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A Review of LASI Wave-1 Data

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Abstract

The Longitudinal Aging Study in India (LASI) was a research project conducted by the International Institute for Population Sciences (IIPS). Its primary aim was to comprehensively investigate the complex aspects of aging in the context of India's diverse and evolving society. Given that the country's population is changing due to demographic and epidemiological transition, it *serves as a crucial source of information regarding the various dimensions of aging such as health, economics, social dynamics, and policy considerations. This in-depth analysis aims to condense the fundamentals of LASI, such as its techniques, problems, and far-reaching policy consequences, from the wealth of LASI data now available. This research highlights the crucial importance of this data repository by delving into the complex web of ageing in the Indian context. In a time of rapidly changing demographics and health care paradigms, LASI data shines as a compass for making sense of India's intricate age-related patterns. It provides a wealth of data for researchers, policymakers, and other stakeholders to use in developing effective policies, initiatives, and strategies for India's burgeoning elderly population. This review paper highlights the importance of LASI data in enhancing the comprehension of the intricate patterns of aging in the Indian context and synthesis of the main features like methodologies, challenges, and policy implications.*

Key words: LASI, Health, Well-being, Family support, Social networks.

Introduction

Population ageing is the process by which the proportion of elderly people increases and the proportion of younger people decreases, it is a result of both declining fertility and increased longevity[1]. The demographic transition of the world's population from a state of high birth and death rates to low birth and death rates has continued apace. This transition has been driven by the increase in the number and proportion of the elderly population[2].

In 1950, the global population aged 60+ was 205 million (8.2%), rising to 606 million (10%) in 2000 and 800 million now. In 2050, the amount of people aged 60 and beyond is expected to reach 21.1 per cent, or two billion, surpassing the population having the 0-15 age group. As the number of older people rises and children decline, it will be the first time in history that the number of children and older people is equal[3]. Recent fertility declines in East and Southeast Asian countries have led to an accelerating elderly population growth. Asian communities and

governments face unprecedented challenges with aging populations, leading to social and economic challenges[4].

India in the Context of Aging Population

India has the second-largest aged population in the world, after China, with 103 million[5]. Since 1961, elderly people have grown from 24 million to 43 million by 1981, 57 million by 1991, 77 million by 2001, and 103 million[5]. The elderly population tripled in 40 years. The growth rate of the elderly population (3.5%) was significantly higher than the average population growth rate of 2 per cent each year during 1991-2001. India's elder population is projected to grow from 117 million in 2015 to 193 million by 2030 and 335 million by 2050, according to UN statistics. It is projected to reach 13 per cent of the population in 2030 and 20 per cent in 2050[3]. Countries with an old population above 7 per cent, according to UN criteria, are considered to be aging. Early in the 21st century, India was known as an "aging India" due to 8% of the population having 60 and above age[5, 6].

Changing physical and mental capacities in old age leads to unavoidable health issues. Research in industrialized nations indicates that the rapid drop in elderly mortality is leading to high morbidity rates[7]. However, India had little time to address the growing health, welfare, housing, and long-term care needs of its aging population because of the unavailability of data specifically on the health and socioeconomic condition elderly population before coming up with the LASI data published in 2020.

Available Data on Aging in India before LASI

In 2003, the World Health Organization (WHO) conducted a World Health Survey (WHS) in India which covered household demographics, health care services and expenditures, ambulatory services, health insurance coverage, and individual health status of persons aged 18–49 years[8]. This survey also known as The Study on Global Ageing and Adult Health wave-0 (SAGE-0), and subsequently SAGE-1 (2007-08), SAGE-2 (2015), and SAGE-3 (2019-20) was conducted in six states- Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal, covering an overall sample of 10,279 households[9].

For a vast and diverse country like India the different wave of this survey not suitably represents the whole of India. As well as this survey covers only the age group of 18 to 49 and only 10,279 households. A major portion of the aging population aged 50 and above was not considered here, which makes it not a representative survey of the elderly population.

Introduction to LASI

The Longitudinal Ageing Study in India (LASI) is a diverse and globally coordinated research project involving 72,250 individuals aged 45 and older, along with their partners. This study represents people from all parts of India, including different states. LASI's main goal is to give valuable information to researchers and decision-makers about important topics like socioeconomic profile, health condition, family, and social networks for older people in India[10].

It holds the title of being the largest global study on aging and the first wave of LASI in India. It's in a good position to examine how modifications in policies influence people's behaviors in India. LASI's survey plans, tools, and methods are aligned with the Health and Retirement Study conducted in the United States and it's similar to surveys in other parts of the world like Asia and Europe.

The funding for the first phase of LASI, known as LASI Wave 1, came from the Ministry of Health and Family Welfare, Government of India, along with support from the National Institute on Aging, and the United Nations Population Fund in India. LASI is a joint effort involving three main institutions: the International Institute for Population Sciences (IIPS), the Harvard T.H. Chan School of Public Health (HSPH), and the University of Southern California (USC), as well as numerous other institutions from both within the country and around the world[11].

Objectives

The primary objective of this paper is to introduce the researchers/policymakers to the LASI survey data which provides a thorough and well-founded collection of scientificdata concerning demographic information, economic status of households, chronic health issues, health conditions based on symptoms, functional health, mental well-being (including cognition and depression), biomarkers, health insurance, healthcare usage, family and social connections, social welfare initiatives, employment and work status, retirement, levels of contentment, and expectations about life.

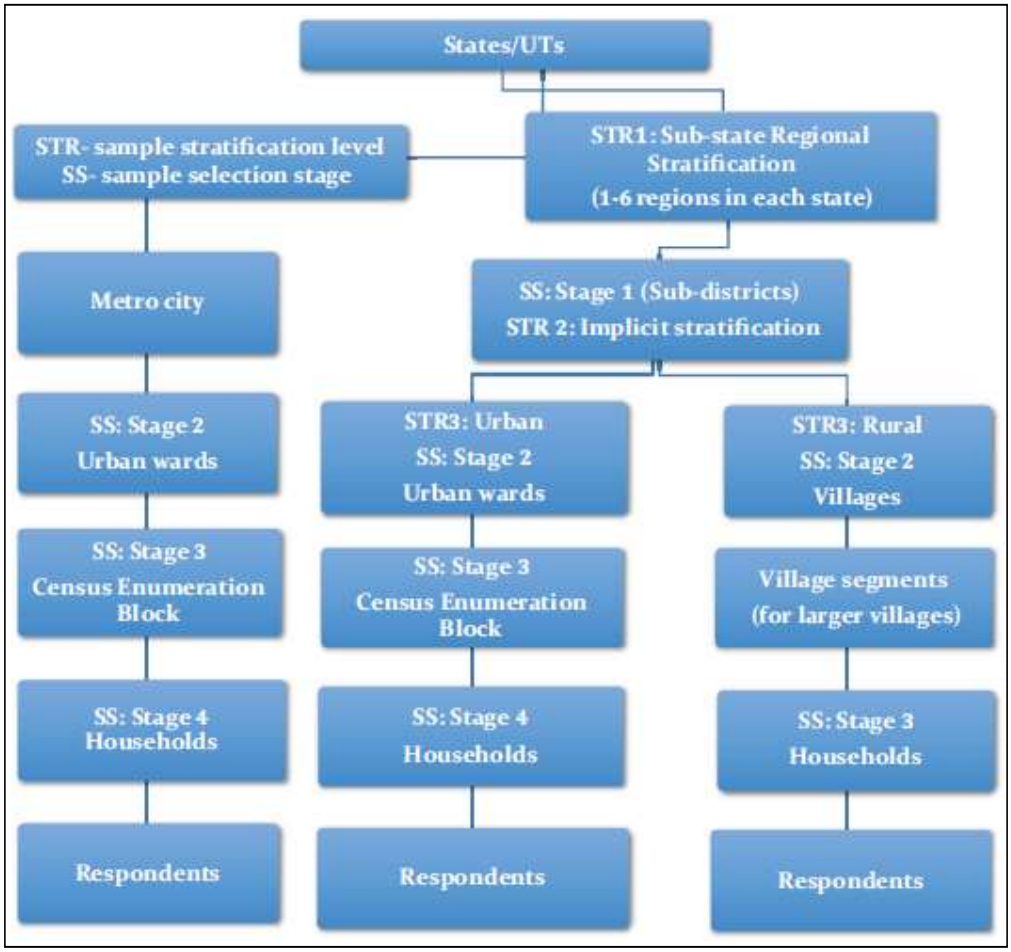
Methodology of LASI Survey

The LASI data employ a nationally representative sample of senior citizens from diverse Indian states. It captures the evolution of aging experiences by collecting data at multiple periods, providing a dynamic perspective on aging-related changes.

The LASI study employed a multistage sampling strategy (three stages in rural areas and four stages in urban areas) to identify its ultimate subjects of investigation: individuals aged 45 and older, as well as their spouses of any age. Depending on whether the location was rural or urban, Wave 1 of LASI employed either three or four distinct sampling stages. In each state or union territory, Primary Sampling Units (PSUs) representing sub-districts (Tehsils/Talukas) were selected as the first step. The next step involved selecting villages in rural areas and wards in urban areas within the chosen PSUs. Thirdly, for rural areas, households were selected from these selected communities. In urban areas, an additional phase was incorporated. Within each urban constituency, a Census Enumeration Block (CEB) was chosen at random in this additional third stage. Lastly, in the fourth stage, households were chosen from these designated CEBs. This comprehensive methodology guarantees the inclusive representation of older adults and their spouses in a variety of settings, taking into consideration rural and urban characteristics. For a household to meet the criteria, at least one member must be at least 45 years old. Individuals within these eligible households who are at least 45 years old and their spouses, regardless of their age, are qualified[10]. In addition, LASI deliberately targets a larger proportion of older adults from all states.

The initial phase of LASI, known as Wave 1, encompassed a panel group of 72,250 participants aged 45 and older, along with their partners. This sample included 31,464 senior individuals (aged 60 and above) and 6,749 individuals in the oldest age group (aged 75 and above) from 35 Indian states and union territories (excluding Sikkim). The LASI Wave 1 field survey tookplace throughout India between April 2017 and December 2018 and data were published in 2020[11]. The household response rateis calculated as the ratio of participating households in the survey to the total number of households sampled that were eligible based on age criteria.

Figure 1
Stages of Sample Selection



Source: LASI Report, 2020

Aspects covered in the LASI Wave-1 survey

Health and Well-being

The LASI study provides a comprehensive look at the rates of several chronic illnesses among the elderly. Heart disease, diabetes, high blood pressure, and cancer are only a few of the chronic illnesses whose incidence increases with age. The goal of LASI is to provide a solid groundwork for understanding the health issues faced by the elderly by precisely estimating the prevalence of such illnesses and the impact they have on the lives of those who are afflicted. This information

is vital to researchers, clinicians, and policymakers who are working to find better ways to prevent, manage, and treat these conditions.

It also has the potential to make important contributions to the study of mental health issues. The findings of the study support the view that mental well-being is an integral part of health. Depression, anxiety, dementia, and other mental diseases all have serious consequences for the quality of life and ability to perform daily tasks in the elderly population. The LASI study looks into how often these things happen to learn more about the psychological and mental effects of getting older. By launching this project, we hope to lessen the stigma that seniors have when seeking help for their mental health and encourage the growth of strong networks of care.

In addition to looking at multiple health indicators, LASI also explores how the elderly make use of medical treatment. Access to healthcare, the factors that prevent people from using it, and the regularity with which people seek medical advice are all investigated. By examining general tendencies, LASI looks for areas of weakness and inefficiency in the healthcare system, with a focus on the specific needs of the elderly. Healthcare policy and treatment can be improved by employing data-driven approaches that account for the specific needs and preferences of a growing elderly population.

Economic Well-being

The LASI study provides a comprehensive look at the rates of several chronic illnesses among the elderly. Heart disease, diabetes, high blood pressure, and cancer are only a few of the chronic illnesses whose incidence increases with age. The goal of LASI is to provide a solid groundwork for understanding the health issues faced by the elderly by precisely estimating the prevalence of such illnesses and the impact they have on the lives of those who are afflicted. This information is vital to researchers, clinicians, and policymakers who are working to find better ways to prevent, manage, and treat these conditions.

It also provides important contributions to the study of mental health issues. The findings of the study support the view that mental well-being is an integral part of health. Depression, anxiety, dementia, and other mental diseases all have serious consequences for the quality of life and ability to perform daily tasks in the elderly population. The LASI study looks into how often these things happen to learn more about the psychological and mental effects of getting older. By launching this program, we hope to lessen the stigma that seniors have when seeking help for their mental health and encourage the growth of strong networks of care.

In addition to this, LASI also explores how the elderly make use of medical treatment. Access to healthcare, the factors that prevent people from using it, and the regularity with which people seek medical advice are all investigated. By examining general tendencies, LASI looks for areas of weakness and inefficiency in the healthcare system, with a focus on the specific needs of the elderly. Healthcare policy and treatment can be improved by employing data-driven approaches that account for the specific needs and preferences of a growing elderly population.

Family Support and Living Arrangements

In India, family dynamics play a crucial role in molding the lives of the elderly. The Longitudinal Study of Ageing in India (LASI) investigates the complex web of intergenerational ties, caregiving routines, and housing arrangements that characterize the lives of India's aging population.
The dynamics of family life are illuminated by LASI's research into intergenerational linkages and exchanges. This research sheds light on the intergenerational support networks within families and the degree to which grandparents are involved in the daily lives of their children and grandkids. LASI also places a strong emphasis on the study of caregiving styles. The study examines the obligations and commitments of family members who assist elderly loved ones. One aspect of this is learning about the difficulties experienced by carers and how caregiving responsibilities are divided up within families.

