3)
Special disaster force (primary and back-up team)	2		1	3	6 (11.3)

DMS: Deputy Medical Superintendent, HOD: Head of the Department, JR: Junior resident, MO: Medical officer, NS: Nursing Staff, SR: senior resident, SD: Standard Deviation.

Discussion

Prior to Disaster Management Act 2005, management of disaster was relief-centric. Disaster Management Act⁸ has defined the role and responsibilities of various departments including health department in India. Guidelines on medical preparedness and mass casualty management emphasised on the preparedness of the health department including hospitals to manage the disasters.¹¹ Human resource without skill will not be able to perform its duties effectively during a disaster situation. This statement corresponds with the observation made by Jain and Thirupphugazh¹⁴ in their study wherein they claimed that there were three levels of capacity building; and one of the levels was individual which pertains to the skills and knowledge of the individual. Perry and Lindell¹⁵ made similar observations in their study. They identified that training is an integral part of the disaster planning process and successful training yields high dividends in effectiveness of emergency response. Therefore, there is a need for skill building of the hospital staff.

Many trainings have been prescribed for medical and para-medical staff in the guidelines on medical and mass casualty management.¹¹ The training topics assessed in present study were in consistent with the study of Nair and Gupta¹⁶ wherein trainings advised were on mass casualty event, basic and advanced life support, hazardous materials life support, triage protocols, and use and maintenance of emergency equipment. Study by Talatiet al.¹⁷ highlighted the importance of triage. The study revealed that all medical and para-medical staff should be trained in triage but only 53.1% of the respondents of the district health department (except senior administrators of district health department) and 45.9% of the doctors and nursing staff of hospitals were trained in triage. Gupta and Mishra¹⁸ in their study claimed that there was a lack of trained manpower that could effectively cater to the seriously injured patients at all levels of health care. There was lack of trained doctors and

nurses in emergency departments as revealed in this study also. In hospitals, 67.2% of the respondents were trained in BLS/ACLS, 82% in BMW management, 14.8% in CBRN and 42.6% in EMR.

Hospital's surveillance system should be able to detect the earliest cases on infection especially among the disaster casualties¹⁹ but the training status of hospital doctors and nurses in IDSP was found to be 11.5%. A tri-city mega mockexercise on earthquake covering cities of Shimla, Panchkula, Mohali and Chandigarh found that training of stakeholders in various aspects of disaster management was lacking.²⁰ In his article, Hariharan²¹ advised training in psycho-social care of first responders and primary care givers. Perry and Lindell¹⁵ also revealed similar findings in their study. They noticed that for every single patient with a physical injury, there were 10 people with some level of psychological impairment, and they need psycho-social care. However, only 11.5% of the respondents in hospitals (except hospital administrators/managers) and only 4.1% of the respondents (except district health department administrators) of district health department were trained in psycho-social care. When the respondents and their senior health officers were asked about the improvement measure for the effective management of disasters, 57.7% of the respondents of district health department and 52.8% of the hospital respondents suggested to train and retrain the health care providers. They noticed that lack of skill hampered the management of disaster or disaster like situation because in that situation, every minute counts and skilled staff can effectively put their effort.

Conclusion

District health department and hospitals are required to be prepared to manage the disasters or disaster like situations. Capacity building of health care providers working in the health facilities of district health departments and hospitals, is of paramount importance for the management of disasters or disaster like situations. The apex disaster management body in India- National Disaster Management Authority (NDMA) has issued various guidelines for the disaster management. NDMA and National Policy on Disaster Management have recommended capacity building of health care providers in various aspects of disaster management. Training status of QRT in-charges, QRT members and DPOs of district health department and medical and nursing staff working in various emergencies in hospitals was assessed in this study. The study showed that 53.1% of the respondents of district health department were trained in Triage and 4.1% in psycho-social care. Training status of doctors (JRs/MOs/SRs) and nursing staff working in both the hospitals showed that 67.2% were trained in BLS/ACLS, 82% in BMW management, 14.8% in CBRN, 42.6% in EMR and only 11.5% in psycho-social care and IDSP. It shows the training status of medical and para-medical staff at the district level and in hospitals, were low in CBRN, EMR, IDSP and psycho-social care (less than 50%) and training in Triage among hospital respondents was also low (45.9%). Twelve years have passed since the Disaster Management Act was enacted but still capacity building of the health care providers is a challenge for the hospital and health department.

Recommendations

Capacity building of health care providers is very important and it needs to be strengthened at every level. In this study, training status of QRT in-charges, QRT members and DPOs at the district-level and doctors and nurses working in various emergencies in hospitals was less than 50% in IDSP, CBRN, EMR and psycho-social care and it was also less than 50% in Triage among doctors and nurses working in various emergencies in hospital. Therefore, it is highly recommended that training for all the hospital staff (specially staff working in various emergencies) and QRT in-charges and its members in the IDSP, CBRN, EMR, psycho-social care and Triage should be held regularly. Refresher training of the health care providers should also be held periodically, who were trained three to five years back.

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Regional Variation in Contraceptive use in Rajasthan: Demographic and Socio-Economic Challenges

Sherin Raj T.P*, V.K. Tiwari** and J.V. Singh***

Abstract

Area-wise, Rajasthan is one of the largest states in the country with a high population growth rate in different regions of the state. The use of various contraceptive methods in Rajasthan varies in each region, and also among different caste and religious groups. This paper examines the socio-economic and demographic factors responsible for the regional variation in using contraception among currently married women in the reproductive age group. District Level Household Survey (DLHS-3) data have been used for the analysis in this study. The study found that the contraceptive prevalence rate for any method is the highest in the Southern region (61.2%) and the lowest in the North-eastern region (52.3%). Age of the mother, caste, religion, education, wealth index, child loss and exposure to mass media were significantly influencing the acceptance of various methods of contraceptives in the state and regions. Family planning efforts in Rajasthan must consider the determinants of different contraceptive preferences and choices across different women groups to address these preferences and choices in an efficient and cost-effective manner.

Key words: Contraceptive use, CPR, Family planning, Population growth, Regional variation.

Contraceptive use, as a proximate determinant of fertility, plays an important role in reducing fertility; and at times, contraceptive prevalence has been used to evaluate the effect of family planning programmes (Boulier, 1985).¹ In 2000, the heads from 189 countries endorsed the Millennium Declaration (Cates Jr. W et al. 2010)² where universal access to contraceptive methods was reemphasized as the most cost-effective way of reducing maternal mortality (Goldie SJ et al. 2010)³. Family planning research and policy have efficiently reoriented the choice of avoiding pregnancy along with convenient and informed access to contraceptive methods to control fertility, especially unwanted/unintended or mistimed pregnancy (Roy TK et al. 2008⁴, Dehlendorf C et al. 2010⁵; Cleland K et al. 2011⁶), and to attain the desired family size (Cleland K. et al. 2011⁶).

Rajasthan is one of the largest states by area in the country with a high population growth rate (21.4%) in India as per 2011 census. There were 32 districts as per the 2011 census and four regions (as per NFHS-2)⁷ in Rajasthan. The acceptance of different contraceptive methods varies in each district and region, within society and also among different caste and religious groups. The possible reasons for the lower acceptance include cultural backgrounds, attitudes towards family planning, meagre knowledge of family planning methods, lack of accessibility and availability of services, and the prevalence of traditional methods of birth control (Singh LP & Srinivasan K. 2000)⁸.

*Assistant Research Officer; **Professor and Head, Department of Planning and Evaluation, The National Institute of Health and Family Welfare, New Delhi-67. ***Professor and Head, Department of Community Medicine, King George's Medical University, Lucknow-03.

In view of these factors in Rajasthan, it is imperative to examine the regional variation in the use of contraceptives among currently married women of reproductive age group.

Methodology

District Level Household Survey (DLHS-3)⁹ data have been used for the analysis. In the state of Rajasthan, DLHS-3 sample covered a total of 38797 currently married women in the age group 15-49. For regional analysis, the state has been divided into four regions according to the National Family Health Survey 2 (NFHS-2)⁷ as given below:

TABLE 1
Regional Classification of Districts in Rajasthan

	Region	Districts
1	Western Region (13629)*	Ganganagar, Bikaner, Churu, Jaisalmer, Jodhpur, Nagaur, Pali, Barmer, Jalor, Sirohi, Hanumangarh (11 districts)
2	North-eastern Region (14527)*	Jhunjhunun, Alwar, Bharatpur, Dhaulpur, Sawai Madhopur, Jaipur, Sikar, Ajmer, Tonk, Bhilwara, Dause, Karauli (12 districts)
3	Southern Region (4735)*	Dungarpur, Banswara, Udaipur, Rajasmond (tribal dominated)
4	South-eastern Region (5906)*	Chhitaurgarh, Bundi, Kota, Jhalawar, Baran (Hadoti Area)

* Sample size in each region from DLHS-3 given in bracket

The Western region includes Ganganagar, Bikaner, Churu, Jaisalmer, Jodhpur, Nagaur, Pali, Barmer, Jalor, Sirohi and Hanumangarh district. The North-eastern region constitutes Jhunjhunun, Alwar, Bharatpur, Dhaulpur, Sawai Madhopur, Jaipur, Sikar, Ajmer, Tonk, Bhilwara, Dause, and Karauli district. The Southern region constitutes Dungarpur, Banswara, Udaipur, and Rajasmond district. The South-eastern constitutes Chhitaurgarh, Bundi, Kota, Jhalawar, and Baran district.

Findings

Awareness and Family Planning

Awareness on family planning methods plays a significant role in deciding a suitable method of contraception. Many a times, women shy away from using contraception mainly because they lack knowledge and are afraid of sterilization; Copper T or pills don't suit them; or injection is not available, etc. thereby carry the burden of unwanted pregnancies or go for abortion which is mainly unsafe. The knowledge of a wide-range of contraceptive methods helps women to overcome such difficulties.

In the District Level household Survey report 2007-08, it was found that 99.2 percent of the currently married women in the age group 15-49 know any kind of modern method of family planning in Rajasthan. The regional analysis shows the awareness of modern method of family planning is more than 98 per cent in all the regions. Knowledge on male and female sterilization method was also more than 90 per cent in all the regions except the north-eastern region (Table 2).

TABLE 2
Awareness of Contraceptive Methods Among the Currently Married Women

Regions	Any Method	Any Modern Method	Male Sterilization	Female Sterilization	IUD	Pill	ECP	Condom/Nirodh	Female condom	Rhythm Method
Western Region	99.9	98.9	94.1	99.9	79.8	94.8	34.5	87.8	5.9	53.2
North-eastern Region	98.3	98.2	87.6	97.7	74.3	86.9	40.7	81.8	9.7	46.7
Southern Region	99.9	99.9	99.4	99.9	82.1	98.0	34.7	98.4	2.6	75.1
South-eastern Region	99.0	98.9	92.4	98.4	69.4	91.2	27.8	83.9	7.70	48.3
Rajasthan	99.2	99.1	92.0	98.8	76.4	91.6	34.5	86.2	7.2	52.6

Source: DLHS-3, 2007-08.

A significant variation is observed in the Knowledge of IUD. It varies from the lowest 69.4 percent (South-eastern region) to the highest 82.1 percent (Southern region). Awareness on emergency contraceptive pills (ECP) was low (34.5%). Knowledge on Female condom is very less (less than 10%) in all the regions and in the southern region, it is the lowest with 2.6 percent. The acceptance of any modern contraception was the highest in the southern region.

Current Use of Family Planning Methods

Table 3 shows that the most commonly used method is female sterilization (42.6%) followed by condom/Nirodh method (7.7%). The percentages of other methods like pills, IUD, rhythm, ECP, vasectomy, withdrawal methods are very low (5% or less). Among various methods of family planning, female sterilization is the main method used in all the regions, the level of acceptance of this method was almost same (42%) in all the four regions (Table 3). Regarding IUD, Southern region has the highest percentage users (2.0%). The Condom/Nirodh users were the highest in Southern region (11.7%) followed by South-eastern region with 10.21 percent while in the North-eastern region, it was the lowest with 6.2 per cent. This indicates the need of providing a basket of choices to the couples.

TABLE 3
Regional Variation In Contraceptive use by Various Methods

	Female sterilization	Male sterilization	IUD	Pills	Injectables	Condom/Nirodh	Female Condom	Rhythm Method	Withdrawal	Other	Not mentioned
Western	42.73	0.51	1.72	3.32	0.10	6.97	0.02	1.50	0.83	0.04	42.25
North-eastern	42.71	0.66	0.79	2.19	0.14	6.16	0.01	1.59	1.18	0.23	44.32
Southern	42.37	0.78	2.03	3.82	0.11	11.66	0.02	2.20	1.25	0.04	35.73
South-eastern	42.23	0.47	0.85	3.32	0.05	10.21	0.00	1.74	0.85	0.10	40.18
Rajasthan	42.60	0.60	1.28	2.96	0.11	7.73	0.01	1.66	1.02	0.12	41.92

Source: Computed from DLHS-3 data 2007-08.

When we see the contraceptive prevalence rate, there is a gap between awareness and practices of various types of family planning methods. There are many barriers to use contraception. The contraceptive prevalence rate (CPR) for any method changed marginally by 6.6 percent points from 40.3 to 46.9 percent during DLHS-1 to DLHS-2 (not given in table) and it has increased to 58.1 percent in DLHS-3. CPR for any method is the highest in the Southern region (61.2%) and the lowest in the North-eastern region (52.3%). There is a substantial gap between rural and urban CPR in each region. CPR by modern methods has statistically significant variations across the regions and localities. Traditional methods were accepted by few (2.7%) couples in Rajasthan (Table 4). Traditional method users were the highest (3.4%) among the rural women of the Southern region and were the lowest in rural areas of the Western region (2%). This indicates that couples mostly rely on modern methods.