LASI looks into the several types of senior Indian housing. Finding out if the elderly live alone, with a partner, their children, or in some other arrangement is part of this research. LASI sheds light on the social engagement, caregiving accessibility, and general health of the elderly based on their living arrangements.

Social Networks and Loneliness

Social networks play a crucial role in determining an individual's overall well-being. The LASI investigates in depth the complex terrain of social interactions, social participation, and the prevalence of loneliness among senior adults. Through its examination of social interactions, LASI endeavors to determine the extent to which older individuals interact with friends, family, and larger social circles. This analysis sheds light on the nature and frequency of their interactions, which have a direct bearing on their emotional and mental health.

The LASI analysis of social participation examines the extent to which older citizens are engaged in a variety of social and community activities. Participation in group activities, organizations, religious gatherings, and other social events can have a significant effect on a person's sense of belonging and connection.

Policy Implication

The Longitudinal Aging Study in India (LASI) has significant policy ramifications aimed at enhancing the well-being of elderly individuals within the nation. By furnishing comprehensive insights spanning health, economic stability, social assistance, and more, LASI equips policymakers with data-centric instruments to confront the challenges posed by the aging demographic. These consequences span from shaping healthcare strategies and augmenting financial security through pension systems and social safety initiatives to nurturing social integration and devising environments conducive to aging. Moreover, LASI's extended design facilitates an exceptional avenue for evaluating and enhancing policies over time, guaranteeing their continued effectiveness in meeting the changing requisites of older citizens. Under these policy inferences, LASI contributes to the establishment of a society that esteems and sustains its aging populace, ultimately heightening the quality of life for elderly individuals across India.

Conclusion

The Longitudinal Aging Study in India (LASI) is a key driver of both research progress and innovative policy, embodying a core mission of ground-breaking exploration. By deeply examining the aging process, LASI significantly contributes to improving the well-being of India's older population. Its unique strength lies in connecting research and policy, generatinga powerful link that has the potential to bring about important changes in society. By sheddinglight on the complexities of aging, LASI offers practical insights for policymakers to create interventions and initiatives tailored to the various needs of older adults. This alignment between research and policy enhances LASI's role as a catalyst for positive transformation, nurturing a societal mindset that values and empowers the aging demographic. In this pursuit,LASI shines as a guiding beacon, illuminating the path toward a kinder, more inclusive, and supportive society one that deeply respects and cherishes its aging citizens and their contribution to India's progress and growth. During this round of the LASI survey, it was not feasible to obtain estimates of migration on the district level. This shortcoming of LASI data might be fixed for the next wave of this study if investigators decide to address it.

References

1. Sagaza H. (2004). Population aging in the Asia-Oceania region. Geriatrics & Gerontology International; 4 (1): s34-s37.
2. Norman R. A. & Henderson J. N. (2003). Aging: an overview. Dermatology and Therapy; 16: 181-185.
3. United Nations Population Division. (2006). Revision World Population Prospects. New York, USA: United Nations.
4. Chan A. (2005). Aging in southeast and east Asia: issues and policy directions. Journal of Cross-Cultural Gerontology; 20: 269-284.
5. Office of Registrar General (2011). Census Reports – 2011. New Delhi: Ministry of Home Affairs, Government of India.
6. Liebig P. and Rajan S. I. (2003). An aging India: Perspectives, Prospects and Policies. New York, Haworth Press.
7. Haines M.R. (1995). Disease and health through the ages. In Simon, J. (Eds.), The State of Humanity (p. 51-60). Basil Blackwell: Oxford University Press.
8. World Health Organization. SAGE waves. https://www.who.int/data/data-collection-tools/study-on-global-ageing-and-adult-health/sage-waves. (Accessed on 15 September 2023).
9. International Institute for Population Sciences. Study on Global Ageing and adult health INDIA. https://iipsindia.ac.in/sage. (Accessed on 15 September 2023).
10. International Institute for Population Sciences, NPHCE, MoHFW, Harvard T. H. Chan School of Public Health, & University of Southern California. (2020). Longitudinal Ageing Study in India (LASI) Wave 1, 2017-18, India Report.
11. International Institute for Population Sciences and NPHCE, MoHFW. (2020). Longitudinal Ageing Study in India (LASI) Wave 1, 2017-18, Factsheets – States/UTs.

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Unmet and Met-Need of Contraception in 8 EAG States of India in 2019-'21: Strategies to Meet the Unmet

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Abstract

Unmet need for contraception was substantially high during 2019-'21 in the 8 EAG States viz. Uttar Pradesh, Bihar, Madhya-Pradesh, Rajasthan, Odisha, Jharkhand, Chhattisgarh, and Uttarakhand; comprising of 45.9 per cent of India's population, as per 2011 census. This study highlights the factors influencing all the four components of demand for contraception viz. unmet and met-need for contraception for spacing and limiting births, in the so called 8 demographically backward Empowered Action Group (EAG) states of India.

Data on battery of socioeconomic, demographic and programme factors affecting demand for contraception have been drawn from the Fifth National Family Health Survey (NFHS-5), 2019-21. The survey covered respondents stretched *over 707 districts spanned over 29 states and 6 Union Territories of India. The database for this study is confined only to 227865 currently married women respondents aged 15-49, from the eight EAG states. The Multinomial Logit Regression analysis has elicited relative significance and probable directions of effects of the selected socioeconomic and demographic variables on the four components of demand for contraception.*

The Multiple classification analysis, eliciting probabilities of usage or non-usage of contraception, suggests that strengthening of IEC component on family planning, strict promulgation of minimum age at marriage act, alleviation of son-preference, reduction in infant and child mortality, allaying misapprehensions on side effects and health risks of contraception, improvement in girls school enrolment and women's education and women's gainful employment enabling women's empowerment, and propagation of contraception usage for limiting births among Muslim women, would significantly improve the contraception usage.

Rather simultaneous efforts on supply along with demand-side factors towards curtailment of unmet need and no-use and no-demand for contraception would facilitate faster reduction in fertility and hasten the process of demographic transition and population stabilization in the demographically backward EAG states and thus in India.

Key words: Unmet Need, Met Need, Contraception, Spacing Births, Limiting Births, Women's Empowerment, Multinomial Logit Regression, Multiple Classification Analysis.

Introduction

Role of contraception in fertility regulation has always been crucial and pretty effective in most of the historical and contemporary situations (Harvey, 1996). The advent of modern contraception methods since fifties and sixties made fertility a choice variable being treated in most of the socio-economic theoretical frameworks evolved during the Sixties and Seventies (Easterlin,1969). However, most empirical studies have aptly demonstrated that contraception had always been the most significant catalytic factor and cost-effective strategy for fertility regulation (Gulati, 1996). Realizing the potential dangers of burgeoning population, in 1952 India became the first country to launch an official family planning programme promoting contraception and responsible parenthood to control fertility and hasten the process of demographic transition in India. Official efforts have succeeded in averting about 443 million births till 2010-11 (GoI, 2011).

More importantly, using contraception to curtail fertility has been stressed for accelerating population stabilization in developing countries (Robey et al, 1996; Westoff and Bankole, 2000). The extent of unintended pregnancies, that is, unwanted or mistimed ones, is still around one in four worldwide (Haub and Herstad, 2002). Unwanted fertility is likely to be nearly non-existent at the two extreme stages of transition-initially when fertility desires are mostly unrestricted and at the end of the transition when couples have nearly complete control over their fertility (Kulkarni & Choe, 1998). Reducing the unmet demand for contraception would help couples achieve their reproductive goals and reduce unintended pregnancies that lead to abortions and unwanted births, both of which are unacceptably high in many developing countries (Becker 1999; Potts 2006). One particular harmful consequence of unintended pregnancies is unsafe abortion, leading to high rates of maternal morbidity and mortality in less-developed countries. An estimated 18 million unsafe abortions take place in these countries annually (Murray and Lopez, 1998). Additionally, unwanted births pose risks for children's health and wellbeing and contribute to rapid population growth in resource constrained countries.

However, promotion of contraception as a fertility regulation strategy seems to had been consigned to the back burner in India in late 1990's, especially since ICPD conference in 1994, despite the fact that almost all the empirical studies had demonstrated that contraception had always been the most significant catalytic factor and cost effective strategy for fertility control in almost in all the circumstances. Major paradigm shifts in India's population policies post-ICPD switched from the earlier method-mix target oriented approach to a client-entered demand-driven approach to reproductive and child health. This new approach was enshrined in the National Population Policy 2000, with tangential reference to fertility control. The policy then called for vigorous promotion of a small family norm to achieve replacement levels of fertility by 2010. Nevertheless, a report submitted by the working group on population stabilization constituted by the Planning Commission had aptly concluded that "there appears to be an urgent need for bringing back promotion of contraception as the main concern of Family Welfare programmes in the high fertility states of India and thus the couples' felt need for contraception should be fully met" (GoI, 2006).

National Rural Health Mission launched in April 2005 brought focus on provision of healthcare towards improvement in the quality of life, especially amongst underprivileged and underserved groups amongst Indian citizens. Possibly, the underlying presumption in most of such national

and international strategic pronouncements over the quality of life or standards of living could be that improvement in the quality of life would motivate people to limit their family size and thus fertility regulation and population stabilization processes would get accelerated. Possibly, the underlying presumption in most of such national and international strategic pronouncements over the quality of life or standards of living could be that improvement in the quality of life would motivate people to limit their family size and thus fertility regulation and population stabilization processes would get accelerated.

From a policy perspective, increasing the demand for contraception and at the same time reducing the unmet need for contraception is important for both achieving demographic goals and enhancing individual rights. From the demographic standpoint, increasing the demand and reducing unmet demand for contraception would contribute to lowering fertility. Reducing the unmet need for contraception is also important for helping couples achieve their reproductive goals and enhancing wellbeing of women and children (Malcolm Potts, 2006) and may help in reducing unintended pregnancies that lead to abortions and unwanted births—both of which are unacceptably high in many developing countries witnessing fertility transition (Becker, 1999). Interestingly, unwanted fertility or proportion of unwanted births was discerned to be low in countries with very low or very higher levels of fertility and highest in countries with intermediate levels of fertility (Bogart's, 1990, 1997).

The major reasons extended for the lack of demand for contraception in developing countries are misguided fear of side effects, health concerns, familial and societal objections to the usage of contraception, high costs, limited supplies, etc. In the Indian context it may be of interest to mention that apart from the fact that the current unwanted fertility being higher the prospective decline in the wanted fertility because of improvements in quality of life would imply further increase in demand for contraception. It is obvious in the context of hastening the pace of population stabilization processes in the country that a focused attention is given not only to the current substantial unmet need of contraception but also to the prospective increased demand for contraception resulting from the improvements in the quality of life.

Objectives of the study

Although fertility decline has set-in all over India, yet the slow pace in certain regions remains a serious concern to population and development planners. Keeping the context and concern, the study intends to analyze factors influencing different components of total demand for contraception viz. met as well as unmet need for spacing as well as limiting births in 8 demographically backward states viz. Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, Odisha, Jharkhand, Chhattisgarh and Uttarakhand; popularly known as Empowered Action Group (EAG) states of India. The EAG states comprise almost 45.9 per cent of India's population as per 2011 Census, and within the EAG states we find Uttar Pradesh and Bihar are the most populous states of India comprising 16.5 per cent and 8.6 per cent of India's population.

Database and Methodology

The Fifth National Family Health Survey (NFHS-5) data is appropriate and used in the study. It provides detailed information from 636,699 households for 724115 women and 101839 eligible

men stretched over 706 districts spanned over 29 states and 6 Union Territories of India. The NFHS collected detailed information on fertility, mortality, family welfare, and important aspects like nutrition, sexual behavior, domestic violence, adolescent reproductive health, testing of adult population for HIV, etc. The information was elicited to enable the GOI to provide national and international agencies to monitor and evaluate policies and programmes related to population, health, nutrition, and family planning and contraception behaviors.

This study intends to elicit the effects of selected socioeconomic and demographic factors on met and unmet demand for contraception in the EAG states of India. The data on usage or non-usage of contraception amongst currently married and fecund women in the EAG states provided by NFHS-5 would be utilized for the purpose.

The database over battery of socioeconomic and demographic variables, mother and child health indicators, contraceptive usage and non-usage, etc. for currently married women aged 15-49 years filtered for 227,865 currently married women covered in the 8 EAG states has been utilized in this study.

Conceptual modifications to the measurement of unmet need for contraception have brought forth lot of literature over the recent past (Westoff 1992, Bhushan 1997; Casterline and Sinding 2000). The definitional aspects of unmet and met need of contraception for spacing and limiting births are detailed in the NFHS[1]-5 documents. The response variable is categorized into five mutually exclusive and exhaustive categories: (1) respondents not using any type of contraception, (2) respondents with unmet need for spacing births, (3) respondents with unmet need for limiting births, (4) respondents using spacing methods and (5) respondents using limiting methods. The reference category (1) comprises of respondents who are not using any contraceptive method and have not expressed any need for the same. Each respondent can fall into only one of the five mutually and exhaustive categories.

For the purpose some selected socioeconomic, demographic and program factors affecting met and unmet need for contraception in India have been brought under the purview of the present study. Identification of the key contributing factors and their relative significance in impacting the different components of the total need of contraception would be elicited using multinomial logit regression analysis.