TABLE 4
Regional Variation in Contraceptive Prevalence Rate by Place of Residence

	CPR any Method			CPR any Modern Method			Traditional Method		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Western *	54.5	61.8	55.9	52.5	58.7	53.7	2.0	3.0	2.2
North-eastern *	50.3	60.0	52.3	47.6	56.8	49.5	2.5	3.1	2.6
Southern *	59.8	71.8	61.2	56.3	68.9	57.8	3.4	2.8	3.4
South-eastern *	52.8	62.9	55.0	50.2	60.3	52.4	2.5	2.4	2.5
Rajasthan*	56.4	64.3	58.1	53.6	61.0	55.3	2.6	3.1	2.7

Source: Computed from DLHS-3 data 2007-08. * $p < 0.05$

The pattern of family planning acceptance among different social groups significantly varies due to their perception regarding control of fertility. Across the social groups, it is seen that among the SCs, the acceptance of contraceptive for any method and modern methods is much lower than the 'other social groups' and OBCs. Scheduled Tribes have the highest traditional method users (3%) as compared to other social groups. The reason may be due to the low reach of available health services to them (Table 5).

TABLE 5
Regional Variation in Contraceptive Prevalence Rate by Social Groups

	Any Method					Modern Method					Traditional Method				
	SC	ST	OBC	Others	Total	SC	ST	OBC	Others	Total	SC	ST	OBC	Others	Total
Western***\$\$\$	58.6	47.0	56.6	62.0	57.8	56.5	45.0	54.4	59.2	55.4	2.2	2.0	2.2	2.8	2.3
North-eastern***\$\$#\$	49.8	52.4	55.8	63.1	55.7	47.3	48.3	52.8	60.3	52.7	2.3	3.7	2.7	2.7	2.8
Southern*	61.4	63.6	63.6	68.6	64.3	57.0	60.5	59.8	64.6	60.8	4.4	3.0	3.7	3.9	3.4
South-eastern***\$\$#\$	59.2	54.3	59.3	70.3	59.8	55.3	52.0	56.6	68.4	57.1	3.7	2.3	2.6	1.6	2.6
Rajasthan***\$\$\$	55.2	56.5	57.2	64.0	58.1	52.6	53.5	54.4	61.2	55.3	2.5	3.0	2.6	2.8	2.7

Significance any method at * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, Significant modern method at \$ $P < 0.05$, \$\$ $P < 0.01$, \$\$\$ $P < 0.001$, Significant traditional method at # $P < 0.05$, ## $P < 0.01$, ### $P < 0.001$.

Regional analysis indicates that Southern region has the highest contraceptive prevalence rate (64.8%) for any method followed by the South-eastern and Western region with 59.8 and 57.8 percent respectively. Traditional methods users are also the highest in Southern region (3.4%) followed by North-eastern and Southern region with 2.8 and 2.6 percent respectively. The Southern region is bordering with Gujarat, and the development of the neighbouring districts may have influenced the higher contraceptive use in southern regions.

TABLE 6
Regional Variation in Contraceptive Prevalence Rate by Religion

Regions	CPR any Method			CPR Modern Method			Traditional Method		
	Hind	Musli	Other	Hindu	Musli	Others	Hind	Musli	Other
Western ***SSS#	59.4	40.0	71.2	57.2	36.4	68.1	2.1	3.4	3.0
North-eastern***SS\$	56.7	36.1	64.0	53.7	33.5	60.0	2.9	2.0	4.3
Southern	64.1	68.1	73.0	60.4	65.9	73.0	3.6	2.2	1.4
South-eastern***SS	58.6	67.8	74.2	55.8	64.3	69.4	2.7	3.5	3.2
Rajasthan***SSS	58.9	43.3	70.5	56.1	40.1	67.5	2.7	2.9	2.9

*Significant any method at *P<0.05, ** P<0.01, ***P< 0.00. Significant modern method at \$P<0.05, \$\$P<0.01, \$\$\$P<0.001. Significant traditional method at #P<0.05*

Religion has a strong social, economical and cultural influence; and plays a crucial role in the acceptance of family planning. The fertility rate of Muslims is higher as compared to Hindus and Christians in India due to low literacy, and religious influence among Muslims. Contraceptive prevalence rate of any method and modern method in Rajasthan is higher among other religious groups such as Christianity, Sikhism, etc. with 70.5 and 67.4 percent respectively; and the lowest among Muslims with 43.3 and 40.1 percent respectively (Table 6). Regional analysis shows that other religious groups (other than Muslims and Hindus) have higher contraceptive prevalence rates for any method and modern method in all regions. In Southern and South-eastern region, Hindus have the lowest the CPR for any method (64.1%) and modern method (58.6%), probably due to a large tribal population.

The Southern and South-eastern regions are the most prosperous and also border with Gujarat state. May be due to this reason, contraceptive acceptance is better among all the religious groups in these regions. The North-eastern region comprises more than 10 per cent Muslim women. The fact is that in Western and North-eastern region, Muslims have the lowest CPR for any method (40% & 36.1%) and modern method (36.4% & 33.5%). The low illiteracy among the Muslims in the state may be a prime factor for the low acceptance of modern contraception in the Muslim populated region like North-eastern.

Female education, particularly completion of primary and into secondary school, is strongly related to lowered fertility (Jain & Nag 1986¹⁰; Jejeebhoy 1995¹¹). Analysis of the current study indicates that women who have 10 and above years of schooling, have the highest contraceptive prevalence rate for any method (59.4%), modern method (55.8%) and traditional method (3.6%) (Table 7). Similar trend has been

observed in all the regions except the Southern region. In the Southern region, non-literates have the highest contraceptive prevalence rate for any method, modern method and traditional methods. It may be due to the developmental influence of border district of Gujarat and the better availability and accessibility of facilities in this region.

TABLE 7
Regional Variation In Contraceptive Prevalence Rate by Education of Women

	Any Method				Modern Method				Traditional Method			
	Non-Literate	Less than 5 yrs	5-9 yrs schooling	10 and above yrs	Non-Literate	Less than 5 yrs	5-9 yrs schooling	10 and above yrs	Non-Literate	Less than 5 yrs	5-9 yrs schooling	10 and above yrs
Western*** SS	58.5	53.6	55.5	60.1	56.3	51.2	53.3	57.2	2.2	2.1	2.2	2.9
North-eastern***SSS##	56.6	50.7	51.1	57.0	53.7	48.3	48.4	52.5	2.6	2.4	2.6	4.6
Southern ***SS\$ #	67.0	59.6	55.1	59.4	63.0	58.2	52.7	55.9	4.0	1.4	2.3	3.8
South-eastern***SS	59.8	64.2	54.3	65.1	56.7	61.3	52.0	62.6	2.9	2.8	2.2	1.8
Rajasthan***SSS##	59.3	55.7	53.7	59.4	56.5	53.5	51.2	55.8	2.7	2.2	2.4	3.6

Significant Any Method At *P<0.05, ** P<0.01, ***P< 0.001, Significant Modern Method At \$P<0.05, \$\$P<0.01, \$\$\$P<0.001, Significant Traditional Method At #P<0.05, ##P<0.01, ###P<0.001

Wealth index is the proxy of standard of living. In Rajasthan, we can see that the contraceptive prevalence rate is much higher among the rich groups as compared to the poor and middle income groups in respect of acceptance of any method and modern method.

People belonging to the poor wealth index were more among the acceptors of traditional methods as compared to the middle and rich wealth index groups in the state; may be due to access related issues. The variation in prevalence of contraceptive of any method between poor, middle and rich was large (11.5 points), Similarly, the gap for modern method was 11.7 points and highly significant (Table 8).

The prevalence rate of contraceptives also varies from region to region with wealth index. CPR for any method among the rich wealth index group, Southern region has the highest with 70.5 percent followed by South-eastern region with 66.6 percent. For poor wealth index group, Southern region has the highest with 62.2 percent and Western region has the lowest with 47.3 percent. Regarding modern method for rich wealth index group, Southern region has the highest prevalence rate with 67 percent followed by South-eastern region with 64 percent and the lowest was in western region with 59.1 percent. For the poor wealth index group, Southern region has the highest with 58.6 percent and Western region has the lowest with 44.4 percent. In the middle wealth index group, Southern has the highest with 59 percent and North-eastern region has the lowest (48.2%) CPR for modern methods. Any method and

modern method of contraceptive prevalence rate has highly significant association with wealth index (Table 8).

TABLE 8
Regional Variation in Contraceptive Prevalence Rate by Wealth Index

	CPR any Method			CPR any Modern Method			Traditional Method		
	Poor	Middle	Rich	Poor	Middle	Rich	Poor	Middle	Rich
Western ^{***SSS#}	47.3	54.4	64.8	44.4	52.5	62.4	2.9	1.9	2.4
North-eastern ^{**SSS}	48.1	51.3	62.3	45.4	48.2	59.1	2.5	2.7	3.0
Southern ^{***SSS}	62.2	62.7	70.5	58.6	59.0	67.0	3.5	3.7	3.5
South-eastern ^{***SSS}	53.1	58.0	66.6	49.9	55.2	64.0	3.2	2.7	2.5
Rajasthan ^{***SSS}	53.1	54.5	64.6	50.1	51.8	61.8	3.0	2.5	2.7

Significance any method at *P<0.05, ** P<0.01, ***P< 0.001, Significant modern method at ^SP<0.05, ^{SS}P<0.01, ^{SSS}P<0.001, Significant traditional method at [#]P<0.05, ^{##} P<0.01, ^{###} P<0.001

Contraceptive prevalence varies substantially by age of the women. As the age of the women increases, use of contraception also increases because by the age of 35 or 40, most of the couple completed their desired family size.

Among the regions, Southern region has the highest contraceptive use (84.2%) among the women in the 35-49 age groups followed by South-eastern region with 77.2 percent and the lowest was found in North-eastern region 21.3 percent in the 15-24 age group (Table 9). The regional analysis shows that in Southern and South-eastern region the highest users of traditional methods were in the age group 35-49 but, in Western and North-eastern region same was in 25-34 year age group. From this perspective, Western and North-eastern regions need to be provided better family planning services. The age is found to be statistically significant in the state and all regions for use of any method and modern method of contraception.

TABLE 9
Regional Variation In Contraceptive Prevalence Rate by Age of Mother

	Any Method				Modern Method				Traditional Method			
	15-24	25-34	35-49	Total	15-24	25-34	35-49	Total	15-24	25-34	35-49	Total
Western ^{**SSS}	21.4	62.1	74.4	57.8	19.1	59.2	72.3	55.4	2.5	2.6	2.0	2.3
North-eastern ^{**SSS}	21.3	62.7	72.7	55.7	18.5	59.7	70.3	52.7	3.0	3.0	2.4	2.8
Southern ^{***SSS}	25.3	68.7	84.2	64.3	22.2	65.3	80.4	60.8	3.1	3.4	3.7	3.4
South-eastern ^{***SSS}	26.8	65.9	77.2	59.8	24.6	63.2	74.3	57.1	2.1	2.6	2.9	2.6
Rajasthan ^{**SSS}	22.8	63.8	75.4	58.1	20.1	60.8	72.8	55.3	2.7	2.9	2.5	2.7

Significance any method at *P<0.05, ** P<0.01, ***P< 0.00. Significance modern method at ^SP<0.05, ^{SS}P<0.01, ^{SSS}P<0.001.

From the findings given in Table 10, it is evident that women who had mass media exposure, have higher prevalence rate of contraceptive use of any method or modern method in the state as well as in all the regions. Among the regions, Southern region had the highest prevalence with 64.7 percent among those who had mass media exposure compared to other regions for any method, modern method and traditional

methods. A statistically significant association is found in each region with mass media except the South region.

TABLE 10
Regional Variation in Contraceptive Prevalence Rate by Exposure of Media

Regions	Any Method		Modern Method		Traditional Method	
	With Media Exposure	No Exposure	With Media Exposure	No Exposure	With Media Exposure	No Exposure
Western ^{****SS}	60.8	55.1	58.3	53.0	2.5	2.1
North-Eastern ^{***SSS}	59.8	52.3	56.8	49.3	2.8	2.7
Southern [#]	64.7	64.2	61.6	60.2	3.0	4.0
South-Eastern ^{****SS}	63.3	57.8	60.8	55.1	2.4	2.6
Rajasthan ^{****SS}	61.3	55.5	58.6	52.7	2.7	2.6

Significance Any Method At *P<0.05, ** P<0.01, ***P< 0.001, Significant Modern Method At ^SP<0.05, ^{SS}P<0.01, ^{SSS}P<0.001, Significant Traditional Method At [#]P<0.05.

Number of living children is another strong and important factor influencing the contraceptive behaviour. Women with four or more living children had high rate of contraceptive prevalence of any method, modern method and traditional method in the state (71.8%) and also in all regions. The Southern region had the highest contraceptive users for any method, modern method and traditional methods with 83.5, 79.7 and 3.9 percent respectively, among the women with four or more living children followed by South-eastern region. Women having no child or one child were at minimum use of contraceptive method in the state with 17.1 percent. The lowest users were in the North-eastern region among the women with no child or one child for any method and modern method with 14.4 and 11.7 percent respectively (Table 11). This implies shorter birth interval leading to poor maternal and child health. The analysis shows that there is a significant statistical association between number of living children and contraceptive use for any method and modern method in the state and in all regions.

TABLE 11
Regional Variation in Contraceptive Prevalence Rate by Number of Living Children

	Any Method			Modern Method			Traditional Method		
	< 2	2-3	4+	< 2	2-3	4+	< 2	2-3	4+
Western ^{****SS}	17.5	69.0	69.8	15.2	66.5	67.5	2.3	2.6	2.1
North-eastern ^{****SS}	14.4	66.7	68.9	11.7	63.7	65.7	2.7	2.8	2.8
Southern ^{****SS#}	20.0	76.4	83.5	17.7	72.5	79.7	2.3	3.8	3.9
South-eastern ^{****SS}	19.5	73.9	76.1	17.3	71.4	72.6	2.1	2.4	3.3
Rajasthan ^{****SS}	17.1	69.9	71.8	14.7	67.0	68.8	2.4	2.8	2.7

Significance any method at *P<0.05, ** P<0.01, ***P< 0.001, Significant modern method at ^SP<0.05, ^{SS}P<0.01, ^{SSS}P<0.001, Significant traditional method at [#]P<0.05.

Experience of child loss is another factor which influences the use of family planning methods. The highest contraceptive users were reported in the Southern region for any method and modern method with 72.7 and 68.6 percent respectively among the

women those who had not experienced child loss (Table 12). There is almost 5 points gap in the use of contraception among those who lost their child and did not loss. The table also shows that there is a significant association between child loss and contraceptive prevalence rate by any method and modern method in the states and regions except the South.

TABLE 12
Regional Variation in Contraceptive Prevalence Rate by Child Loss

	Any Method		Modern Method		Traditional Method	
	Children died	Not died	Children died	Not died	Children died	Not died
Western ****SS	59.3	64.8	57.0	62.4	2.2	2.4
North-eastern ****SS	57.6	62.3	54.3	59.2	3.1	2.8
Southern	68.8	72.7	64.6	68.6	4.2	4.0
South-eastern **SS	63.8	68.0	60.0	65.0	3.7	2.8
Rajasthan ****SS	60.3	65.5	57.1	62.6	2.9	2.8

Significance Any Method At *P<0.05, ** P<0.01, ***P< 0.001, Significant Modern Method At \$P<0.05, \$\$P<0.01, \$\$\$P<0.001, Significant traditional method at #P<0.05.

Logistic Regression Analysis

To get the net influence of various variables on contraceptive practices, logistic regression analysis was used in DLHS-III data. From Table 13, it is evident that the chance of adopting contraceptive use was more than 10 times among the women in the age group 35-49 years as compared to women in the younger age group of 15-24 years in all the regions and the state. With respect to the castes of the women, the likelihood of contraceptive use among the STs was 28 percent lesser in the State, while it was 35 percent and 34 percent lower in STs of Western and North-eastern regions respectively as compared to general women.

As far as the religion is concerned, the likelihood of adopting contraceptives were higher among Hindus in the state and in regions except the South-eastern region. At the state level, the likelihood of contraceptive use were 14 percent higher among urban women than its counterparts, while in Southern and North-eastern region, it was 82 and 43 percent higher than rural women which is due to the low socio-economic development in both the regions.

In the South-eastern region, the urban women are less likely to use contraception as compared to the rural women. It may be because of the accessibility and availability of government and private health facilities. It is clearly evident from Table 13 that women with educational level of 10 and above years of schooling, have more than two times likely to use contraception than illiterate women in the state. Similar pattern is observed in all the regions, for example, in the North-eastern and South-eastern regions, women with education of 10 or above years of schooling have more than three times likely to use contraception than illiterates.

TABLE 13
Odds Ratio of CPR for any Method by Regions and State

	Categories	Western Exp(B)	North-Eastern Exp(B)	Southern Exp(B)	South-Eastern Exp(B)	Rajasthan Exp(B)
Age Group	15-24®					
	25-34	6.302***	6.553***	6.331***	5.970***	6.345**
	35-49	11.29***	10.361***	14.609***	10.711***	11.067***
Caste	General®					
	Scheduled caste	0.766	0.719	0.791	0.868	0.738**
	Scheduled tribe	0.654	0.666	0.867	0.694	0.724**
	OBC	0.832	0.805	0.995	0.980	0.848*
Religion	Hindu®					
	Muslims	0.843	0.714	0.918	2.920**	0.926
	Others	1.595	0.748	0.578	2.396	1.283
Place of Residence	Rural®					
	Urban	1.043	1.435*	1.823	0.509**	1.145
Women Education	Non-Literate ®					
	Less than 5 yrs	1-060	0.948	1.017	1.972*	1.197
	5-9 yrs schooling	1.345	1.520**	0.799	1.447	1.293**
	10 and above yrs	1.971***	3.284***	0.676	3.386***	2.173***
Wealth Index	Rich®					
	Middle	0.849	0.702	0.526*	0.469**	0.704**
	Poor	0.746	0.842	0.712	0.564**	0.728***
Media Exposure	Exposure®					
	No Exposure	0.918	0.745	1.012	0.773**	0.846*
No. of Living Children	< 2					
	2 - 3	1.422**	1.505*	1.679*	1.311	1.475***
	4+	0.814	0.941	3.059	2.700*	1.147
Children Died	No®					
	Yes	.585**	0.614*	0.325***	0.415	0.520
Regions	South-Eastern®					
	Western					0.691***
	North-Eastern					0.438***
	Southern					1.244*

®Reference Category, Significance at * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

The analysis shows women with no media exposure were 16 percent less likely to use contraceptives than those with media exposure. The regional analysis shows that the Southern region is not showing much difference in the contraceptive use between women with multimedia and no multimedia exposure. Because this region is a developed region and the districts in this region are bordering with Gujarat. Rest of the regions shows similar trend as in the state. Analysis reveals that women with two or three and four or more children, are more likely to use contraception at the state level and it was 47 and 15 percent higher than the women with no child or one child. More than three times and two times higher likelihood for using contraception is

observed in the Southern and South-eastern regions respectively among the women with four or more children as compared to women with no child or one child. From Table 13, it is evident that at the state level, those who experience child loss, their likelihood to use contraceptives were 48 percent lesser than their counter parts. This pattern is also seen in other regions. The likelihood of contraceptive use was 68, 59, 42 and 39 percent lesser than those who experienced child loss in the Southern, South-eastern, Western and North-eastern regions respectively.

Multinomial Regression Analysis

Table 14 describes the odds ratio of permanent method, temporary method and traditional methods against no method users using the multinomial logit regression model. It shows that women in the higher age group were significantly more likely to use permanent, temporary and traditional methods as compared to women in the younger age group (15-24). In the younger age group, women intend to produce more children; in the later ages when they accomplish the family size, they start using contraception. Among the women in the age group 35-49 years, the permanent method users were more than double as compared to women in the age group of 25-34 years while for temporary method users, women in the 25-34 years age group were more than two times higher than the women in the 15-24 years age group.

The effect of religion was significant only for Muslims. Compared to Hindus, the likelihood for permanent method among Muslims was 69 percent lower while for other categories, there was no significant difference with Hindus. Regarding temporary methods, women from other religions had higher odds than Hindus but Muslims didn't have much significant difference with Hindus. Similarly for traditional method, Muslims were less likely to use the traditional method than Hindus while women from other religions were more likely to use the traditional method as compared to Hindus. Education had a positive and significant effect on temporary method use. Women who had education of 10 and above years of schooling, were more likely to use temporary methods as compared to illiterates women.

Among the permanent method users, women with less than 5 years of schooling had more likely to use this than illiterates while highly educated women were less likely (48% lower odds) to adopt permanent methods than illiterates and it was statistically significant also.

Compared with the women in the general category, those belonging to the scheduled caste and scheduled tribe communities were less likely to accept permanent methods, temporary methods and traditional methods. Regarding permanent method users, women belonging to other backward category had no difference with women belonging to the general community while temporary method users were significant and less likely to adopt this method as compared to women in the general community. The difference in use of traditional method across the various castes was not

statistically significant. Women in the rich strata were significantly more likely to use permanent or temporary methods than their poor counterparts. Similar effects were seen for middle wealth index group but the results were not statistically significant for temporary and traditional method users. Women who had experienced child death, were significantly less likely to use permanent (OR=0.56, $p<0.001$) and temporary methods (OR=0.68, $p<0.001$). Women who didn't have exposure to mass media, had significantly less likely to use permanent or temporary contraceptive methods.

TABLE 14
Effect of Socio-Demographic Characteristics on the use of Various Methods of Contraceptive

		Permanent Methods vs None			Temporary Methods vs None			Traditional Methods vs None		
		Exp(B)	LB	UB	Exp(B)	LB	UB	Exp(B)	LB	UB
Age Group	15-24®	1.000	.	.	1.000	.	.	1.000	.	.
	25-34	10.063 ^c	9.125	11.097	2.340 ^c	2.134	2.566	1.874 ^c	1.563	2.247
	35-49	22.61 ^c	20.434	25.019	1.432 ^c	1.282	1.6	2.425 ^c	1.999	2.942
Religion	Hindu®	1.000	.	.	1.000	.	.	1.000	.	.
	Muslims	0.310 ^c	0.278	0.346	1.030	0.908	1.169	0.861	0.677	1.094
	Others	1.027	0.833	1.267	1.155	0.904	1.476	1.113	0.68	1.821
Education	Non-Literates®	1.000	.	.	1.000	.	.	1.000	.	.
	Less than 5	1.063	0.919	1.23	1.318 ^b	1.09	1.593	0.821	0.554	1.216
	5-9 Years of School	0.925	0.852	1.004	1.579 ^c	1.424	1.751	0.949	0.775	1.16
	10 and above	0.520 ^c	0.46	0.587	2.336 ^c	2.044	2.669	1.230	0.948	1.596
Caste	General®	1.000	.	.	1.000	.	.	1.000	.	.
	Scheduled Caste	0.931	0.847	1.024	0.775 ^c	0.679	0.884	0.924	0.726	1.176
	scheduled tribe	0.943	0.848	1.049	0.739 ^c	0.639	0.854	0.873	0.672	1.134
	OBC	1.000	0.926	1.081	0.841 ^b	0.763	0.928	0.962	0.797	1.163
Wealth Index	Poor®	1.000	.	.	1.000	.	.	1.000	.	.
	Middle	1.353 ^c	1.254	1.459	1.073	0.958	1.202	1.164	0.958	1.414
	Rich	2.139 ^c	1.954	2.34	1.791 ^c	1.575	2.038	1.621	1.291	2.035
Child death	No®	1.000	.	.	1.000	.	.	1.000	.	.
	Yes	0.568 ^c	0.532	0.606	0.677 ^c	0.612	0.75	0.847	0.717	1.002
Media Exposure	Yes®	1.000	.	.	1.000	.	.	1.000	.	.
	No	0.941 ^a	0.89	0.995	0.825 ^c	0.763	0.892	1.007	0.875	1.158
Regions	South-Eastern®	1.000	.	.	1.000	.	.	1.000	.	.
	Western	0.730 ^c	0.669	0.796	0.594 ^c	0.532	0.664	0.660	0.53	0.822
	North-Eastern	0.776 ^c	0.712	0.847	0.438 ^c	0.39	0.49	0.830	0.672	1.025
	Southern	1.112	0.993	1.244	1.424 ^c	1.241	1.634	1.626	1.26	2.099

® Reference category, No method use is the base category; LB -lower boundary, UB - upper boundary

^a $p<0.05$, ^b $p<0.01$, ^c $p<0.001$

To understand the regional variation in the use of various contraceptive methods, a region variable placed in the model at state level. Results suggest that currently married women in the Southern region were more likely to use permanent methods of family planning as compared to those belonged to the South-eastern region. Women in the Western and North-eastern regions were almost 27 and 23 percent less likely to use permanent methods respectively as compared to women in the South-eastern

region. Compared to South-eastern region, women in the Southern region had 42 percent significantly higher odds for using temporary methods. But women in the Western and North-eastern regions were significantly less likely (41% and 57% lower odds) to use temporary methods as compared to women in the South-eastern region. In the case of traditional methods, the likelihood was 63 percent higher among the women of the Southern region as compared to the women of South-eastern region while Western and North-eastern region had lesser odds (44% and 17% respectively) as compared to the South-eastern region against no method users which was not significant.

Discussion

The awareness on any method of family planning is almost similar in each region. However, north-eastern region had relatively lower level of knowledge on modern methods such as male sterilization, IUD, Pills and condom according to DLHS-III survey estimates. Knowledge of IUD varied from 69.4 percent in the South-eastern region to 82.1 percent in the Southern region but knowledge on ECP (34.7%) and female condom (2.6%) was found to be low in the Southern region as well as in the rest. In the Southern region, condom users were nearly 12 percent while it was 6 percent in the North-eastern region. Southern region is the tribal dominated area where knowledge and practice of traditional method was comparatively higher. Another reason for high awareness may be that the districts of the Southern region are bordering with Gujarat; so, more developed and have positive attitude towards family planning. Possibly due to this reason, CPR for any method and modern methods were high in the Southern region. However, the contraceptive prevalence rate was lower than the prevailing awareness level in each region and the state. It indicates a kind of gap between awareness/knowledge and practices of any types of family planning methods. On the other hand, it may also imply the availability of services as inadequate. The phenomena of high knowledge and low practice have been observed in multiple studies conducted in various parts of India (Kumari 2005¹²; Prusty 2014¹³; Bhasin et al. 2005¹⁴; Bora & Kumar 2014¹⁵).

There is a substantial gap between rural and urban CPR (any method) in each region. The study by Chaurasia (2014)¹⁶ using DLHS-3 supports the findings of the current study. These variations are mainly due to the differentials in the availability and accessibility of the facilities and services.