In the study, bivariate analysis highlights only two-way linkages between contraception usage and selected background characteristics of women. Thereby, multivariate analysis would provide impacts and relative significance of different socioeconomic and demographic factors on the

[1] Unmet Need for Spacing Births refers proportion of all currently married women who are neither pregnant nor postpartum amenorrhoeic, are considered fecund, and want to postpone their next birth for 2 or more years, but are not using any contraceptive method.
Unmet Need for Limiting Births refers proportion of all currently married women who are not pregnant and not postpartum amenorrhoeic, are considered fecund, and want to stop childbearing, but are not using any contraceptive method.
Met Need for Spacing Births refers to proportion of all currently married women who are using some method of family planning and say they don't want to have another, or are undecided to have another, child over coming two years.
Met Need for Limiting Births refers to all the currently married women who are using contraception and who don't want to have any more children.

usage of contraception. For the purpose multinomial logit analysis is being carried out in the present study.

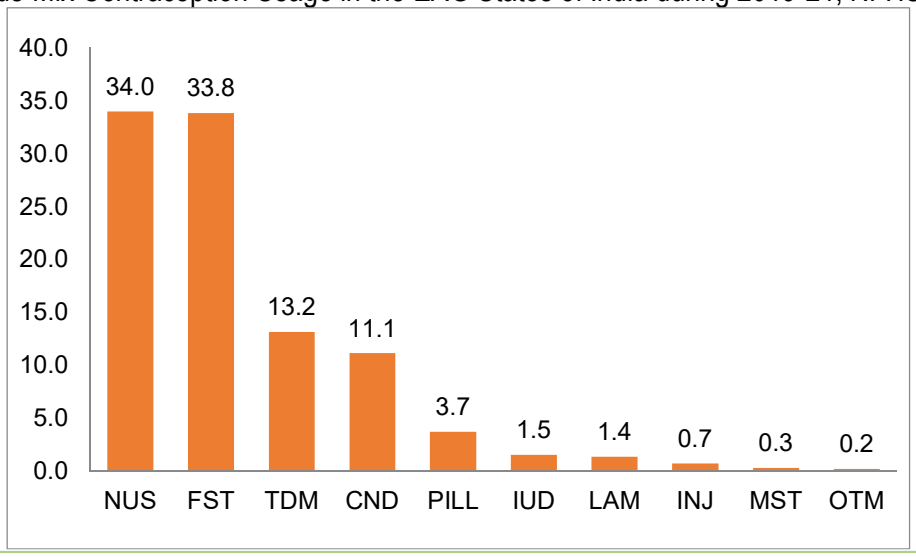
This study would employ multinomial logit regression analysis to highlight important predictors of met and unmet demand for contraception. Parametric estimates of the multinomial regression coefficients are elicited through the maximum likelihood estimation procedure. Parametric estimates of the Multinomial Logit Regression, being non-neutral to the selection of the reference category women, would be utilized to elicit effects of alternate socio-economic and demographic predictor variables on the log of odds of usage or non-usage of spacing and limiting methods to the reference category of no-use and no demand for contraception. A note on cautious interpretations of increase or decrease in the odd ratios in the multinomial regression analysis is provided in an earlier study (Gulati, 1996). For further details on formulation, estimation procedures and proper interpretations of the effects, one can look into technical literature on the causal analysis (Retherford, 1993). Some technical aspects of the estimation procedure and methodology are provided in Appendices too.

The estimated regression coefficients can be used for multiplicative effects of the odd ratios and thereby probabilities or likelihood of respondents being in different categories of non-users or users stated earlier with different background characteristics have been provided in multiple classification analysis (MCA) in this study. Alternatively, the effects of predictor variables on the response variable are the form of estimated probabilities subject to changes in the predictor variables. Thereby, MCA would elicit likelihood or probabilities of met and unmet need of contraception for spacing and limiting births as well as for non-use and no demand for contraception, which are neutral to the selection of the reference category. The focused discussion on the elicited probabilities would highlight likelihood of usage, non-usage for spacing and limiting births as well as no-use and no-demand for contraception in the EAG states of India.

Method-mix Usage of Contraception in EAG States

Usage of contraceptive methods in the eight EAG states has been drawn from the 227865 currently married women aged 15-49 years covered in the National Family Health Survey in 2019-21 (NFHS-5). Perusal of Fig-1 and Appendix Table-1 reveals that almost 66 percent of the couples are using contraception in the EAG states, comprising usage by 10.3 per cent for spacing births and 55.7 per cent for limiting births. Female Sterilization (FS) still remains the most popular modern contraceptive method in the EAG States. Across EAG states, the usage is lowest in Bihar (56%) and Uttar Pradesh (62%), and highest in Odisha (74%) and Madhya Pradesh and Uttarakhand (72% each). Second most widely used method is condom by 11.1 percent of the couples. Out of other modern contraception methods we find pills being reported by 3.7 per cent and IUD by 1.5 per cent of the women. Interestingly, 13.2 per cent of the users of contraception still report use of traditional methods, mostly the rhythm and the withdrawal methods, which turns out to be slightly higher than the all India average of 10.2 per cent (NFHS-5, 2022, p158). Furthermore, the lactation amenorrhea method (LAM) is being reported by 1.4 per cent women across EAG States compared with 0.7 per cent over All-India (NFHS-5, 2022, p.158). Interestingly, strong negative linkage between contraception usage and fertility gets evidenced in Appendix Table-1, such as Bihar having minimum usage with Met Need of Contraception (MNC=56.0%) and maximum fertility with Total Fertility Rate (TFR=3.0), compared with Odisha having maximum MNC (74.0%) and minimum TFR (1.8).

Figure 1
Methods-Mix Contraception Usage in the EAG States of India during 2019-21, NFHS-5 (%)



NUS: Not Using, FST: Female Sterilization, TDM: Traditional Methods, CND: Condoms, PILL: Pills, IUD: Intrauterine Device, LAM: Lactational Amenorrhea, INJ: Injections, MST: Male Sterilization. OTM: Other Methods

Source: Authors calculation based on NFHS-5 data, 2019-21

Main reasons for non-use and no intention to use contraception during 2019-21 in EAG States

It may be of interest to examine the reasons for non-use of contraception and no intention to use anytime in future, as they could provide important clues about the demand side and supply side constraints to contraception (Zappella, 1997). Supply side constraints such as inaccessibility or effectiveness of contraception methods, or misapprehensions about contraception methods, would suggest that program interventions can improve the demand for contraception. On the other hand, demand-side constraints such as familial or societal opposition to family planning or lack of knowledge suggests for strengthening the IEC component to improve demand for family planning. Distribution of ever married women neither using nor having any intention to use contraception is provided in Table 1.

Perusal of Table 1 reveals that women who are neither using nor intend to use contraception across EAG States extend predominantly fertility related reasons (78.5%), of which 35.1 per cent report not having sex and 6.1 per cent report infrequent sex, and around 14.0% extend menopausal or hysterectomy reasons. Interestingly, around 16.34 percent expressed societal opposition to the usage, comprising mainly husband's opposition (12.81%) and self-opposed (3.21%). Around 16.37% women extend method related reasons like fear of side effects (2.16%), cost too much (2.63), don't like existing methods (2.26), etc. We still find 1.9% women expressing lack of knowledge or source of accessing the contraception methods. It may be of interest to mention that a fall in the percentages of women extending reasons like Menopausal, Hysterectomy, Infecundity, Fatalistic or Opposition to Use, has been observed between NFHS-

4, 2015-16 and NFHS-5, 2019-21.

Table 1

Percentage Distribution of the Women Aged 15-49 by Main Reason for No-Use and No Intention to Use in 2015-'16 and 2019-'21

EAG states	NFHS 4	NFHS 5*
Fertility Related Reasons	**71.8**	**78.55**
Not having sex		35.11
Infrequent sex, no sex	22.2	6.07@
Menopausal, hysterectomy[2]	26.5	13.98
Sub fecund, infecund	6	4.21
Postpartum amenorrhic	3.3	5.86
Breastfeeding	3.8	8.26
Fatalistic	10	5.06
Opposition to Use	**18.2**	**16.34**
Respondent opposed	5.3	3.21
Husband opposed	12.2	12.81
Others opposed	0.7	0.32
Religious Reasons	**1.7**	**0.44**
Religious prohibition	1.7	0.44
Lack of Knowledge	**1.9**	**0.42**
Knows no method	1.2	0.2
Knows no source	0.7	0.22
Method related Reasons	**18.4**	**16.37**
Fears side effects	2.7	2.16
Lack of access	0.3	0.37
Cost too much	2.4	2.63
Inconvenient to use	0.3	0.25
Health risks/ No-liking of existing methods	4.3	0.5#
Don't like existing method		2.26
Other reasons	6.7	7.29
Don't Know	1.7	0.91
Number of women	**21522**	**45431**
*Ever Married, @: Infrequent sex, # Health Risk		

Source: Author's calculation based on NFHS-5 data, 2019/21

Appendix Table 1

Percent Distribution of currently married Women by Contraception Usage Status in EAG States of India: 2019-'21

State	UNSB	UNLB	MNSB	MNLB	NUND	MNC	TFR*	N
Bihar	6.1	7.5	8.0	47.8	30.6	55.8	3.0	31766
Uttar Pradesh	4.8	8.1	11.8	50.6	24.7	62.4	2.7	62670

[22] Hysterectomy is surgery that involves partial or complete removal of the uterus of a woman. Three percent of women age 15-49 have had a hysterectomy (NFHS-5, p165).

Madhya Pradesh	3.8	3.8	8.2	63.6	20.6	71.8	2.6	34970
Rajasthan	3.7	3.9	11.8	60.5	20.1	72.3	2.4	30753
Jharkhand	4.8	6.7	8.7	52.9	26.8	61.6	2.4	19466
Chhattisgarh	3.4	4.8	8.6	59.2	23.9	67.8	2.2	18913
Uttarakhand	3.2	5.6	10.9	59.9	20.4	70.8	1.8	9151
Odisha	2.5	4.6	13.4	60.7	18.7	74.1	1.8	20176
EAG States	4.3	6.0	10.3	55.7	23.7	66.0	2.3	227865

Note- *UNSB: Unmet Need for Spacing Births; UNLB: Unmet Need for Limiting Births; MNSB: Met Need for Spacing Births; MNLB: Met Need for Limiting Births, NUND: No Use & No Demand; MNC: Met Need of Contraception, TFR: Total Fertility Rate, N: Number of the Respondents. *SRS-2020*

Most of the reasons cited for non-use and no intention to use in future too, are primarily because of wrong perceptions about FP methods or possibly lack of follow-up of some contraception methods where minor clinical interventions are needed at the time of adoption like IUD insertions, tubectomy or vasectomy. Thus, strengthening IEC components towards proper sensitization of women and strict follow up of minor complications arising out of some methods of contraception would facilitate generation of more demand for contraception amongst women who are neither using nor have intention to use in future too. Thus, the demand for family planning can be improved through proper sensitization of women and alleviation of method specific misapprehensions and alleviation of opposition to use amongst the 25.86 percent of women, who are neither using any method nor expressing any intention to use in future too.

Patterns of contraception usage by selected background characteristics

Information on extent of unmet and met need for family planning for spacing as well as limiting births by selected background characteristics of currently married women aged 15-49 years in the EAG states of India is provided in Appendix Table 2. Total demand for contraception is sum total of unmet and met need for contraceptive methods for spacing as well as limiting births. Patterns of contraception usage by age clearly depict that unmet need for spacing births (UNSB) is much higher in the younger age group women of 15-24 and declines fast in the upper aged women. Unmet need for limiting births (UNLB) is higher in the middle age groups women compared to younger (15-24) and later reproductive age group women (45-49). As per general expectations the met need for limiting births (MNLB) gets much higher in the later reproductive age groups women and depicts almost an increasing trend of the usage of permanent methods along with age. Furthermore, proportion of unmet need as of total demand (UNTD) depicts declining trend along with age of women.

Contraception usage patterns by age at first birth depict that all the components of demand for children, except met need for limiting births (MNLB), increase along with the increase in the age at first birth. Patterns of contraception usage by number of living children are also in line with general expectations. Met need for spacing births is discerned to be higher among low parity women having lesser number of children and gets lower among women with higher number of children. Usage of contraception for limiting births is obviously much lower among women with one or two children and a substantial rise is discerned among women with two or more children. As per general expectations, we find that proportionate unmet need to total demand for contraception depicts declining trend along with number of children.

Usage of contraception patterns by number of surviving sons are on similar patterns as of number of living children. Furthermore, met need of limiting births (MNLB) witness sudden surge after having one or two sons, and on the other hand we find much lower proportion using contraception for limiting births among women having no son. Possibly, the extent of son preference is still profound among women across EAG states. Contraception usage by women's educational levels reveals that unmet as well as met need for contraception for spacing births gets higher among women with increasing levels of education. Possibly, usage of contraception for spacing births seems to be higher among women with higher levels of education. On the other hand we find unmet as well as met need for contraception for limiting births declines among women with increasing levels of education. Alternatively, usage of contraception for limiting births seems to be higher among women with lower levels of education.

Muslim compared to Non-Muslim women depicts higher unmet need of contraception for spacing as well as limiting births. However, met need of contraception for spacing births among Muslim women turns out to be higher than Non-Muslim women. On the other hand, we find that met need of contraception for limiting births turns out to be much higher among Non-Muslim compared with Muslim women. Possibly, usage of permanent methods of contraception is much lower among Muslim compared with the Non-Muslim women. Unmet need of contraception for spacing as well as limiting births seems to lower among women living in urban compared to rural areas. on the other hand, we find met need of contraception for spacing as well as limiting births seem to be higher in urban compared with rural areas. Women's empowerment enabling factors like watching television and no physical violence characterized by never being slapped by husband clearly depict much higher usage of contraception for spacing (MNSB) as well as limiting births (MNLB). Also we find that unmet need of contraception for both spacing as well as limiting births is also lower among such empowered women. Experiencing of death of a child by women depicts lower unmet need of contraception for spacing (UNSB) as well limiting births (UNLB). Whereas, usage of contraception for spacing births (MNSB) turns out to be higher and for limiting births (MNLB) to be lower among women who experienced death of a child.