The pattern of family planning methods varies among different social groups due to their own perception regarding fertility control. Across the social groups, it is seen that among SCs, the contraceptive for any method and modern methods are much lower than the other social groups. Scheduled Tribes were the highest traditional method users (3%) compared to other social groups. The reason may be due to their traditional knowledge and practices. Women from other than SC/ST and OBC category, have the highest prevalence rate of contraceptive use for any method and modern method in all the four regions and state as compared to the other social

groups. One of the possible reasons may be that due to communication gap between service providers and acceptors among SC/ST and OBC, and lack of access among the under privileged groups.

Contraceptive prevalence rate of any method and modern method in Rajasthan is higher among other religious groups (Christian, Sikh, etc.) with 70.5 and 67.4 percent respectively and the lowest among Muslims with 43.3 and 40.1 percent respectively. The southern and south-eastern regions have less percentage of (2% and 6.4%) Muslim population and the regions are prosperous also. May be due to this reason, contraceptive acceptance rate is better among all religious groups in these two regions. North-eastern region comprises of more than 10 percent Muslim population. In the western and north-eastern region, Muslims have the lowest CPR for any method (40% & 36.1% respectively) and modern method (36.4% & 33.5%, respectively). Analysis of the National Family Health Surveys (NFHS-III, 2005-06)¹⁷ in India for Muslim and non-Muslim differentials in Family Planning showed that Muslim women had greater opposition to family planning. Also, Muslims tend to utilize private-sector services due to better privacy but the family planning programme rely on public-sector (Mishra 2004)¹³. Though more and more educated class among Muslims opting for small family but the belief that Islamic law prohibiting contraception was seen as the major obstacle among the masses (Singh et al. 2003)¹⁸. Logistic regression analysis also indicated that Muslims have less likely to use contraception as compared to other religious groups in each region except the southern region. The multinomial regression results reveal that the effect of religion was significant only for Muslims. As far the temporary methods are concerned, women from other religions have higher odds (OR=1.16) than Hindu women. Similarly, Muslims were less likely to use the traditional method than Hindus.

Education of women plays a crucial role in the utilization of family planning methods (Singh & Joshi 2014¹⁹; Raju 1987²⁰; Chaurasia 2014¹⁶). Female education, particularly completion of primary and secondary schooling is strongly related to lowering fertility (Jain & Nag 1986¹⁰; Jejeebhoy 1995¹¹). Women who have 10 and above years of schooling, have the highest contraceptive prevalence rate for any method (59.4%), modern method (55.8%) and traditional method (3.6%). Similar trend has been observed in regions except the southern region. In the southern region, illiterates have the highest contraceptive prevalence rate for any method, modern method and traditional methods. It may be due to the influence of border district of Gujarat, low poverty in rural areas and better availability and accessibility of facilities in this region. Findings from multinomial regression analysis shows that women who had education of 10 and above years of schooling were more likely (OR= 2.34) to use temporary methods as compared to illiterate women. While highly educated women were less likely (48% lesser odds) to adopt permanent methods. Women who had education of more than 10 years of schooling, were 23 percent more likely to use traditional method than illiterates.

Rich groups have high CPR for any method and modern method in all regions and CPR is the lowest among the poor wealth index groups. In the state, middle and poor wealth groups were 30 and 28 percent less likely to use any modern method of contraception as compared to the rich group. Similar conclusion has been drawn in other studies (Chaurasia 2014¹⁶; Bandhi et al. 2014²¹; Zavier & Padmadas2012²²) as well. An analysis of NFHS-III for Uttar Pradesh found that contraceptive use was strongly associated with the wealth index. Regional analysis found a vast variation in CPR between rich and poor wealth groups. The southern region has the highest contraceptive prevalence rate of more than 70 percent among the rich wealth index, and the lowest (62.3%) in the north-eastern region. Among the poor wealth index, the western region had the lowest CPR of any method with 47 percent. Logistic regression analysis reveals even in the southern-eastern region, CPR is 57 and 44 percent lesser among middle and poor wealth index group respectively than the rich group. Two districts of the southern region have a low human development index as per the Rajasthan human development report (2008), that may be the reason for the wide gap between rich and poor in prevalence of contraceptive use (Government of Rajasthan 2012)²³.

Age of the mother is an important demographic variable that influences contraceptive behaviour. The highest contraceptive use has been observed in the 35-49 age group of women for any method and modern method in the state and regions; and the lowest was in the age group of 15-24 years. Another Indian study concluded that after crossing 40 years, women lose their reproductive ability so that contraceptive use becomes redundant. Beyond this level, therefore, CPR level falls (Husain, Ghosh and Dutta 2010)²⁴. Similar conclusion has been derived in the study conducted in Odisha by Sahoo (2007)²⁵.

The odds ratio indicates that the chance of adopting contraceptive use is more than 10 times higher among the women in the age group of 35-49 years in comparison to the women in the younger age group of 15-24 years in all the regions and state. Acknowledging the deep-rooted custom of child-marriage in the state, the latest data of Annual Health Survey (AHS, 2012)²⁶ indicates that nearly one-fourth of the girls are getting married before reaching the age of 18 years and more than half of the currently married women aged 20-24 years had married before the legal age (18 years) in Rajasthan.

The traditional method users were the highest among the currently married women in the age group of 25-34 years at the state level but in the southern region, the highest traditional method users were in the 35-49 years age group. This finding support the study done by Ram et al.(2014)²⁷ which found that age differentials of the married women in the age group of 30-44 years were more in using traditional methods as compared to women below 30 years.

Media exposure was found to be a strong determinant of contraceptive use. The contraceptive prevalence rate for any method among women with media exposure

was 61.3 percent which was 6 percent points higher than those who were not exposed to any mass media. In the case of traditional methods, exposure to media doesn't make significant difference in contraceptive use as compared to women who were not exposed to media. A study done in Odisha found that the probability of using contraception among women who had been exposed to any mass media was significantly higher than the women who were not exposed to media (Sahoo 2007)²⁵. Another study concluded that media has a strong influence on CPR, and can be an important substitute for education of respondent or her partner. Respondents who watch TV occasionally, about once a week, or more frequently, are more likely to adopt contraceptives (Nair 1970)²⁸. Logistic regression results shows that the southern region does not have much difference in the contraceptive use among women with exposure to multimedia and no exposure of multi-media. Because this region is highly developed and borders with Gujarat state. Rest of the regions shows a similar trend as in the state.

The analysis in the current study found that contraceptive prevalence rate for any method and modern method were higher among the women who had not experienced any child loss. Similar conclusion had been drawn in another study which found that those women who do not experience any child death tend to use contraception more than those who have experienced child death (Sahoo 2007)²⁵. Among the regions, the highest contraceptive users were reported from the southern region for any method and modern method with 72.7 and 68.6 percent, respectively among the women those who have not experienced child loss. From the results of logistic regression, it is evident that in the state, who experience child loss, their likelihood to use contraceptives were 48 percent lesser than their counterparts. The likelihood of contraceptive use were 68, 59, 42 and 39 percent lesser among women who experienced child loss in the southern, south-eastern, western and north-eastern regions respectively. In case one has the experience of child loss, they will definitely try for another child and avoid contraception. This shows that infant or child death significantly increases the tendency of progressing to the next birth to replace the loss of the old one. Multinomial regression analysis indicates that women who had experienced child death, were significantly less likely to use permanent (OR=0.56, $p<0.001$) and temporary methods (OR=0.68, $p<0.001$). Experience of any child-death during family building process is discerned to bear significant and negative impact on the usage of permanent methods of contraception (Gulati & Das 2013)²⁹. Thus, reduction in infant and child mortality, which is an ideal goal by itself, would positively impact on the usage of permanent methods of contraception in the state.

The impact of the number of living children on contraceptive use among the currently married women gives positive relationship for the modern method in the present study. Contraceptive use ranges from 17.1 percent among women having no child or one child to 71.8 percent among women with four or more living children for any method. Almost similar kind of variation is observed for modern method at the state level and regions. Women without child or having one child were at the bottom of contraceptive users in the state and regions for all the three categories (any method,

modern method and traditional methods). A study by Chaurasia (2014)¹⁶ found that only 9 percent women with one surviving child used contraceptives. By contrast, 90 percent women with at least two surviving children used contraceptives and for terminal methods, the proportion was more than 97 percent. The logistic regression showed that women with two, three, four or more children, had more likely to use contraception in the state which was 47 and 15 percent higher than the women with no child or one child. In the southern and south-eastern region, the contraceptive prevalence rates were more than two times higher (OR=3.06 and 2.70 respectively) among the women with four or more children as compared to women with no child or one child. It clearly indicates that contraceptive use increases with parity. So programme must focus on women with less children.

This is worth to mention that DLHS-IV was not conducted in the State of Rajasthan due to AHS survey in the state and comparing DLHS with NFHS is not appropriate. However, according to the National Family Health Survey 4 (NFHS-4)³⁰ for Rajasthan, the contraceptive prevalence rate (CPR) among currently married women aged 15- 49 years is 60 percent, up from 58 percent in DLHS-3. Notably, the share of female sterilization in contraceptive method use is 68 percent, up from 42.6 percent at the time of DLHS-3. Muslim women (46%) are much less likely to use contraception than Sikh (65%) and Hindu women (61%). Women in Rajasthan are more likely to use contraception if they already have a son. For example, among women with two children, 74 percent with at least one son use a method of family planning as compared to 37 percent of women with two daughters and no sons. Urban women and educated women are more likely to use spacing methods than other women.

Conclusion

According to the District Level Household Survey-3, the contraceptive prevalence rate in the state was 58.1 percent. The CPR for any method is the highest in the southern region (61.2%) and the lowest in the north-eastern region (52.3%). There is a substantial gap between rural and urban CPR which is also visible in each region. Across the social groups, it is seen that among SCs, the contraceptive use for any method and modern methods was much lower than the other social groups followed by STs. Among the religious groups, Muslims have the lowest prevalence rate of contraceptives for any method and modern method with 43.3 and 40.1 percent respectively. Female education, particularly completion of primary and secondary schooling is strongly related to lowered fertility level. A significant association is observed between CPR and exposure to mass media in each region except the southern region. The study also found that contraceptive prevalence rate for any method and modern method were higher among the women who have not experienced any child loss in the state and the regions.

Permanent method users were the highest in the age group of 35-49 years while temporary method users were the highest in the 25-34 years age group. Highly

educated women were more likely to use temporary methods and less likely to use permanent methods as compared to illiterates. Women belonging to SC, ST and OBC were less likely to use permanent, temporary and traditional methods as compared to women belonging to general group. So, the researchers conclude that age of the mother, caste, religion, education, wealth index, child loss and exposure to mass media were significantly influencing the acceptance of various methods of contraceptives. It is need of hour that family planning efforts in Rajasthan explore the determinants of different contraceptive preferences and choices across different women groups and reinvigorates them to address these preferences and choices in an efficient and cost-effective manner. Implementing these strategies in Rajasthan may empower them to use effective modern contraceptive methods and improving maternal and child health which can help governments to achieve their development goals and reduce the regional variations.

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Injection Safety Among Healthcare Professionals: Assessment of Knowledge and Practices in a Tertiary Care Hospital in Delhi

Rajneesh Mohan Siwan^{*}, Jayanta K. Das^{} and Sanjay Gupta^{***}**

Abstract

As per the available estimates, around three billion injections are administered annually in India; and out of these, 1.89 billion are unsafe. The present study was undertaken to assess the knowledge and practices amongst healthcare professionals on injection safety in a government tertiary care hospital in Delhi. It was a cross-sectional descriptive study conducted during December 2017-March 2018. Sample size was calculated using $(1.96)^2 pq/d^2$ formula and 250 healthcare professionals (HCP) were taken as respondents. Data were obtained by self-administered questionnaire (SAQ) for knowledge and practice. Injection safety practices among HCP were done in purposively selected five departments. Data were analyzed by using SPSS software version 23. It was found that knowledge of definition of safe injection, universal precautions, steps to be taken after Needle Stick Injury (NSI) was less. Unsafe practices like not maintaining hand hygiene, not taking consent before injections, not using clean barriers to protect fingers when breaking glass ampoules and rubbing after administering intra-muscular injection were observed.

Key words: Knowledge, Injection safety, Practices, Healthcare professionals (HCP), Needle Stick Injury (NSI).

World Health Organization (WHO) defines safe injection as the one which does not harm the recipient, does not expose the provider to avoidable risk, and does not result in waste that is dangerous for the community.¹ WHO has estimated that about 16 billion injections are administered each year in the developing and transitional countries.² The estimated number of injections per person per year was estimated as 3.4 (range 1.7–11.3) in these developing and transitional countries. Proportion of unsafe injections were estimated to be 39% (range 1.2–75%).³ In some areas of the WHO South-East Asian region (which includes India), the estimate for unsafe injections was as high as 75%.³ It has been estimated that in India, around three billion injections are administered annually and of them, 1.89 billion are unsafe.⁴

In developing countries, injection is regarded as a powerful tool to heal disease.⁵ Patients are pleased and may feel that they have obtained the best care when they are administered injections. Health workers get financial and status rewards by using injections. Hence, a mutually reinforcing cycle exists between the patient and the injection provider which is responsible for frequent use of injections.⁶ Unsafe injections can lead to morbidity and even to death. It may lead to avoidable risks to patients, to HCPs and to the community. Each year, hundreds of thousands of HCPs are estimated to be at risk for infections like Hepatitis B and C and the human immunodeficiency virus (HIV) due to unnecessary and avoidable accidents from needle stick injuries (NSIs) and mucosal exposures.⁷

^{*}-MD (CHA) student, NIHFWS, New Delhi, Email: drmsiwan@gmail.com, ^{**} Director, NIHFWS and ^{***}Professor, NIHFWS, New Delhi.

It has been estimated that unsafe injections lead to 40% of the cases of hepatitis C, 32% of hepatitis B, and 5% of HIV infections each year. The risk of transmission of infection in an unsafe injection from an infected patient to the HCP following an NSI are: Hepatitis B- 3-10%, Hepatitis C- 3% and HIV- 0.3%.⁸ Episodes of transmission of blood-borne pathogens through injections are usually linked to the unsafe use of multi-dose vials or preparation of medications in areas potentially contaminated with blood or body fluids.⁹ Complications such as injection abscesses and nerve damage may also occur following unsafe injections. Unsafe injections have also been responsible for outbreaks of viral hepatitis like the outbreak reported of Hepatitis B in 2009 in Gujarat.¹⁰ This outbreak was investigated and 40% of all positive cases (n=856) revealed the history of receiving therapeutic injections during the past 1.5-6 months.¹⁰ It has been estimated that every year, around 13 lakh deaths (3 lakhs in India) are caused by unsafe injection practices among medical practices.¹¹

Objectives

In view of scarcity of studies in India on knowledge and safe injection practices on injection safety, the present study was conducted with the following objectives:

1. To assess the knowledge of healthcare professionals on injection safety, and
2. To observe practices of injection safety among healthcare professionals.

Methodology

Study design and setting: This study was a descriptive, cross-sectional and conducted in a government tertiary care hospital, New Delhi during December 2017-March 2018.

Study participants: From the selected hospital, five departments where injection procedures were frequently practiced, were selected. Study samples included doctors (both Junior Residents- JRs and Senior Residents- SRs, and nurses working in the five departments i.e. Medicine, Surgery, Paediatrics (including immunization services in outpatient department), Gynaecology and Obstetrics, and Emergency.

Sample size: The sample size for the present study was calculated by using the formula $(1.96)^2 pq / d^2$, with allowable error of 6%. This came out to be 249 and the total number of HCPs (doctors and nurses) who participated in this study were 250.

Methods of data collection: After obtaining written informed consent from the participants, they were interviewed through self-administered questionnaires (SAQs) to assess knowledge and know about their practices. WHO tool C was used for SAQ with modification. The modified tool was pre-tested in large hospital in Delhi. Primary data were collected using SAQs technique from all the 250 HCPs. Moreover, 126 observations (60 in doctors and 66 in nurses) of injection administration were made for observing the practices among the healthcare professionals.

Method of data analysis: The collected primary data were analyzed using Microsoft Excel and Statistical Package for the Social Sciences (SPSS version 23).

Ethics: The protocol for this study was reviewed and institutional ethical clearance was obtained. For collecting data from the study hospital, written permission was obtained from the competent authority of the hospital. Those who did not give consent were not included as respondents in the study.

Findings

In the present study, findings are observed in terms of knowledge and practices of HCPs on injection safety. Moreover, by using Chi-square test, association between knowledge and practices of injection safety was also calculated. The study findings are presented below.

Knowledge of HCP: For assessment of knowledge on injection safety, a pre-tested SAQ was used. This pre-tested questionnaire was distributed among all the HCPs in the selected five departments after taking their consent. The questions were related to assessing their knowledge on injection safety. A total of 17 questions were there in the SAQ. Analysis of data for the questions considered most important, is presented in Table 1.

TABLE 1
Knowledge of Respondents (N=250) on Different Aspects of Injection Safety

Sl.No.	Knowledge regarding	Number of participants with correct and complete responses	%age of participants with correct and complete answers
1.	Definition of safe injection as per WHO	42	16.8
2.	Universal Precautions	132	52.8
3.	Diseases transmitted by unsafe injections HIV and HBV	249	99.6
	HCV	199	79.6
4.	Other complications apart from Blood-Borne diseases transmitted by unsafe injection	74	29.6
5.	How to administer injection to a patient in case of small cut on hand of injection provider	153	61.2
6.	Personal Protective equipment (PPE)	185	74
7.	Needle stick injury	181	72.4
8.	Sharp injury	174	69.6
9.	Post exposure prophylaxis (PEP)	178	71.2
10.	Steps to be taken after NSI	133	53.2
11.	Safe disposal of injection related bio-medical waste	140	56

The correct knowledge of safe injection as per WHO definition was found among 16.8% of the HCPs which is a matter of concern as HCPs should be aware of all the components of injection safety. Only around half of the study respondents were aware on universal precautions. Knowledge on the diseases transmitted by unsafe injection was found in 99.6% of HCPs for HIV and HBV while it was 79.6% for HCV. Knowledge on Personal Protective Equipment (PPE) and Post-Exposure Prophylaxis (PEP) was found to be present in around 70-75% of the HCPs. Around three-fourth of

the HCPs were not found to be aware of complications caused by unsafe injection practices apart from blood-borne infections like abscess, nerve injury and septicemia. Knowledge on the steps to be followed in case of Needle Stick Injuries (NSIs) was found only in 53.2% of HCPs. Less than three-fifth (56%) of the study participants were found to be having correct knowledge on the safe disposal of injection related bio-medical waste (BMW). This lack of knowledge on BMW can lead to higher infections and chances of higher needle stick injuries among the professionals, patients and community also.

Practices of HCPs: Primary data on injection practices were collected from all the 250 HCPs (131 doctors and 119 nurses). More than three-fifth of HCPs stated that injection safety guidelines were available with them but the researchers could not find separate guidelines available on injection safety in the hospital. The hospital was covering the topic of injection safety under infection control guidelines only. More than one-tenth of the study participants stated in SAQs that they rub injection site after administering intra-muscular injections. Around 4% of them stated that they recap the needle after injection administration (Table2).

TABLE 2
Analysis of Reponses on Injection Practices

Sl.No.	Practices inquired from participants using SAQ	Total Study Respondents- 250	
		Yes (%)	No (%)
1	Availability of Injection safety guidelines at their workplace	67.6	32.4
2	Availability of Bio-Medical waste disposal guidelines at their workplace	96.8	3.2
3	Taking consent before administering injection	72.8	27.2
4	Cleaning the needle with cotton/ alcohol swab before giving injection	6.8	93.2
5	Rubbing of injection site after giving intra-muscular injection	14.4	85.6
6	Correct identification of colour coded categories for BMW management	87.6	12.4
7	Use of needle destroyer or a hub cutter for disposing the used needles	96.8	3.2
8	Recap the needle after injection administration	4	96
9	Bend the needle before its final disposal	10.4	89.6
10	Remove the needle from injection before its final disposal	5.2	94.8

Injection Practices: In total, 126 injection practices were observed among the HCPs. These constituted around half of the total HCPs. Out of these 126 injection practices observed, 60 injection practices were performed by doctors and 66 were performed by nurses. In total, 80 (63.5%) therapeutic injections, 26 (20.6%) vaccination injections and 20 (15.9%) phlebotomies were observed. During observation of injection practices, no loose needles, syringes, phlebotomy equipment, intra-venous equipment were found inside the facility. In the present study, one needle and one syringe was observed to be used for each injection in the study hospital.

Study participants were observed from the time they started preparing the injections and till the time of its bio-medical segregation. These observations of injection practices are presented in Table 3. In the present study, all the HCPs were using disposable and auto-disable syringes. Around one-third of the injections were not prepared on clean work-table or tray, and around one-third of them were not

performing hand wash before administering injections. Out of 20 observations on the usage of multi-dose vials, 40% of the participants were observed to be leaving the needle inside the cap of multi-dose vial for drawing additional doses of medicine or vaccine. More than four-fifth of the participants were not using clean barriers to protect fingers while breaking glass ampoules and hence, pre-disposing themselves for injuries. 4% of the respondents responded that they recap the needles after injection. 12.5% of the respondents rubbed after administration of intra-muscular injection. During the past one year, around one-fifth of the total participants reported to have suffered accidental needle stick injuries. Nurses sustained more accidental NSI (29.4%) as compared to doctors (10.7%). Around three-fifth of the participants who sustained NSIs were required to undertake post exposure prophylaxis. None of the wards or immunization OPD in the study hospital was having guidelines on PEP displayed. Nearly one-tenth of HCPs stated that they had undergone injury by sterile needles several times and they just cleaned the injured area with spirit swab.

TABLE 3
Observations of Injection Practices Among the Respondents

SL.No.	Injection Practices	Total Observations made	Practices observed being followed (in numbers)	Percentage of injection practices observed to be followed (in %)
Practices Observed Prior to Injection Administration				
1.	Preparation of Injections on a Clean Worktable or Tray	126	82	65
2.	Hand hygiene	126	85	67.1
3.	Gloves used prior to beginning of injection session (gloves were not changed in between the session)	126	94	74.6
4.	Consent taken before administering injection	126	72	57.1
5.	Cleaning of patient skin before injection	126	121	96
Practices Observed during Injection Administration				
6.	Removing of needles from the cap of multi-dose vials	20	12	60
7.	Use of clean barriers to protect fingers when breaking glass ampoules	40	5	12.5
Practices Observed after Injection Administration				
8.	Recapping of needles after injection administration	126	5	4
9.	Rubbing after administering intra-muscular injection	40	5	12.5
10.	Bio-medical waste segregation at source	126	98	77.7

Association between Knowledge and Practices of Injection Safety

Association between knowledge and practices of injection safety was calculated. Null hypothesis for the factor of practice on injection safety and knowledge of injection safety of the participants on various parameters of injection safety was “practice on injection safety of participants was not associated with knowledge on injection safety”. When the data were analyzed using the chi-square test, p value was found to be <0.05. So, association between practice on various parameters of injection safety was significantly associated with knowledge on injection safety. Thus, null hypothesis was rejected with statistically significant p value<0.05.

Table 4
Association between Knowledge and practices

Knowledge on injection safety	Safe Injection Practices			
	Consent taken	Not cleaning needle before injection	Not rubbing after administering intramuscular injection	Correct disposal of needle after injection
Yes	57	117	107	89
No	15	9	14	18
Chi-Square = 9.23, df=3				
P-Value= 0.026				

Discussion

Knowledge and practices assessed among HCPs was analyzed statistically. It was observed that certain aspects required special attention. As far as knowledge is concerned, the HCPs were lacking the concept of definition of injection safety (83.3%). Similar findings were found in the study by Kulkarni et al.¹² among nurses in a tertiary care teaching hospital of Marathwada region of Maharashtra where 75.7% of them were not aware about the concept of injection safety. In the present study, 47.2% of the HCPs were unaware of universal precautions. Moreover, around 47.8% of HCPs also lacked the knowledge of steps to be followed in case of NSIs. On the other hand, knowledge of HCPs on diseases transmitted by unsafe injections was 99.6% for HIV and HBV, and 79.6% for HCV. Similar results were obtained in a study conducted in Cambodia (Rapid assessment of injection practices in Cambodia, 2002)¹³ where 90 percent of the prescribers and injection providers were aware that HBV, HCV, and HIV were transmitted through unsafe injection practices. As far as injection practices are concerned, all injection sessions observed in the study hospital involved disposable syringes without reuse which is highly recommended as per the WHO standards. In the present study, one needle and one syringe was used for each injection which is similar to the result obtained in a study done in Egypt by Ismail N.A. et al.¹⁴. The site where injections are being prepared is very important since this site may harbour the source of infection from the blood or other body fluids, soiled linen, cotton or other materials. In the present study, in 65% of the injection session observations, injections were prepared on clean working tray. In contrast, in a study by Sahu and Gandhi¹⁵ in Chhattisgarh, only 33.6% of the injections were prepared on clean working tray. In another study by Mehta DR et al.¹⁶ in a tertiary care teaching hospital, it was found that working tray was clean in 84.20% of the observations of total injections given and hence, better infection prevention measures as compared to the present study.

In the present study, 67.1% of the study participants were observed washing their hands before starting the injection sessions. This practice was found to be much better than observations in various other studies like when compared with study done by Sahu D and Gandhi N¹⁵ in Chhattisgarh where they found that 70.3% of the participants did not wash their hands. In another study by Rehan H.S. et al.¹⁷, 95.4% of unsafe practice of not washing hands was found. In another study by Paul B et al.¹⁸ conducted among nurses in Kolkata, it was observed that about 12.5% of the subjects

washed their hands with soap and water before administering injection. In the present study, 74.6% of the participants were observed to wear gloves before starting injection sessions and the gloves were not changed in between for each patient. In an interventional study in Nigeria by OguamanamOkezieEnwere& Kevin Chiekulie Diwe¹⁹, they found that all doctors and laboratory scientists always used gloves as compared to 94.8% (91/96) of nurses while handling patients or material. In another study by Paul B et al.¹⁸ conducted among nurses in a tertiary care hospital of Kolkata, it was found that only 3.7% of the nurses wore sterile gloves before starting injection administration. The study done by Hauri et al.²⁰ suggested that avoiding needle recapping and other hand manipulation is essential to prevent needle stick injuries. Two-handed recapping of the needle should be avoided as it is the most common cause of needle stick injury encountered. In the present study, recapping of the needle was found only in 4% of the observations. Study by IPEN⁴ found that recapping was nearly one-third (30.8%) for plastic syringes and when glass syringes used, it was 16.5%. When the findings of the present study are compared with the findings of the study done by Sahu & Gandhi¹⁵ in Chhattisgarh, recapping of needle was found to be done by the participants (nurses) in 33.1% of the observations. In a study in Cambodia (Rapid assessment of injection practices in Cambodia, 2002),¹³ it was found that 58% of injection providers recapped the syringe after use. In the study by Mehta et al.¹⁶ in a tertiary care teaching hospital, they found that recapping of needles was done by 12.2% of injection providers. In the present study, it was observed that in 96% of the observations, the patient skin was cleaned by alcoholic swab in proper manner from inward to outward circular manner. This is a good practice as it prevents contamination of the injection site from the periphery. In the study by Mehta et al.¹⁶ in a tertiary care teaching hospital, it was seen that out of the total injections administered, 82.90% were administered after the skin was cleaned with spirit cotton swab. Covering of neck of ampoule is recommended in “Guide to Good prescribing”²¹ by WHO with a purpose to prevent injury to the hands of health care provider from broken pieces of ampoule in case of mishandling of ampoule. In the present study, in 87.5% of the observations where glass ampoule was broken, no gauze piece was covered over neck of the ampoule. This practice may prove dangerous as ampoules broken in such a fashion could have micro granules of glass inside the medicine. These micro granules if aspirated and injected to patients could have serious implications. In the current study, bio-medical waste segregation at the source was done as per the existing guidelines in 77.5% of the observations. In IPEN Study,⁴ bio-medical waste segregation was done only at 6.2% of the health facilities at the country level. Hence, this practice has shown remarkable improvement in the present study but still requires improvement.