Graphical representation of Met as well Unmet-Need of contraception for spacing and limiting births by some selected background characteristics like age, number of living sons, working status, and religion of women are presented in figure 2. The patterns discussed earlier get clearly depicted by the bar diagrams. Fig-2.1 clearly reflects usage of contraception for spacing births (MNSB) is higher among younger women and for limiting births (UNLB) is higher among women in higher age groups. Fig-2.2 reflects that usage of contraception for limiting births (MNLB) surge substantially after having a son, possibly reflecting profound son preference among women across EAG states. Fig-2.3 reveals that met need for spacing births (MNSB) as well as for limiting births (MNLB) is higher among working compared to non-working women. Fig-2.4 clearly reflects that met need of contraception for spacing births (MNSB) is higher among Muslim compared with the Non-Muslim, whereas usage of contraception for limiting births (MNLB) is substantially higher among Non-Muslim compared to Muslim women.

Figure 2

Met and Unmet Need of Contraception by Women Background Characteristics, 2019-'21

Figure-2.1

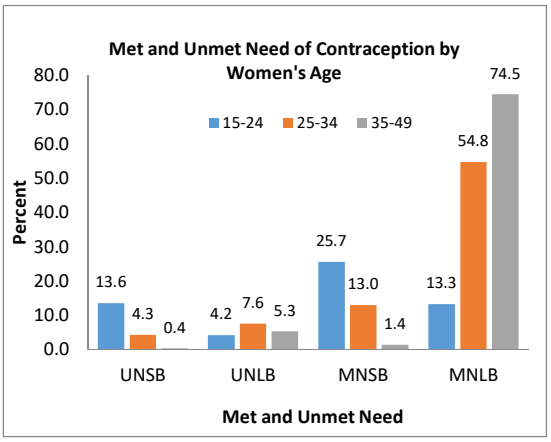


Figure-2.2

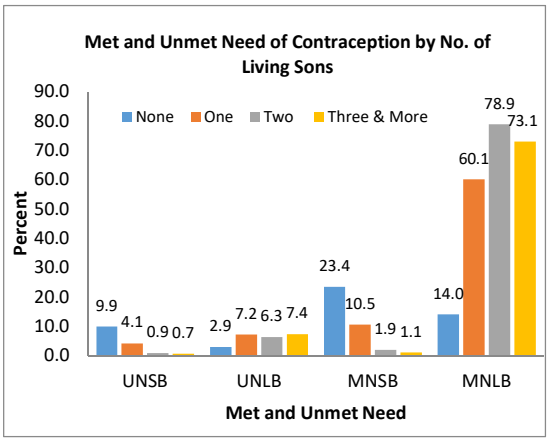


Figure-2.3

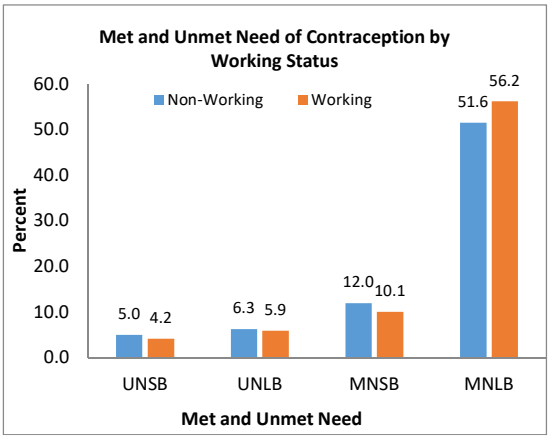
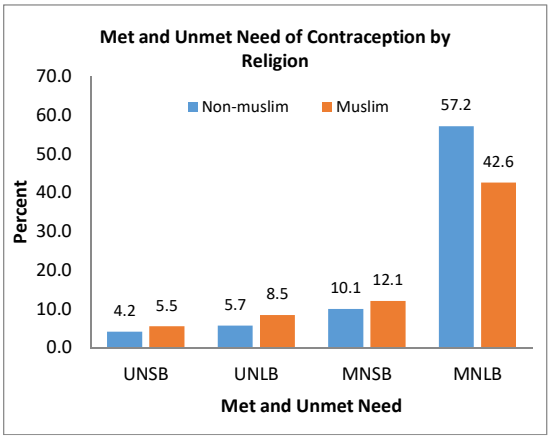


Figure 2.4



Source: Authors calculation based on NFHS-5 data, 2019/21

Multinomial Logit Regression Findings

Parametric estimates of the multinomial logit regression coefficients with all the selected predictor variables are presented in Table 2. The estimated coefficient (βi) depicts the additive effect of one-unit change in the predictor variable (Xi) on the log of odds (log Ω_i) of the response variable. Equivalently, the term ($e^{\beta i}$) depicts the multiplicative effect on the odds-ratio or the ratio at which the odds of the response variable would increase or decrease depending upon the positive or negative sign of the coefficient, respectively. Parametric estimates of the coefficients and levels of significance of the underlying models for unmet and met need for contraception for spacing and limiting births are provided in Table-2.

Perusal of Table-2 reveals that the parametric estimates of the multinomial regression equation coefficients of all the demographic variables viz. age of women, age at first birth, number of living

children and number of living sons; turn out to be highly significant i.e. at 1% level of significance, implying improvements in the log of odds (log Ω_i) of all the categories of the contraception usage. However, positive coefficient generally implies improvements in the (log Ω_i), which in turn implies improvement in the odd ratios and thereby improvement in the probabilities of contraception usage category compared to the reference category. Thus, the positive coefficients generally imply improvements in the occurrence of the event or contraception usage category. But there is a possibility that the sign of the coefficient may not imply improvement is the probability of the contraception usage category (Gulati, 2014). Thus, the discussion on changes in probabilities of occurrence of all the five categories of contraception usage with respect to age, age at first-birth, number of living children and sons, etc. would be carried out later in the Multiple Classification Analysis section.

Table 2

Multinomial logit regression coefficients of the model with unmet need for spacing births (UNSB), unmet need for limiting births (UNLB), met need for spacing births (MNSB) and met need for limiting births (MNLB), with no-use & no-intention to use of contraception as the reference category among the response variables: NFHS-5

	UNSB Log(p1/p0)		UNLB Log(p2/p0)		MNSB Log(p3/p0)		MNLB Log(p4/p0)	
Predictor Variables	Coeff (β)	μ	Coeff (β)	μ	Coeff (β)	μ	Coeff (β)	μ
Intercept	-.029	.925	-2.908	.000	1.209	.000	-1.444	.000
Age_women	-.344	.000	-.041	.000	-.184	.000	.030	.000
Age_firstbirth	.329	.000	.033	.002	.167	.000	-.040	.000
Total_LCh (NLC)	.451	.000	.676	.000	-.152	.001	.428	.000
Total_LSon (NLS)	-.298	.001	.685	.000	-.384	.000	1.176	.000
Total_LSon-Sq (NLS-Sq)	.047	.137	-.115	.000	.050	.004	-.298	.000
Education_women	.025	.003	.056	.000	.040	.000	.051	.000
Muslim/Non-Muslim	.468	.000	.045	.618	.367	.000	-.678	.000
Work Status	.202	.090	.012	.886	.098	.239	.364	.000
R-U Residence	.045	.671	.057	.490	.261	.000	.321	.000
Physical Violence	.038	.678	-.043	.539	.162	.013	.082	.058
Child- Death	-17.437		.515	.187	-18.802		-.706	.007

Note: μ: Level of Significance, p_0 pertain to the reference category No-Use and No Intention to Use

Source: Author's calculation based on NFHS-5 data, 2019/21

Appendix Table 2

Percent Distribution of Currently Married Women (15-49 years) in EAG States by Selected Background Characteristics, 2019-'21 (%)

	UNSB	UNLB	MNSB	MNLB	NUND	TD	UNTD	N
Women age (In Years)								
15-24	13.6	4.2	25.7	13.3	43.2	56.8	31.3	41744
25-34	4.3	7.6	13.0	54.8	20.4	79.6	14.9	87475
35-44	0.5	6.0	1.9	76.4	15.3	84.7	7.7	68791
45-49	0.1	3.8	0.3	70.2	25.5	74.5	5.2	29855
Age at first Birth*								
<18	1.8	5.9	3.9	71.0	17.4	82.6	9.3	37121
18-21	3.8	6.5	9.1	62.5	18.1	81.9	12.5	102664
>21	5.1	6.8	14.0	53.6	20.4	79.6	15.0	67386
Total	3.8	6.5	9.8	61.1	18.8	81.2	12.7	207172*
Number of Living Children								
0	8.8	1.0	15.5	1.5	73.1	26.9	36.5	20693

1	12.8	3.2	34.1	15.8	34.1	65.9	24.2	36439
2	3.1	7.1	7.8	66.9	15.1	84.9	12.0	66274
3+	1.2	7.3	2.5	73.3	15.7	84.3	10.0	104459
Number of Living Sons								
0	9.9	2.9	23.4	14.0	49.7	50.3	25.6	53131
1	4.1	7.2	10.5	60.1	18.0	82.0	13.9	91363
2	0.9	6.3	1.9	78.9	11.9	88.1	8.3	63734
3+	0.7	7.4	1.1	73.1	17.9	82.1	9.7	19637
Women's Education								
No education	2.3	6.2	5.1	63.8	22.7	77.3	10.9	81929
Primary	3.1	6.2	7.5	62.0	21.2	78.8	11.8	33021
Secondary	5.8	5.8	13.2	50.0	25.3	74.7	15.5	88811
Higher	7.3	5.7	21.3	41.1	24.6	75.4	17.2	24104
Religion								
Muslim	5.5	8.5	12.1	42.6	31.2	68.8	20.4	22636
Non-Muslim	4.2	5.7	10.1	57.2	22.9	77.1	12.8	205229
Wealth Index								
Poorest	4.6	7.2	8.4	52.9	26.9	73.1	16.1	62096
Poorer	4.5	6.3	9.4	55.9	23.9	76.1	14.1	52879
Middle	4.4	5.5	10.0	57.2	22.9	77.1	12.9	42222
Richer	4.1	5.4	11.7	57.2	21.7	78.3	12.1	36367
Richest	3.5	4.7	14.0	57.1	20.7	79.3	10.3	34301
Place of Residence								
Urban	3.5	5.1	12.0	57.9	21.4	78.6	11.1	51587
Rural	4.5	6.2	9.8	55.1	24.4	75.6	14.2	176279
Watching Television								
No	4.6	7.3	8.0	53.6	26.5	73.5	16.2	82830
Yes	4.1	5.2	11.6	57.0	22.1	77.9	12.0	145036
ANM visit								
No	3.4	5.7	8.6	60.3	22.1	77.9	11.7	173858
Yes	7.1	7.0	15.9	41.1	28.9	71.1	19.8	54007
Any Child Died								
No	4.6	5.9	11.1	54.7	23.7	76.3	13.8	196768
Yes	2.2	6.4	5.2	62.3	23.9	76.1	11.3	31097
Husband ever slapped or not								
No	5.0	6.3	12.0	51.6	25.1	74.9	15.1	24213
Yes	2.8	5.0	6.9	66.7	18.6	81.4	9.6	9598
Women's Occupation								
Not working	5.0	6.3	12.0	51.6	25.1	74.9	15.1	24213
Agricultural	2.8	4.6	5.6	68.7	18.3	81.7	9.1	5442
Professional	4.3	6.0	10.2	55.9	23.7	76.3	13.4	198211
Total	4.3	6.0	10.3	55.7	23.7	76.3	13.5	227865
No. of Women	9798	13643	23465	126980	53979			227865

Note- UNSB: Unmet Need for Spacing Births; UNLB: Unmet Need for Limiting Births; MNSB: Met Need for Spacing Births; MNLB: Met Need for Limiting Births, NUND: No Use & No Demand; TD: Total Demand, TFR: Total Fertility Rate, N: Number of

the Respondents, UNTD: Unmet Need to Total Demand, N: Number of Women. * 20693 married women are yet to experience childbirth.

Source: Author's calculation based on NFHS-5 data, 2019/21

Interestingly, nonlinearity of the relationship between Contraception-usage categories and Number of Living Sons get depicted by significant coefficients pertaining to number of living sons i.e. NLS as well as NLS-squared in all the categories, excepting UNSB, of the contraception usage. Furthermore, the regression coefficients of usage of contraception for spacing as well as limiting births turn out to be substantially higher for number of living sons compared to number of living children. In other words, composition of children favoring sons seems to have much stronger impact on the likelihood of using contraception for spacing as well as limiting births. It may be of interest to mention that the threshold number of sons where surge in the usage of contraception for limiting births (MNLB) turns out to be at peak and from where onwards the usage gets decelerated. The threshold level of sons beyond which the met need for limiting births depicts this pattern turns out to be two sons[3]. Alternatively, probability of using permanent methods of contraception surges after having at least two sons, which possibly depicts strong son-preference in the Indian society or across EAG states.

Women's education depicts significant and positive impact on met need of FP for spacing as well as limiting births. Women's occupational hierarchy also depicts significant and positive impact on met need of FP for spacing as well as limiting births. Alternatively, met need of FP for spacing as well as limiting births is higher amongst educated women compared with less educated and uneducated women. Thus, women's education as enabling factor for women's empowerment plays an important role towards adoption of family planning methods for spacing as limiting births. Similarly, women's occupational hierarchy or possibly gainful employment depicts significant and positive impact on met need of FP for spacing as well as limiting births.