Conclusion

Knowledge on concept of injection safety, universal precautions, steps to be taken after NSI requires to be enhanced among the HCPs at the earliest. Practices which were not confirming to the standard WHO guidelines like non-availability of separate guidelines on the topics of injection safety, judicious use of injections, PEP and

reporting of adverse or near miss events require urgent action. Unsafe injection practices like not preparing injections on clean workable tray, not removing needles from the cap of multi-dose vials, recapping of needles, not following hand hygiene in 100% of injection practices, and not using clean barriers to protect fingers while breaking glass ampoules were also observed in the hospital. These injection practices require reinforcing good practices in training sessions and conducting surprise ward rounds and supportive supervision. Nearly one-fifth of the participants reported accidental needle stick injuries during the last one year. NSIs could further be reduced by procuring safety engineered devices, reuse prevention injection equipment which are recommended by WHO also. Needle Stick Safety and Prevention Act, 2000 in America mandates the use of safety-engineered medical devices (SEMDs) within the United States healthcare facilities to protect healthcare professionals (HCPs) and patients from the risk of needle stick injuries¹⁹. Such legal provisions with strong implementation are lacking in India. Community participation or involvement in the form of their education and improving awareness on safe injection practices is suggested. Regular sessions of interactions with patients and their attendants on safe injection practices to be conducted. Community could be informed on injection safety through IEC materials in the form of leaflets, posters, banners, displays and audio-visual messages at the patient waiting areas.

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Cholera Outburst of 2016 in Jaipur: an Observational Descriptive Analysis

Monika Rathore,* Amita Kashyap,** Narottam Sharma;*** Ravi Prakash Sharma,**** Priyanka Bharti and Priyanka Kapoor *****

Abstract

Around 3-5 million cholera cases and one lakh deaths occur every year worldwide; however, very few are reported officially. Recently, there was an outburst of cholera in Jaipur district. Several cases of diarrhoea were reported but those were not investigated for cholera initially. Data were gathered with an objective to assess the trends of cholera in the last 5 years (2011-2016) in Jaipur district with special reference to the 2016 outburst. This observational and descriptive study was conducted during May-July 2016. Data were collected from cholera cases admitted in Infectious Disease Hospital and SPMCH Hospital, Jaipur; field visits of affected area; reports of state IDSP cell; CMHO office; and Department of Micro-biology. Laboratory confirmed cholera cases were very less till year 2014 in Jaipur district. Suddenly, it rose in the year 2016. Total 598 suspected and 72 lab-confirmed cases were reported. 14 suspected cholera deaths were reported. Three areas of Jaipur city- MBC Bhatta colony in Kanauta area, twelve colonies in Tonk Road area, and walled city area were hard hit during the Outburst. Unhygienic housing conditions, open defecation, people were not in a habit of washing hands with soap and water, and uncovered food with houseflies sticking on it were observed in Bhatta Basti area. Water samples from the pots were also found unsatisfactory for drinking. Breakdown of pipelines with mixing of sewerage water was found in Tonk Road area. Breakdown in pipelines, accumulation of sewage, waste water around pipelines with no proper drainage system and open defecation were observed in the affected areas. In addition to it, the level of chlorination was found to be below 0.2 ppm in the affected areas.

Key words: Cholera, Diarrhoea, Trends, Outburst, Jaipur,

Cholera is a disease with long history, first pandemic reported long back in 1820 in Bengal that eventually spread across India.¹ Hundreds of thousands of Indians and ten thousand British troops died during this pandemic.² As per WHO, around 3-5 million cholera cases and one lac deaths occur every year worldwide; however, very few are reported officially. This acute gastrointestinal infection is caused by ingestion of contaminated food or water. Majority remains either asymptomatic or mildly symptomatic but one-fourth of the cases have severe watery diarrhoea which may lead to dehydration and death within hours, if not treated promptly.³ It mostly effects the population with poor water quality, particularly surface water like river, unprotected wells and poor sanitation and hygiene conditions.^{4,5} Cholera outbreaks often occur during emergencies, such as earthquakes and flood events, or in refugee settings when water supply, sanitation and hygiene (WASH) infrastructure is compromised. Prompt case management, provision of safe water through chlorinating individual water containers and water trucking of chlorinated water along with improved hygiene and safe food handling practices such as hand washing with soap, house hold disinfection

*Professor, E-mail: rathoremonika@rediffmail.com; **Professor, amitakashyap1@gmail.com; ***CMHO, cmho1-jaip-rj@nic.in, Department of Community Medicine, Jaipur; ****III-Year PG Resident; Department of Community Medicine, SMS Medical College, Jaipur.

and hygiene kit distribution^{4,5} are immediately required to control it. There was an outburst of Cholera in Jaipur district in 2016. Several cases of diarrhoea were reported but those were not investigated for cholera initially. Disinfection and hygiene kit distribution^{4,5} are immediately required to control it. There was an outburst of Cholera in Jaipur district in 2016. Several cases of diarrhoea were reported but those were not investigated for cholera initially. First case was lab-confirmed on 04 April 2016. There were 12 deaths occurred in a hostel of mentally challenged people with initial symptoms of diarrhoea that rapidly lead to deranged renal function, electrolyte imbalance and shock. Cholera was suspected, though only two of them were lab-confirmed. Thereafter, cases from many colonies of Jaipur city started reporting. There were total 598 suspected cases with 72 lab-confirmed cases of cholera, and 14 cholera suspected deaths were reported by mid-July 2016 in Jaipur district. Data were collected with an objective to assess the trends of cholera in the last 5 years (2011-2016) in Jaipur and to describe the age, sex, time, place distribution of cholera cases those were reported in Jaipur in 2016; and the containment measures taken thereafter.

Methodology

This observational and descriptive study was conducted during May-July 2016. Primary data were collected from cholera cases admitted in Infectious Disease Hospital, Jaipur; and during field visits of the affected areas. Secondary data were collected from the state IDSP cell, CMHO office, Department of Microbiology, JK loan Hospital's case records. Five years data of cholera cases reported in Rajasthan were also collected from the IDSP cell of Jaipur district. Line list of cholera cases of 2016 in Jaipur district were collected. Stool samples of all the suspected cholera cases admitted in Infectious Disease Hospital, JK loan, and Jaipuria hospitals were collected and sent to the Department of Microbiology of SMS Medical College and RUHS College of Medical Sciences, Jaipur for hanging drop preparation and culture, and sensitivity to detect cholera. Water samples from all the 44 water sources in the affected areas were collected on three alternate days and sent to the State Epidemiological lab, Jaipur. Chlorine level of potable water was estimated with chloroscope in the affected areas from all levels e.g. common storage water tank, pipe lines and domestic containers.

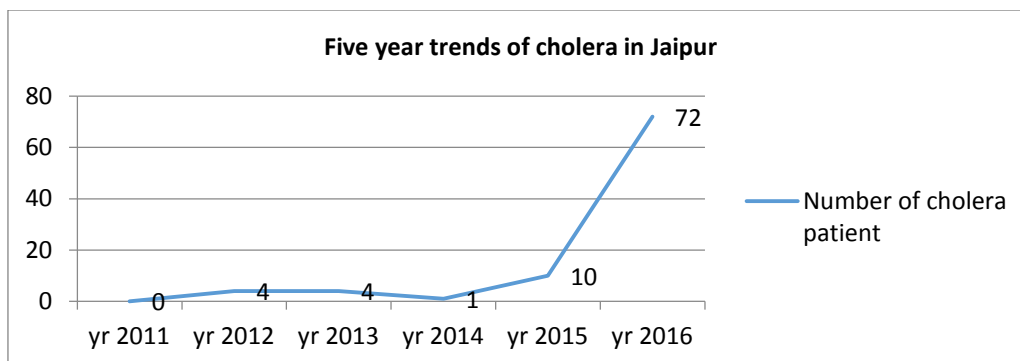
Statistical analysis: Data collected were compiled on an excel sheet. Continuous data were summarized in the form of mean and standard deviation. Count data were summarized in the form of proportions. Bar chart was used to depict the count Data, line diagram for time trends and spot map for geographical distribution.

Findings

Trends of Cholera: The reported cases of lab-confirmed cholera were very less till the year 2014 in Jaipur district which suddenly rose to 72 cases. Total 598 suspected cases were reported. Seventy-two were laboratory-confirmed cholera cases and 14 deaths were reported from January to July 2016. Three areas of Jaipur city: MBC

Bhatta colony in Kanauta area, 12 colonies in Tonk Road area, and walled city area were hard hit during this cholera outburst in Jaipur.

FIGURE 1
Cholera Trend Jaipur District During 1911-1916



Seasonal Trend: Cholera data of the last two years were analyzed for seasonal trends. Cholera cases are mostly seen during the hot and humid months from April to June. It started declining in the month of July.

FIGURE 2
Seasonal Trends of Cholera in District Jaipur (2015-16)

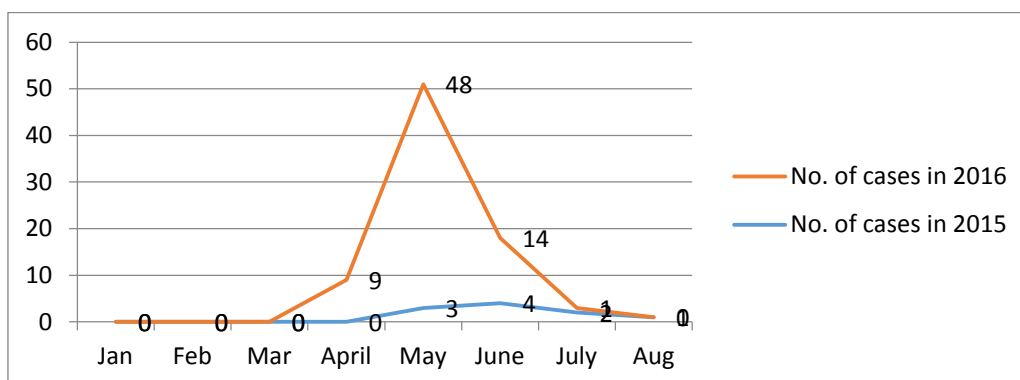


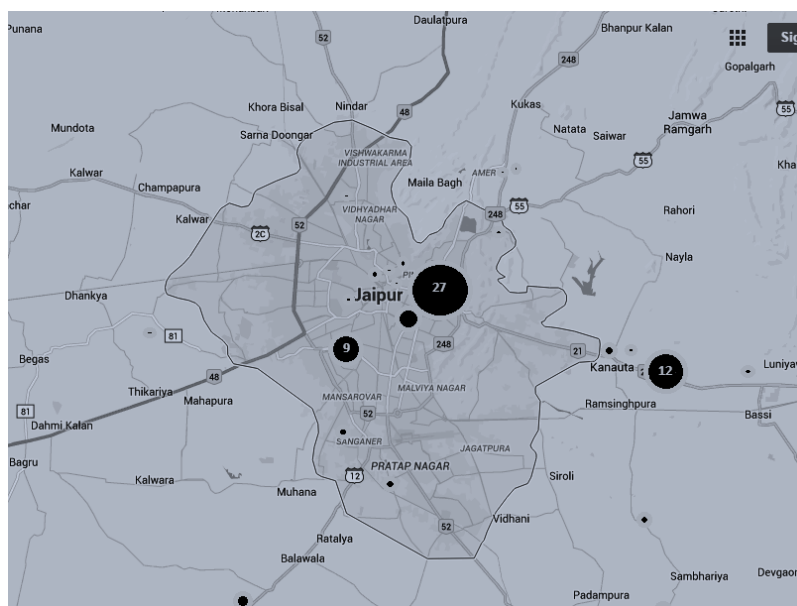
TABLE 3
Age and Sex Pattern of Cholera Cases Reported During Current Outburst

Age Group	Sex		Total (%)
	Male	Female	
0-5 years	4	4	8 (11.11%)
>5-10 years	8	5	13 (18.05%)
>10-18 years	9	1	10 (13.88%)
>18-30 years	9	7	16 (22.22%)
>30-65 years	14	8	22 (30.55%)
>65 years	2	1	3 (4.16%)
	46	26	72