Muslim compared to non-Muslim women depict significantly lower contraception usage of limiting births, but higher usage of spacing methods. In other words, prevalence of utilization of permanent methods of contraception is significantly lower amongst Muslim compared to non-Muslim women, whereas utilization of temporary methods of contraception is the other way round. This could be a cultural phenomenon amongst Muslim society that adoption of permanent methods of contraception like sterilization has some religious prohibition or constraints.

Exposure to electronic media, like watching television, depicts significant and positive impact towards improvement in the utilization of spacing as well as limiting methods of contraception. Furthermore, women's empowerment characterized by less of domestic violence, depicted by slapped by husband or not, also depicts higher tendency of utilization of spacing as well as limiting methods of contraception. Urban women depict higher tendency of using spacing methods compared to limiting methods compared to rural women.

Impact of experience of any child-death in family during the family building process depicts significant and negative impact on met need of contraception components of demand for contraception. Alternatively, met need of contraception for spacing as well as limiting births get

[3] $\partial MNLB/\partial NLS=1.176-2x0.298*NLS=0$ implies $NLS\approx1.97$

negatively influenced by the experience of child death in the family. Thus, efforts towards infant and child mortality reduction indirectly facilitate higher usage of temporary as well as permanent methods of contraception, which in turn would help in fertility reduction. The results suggest that infant mortality reduction and higher utilization of contraception reinforce each other.

Adjusted Probabilities of Un-met and Met Need of Contraception by Selected Background Characteristics

Adjusted probabilities of met and unmet need for contraception for spacing and limiting births and no-use and no-demand provided in Table 3 are calculated, using multinomial regression coefficients from Table 2, and averages of the predictor variables from Appendix Table 3. In the binary logit model, the sign of the coefficient depicts with certainty about the direction of the impact on odds ratios as well as probabilities, because the sum of probabilities in the numerator and denominator add up to one, and hence probabilities based on the coefficients follow the same direction as of coefficient. Thus, an increase in the log of odds ratio (log Ω_i), automatically implies an increase in odds ratio and thereby increase in the probability of usage of contraception (p_1) compared to the reference category i.e. p_o, in the Binary Logit Analysis. But the same may not be true in the multinomial logit model, as the sum of probabilities in the numerator and the denominator do not add up to one.

The positive sign of the coefficient in the Multinomial Model may not automatically imply increase in the probabilities of events (p_i) in numerator and (p_0) denominator. Under situation of slower decline in the probability for event in the numerator and compared with the decline in probability of event in the denominator can also result into positive coefficient. Similarly, negative coefficient may result out of proportionate increase in probability of occurrence of event in the numerator (p_i) being lesser than the relevant probability change of occurrence of event referred in the denominator, being the reference category (p_0). Thus, interpretation of the regression coefficients and multiplicative effects on the odd ratios needs careful interpretation in the multinomial logit model compared with the straightforward interpretation in the binary logit model. Rather, clear understanding about the effect of a predictor variable on likelihood of occurrence of event in numerator and denominator in the Multinomial Regression Model could be provided by the calculated probabilities, rather than the coefficients or the odds ratio, which are neutral to selection of the reference category. Thus, multiple classification analysis (MCA) in Table 3 providing adjusted values of probabilities of occurrences (p_i's) by selected background characteristics under study.

Met Need of Contraception for Limiting Births (MNLB)

Likelihood of Using Contraception for Limiting Births (p_4) by women with different background characteristics is provided in column (4) in Table 3. Perusal of the col.4 reveals that the likelihood of using permanent methods of contraception increases with age. The probability improves from almost 56 per cent at age 25 years to 83 per cent at 45 years. Similarly, likelihood of usage of contraception for limiting births improves amongst women who initiate their childbearing and delivery process improves from almost 73 per cent amongst women with age at its birth of 18 years to almost 80 per cent amongst women initiating the process at the age of 24 years. The curvilinear nature of linkage with number of living sons discussed earlier also gets reflected in the

likelihood trends amongst women with different compositions of living children. Interestingly likelihood of using limiting methods of contraception is almost 84 per cent amongst women with 3 sons and no daughter against only 54 per cent amongst women with 3 daughters and no son. Also we find that the likelihood with two sons and no daughter is almost 79 per cent against only 45 per cent with no son and two daughters. Thus, strong son preference in the EAG states gets revealed by substantial increase in likelihood of using limiting methods of contraception amongst women having distribution of living children skewed in favor of sons.

Coming to socioeconomic predictor variables we find likelihood of using contraception for limiting births improves along with women's education from almost 74 per cent amongst women with no education to almost 83% amongst women with 16 years of education. Muslim compared to non-Muslim women depicts substantially lower likelihood of usage of permanent methods of contraception for limiting births. Interestingly we find met need of contraception for limiting births amongst Muslim women is only 64 per cent compared to 79 per cent amongst Non-Muslim women. However, met need of spacing births amongst Muslim women turns out to slightly higher compare to Non-Muslim women. Possibly, religious bias against usage of permanent methods of contraception among Muslim women could be responsible for such differentials in the met need for limiting and spacing births.

Women's gainful employment depicts significant and positive impact on the likelihood of using contraception for limiting births. The likelihood improves from almost 79% amongst non-working women to more than 84 per cent amongst professionals. Possibly, women's education and gainful employment depicts significant impact towards higher likelihood of using contraception for limiting births in the EAG states. Experience of child death is discerned to have significant impact on the usage of permanent methods of contraception. We find med need of limiting births turns out to be only 67 per cent among women experiencing child death compared to 81% amongst women with no experience of child death. Possibly, further improvements in infant and child mortality would bear further improvements in the usage of permanent methods of contraception and thus met need of limiting births.

Table 3

Multiple Classification Analysis Table of Adjusted Values of Probabilities ($p_{i's}$) for Unmet and Met Need of Contraception for Spacing and Limiting Births and No Use and No Demand of Contraception in EAG States

Predictor Variables	UNSB; p_1 (1)	UNLB; p_2 (2)	MNSB; p_3 (3)	MNLB; p_4 (4)	NUND; p_5 (5)
Women Age					
25	0.078	0.099	0.105	**0.558**	0.160
30	0.015	0.085	0.044	**0.686**	0.169
35	0.003	0.066	0.017	**0.755**	0.160
40	0.000	0.049	0.006	**0.798**	0.146
45	0.000	0.036	0.002	**0.831**	0.131
Age at 1st Birth					
18	0.007	0.054	0.042	**0.727**	**0.170**
21	0.003	0.046	0.024	**0.768**	**0.159**
24	0.001	0.038	0.014	**0.800**	**0.147**
Children's Sex Composition					
0-Child Family					
0S0D	0.006	0.021	0.180	0.266	0.527

1-Child Family					
1S0D	0.004	0.040	0.061	**0.602**	0.292
0S1D	0.009	0.036	0.136	**0.358**	0.462
2-Child Family					
2S0D	0.003	0.052	0.020	**0.786**	0.139
1S1D	0.005	0.058	0.039	**0.682**	0.216
0S2D	0.012	0.058	0.096	**0.453**	0.381
3-Child Family					
3S0D	0.002	0.067	0.009	**0.842**	**0.081**
2S1D	0.003	0.070	0.012	**0.821**	**0.095**
1S2D	0.006	0.080	0.024	**0.738**	**0.152**
0S3D	0.014	0.088	0.064	**0.539**	**0.295**
Women Education in Years					
0	0.002	0.041	0.022	**0.735**	0.200
4	0.002	0.043	0.022	**0.764**	0.169
8	0.002	0.046	0.022	**0.788**	0.142
12	0.002	0.048	0.021	**0.810**	0.119
16	0.002	0.050	0.021	**0.828**	0.099
Religion					
Muslim	0.005	0.070	**0.046**	**0.642**	**0.238**
Non-Muslim	0.002	0.042	**0.020**	**0.788**	**0.148**
Work-Status					
Working	0.002	0.030	0.016	**0.845**	0.107
Non-Working	0.002	0.041	0.020	**0.794**	0.144
Residence					
Rural	0.002	0.041	0.019	**0.791**	0.148
Uraban	0.002	0.033	0.019	**0.834**	0.113
Phy. Violence					
No	0.002	0.035	0.020	**0.814**	0.129
Yes	0.002	0.039	0.018	**0.803**	0.138
Child-Death					
No	0.002	0.038	0.020	**0.805**	0.135
Yes	0.000	0.107	0.000	**0.666**	0.227
UNSB: Unmet Need For Spacing Births; UNLB: Unmet Need For Limiting Births; MNSB: Met Need For Spacing Births; MNLB: Met Need For Limiting Births; NUND: No Use & No Demand					

Source: Author's calculation based on NFHS-5 data, 2019/21

Appendix Table 3

Descriptive Statistics of the Selected Variables under Study in EAG States, 2019/21

Variable/Abbreviated Name	N	Min	Max	Mean	Std. Dev
Women Age in Years	236348	15	49	32.88	8.487
Age at 1st Birth	214578	15	48	20.44	3.468
NLC (Number of Living Children	236348	0	14	2.43	1.531
NLS (Number of Living Sons)	236348	0	10	1.27	0.996
Education in Years	236348	0	20	5.76	5.384
Religion (Muslim / Non-Muslim)	236348	0	1	0.11	0.312
Work Status (Working / Non-Working)	35082	0	1	0.21	0.407
Residence (Rural / Urban)	236348	0	1	0.22	0.41465
Physical Violence (Yes / No)	26803	0	1	0.32	0.465
Child Death (Yes / No)	203569	0	1	0	0.054
Valid N (list wise)	20954				

Source: Author's calculation based on NFHS-5 data, 2019/21

Met Need of Contraception for Spacing Births (MNSB)

Probabilities of usage of contraception for spacing births (p_3) amongst women with different background characteristics are provided in column (3) in Table 3. Overall, we find that the met need of contraception for spacing births is comparatively much lower than for limiting births amongst women with almost all the background characteristics. Interestingly, we find that met need for spacing births turns out to be higher among Muslim compared to Non-Muslim women. Again we find the curvilinear nature of relationship between usages of contraception for spacing births get depicted along with the n of living sons, again depicting son preference in the EAG states.

Unmet Need of Contraception for Limiting Births (UNLB)

Likelihood of unmet need of contraception for limiting births (p_2) amongst women with different characteristics is provided in column (2) in Table 3. Unlike met need for limiting births we find unmet need of FP for limiting births declines with age. The likelihood of non-usage of permanent methods for limiting births (UNLB) is higher amongst women with skewed distribution of living children favoring daughters. Non-usage of contraception for limiting births (UNLB) turns out to be higher among women who experienced child death (11%) compared to women not experiencing any child death (4%).

Unmet Need of Contraception for Spacing Births (UNSB)

Probabilities of having unmet need of contraception for spacing births (p_1) are provided in column (1) of Table 3. The UNSB is relatively much higher amongst younger women and declines to almost zero above age 35. Also we find that the unmet need is slightly lower amongst women with more of sons than daughters, especially women having two sons compared to women having two daughters. It may be of interest to mention that an unmet need for spacing births is slightly higher among Muslim than non-Muslim women. Again experience of child-death depicts marginally lower likelihood of non-usage of contraception for spacing births (UNSB) among women with compared to women without experience of the child-death.

Not-using and No Demand for Contraception (NUND)

Likelihood of no-use and no-demand for contraception by different background characteristics is provided in Column (5) in Table 3. Perusal of the Table-3 reveals that the likelihood of no-use and no-demand (NUND) declines along with age of the women, along with increasing number of surviving children, and amongst women experiencing no death compared to women who experienced death of any child, and amongst women experiencing less of physical women compared to low-status women experiencing physical violence. The no-use and no-demand for contraception turns out to be higher amongst non-Muslim compared with the Muslim women. Interestingly, the patterns seem to be consistent with the general expectations.

Summary and Concluding Remarks

This study on the contraception usage or non-usage in the EAG states by selected demographic

and socioeconomic background characteristics is based on database for 227865 currently married women aged 15-49 years, covered in the national family health survey during 2019-21 (NFHS-5). Appendix Table-1 in this study reveals proportionate unmet need to total demand (UN/TD) for contraception in India and the 8 EAG states. Demand for contraception in India turns out to be around 76.1 percent, comprising of met need of 66.7 per cent and unmet need of 9.4 per cent as per NFHS-5. The proportionate unmet need of contraception to total demand is still 12.4 per cent for India as per NFHS-5. Furthermore, the proportionate unmet need to total demand for contraception turns out to be higher in the EAG states compared to India, and within EAG states we find it is maximum for Bihar (19.6%) and minimum for Odisha (8.8%).

The multinomial logit analysis in the study highlights effects of selected socioeconomic and demographic predictor variables on the four components of demand for contraception viz. met and unmet need of contraception for spacing and limiting births; as well as no-use and no demand for contraception in the eight EAG states of India. The selected predictor variables under this study comprise of women's age, age at first birth, number and sex composition of children, women's education, religion, working status, rural-urban residence, physical violence, and experience of any child death during their reproductive career. Parametric Estimates of the Multinomial Logit Regression coefficients along with levels of significance depict expected directions of effects of the predictor variables on the four components of demand for contraception compared to the reference category of no-use and no-demand. The Multiple Classification Analysis (MCA) has elicited estimated probabilities or likelihood of usage or non-usage of contraception, characterized by met and unmet need for spacing and limiting births and no-use and no-demand for contraception; by the selected predictor variables.

Interestingly, all the Multinomial Logit Regression Coefficients pertaining to all the predictor variables in the met need for limiting births (MNLB) equation in Table-2 turn to be highly significant, with significance levels i.e. μ values, of the parametric estimates being greater than .01 implying 1 per cent level of significance. Similarly, all the other parametric estimates in the other three equations also turn out to be highly significant. Thus all the estimated parameters in Table-2 pertaining to the women's demographic characteristics *viz*. age, age at first birth, and sex-composition of surviving children; depict significant impacts on all the four components of demand for contraception. Similarly, the socioeconomic factors like education, employment, religion, physical violence and experience of death of any child, depict significant effects on all the four components of demand for contraception.

Multiple Classification Analysis (MCA) in Table-3 provides estimated probabilities or likelihood of contraception usage as well as non-usage among women at different levels of predictor variables. The probabilities are elicited using estimated Multinomial Regression Equation coefficients and the averages of the predictor variables provided in the Appendix Table-1. Perusal of Table-3 reveals that the likelihood of usage of permanent methods for limiting births increases along with increase in age of women and number of children, and still higher amongst women with children with sex-composition skewed in favor of sons. Interestingly much higher usage of contraception for limiting births amongst women with two or more sons gets depicted by the non-linearity in the analysis with respect to number of sons.

Son-preference seems to be quite intense across EAG states. Likelihood of using contraception

for limiting births improves much faster among women with more of sons than daughters. The likelihood turns out to be .84 i.e. 84 per cent, amongst women with 3 sons and no daughter compared to only .53 i.e. 53 per cent, amongst women with 3 daughters and no son. Women's education, gainful employment, urban residence, and empowerment characterized by no physical violence, depict positive impact on the likelihood of using contraception for limiting births. However, likelihood of usage of contraception for limiting births is significantly lower among Muslim compared to non-Muslim women. Interestingly, usage of contraception for spacing births turns out to be higher among Muslim compared to among non-Muslim women. This could be because of religious bias against using permanent methods of contraception for limiting births amongst Muslims in India. All women with unmet need of contraception may not be potential users of contraception. However, analysis of reasons for no-use and no-intention to use in future reported by 45431 women reveals that the usage of family planning among these non-users can be conveniently enhanced among 38.3 per cent of these women reporting reasons like opposition to use by 18.2 per cent, lack of knowledge by 1.9 per cent, and method specific reasons like fear of side effects, cost too much, etc. by 18.4 per cent.

Policy Imperatives

Women, neither using nor expressing any demand for contraception, we find majority of them extended reasons like infrequent or no sex, societal or husbands' opposition, lack of knowledge, health risks, menopausal or hysterectomy. Thus, strengthening of IEC component can facilitate and motivate such women towards adoption of contraception towards reduction in unmet need of contraception, unintended pregnancies and thus unwanted fertility curtailment in the EAG states.

Coming to socioeconomic and demographic variables affecting usage or non-usage of contraception we find that the Unmet need of contraception for spacing births as well as limiting births is comparative much higher among women in younger age groups than in the higher age groups. Focused attention of provisioning of spacing as well as limiting methods to the younger women, who are obviously at lower parities too, would reflect much higher impact on the completed fertility. Thus, focused attention on younger women for motivating them to space as well as limit births would bring around much better results in alleviating unmet need of contraception as well as long terms effects on competed fertility in the EAG states.

Use of contraception for limiting births is discerned to increase much faster among women with more of sons than daughters. Women's empowerment through better education and gainful employment, which by itself is an ideal goal and would also alleviate son preference, would facilitate increased demand for contraception to space and limit births, thereby reduction in the unmet need of contraception.

Experience of any child death during family building process is discerned to bear significant and negative impact on likelihood of usage of temporary as well as permanent methods of contraception. Thus, reduction in infant and child mortality, which is an ideal goal in itself, would also bring around positive impact on the usage of contraception for spacing as well as limiting births in the EAG states of India.

Education and gainful employment of women will improve their status and enhance their usage of contraception. Increased demand and usage of contraception through easy accessibility of quality contraception methods will be important factors in improving the health of women, reducing fertility, achieving demographic goals and enhancing women's rights.

Despite controlling for crucial socioeconomic and demographic factors it has been discerned that contraception usage for limiting births is significantly lower among Muslim compared to non-Muslim women. On the other hand, contraception for spacing births is discerned to be higher among Muslim compared to non-Muslim women. Possibly, lower usage of permanent methods of contraception among Muslim women could be because of some religious bias. Such religious biases can only be alleviated through either intervention from well informed religious leaders or by appropriate and effective IEC interventions through mass media.

The study suggests that though all women in the non-usage of contraception category may not be the potential users of contraception, but assuaging some of the important reasons of non-use like religious and familial opposition to use contraception, alleviation of misapprehensions about side effects and health risks, awareness and accessibility of quality contraceptive methods, etc. would facilitate substantial increase in the usage of contraception amongst currently married women aged 15-49 years in the EAG states of India.

Way Forward

Multivariate analysis of unmet and met need of contraception for spacing and limiting births in the 8 EAG states reveals that focused attention on currently married women with different background characteristics can bring around positive results towards enhancement of usage of contraception towards meeting the objective of reducing the unmet need of contraception and thus reduction in unwanted pregnancies and fertility in these demographically backward states. Some specific recommendations emerging out of the analysis are as follows:

i. Strict promulgation of minimum age at marriage act and girls' education can bring about substantial and further improvements towards promotion of family planning program towards the objective of meeting the unmet need of contraception for spacing as well as limiting births for curtailment of unmet need of contraception and unwanted fertility in the EAG states.

ii. Infant and child mortality reduction have far reaching impact on adoption of contraception towards reduction in unwanted fertility. Empirically, likelihood of usage of contraception and infant and child mortality reinforces each other and facilitates unwanted fertility reduction objective too.

iii. Alleviation of deep rooted son-preference in the EAG states would facilitate motivation of women having only daughters towards adoption of contraception for spacing and especially for limiting births.

iv. Involvement of Muslim religious leaders towards alleviation of unfounded beliefs towards adoption of limiting methods of contraception amongst Muslim women can bring around

substantial impact on their unmet need of contraception, unwanted pregnancies and unwanted fertility.

v. Women's education and gainful employment can bring around significant results towards promotion of family planning program in the EAG states to meet the unmet need of contraception.

vi. Promotion of spacing methods amongst younger couples, especially newly married and low parity women can bring around better health effects on mothers as well as children and enhancement of met demand for contraception.

vii. Financial incentives programs like term deposits for newly born daughters can promote post-partum sterilizations to meet unmet need of contraception and curtail unwanted fertility, like it brought desired results in Tamil Nadu over Southern India.

viii. Focused attention towards motivational efforts and sensitization of women towards adoption of contraception in rural areas can bring around much better results towards reduction in the unmet need of contraception in the EAG states.

References

1. Becker S. (1999). Measuring Unmet Need: Wives, Husbands or Couples. International Family Planning Perspectives; 25 (4): 172-80.
2. Bhushan I (Nov. 1997). Understanding Unmet Need. Working Paper Number 4. Baltimore, Johns Hopkins University School of Public Health, Center for Communication Programmes. Available on https://pdf.usaid.gov/pdf_docs/Pnacg563.pdf.
3. Bongarts J. (1990). The measurement of wanted fertility. Population and Development Review; 16 (3): 487-506.
4. Casterline JB, Steven WS. (2000). Unmet need for family planning in developing countries and implications for population policy. Policy Research Division Working Paper No. 135. New York: Population Council. 2000. Available on https://doi.org/10.1111/j.1728-4457.2000.00691.x
5. Choudhry RH. (2001). Unmet Need for Contraception in South Asia: Levels, Trends, and Determinants, Asia-Pacific Population Journal. 2001; 16(3): 3-22.
6. Ramesh BM, Gulati SC, Retherford RD. Contraceptive Use in India, 1992-93: National Family Health Survey Subject Reports, No 2. International Institute for Population Sciences, Mumbai, India and East-West Center Programme on Population, Honolulu, Hawaii, USA. 1996, 1-107. Available on https://www.eastwestcenter.org/sites/default/files/filemanager/Research_Program/NFHS_Subject_Reports/subj-2.pdf
7. Haub C, Herstad B. Family Planning Worldwide 2002 Data Sheet. Washington DC: Population Reference Bureau. 2002, 1-15. Available on https://www.herodote.net/Textes/population-2002.pdf.
8. Malcolm Potts. (2000). The Unmet Need for Family Planning. Scientific American; 282 (1): 88-93. DOI:10.1038/scientificamerican0100-88.

9. Murray C, Lopez A. (1998). Health Dimensions of Sex and Reproduction: the global burden of sexually transmitted diseases, HIV, maternal conditions, perinatal disorders, and congenital anomalies. Cambridge, Mass.: Published by the Harvard School of Public Health on behalf of the World Health Organization and the World Bank, 1998.
10. International Institute for Population Sciences (IIPS), ICF. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS. 2017. Available on https://rchiips.org/nfhs/NFHS-4Reports/India.pdf
11. International Institute for Population Sciences (IIPS), ICF. National Family Health Survey (NFHS-5), 2019-21. Mumbai: IIPS. 2022. Available from https://dhsprogram.com/pubs/pdf/FR375/FR375.pdf
12. Retherford RD & Choe MK. (1993). Statistical Models for Causal Analysis, John Wiley & Sons Inc; New York.
13. Robey B, Ross JA & Bhushan I. (1996). Meeting Unmet Need: New Strategies. Baltimore, MD: Johns Hopkins School of Public Health. Population Reports, Series J; 43: 1-35.
14. Kulkarni S & Choe MK. (1998). Wanted and unwanted fertility in selected states of India: National Family Health Survey Subject Reports, No 6. International Institute for Population Sciences, Mumbai, India and East-West Center Program on Population, Honolulu, Hawaii, USA, 1-32. Available on https://www.eastwestcenter.org/sites/default/files/filemanager/Research_Program/NFHS_Subject_Reports/subj-6.pdf
15. Westoff CF. (1992). Measuring the unmet need for contraception: Comment on Bongaarts. Population and Development Review; 18 (1): 22-25.
16. Westoff CF & Bankole A. (2000). Trends in the demand for family limitation in developing countries. International Family Planning Perspectives; 26 (2): 56-62+97.
17. Zappella M. (1997). Beyond access: addressing the unmet need for family planning. People and Development Challenges; 4 (7).

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Science Communication in Schools: Current Interventions, Opportunities and Challenges

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Abstract

Science Education, Science Communication and Science Schemes for Science Popularization cannot work in silos. They are interconnected like spider cobwebs and demand for a better coordination to procure the desired results. The aim of the study was to explore the viewpoint of the science students towards their scientific concepts, temper, perception and ambience with regard to the interventions by the Government and other agencies through various schemes. It identifies the missing links and gap areas to achieve the goals of scientific interventions. The data from students and teachers in Delhi were collected with the help of questionnaire; and were analyzed using the statistical packages. The findings of this pilot study in Delhi reveal that several schemes and programmes are in place but the scientific approach of students is limited to rote learning by the students for the purpose of passing exams; and not to internalize theoretical knowledge for practical usage. Although, a large sum of money has been invested on the institutions and programmes to promote science, there is still a considerable scope left to position and popularise science at the school level. The New Education Policy (NEP) and the new Science and Technology Innovation Policy (STIP) gives an impetus for an effective intervention. Imparting Science Education to the students with an effective Students Behaviour Change Science Communication, linked to a Scientific Utility, will help in developing the desired Scientific Temper in the society.

Key words: Scientific temper, Science schemes, Popularisation of science, Social Behaviour Change Communication (SBCC)

Introduction

Science is all around our daily lives: all day, every day, everywhere we go, but its utility is rarely thought off from a scientific point of view, or is being linked to what we have learnt in our classrooms. We could be engaged with science in our daily walks of life by way of linking our personal experiences to it, only if we are taught and trained in that manner.

The five steps of scientific thinking include; defining a question to investigate (scientists raise questions), make predictions (or hypothesis based on their observations), collect data, analyze the data, and finally reach at some conclusions. Does our present-day mode of education help in following the same principle, is a hundred million question.[1]

In the last two decades, we have seen a tremendous increase in science communication and public engagement activities. There has been a drastic shift from 'public understanding of science' (PUS) models of communication to a more dialogic approaches. The two-way communication between science communicators and the public has increased manifold. Along with it, features of one-way communications like, science museums, science fairs and festivals, popular science media, science blogging, sci-art activities have also created an ambience for developing scientific temper.

Some of the interventions initiated by the Government for the senior secondary school students include that of Science Olympiads, Innovation in Science Pursuit for Inspired Research (INSPIRE), Kishore *Vaigyanik Protsahan Yojna* (KVPY), National Talent Search Exams (NTSE), Science Clubs, Science through A/V Media, CSIR Program on Youth for Leadership in Science (CPYLS), Atal Tinkering Labs (ATL), Knowledge and Awareness Mapping Platform (KAMP), Popular Science Magazines, National Teachers Science Congress (NTSC), among several others.

Rationale of the Study

No interventions, without a proper monitoring and evaluation will yield the desired results. Thus, this study will not only identify the gaps, but will also enlighten to bridge those gaps. The study will be apt in its approach to identify the missing links and build on it at a time when a lot of emphasis is being given towards scientific development. It will certainly lead India towards a developed Nation from the category of being a developing country by 2047.

Problem Statement: To identify the missing links in achieving the goal of popularization of science through scientific interventions, by comparing and analysing the impact of schemes in senior secondary schools of Delhi.