TABLE 4
Geographical Distribution of Cholera Cases in Jaipur

Affected Residential Colonies of Jaipur (2016)	No. of Lab-confirmed Cholera Cases
Topkhana	27
MBC Bhatta, Kanauta	12
Gopalpura Bypass	9
Phagi	3
Sanganer	3
Pratap Nagar	3
Sirsi, Jamdoli	2
Sardar Patel	2
Beelwa, Goner Phatak Mod	2
Kunda, Amer	1
Murlipura, Dherkebalaji	1
Sirsi	1
Naharikanaka	1
Luniyawas	1
Nayi Ki Thadi, Amer	1
Hasanpura	1
Chaksu	1
Jaisingh Pura Khor	1

TABLE 5
Geographical Distribution of Cholera Cases in Jaipur



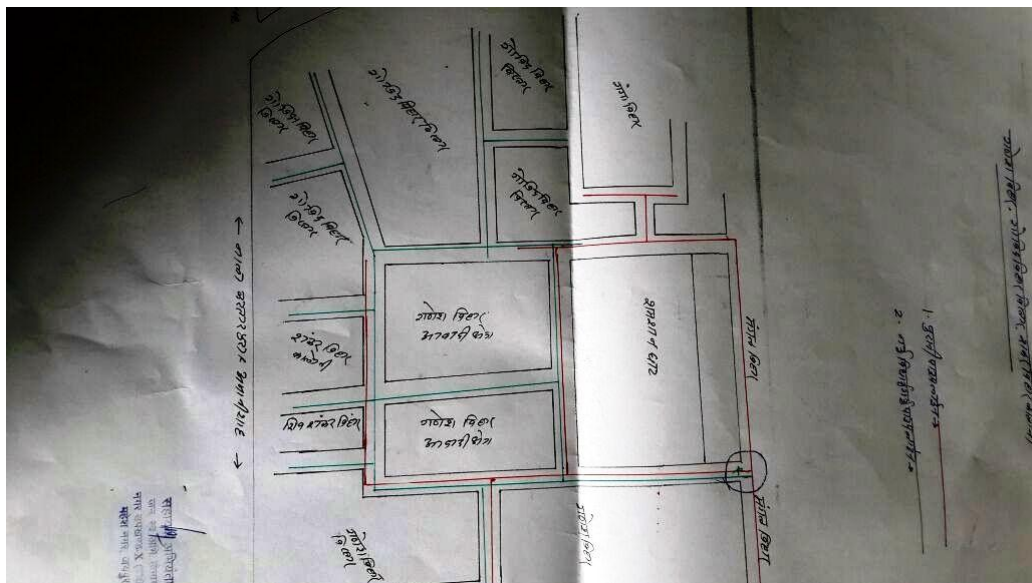
Data of outburst of cholera in Jaipur city in 2016 were analyzed. Total 598 suspected cases were reported. Seventy two were laboratory-confirmed cholera cases and 14 deaths were reported from January to July 2016. Three areas of Jaipur city: MBC Bhatta Colony in Kanauta area, 12 colonies in Tonk Road area, and walled city area were hard hit by cholera in Jaipur. There were sporadic cases (one or two) from people of Luniyawas, Jaisinghpura Khor, Chaksu, Hasanpura and Naharikanaka who used to work in Topkhana for their living.

MBC Bhatta Area, Kanauta: There was a pool of acute GE cases with lab-confirmed 12 cholera cases in this area. Kanauta is situated 15 km in east of Jaipur city. This area is famous for brick kilns (*Bhatta*). Manual labourers come from far flung areas and live here in temporary accommodations in many brick kilns. There were around 50-55 households living in MBC Bhatta (one of the brick kilns). Majority (44) of the households had at least one of acute gastro enteritis cases. People here consumed water either from water boring done at the brick kiln site for making bricks. Boring of 320 feet deep was dug two months ago. It was 18-20 steps away from the dwellings and 25-30 meters away from the spot of excreta disposal. Water was not sent by the brick kiln owner, even once, to PHED Lab for testing its quality; whether it is suitable for drinking or not. On lab testing, the water from the boring was found satisfactory and fit for consumption and household work. The second source of water was 'water tankers' supplied by a private tanker company (RK Water Supply). Though water was supplied in a covered container with a tap twice a day but it was found unsatisfactory on testing on two occasions. Total water samples from six sites (water tanker, boring, overhead tank, randomly selected houses of affected families) were taken and sent for testing. In addition to it, majority of the labourers were illiterate and were not washing hands with soap and water after defecation; and before consuming food. Housing conditions were very unhygienic. There were open defecation; food was left uncovered with houseflies sticking on it. Water was stored in pots and covered with plate and a steel tumbler without handle was used for water extraction. Cooked food was not covered properly. However, water samples from the pots were found unsatisfactory for drinking.

Gopalpura Bypass: Gopalpura bypass is 11 km. at south from the heart of Jaipur city. It has 3000 households with a total population of 12,920 (6611 males and 6309 females; Census 2011). Colonies involved were Shiva Shankar Vihar, Kesav Vihar, Ganesh Vihar, Mangal Vihar and Dewari of Ridhi Sidhi Choraha near Gopalpura bypass. Though there were pakka houses and separate toilets but people here belong to lower middle class. There are two important water sources: one from PHED pipe line and another from private bore well in individual houses. Colony residents complained that for the last 20-25 days of the field visit, pipe line water had bad odour, yellow colour with suspended impurities. It was also observed that road work was undergoing and people complained of leaking pipe lines in this area. On testing water from PHED pipe line, it was found unfit for drinking with 0.2 ppm residual chlorine. In addition, choked sewerage lines at many places, were posing contamination threats to drinking water, as water pipelines were 20 year old and were in a miserable condition which were laid alongside the sewer line. It was observed that most of the cases were from the Shiv Shanker Vihar colony, because it was nearer to the source/leakage of water during repair by JDA. Least cases were reported from Mangal Vihar, Ganesh Vihar, Keshave Vihar as their main water source was bore wells. Total eight water samples from PHED water line were taken and out of which 6 (75%) were found unsatisfactory and 17 samples were taken from private bore wells and they all were found satisfactory.

Intervention done at Gopalpura Bypass

Pipe Line System of Outbreak Area



PHED supplied 1185 campers of reverse osmosis (RO) treated water of 20 liters each for a family of 5 persons, one each in the evening and morning and more if needed. Eighty two water tankers were arranged for the residents to meet their demand for water. PHED department had set 13 points for camper's distribution with help of local people. The area was visited by mobile team of 6-8 members from CMHO office consisting of District Surveillance Officer, Deputy Chief Medical Health Officer, Epidemiologist, Medical Officers, Paediatricians, Pathologist, LT and staff of nearby PHC. Twenty eight patients of diarrhoea and vomiting were referred to the SMS Hospital. Fifty two household contacts of diarrhoea cases of that area were given chemo-prophylaxis. Tablet Doxycycline, Zinc and ORS were given to them.

Topkhana: This is an over-crowded area of the walled city with a population of 26,296 (Census 2011) with Muslim predominance. It is famous for handicraft and jewel work (nagino ka kam). Its main water source is from PHED and few houses were supplied with boring water from the Masjid. Water sample collected from PHED source was found unfit for drinking with chlorine level 0.2 ppm. Visibly it was yellow coloured with foul odour. The living condition of that area was also very unhygienic. The raw meat sold in the butcher shop were left open and contaminated with flies, drains were not covered; even in houses, leftover food was not disposed properly. Furthermore, habit of hand washing was not practiced before consumption of food.

Control measures like the suspension of PHED water-supply for a short period, supply of safe water through water tankers and campers, repair of pipe line in the areas where road work was under process, distribution of chlorine tablets in houses of the affected areas, screening of all the acute diarrhoea and vomiting cases,

chemoprophylaxis of all family members of positive cases, and stool samples of all the admitted diarrhoea cases for detection of cholera were undertaken in the affected areas.

Discussion and Conclusion

S. Kanungo et al.⁶ analyzed data for the period 1997-2006 and concluded that 21 states have reported cholera cases during this period but Rajasthan was not included in that. In 2016, 72 reported cases of cholera was recorded from one city i.e. Jaipur of Rajasthan. The researchers observed poor sanitation and poor quality of water in the affected areas. Similarly, Akhilesh K⁷ et al., Godfrey Bwire⁸ et al., Tony Fredrick⁹ et al. and Chengappa K Uthappa¹⁰ had also concluded that contamination and poor maintenance of water sources and unhygienic conditions were primarily responsible for cholera spread. Twelve deaths in a home for mentally challenged persons in Jaipur in 2016 was probably due to cholera, though tests were done only in 2 cases and both were found cholera-positive. An earlier study by Subhransu Sekhar Datta¹¹ et al., reported that 3 deaths had occurred in the shelter home for the mentally challenged females in Howrah in West Bengal. In the current study, majority (64%) of the cholera-affected were males but Dickson Shey Nsagha¹² et al., in Cameroon observed that 42% of the cholera-affected were males whereas a study in Nepal by Pappu Kumar Gupta¹³ et al. has reported that 41.93% of the cholera-affected were males.

There were very few cholera cases in Jaipur district till the year 2015. A large outbreak of cholera had occurred in 2016 with 598 suspected and 72 lab-confirmed cholera cases. There were 14 suspected cholera deaths also. Three areas of city were hard hit. Break down in pipelines, accumulation of sewage, waste water around pipelines with no proper drainage system and open defecation were observed in these areas. In addition to it, the level of chlorination was below 0.2 ppm in the affected areas.

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A Community-based Intervention for Management of Anaemia in Adolescent Girls, RHTC Naila, S.M.S. Medical College, Jaipur

Suman Charawandya,* Amita Kashyap, Monika Rathore,*** Mukesh Kumar Meena,**** V.K. Mathur,***** and Mahesh Verma*******

Abstract

Adolescent anaemia is a rampant health issue in Rajasthan. Several efforts of the Government in the past, including making Iron Folic Acid tablets available free of cost also could not improve the situation much. To assess the effect of 'community-based Intervention' on hemoglobin level and awareness of anaemia amongst adolescent girls for its control and intervention; this study was conducted. The methodology included house-to-house visits and fortnightly group discussions with adolescent girls at the Aanganwadi Centres (AWCs). Awareness regarding causes and consequences of anaemia, iron rich foods, enhancement of bioavailability of iron in food, etc. were assessed. Peer motivators and mothers were also involved to ensure compliance of IFA tablets. Baseline prevalence of anaemia was high (>95%) in both the groups. Improvement in hemoglobin was seen in 58% of the girls after 6 months of intervention in the study group. There was a significant difference in change in hemoglobin level, compliance of IFA intake and awareness regarding anaemia in both the groups. Majority of the adolescent girls were anaemic at the beginning. It was observed that one-to-one communication, peer group discussions, involvement of family members enhances the awareness regarding anaemia, compliance to IFA intake and hemoglobin level in the intervention group than the control group. Community-level interventions are required to enhance the awareness about the causes, symptoms, consequences and food that prevents anaemia. Compliance to IFA intake by involving peers as well as family members is also required.

Key-words: Adolescent, Girls, Anaemia, Community, Intervention, Naila.

Iron deficiency is the most common nutritional disorder in the developing world^{1,2}. Almost all the adolescent girls are anaemic in India (98%) as well as in Rajasthan (99%). Overall, 22% of the girls are mildly anaemic, 57% are moderately and 22% are severely anaemic³. Anaemia still remains a grave problem despite all the government efforts through various schemes for the last 45 years^{4,5}. This situation underlines that success of any intervention essentially requires community and individual ownership. Making the community aware of anaemia, measures to improve hemoglobin level, role of family members for ensuring compliance to iron supplements are few of the important steps to combat this situation.

Objective

The basic objective of this study was to determine the difference in hemoglobin level and awareness regarding anaemia after 6 months of 'community-based intervention' from the baseline in both the groups-control and intervention.

*Resident and Medical officer, E-mail: drsumanmukesh26@gmail.com; **Professor, amitakashyap1@gmail.com
Professor, rathoremonika@rediffmail.com, *Sr. Paediatrician, SMS Medical College, Jaipur, *****Director
Public Health, Government of Rajasthan and*****Professor, verma.drmaahesh5@gmail.com, Community
Medicine, SMS Medical College, Jaipur;

Methodology

The study was conducted during October 2011-September 2012 in the rural field practice area (RHTC) of the Department of Community Medicine, S.M.S. Medical College, Jaipur (Rajasthan). The community-based intervention (CBI) was done for a period of 6 months starting from February 2012 to July 2012.

Out of 11 Aanganwadi Centres in the RHTC area, two were randomly selected and one each was randomly allocated to the control and intervention group. All the eligible adolescents residing in the selected Aanganwadi Centres were included in the study.

The inclusion criteria were unmarried adolescent girls in the age group of 10-18 years, with <12 g/dl haemoglobin, and who gave consent. Similarly, exclusion criteria were any serious illness for the last 2 weeks requiring hospitalization, any chronic disease/infection, history of blood transfusion in the last 3 months, and those who refused to participate. A pre-designed pre-tested schedule was used for socio-demographic data. Data were also generated from Adolescent IFA Intake Monitoring Card and focus group discussions with the girls, mothers and ASHAs. Sahli's method was used for haemoglobin estimation. Baseline data were collected from both the control and interventional groups. All the routine health services were kept in the control as well as in the intervention group. Following interventions were also done along with the routine services in the intervention group: i) orientation of the community about the study objectives, ii) house-to-house visits to give nutrition health education to adolescent girls and their family members, and iii) fortnightly talks with adolescent girls at AWCs using posters/videos. These discussions covered topics such as causes of anaemia, its consequences, iron rich foods, how bioavailability of iron in food is enhanced/hampered, and right cooking practices. Among other interventions, ASHA was given half day training to improve her knowledge and communication skills, peer motivator and mothers were asked to ensure weekly intake of IFA and its entry in 'adolescent card', focus group discussions with adolescent girls and their mothers were done to find out their knowledge and practices regarding anaemia, and deworming.