Review of Literature

On reviewing the key stakeholders like the reporters, science information professionals, scientists and audiences; it was revealed that lack of effective science communication is one of the major causes for the widespread science illiteracy.[2] Enormous work is being carried out world-wide on science popularization but only a few have found the space in the scholarly journals. To be specific, the 'How and Why' of scientific discoveries is comparatively less reported. An all-out effort is needed by the policy makers, science communicators and educators to lessen the gap between scientific discovery and disseminating that information. It will create a revolutionary change not only in the mindset of people but also benefit the economic policies of the government pertaining to literacy, difference of opinions, political environment and inflation which will bring in a paradigm shift towards scientific thinking.[3]

Several science communication models have been presented by the researchers for popularizing science. Deficit model emphasis upon the lack of scientific knowledge among the general public and could be addressed only through creating awareness. Contextual model stresses upon their own experiences, cultural environment and personal situations to garner social and psychological

knowledge leading to the information of science. The Lay expertise model gives weightage to the inherited scientific knowledge along with the scientists' outcomes. Public Participation model values the opinion of the general public and links it to the science policies.[4]

Tricks for Kids: One of the best practices included that of "*Khel khel mein* Science" by Shailendra Kumar, PGT Chemistry teacher at Sarvodya Vidyalaya, Mangolpuri in Delhi, who is passionate about sharing the science concepts in a simplified manner. An innovative effort is being made by him to explain Chemistry formulas and principles with the help of stories and pictures. The video narration is portrayed through YouTube and What's App groups. An 'Activity room' has been set up by him to take online classes in a fun way.

The science teaching on the part of a teacher is incomplete without a scientific temper and unclear concepts. A strong enabling environment and a passion to learn and then teach play a key role.[5]

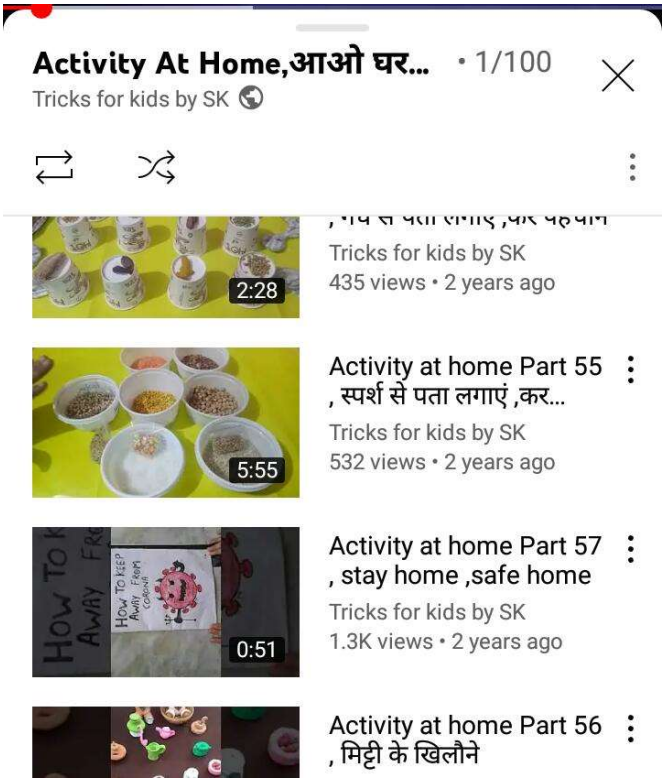


Figure 21: Science activity being explained at home

Eklavya Schools: A novel concept to learn science through experiments and field studies with the aim to build up a questioning and analytical attitude in children was developed in 1972 at Hoshangabad, a small town in Madhya Pradesh. The Hoshangabad Science Teaching Programme (HSTP) came into existence when a group of scientists, engineers, educationists and social activists formulated a vision of developing a model of school science teaching.

Methodology

The Research Design was formulated on the AEIOU (Vowel analogy) model of Science Communication specifying; Awareness, Enjoyment, Interest, Opinion formation, and Understanding. Based on the first-hand information collected, a Research Design was formulated to address the issue. A diagnostic approach to explore the gaps and find a solution was adopted. The study was carried out using the multi-optional and short-response Survey Method to collect the quantitative data. The sampling was done in two stages- one that of teachers and the other of students.

Target audience

- Sample population of 1000 students (500 each from Govt and Private schools) was targeted.
- Sample population of 300 teachers (150 each from Govt and Private schools) was listed.
- Schools covered included 100 (50 each Govt and Private Schools).
- Focus Group Discussions -FGD (6) - along with the science teachers, students, parents and DoE staff was lined up.

Findings and Discussion

Delhi schools have been the frontrunner in popularising science and inculcating a scientific temper among school students. From Government schools, 496 cleared NEET and over 1000 cleared JEE in 2021, which is an indication of the standard of Class 12 passing students. Around 676 students responded to the questionnaire circulated to them on the Google platform. Preliminary analysis show that interventions have yielded a mixed response to the desired results of developing scientific brains and mindset before leaving the schools. The private schools were found to have better facilities, ambience and technical support. But the Government school students were not left far behind, when it came to performance.

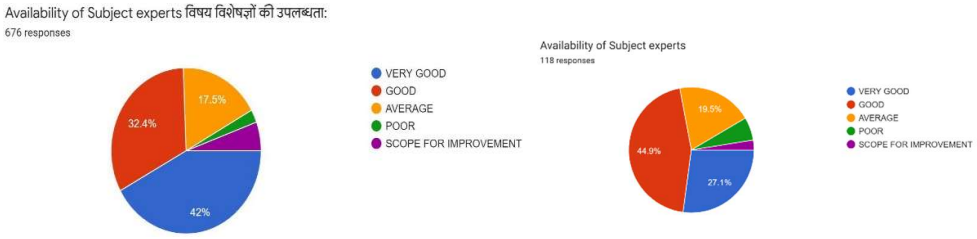
Of the students who responded, 97.1 per cent were girls and only 2.9 per cent boys. Similarly, 98.6% were from Government schools and only 1.4 per cent from private schools. This may attribute to more of seriousness on the part of girls or that they are more vocal/prompt in responding or might be more concerned than the boys to popularise science. Private school teachers, students and management were bit reluctant, and many preferred that the questionnaire may be routed through their principals, and they in turn through the school management.

Out of the 132 respondent teachers, only 120 attempted successfully. Of those who responded, 54.2 per cent were women and 45.8 per cent men. 74.2 per cent were from Government schools, 0.8 per cent from *Kendriya Vidyalayas* and rest 25 per cent from private schools. This may attribute to more of lady science teachers or that they are more vocal/prompt in responding or might be more concerned than the men to populairse science. Private school teachers were bit reluctant, and many preferred that the questionnaire may be routed through their principals, and they in turn through the school management.

Importance for Scientific Thinking

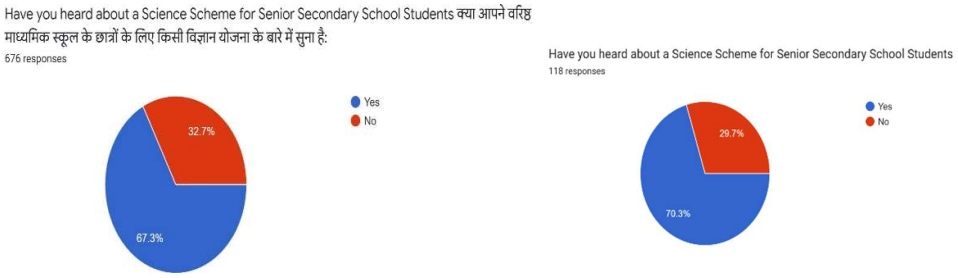
Almost 35per cent of the students opined Weightage for Scientific thinking to be good, 31 % very good and 24 % average. The survey showed that over 66 % students endorsed that scientific thinking was preferred and admired in the schools. Almost 45.8 % teachers opined Weightage for Scientific thinking to be good. Unlike yesteryears, where the complete marking was based on the exams, these days almost 50% of the marking is done on the creativity, content, thinking ability and presentation.

Availability of Subject Teachers



Availability of Subject experts was considered to be good, very good and average by 42 per cent, 32 per cent and 17 per cent respectively. This data could attribute to the presence of science teachers while filling in the form or in contrast that almost every school values the recruitment of subject experts. Availability of Subject experts was considered to be good, very good and average by 45 per cent, 27.1 per cent and 19.5 per cent respectively. Most of the schools engage subject experts as per their streams demand.

Information about the Science Schemes



A large number of students were found to be ignorant about several specific schemes launched for the popularization of science. Although, out of the 672 respondents, 455 (67.3%) students had heard about some or the other Science Schemes for Senior Secondary School Students, whereas 221 (32.7%) were totally ignorant. A large number of teachers were found to be ignorant about several specific schemes launched for the popularization of science. Out of the 118 respondents, 83 (70.3%) teachers had heard about some Science Schemes for Senior

Secondary School Students, whereas 35 (29.7%) were ignorant.

Engagement with Science schemes

Around153(23%)studentswerefoundtobeengagedand523(77.4%)hadnoengagement with any specific science assignments. It is quite possible that engaging in any of the schemes may be of least priority for the school and the student. Around 70 (59.3%) teachers were found to be engaged. This could be mainly because many schools are not notified on these schemes. Secondly, at times, looking at the standard of the entrance exams to qualify these schemes are found to be on the higher side.

Utility of Schemes

Utility of these schemes were opted as very good by 48.7 per cent, good by 32.5 per cent and average by 11.1 per cent. There is all possibility that as students it would be a virtual hope in their minds to connect their learnings into practical usage in the later days. Utility of these schemes were opted as good by 39.8 per cent, very good by 28 per cent and average by 19 per cent. Beneficiary teachers always quoted such schemes as to how it helped to fetch in a scholarship or the recognition they received in higher education.

Analysis

Several of the schemes are known to be scientifically proven interventions to popularize science among school students. The shortage of teachers with scientific temper was found to be one of the major missing links between the Government science schemes and beneficiary students. Secondly, the teachers lack proper guidance and timely information. Government schemes are too complicated to avail the benefits. Scientific craze to know more about the schemes was found missing. Teachers' involvement in the implementation of schemes was lacking. Scientific temper is not rewarded in the form of achievement. Rote learning to gain higher marks and secure good placements was a discouraging factor to develop scientific thinking.

A well-connected Science curriculum in schools will provoke students, resulting in imbibing the desired scientific thinking in the society. Learning by doing and hands-on science models have shown good results in the past for promoting science. Scientific interventions to develop scientific think tanks with an approach of Students Behaviour Change Science Communication (SBCSC) tool is the way forward. An enabling environment and an accepting public will enhance the quality of programmes to function effectively, efficiently and enrich the society at large to develop the desired scientific temperament.

The changing role of science educators and emerging challenges mainly due to digitalization/online learning modes need to be converted into opportunities. The data were analysed with different variables. Based on the data collected, Cross tabulation using IBM SPSS (Statistical package for Social Sciences) version 20 was used to analyse the findings. The Chi-Square Test was applied to know the significance of variable factors like perception, popularity, locality, availability of subject experts, etc in private and government schools.

Table 1

Perception of Science on Nature of Schools

Perception of Science	Private		Government	
	Number	Percent	Number	Percent
Poor	0	0.0%	8	1.3%
Average	7	11.5%	75	12.2%
Good	11	18.0%	190	30.9%
Scope for Improvement	5	8.2%	80	13.0%
Very Good	38	62.3%	262	42.6%
Total	61	100%	615	100%

The table indicates that among the students from the private schools 62.3 percent have very good perception on science, while the students from the government schools only 42 percent have very good perception on science. The chi-square test result shows that there is a statistically significant association between perception of science and nature of schools (P=0.04). It reveals that there is a significant difference in the perception of science with respect to the students from private and government schools. (Less than 0.05 p value means statistically significant. And more than 0.05 it shows not significant. Among both the schools.)

Table 2

Location of school Vs Nature of School

Location of School	Private		Government	
	Number	Percent	Number	Percent
Posh	50	82%	339	55.5%
Cluster/Slum	10	16.4%	243	39.5%
Total	60	100%	582	100%

The study found that 50 per cent of the private schools are located in posh area, while it is 55 percent for the Govt. schools. However, the private schools located at Cluster/slum is 16.4 per cent and Govt. schools located is 39.5 percent. The chi-square test results indicate that there is statistically significant association (p< 0.000) between location of school and nature of school.

Table 3
Gender of student and Nature of School

Gender of student	Private		Government	
	Number	Percent	Number	Percent
Male	7	11.5%	12	2.0%
Female	54	88.5%	603	98.0%
Total	61	100%	615	100%

The gender wise table indicates that majority of the students are female in both the private and Government schools considered for study. More than 85 percent of the students from the private schools and 98 per cent of the students from Govt. schools are females in the study population. The statistical analysis reveals that there is a significant association between gender of the students and type of schools (p<0.000).

No Significance was found in the Level of Scientific knowledge among students from Private or Government schools, and popularity of science in school and nature of school.
SBCC is the systematic application of interactive, theory-based and research-driven communication processes and strategies to address change at individual, community, and societal levels.

A relevant education with a good communication can lead to a fusion of expressing any thoughts or information. Both are complementary to each other and cannot work in isolation. Both, the education and communication, together play a vital part in popularizing science among the school students.

Recommendations

The authors recommend the following:

- Science education and science communication must be made complementary with each other.
- Teaching pedagogy: Thought provoking Science curriculum; hands on experiments as to learning by doing; one centralized syllabus to clear the entrance exams to all these schemes will help.
- Teachers' involvement and regular teachers' orientation will help to develop quality subject experts.
- Rote learning must be discouraged and scientific thinking must be encouraged.
- School ambience and initiatives encouraging science may be rewarded.
- Timely notification and simplified process of attempting.
- Scientific learning linked to utility will be sustainable.

- Thinking in Regional languages help towards innovative methods.
- Students Behaviour Change Science Communication (SBCSC) is way forward.

For the schemes to be truly effective, they need to be “massive” not just in terms of number of schemes offered, but also need to be “massive” in terms of reach, scalability and accessibility.