Qualitative data were summarized in the form of proportions; and differences between proportions were analyzed using the Chi-square test. Quantitative data were summarized as Mean and Standard Deviation, Median and Inter-quartile range. The differences between Means were analyzed using the 't'-test. Hb <12 was considered anaemia- [(Mild 10-11.99Hb, Moderate 7-9.99 Hb, and Severe <7 Hb (as per WHO criteria)].

Findings

Baseline characteristics are comparable in the control and interventional group (Table 1). A very high prevalence of anaemia was observed in the control group (96%) as well as in the intervention group (100%) at the base-line. it was seen that mothers of most of the studied girls were educated above primary (61%). Majority of the girls

(83%) were living near AWC. Average number of contacts per girl was 18.89 (+/- 4.18) times during the study period in the intervention group. After intervention, an improvement was found in hemoglobin levels of 72 (58%) girls where as it declined in 8 (6.5%) girls and remained static in 43 girls (35%) of the intervention group.

TABLE 1
Baseline Characteristics of the Study Groups

Profile of Subjects	Study Groups		P Value
	Control (%) N=88	Interventional (%) N=123	
Age group			$\chi^2=0.879$ 2 df; P = 0.644
10-12yr	29 (32.95)	39 (31.71)	
13-15yr	27 (30.68)	45 (36.59)	
16-18yr	32 (32.36)	39 (23.58)	
School going girls	74 (84.09%)	101 (82.11%)	$\chi^2=2.56$, 1df; p=0.112
SES*			$\chi^2=2.361$ 4df, p=0.670
I	5 (5.68)	4 (3.25)	
II	15 (17.05)	30 (24.39)	
III	15 (17.05)	22 (17.89)	
IV	26 (29.55)	34(27.64)	
V	27 (30.68)	33(26.83)	
Family Type			$\chi^2=1.944$, df 1 p=0.163
Joint	26 (29.54)	49(39.83)	
Nuclear	62 (70.45)	74(60.17)	
Father's Education			$\chi^2=7.902$ with 3df; p=0.062
Just Literate	29 (32.95)	45 (36.58)	
Upto Sr. Secondary	44 (50.00)	69 (56.10)	
Graduate	8 (09.09)	8 (06.50)	
Post-graduate	7 (07.95)	1 (0.008)	
Mother's Education			$\chi^2=0.316$,1df; P = 0.574
Just Literate	75 (85.23)	100 (81.30)	
Up to Sr. Secondary	13 (14.77)	23 (18.70)	
Father's Occupation			$\chi^2=6.887$ with 5 df; P = 0.252
Business	23(26.14)	44(35.77)	
Cultivator	3(3.41)	8(6.50)	
Salaried Pvt.	1(1.14)	3(2.43)	
Govt. Service	2(2.27)	0.00	
Student	1(1.14)	1(0.81)	
Labourer	58(65.91)	67(54.47)	
Mother's Occupation			$\chi^2=3.482$ with 2 df; P = 0.175
House wife	19(21.59)	17(13.82)	
Laborer	69(78.40)	104(84.55)	
Salaried Pvt.	0	2(1.62)	
Baseline Profile of Adolescents			
Eating Habit			$\chi^2=0.589$ with 2 df; P = 0.745
Vegetarian	45 (51.13)	65 (52.84)	
Occasional Non-vegetarian	42 (47.72)	55 (44.71)	
Eggittarian	1 (.01)	3 (0.02)	

There was a significant increase in the proportion of girls who had ≥ 12 g/dl Hb level (from 0 % to 5 %) and seven percent reduction in the proportion of moderately anaemic girls (Hb <10.0g/dl). The difference of change in the haemoglobin status in the control and intervention groups was statistically significant (Table 2). A significant improvement was also observed in the availability of vitamin 'C' and Iron

in the food consumed (Table 3). Only 16 girls in the intervention and 19 girls in the control group were taking Iron Folic Acid (IFA) tablets, that too irregularly at the beginning of the study. On an average, a girl took 19.4 ± 2.08 tablets in the intervention group while it was 11.04 ± 1.92 in the control group during the 24-week study period. Overall, 80% (99/123) girls had good compliance (IFA taken more than 18 weeks). There were 16 girls who complied 100% (took IFA for 24 weeks) in the intervention group. Average number of IFA tablet consumed per month during the study period was significantly higher in the intervention group than the control group $\{3.14 (+/- 0.59) \text{ vs } 1.84 (=/- 0.74)\}$ (Table 4). Intervention brought significant positive difference in the knowledge of adolescents and their mothers regarding the main causes and symptoms of anaemia, foods that prevent it and future consequences of anaemia, also what are the services provided by the government (Table 5).

TABLE 2
Distribution Of Adolescents as Per Their Haemoglobin Status in Both the Groups

Haemoglobin Level (g/dl)	Control Group (n=88)		Intervention Group(n=123)*	
	Before (%)	After (%)	Before (%)	After (%)
7g to 9.99 g/dl	36 (40.91)	39 (44.31)	48 (39.02)	39 (31.70)
10g to 11.9g/dl	49 (55.68)	49 (55.68)	75 (60.97)	78 (63.41)
≥ 12 g/dl	3(3.41)	0	0	6 (4.87)

TABLE 3
Effect of Intervention on Iron and Vitamin C Intake and Haemoglobin Level

Variables	Study Groups		Significance Level
	Control N= 88	Study N=123	
Vit. 'C' Intake (Mean \pm SD)			
Before	30.85 \pm 13.89	32.89 \pm 18.45	P = 0.382
After	31.95 \pm 14.44	38.46 \pm 17.61	P = 0.005
Difference within Group	P = 0.607 1.1 \pm 7.75	P = 0.016 5.5 \pm 13.05	P=0.005(CI 1.33 to 7.47)
Iron intake (Mean \pm SD)			
Before	18.22 \pm 4.59	17.33 \pm 4.02	P = 0.137
After	18.44 \pm 4.48	18.52 \pm 3.68	P = 0.887
Difference within Group	P = 0.748 0.22 \pm 1.39	P = 0.016 1.19 \pm 1.22	P=0.000, CI=0.614 to1.326
Hemoglobin (Mean \pm SD)			
Before	9.9 \pm 1.1	9.98 \pm 0.99	P = 0.669
After	9.87 \pm 1.13	10.49 \pm 0.81	P = 0.000
Difference within Group	P = 0.859 - 0.05 \pm 0.29	P = 0.000 0.51 \pm .115	P= 0.000, CI=0.28 to 0.73

TABLE 4
Month-Wise Average No. of IFA Tablet Intake

Intervention period	Intervention group (n=123)	Control group (n=88)
Baseline	1.66 (0.53)	1.72 (0.71)
First month	2.74 (0.74)	1.89 (0.58)
Second month	3.85 (0.44)	2.04 (0.64)
Third month	3.69 (0.55)	1.93 (0.69)
Fourth month	2.66 (0.51)	1.57 (0.52)
Fifth month	2.41 (0.63)	1.68 (0.55)
Sixth month	3.51 (0.69)	1.93 (0.76)
Average of 6 months	3.14 (=/- 0.59)	1.84 (=/- 0.74)
Student's t test: test statistics = 14.180, df = 209, p= 0.000		

TABLE 5
Change in Level of Knowledge Among Adolescent Girls and their Mothers after Intervention

Knowledge regarding-	Mothers (n = 123)		'p' value	Adolescent Girls (n = 123)		'p' value
	Before	After		Before	After	
Main Cause of Adolescent Anaemia						
Menstrual Bleeding	66 (53.66)	89 (72.35)	0.000	58 (47.15)	109 (88.61)	0.000
Pregnancy/Abortion	34 (27.64)	83 (67.47)	0.000	39 (31.70)	111 (90.24)	0.000
Worm Infestation	96 (78.04)	109 (88.61)	0.040	87 (70.73)	112 (91.05)	0.000
Main Symptoms of Anaemia						
Tiredness and Poor Work Performance	71 (57.72)	98 (79.67)	0.000	54 (43.90)	103 (83.73)	0.000
Pale and Frail	66 (53.66)	98 (79.67)	0.000	48 (39.02)	114(92.68)	0.000
Foods to Prevent Anaemia						
Non-vegetarian Diet	20(16.26)	43 (34.95)	0.002	15 (12.20)	88 (71.54)	0.000
Gur-mungfali (Jaggery-Groundnut)	69 (56.10)	97 (78.86)	0.000	37 (30.80)	97 (78.86)	0.000
Green Leafy Vegetable	75 (60.97)	112 (91.05)	0.000	89 (72.36)	119 (96.74)	0.000
Kala Chana (Lentil)	6 (4.88)	86 (69.91)	0.000	5 (4.07)	119 (96.74)	0.000
Tamarind, Amla, Lemon, Watermelon, Guava, etc.	0 (0.00)	86 (69.91)	0.000	16 (13.00)	119 (96.74)	0.000
Consequences When an Anaemic Girl Becomes Pregnant						
Anaemia in Baby	19 (15.44)	99 (80.48)	0.000	51 (41.46)	104 (84.55)	0.000
Maternal and New-born Death	82 (66.67)	99 (80.48)	0.021	46 (37.39)	104 (84.55)	0.000
LBW Baby	22 (17.89)	65 (52.85)	0.000	12 (9.76)	84 (68.29)	0.000
Government's Efforts to Prevent Anaemia)						
IFA Tablet from School and Anganwadi Centre	31 (25.2)	99 (80.48)	0.000	30 (24.39)	123 (100)	0.000
Poshahar in School and Anganwadi Centre	58 (47.15)	99 (80.48)	0.000	62 (50.41)	123 (100)	0.000
Health Education in School and AWC	48 (39.02)	99 (80.48)	0.000	29 (23.57)	123 (100)	0.000

(*multiple responses hence number exceeds sample size of each group)

Discussion

The present study observed a very high prevalence of anaemia amongst the girls at the baseline (>96%) with one-third moderate anaemic and 61% mild anaemic though none was severe anaemic. NIPCCD Lucknow⁶ reported a comparable finding with 28% moderate anaemic, 45%, mild anaemic while only 3.5% of them were severe anaemic. In the present study, mean rise of haemoglobin was 0.51gm/dl in the intervention group that was similar to the findings by Deshmukh et al.⁷ (0.37 ± 17.7g/dl) while it was less than the figures given by Mehta et al.⁸ (1.54g/dl) and

Viveki et al.⁹ (1.62g/dl). There is a seven point reduction in proportion of moderately (Hb<10g/dl) anaemic girls in the current study which is comparable with the findings of 'Adolescent Anaemia Control Programme in Gujarat'¹⁰ (74 to 53%), Deshmukh et al.⁷ (65% to 54%), Sufiyan et al.¹¹ study (74% to 42%), Lucknow Uttar Pradesh study (92% to 58%). There was a marked reduction in proportion of moderately anaemic girls (from 39% to 31%), similar to IIHFW Hyderabad,¹² in 2002-'03 where percentage of subjects with normal haemoglobin increased from 17% to 59% and concomitant decrease in percentage of subjects with mild and moderate anaemia indicating efficacy of weekly IFA supplementation. Haemoglobin-level improved in 50% of the adolescent girls while they were static in 43% and declined in 7% of girls. The average number of IFA tablets consumed in 24 weeks by the girls was 19.4 ± 2.08 in the current study while Deshmukh et al.⁷ reported consumption of 7.2 ± 2.2 IFA tablets, the rise in haemoglobin-level was also very small with high variation as compared to the findings of the current study in spite of the fact that the study was for 30 months. The present study showed overall 80% compliance and 11% of the girls had total compliance, similar to 'Adolescent Anaemia Control Programme, Gujarat'¹⁰ (89%) where 40% of the girls took IFA regularly, which is higher than the finding in the present study because it was a huge project supported by UNICEF and the government health and education departments collaborated at all levels. A significant relationship between mothers' job and students' knowledge on anaemia was observed in the present study which is similar with the findings by Shojaeizadeh¹³. Baseline practice of cooking in iron utensil was very low (2-7%) in the current study. It increased to 11% (4% rise) which is not a significant change. A study of NIPCCD, Lucknow⁶ reported a much higher proportion (51%) at baseline which increased to 53.75% of the subjects using iron utensils for cooking. The researchers of the present study observed that 67% of the girls had good menstrual hygiene. It is mainly because of easily available cheap sanitary napkins. It significantly improved from 67% to 82%. Food hygiene improved from 41% to 49%, drinking water safety from 36% to 48% after intervention. Girls with heavy menstrual flow were reduced from 30% to 19% though it is not a significant reduction. In the current study, almost 65% of the girls of interventional group were drinking tea within one hour of eating food; a positive change of not taking tea with meals also increased from 36% to 57% though the change is not statistically significant. NIPCCD, Lucknow⁶ reported that practice of taking tea/coffee with meal reduced from 21.5 % to 0.59% at the end of the third phase of intervention.

Conclusion

Majority of the adolescent girls are mild to moderate anaemic. One-to-one communication, peer group discussion, involvement of family enhances the haemoglobin level and compliance of IFA tablets consumption. In addition, it also increased the level of awareness about causes, symptoms, consequences, food that prevents anaemia also increased amongst the adolescent girls and their mothers.

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