References

1. American Museum of Natural History, https://www.amnh.org/explore/videos/the-scientific-process
2. Michael F. Weigold (2011). Communicating Science: A Review of Literature, Advancing Science Communication, University of Florida.
3. Wafia Masih (9 Sept. 2012). International Journal of Scientific & Engineering Research, 3 (9), ISSN 2229-5518.
4. SBCC, USAID, https://pdf.usaid.gov/pdf_docs/PA00K6VP.pdf
5. Ayelet Baram-Tsabari, Department of Education in Technology & Science, Technion - Israel and Stephen Norris, Director of the Centre for Research in Youth, Science, Teaching and Learning, Canada, Bridging science education and science communication research. International Journal of Science Education, Part B, 1 (1): 9-11.

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Utilization of *Janani Shishu Suraksha Karyakram* (JSSK) Scheme in Jodhpur District, Rajasthan: Implementation Issues and Challenges

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Abstract

The Janani Suraksha Yojana (JSY) launched on 1st June 2011 combines the financial/cash assistance with antenatal care during the pregnancy period, institutional care during delivery and immediate postpartum period in a health center by ASHA, is a fully centrally sponsored scheme. The aim of the present article is to document the utilization of services and identify challenges/barriers during implementation. Mixed method study was conducted to access the services utilized by pregnant women and sick new-born up to 1 year of age in urban and rural Jodhpur. Secondary data available from the hospital record was analyzed. Besides, key informants' interviews were conducted to assess challenges/barriers. The findings indicate that although pregnant females are using free medicines, free diagnostics and free transportation services; lack of specialists, lack of laboratory services, timely unavailability of transport and lack of skilled manpower at health facilities were barriers in the way of JSSK. Overall JSSK has been relatively successful in its spheres and has encouraged people towards institutional deliveries. Some priority areas for intervention are better availability of skilled manpower, improved IEC, active monitoring-supervision, regular adequate fund flow, ensuring timely availability of transport services seem to be the need of the hour for this flagship programme of government of India.

Key words: JSSK, ANC, PNC, MMR, Free Drugs and Diagnostics.

Introduction

In 1990, the Maternal Mortality Ratio of India stood at 600 deaths per hundred thousand live births which reduced to 97 as of 2018-20, against the SDG goal of less than 70 by 2030. The pace of this decline coincided with the implementation of the JSY and the JSSK schemes under the NRHM. The *Janani Shishu Suraksha Karyakram* (JSSK) launched on 1st June 2011 combines the financial/cash assistance with antenatal care during the pregnancy period, institutional care during delivery and immediate postpartum period in a health center by ASHA. Under the scheme, pregnant women is entitled to free cesarean section and zero expense delivery, free drugs and consumables, free essential diagnostics (blood, urine and ultrasonography, etc.), free diet during stay in the health facility (up to 3 days for normal delivery and 7 days for cesarean section),free provision of blood transfusion, free transportation from home to health institution, free transportation between facilities in case of referral, drop back from institution to home after 48 hours stay, exemption from all kinds of user charges. The entitlements for sick new-born till 30 days after birth is free and zero expense treatment, free drugs and consumables, free diagnostics, free provision of blood, free transportation from home to health facility, drop back

from institute to home, exemption from all kinds of user charges[1]. In 2015, this scheme was expanded to cover infants up to 1 year of age.

The *Janani Shishu Suraksha Karyakram* helped in reducing both maternal and infant death rate and morbidity.[2] Some studies are conducted in different states of the country which pointed out deficiency of services in all components of the JSSK[3,4,5,6,7] but there has been paucity of studies on JSSK particularly in the part of the Thar Desert region examining the extent of utilization and challenges in implementation of scheme.

The present study aims to find out services being provided under the JSSK scheme and to assess whether the JSSK schemes provide required services to the rural pregnant women. Also, to know the utilization pattern of JSSK so as to improve the coverage and remove the bottlenecks to further increase the utilization of the JSSK scheme. The data used in the study are more than three years old but findings and recommendations are highly relevant as ongoing programme strategies still remain the same.

Methodology

A mixed method study design was followed. Data of four financial years from 2016-2017 to 2019-2020 was collected from the Chief Medical and Health Officer, Jodhpur, but due to unavailability of complete data for financial year 2016-2017 and 2017-2018, only 2 years were analyzed. The Pregnancy, Child Tracking and Health Services Management System (PCTS) was also used for collecting data regarding home and institutional deliveries. Key informants' interviews were conducted to elicit the challenges, barriers and good practices of the JSSK scheme. The data was collected during October 2020 to November 2020. In depth interviews were conducted with District Program Manager (DPM), District Nodal Officer, Computer operator, Medical Officers of both Community Health Centre (CHC) and Primary Health Centre (PHC), Lady Health Visitor (LHV), pregnant female, mother of an infant, Auxiliary Nursing Midwifery (ANM) and Accredited Social Health Activist (ASHA) of different blocks of Jodhpur, Rajasthan regarding challenges, barriers and good practices of JSSK scheme. This study received prior approval from the Institutional Ethics Committee (IEC), All India Institute of Medical Sciences, Jodhpur vide letter No AIIMS/IEC/2020/3324 dated 14 October 2024.

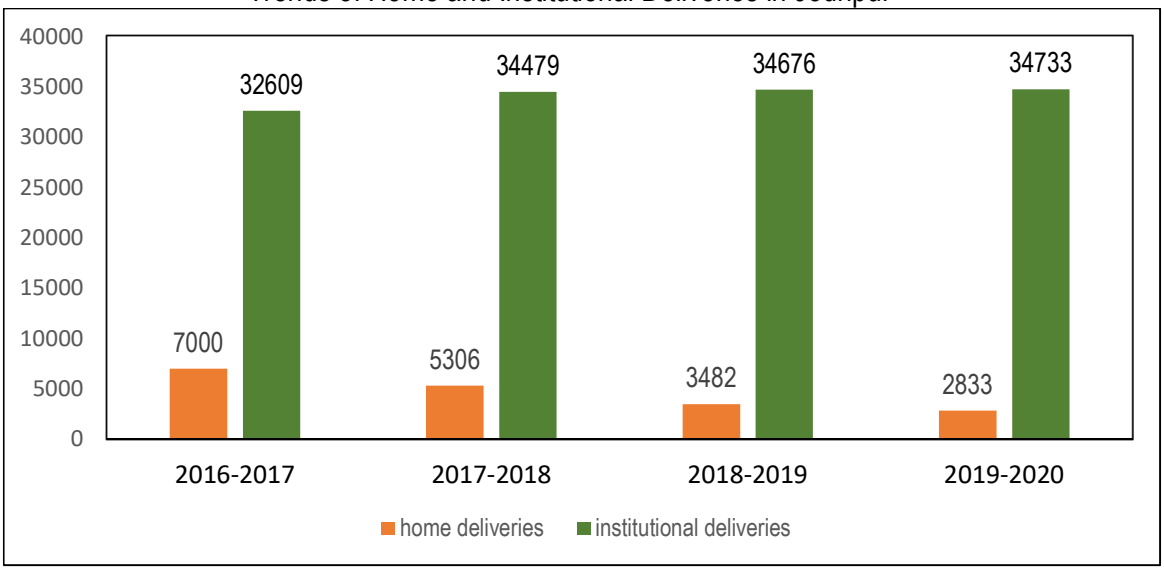
Findings

Current Status regarding ANC and PNC

Before presentation of findings regarding utilization of entitled services under the JSSK, it is pertinent to describe the current situation of utilization of ANC and PNC services in the District.

Figure-1

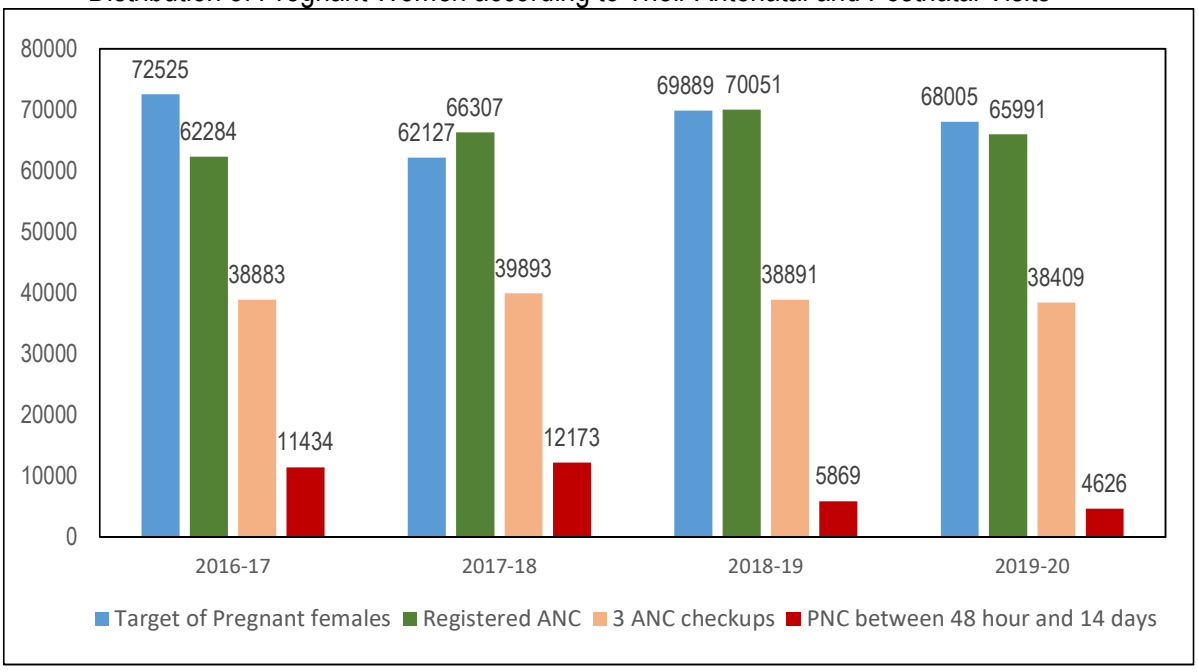
Trends of Home and Institutional Deliveries in Jodhpur



This bar graph in Fig 1 shows that there is 6.1% increase in institutional deliveries and 59.5% decrease in home deliveries from financial year 2016-2017 to 2019-2020 in Jodhpur, Rajasthan.

Figure-2

Distribution of Pregnant Women according to Their Antenatal and Postnatal Visits



Source: Pregnancy Child Tracking & Health System Management System, Jodhpur, Rajasthan.

This bar graph in Fig 2 shows that 85.8% pregnant women were registered for ANC check-ups in financial year 2016-2017 whereas in year 2019-2020 it was 97%.

Services Provided to Pregnant Women.

The data regarding utilization of the JSSK scheme in urban and rural Jodhpur, Rajasthan was collected from the office of the Chief Medical and Health Officer, Jodhpur District and the Pregnancy, Child Tracking System (PCTS) Portal, findings are presented in table 1.

Table- 1

Number of Pregnant Women Given Free Medicines under *Janani Shishu Suraksha Karyakram* (JSSK) during the Financial Year 2018-'19 and 2019-'20

Entitlements under JSSK	**F.Y 2018-2019 (N=70051)***		**F.Y.2019-2020 (N= 65991)***	
	Urban	**Rural**	**Urban**	**Rural**
Free medicine given to ANC	55729	35225	39473	30412
Free medicine given to PNC	9355	25335	18366	24720
Free medicine given in normal delivery	17603	38938	18683	30303
Free medicine given in complicated delivery	1209	437	1056	275
Free medicine given in cesarean delivery	9312	267	10314	362
Total free medicines given to pregnant females	91147	94396	85782	82874

*N= Number of pregnant women registered for ANC.

This table-1 indicates that the total number of free medicines given in urban and rural Jodhpur decreased in the financial year 2019-2020. About 80% mothers having normal delivery received free medicines in 2018-19 compared to 74% in the year 2019-20. The free medicines given to mothers with complicated delivery decreased in 2019-20 compared to 2018-19 but free medicines given in case of Cesarean delivery increased in the year 2019-20 compared to 2018-19.

Table-2

Number of Pregnant Women Given Free Transportation Service from Home to Health Facility under *Janani Shishu Suraksha Karyakram* (JSSK) during the Financial Year 2018-19 and 2019-20

Utilization of free transportation facilities under JSSK	**F.Y 2018-2019 (N=70051)***		**F.Y.2019-2020 (N= 65991)***	
	Urban	**Rural**	**Urban**	**Rural**
Institutional Ambulance	142	129	9	72
104 Janani Express	890	6898	436	6088
108 Ambulance	1694	4020	2263	4723
Authorized Private Vehicle	144	580	388	604
Private Vehicle	332	16939	363	16513
Home to health facility (Total)	3202	28566	3411	29023
Total deliveries registered	28124	39642	30053	30940

*N= number of pregnant women registered for ANC.

This table-2 shows that utilization of free transport facilities in urban areas is around 11% but the same was higher for rural areas (73% in 2018-19 and 94% in 2019-20).

Table-3

Number of Pregnant Women Given Free Transportation Service for Referral to Higher Health Facilities under *Janani Shishu Suraksha Karyakram* (JSSK) during the Financial Year 2018-'19 and 2019-'20

Utilization of free transportation facilities under JSSK	F.Y.2018-2019 (N=70051*		F.Y.2019-2020 (N= 65991)*	
	Urban	Rural	Urban	Rural
In institutional ambulance	436	48	1019	52
104 Janani express	27	1976	0	1104
108 ambulance	98	1593	0	1750
Authorized private vehicle	9	48	0	35
Private vehicle	37	459	26	602
Referral total	588	3775	1357	3490
Total Complicated and Cesarean Deliveries	10521	704	11370	637

*N= number of pregnant women registered for ANC

This table shows a drastic decrease in use of 104 Janani express, 108 ambulance and authorized private vehicles in urban areas for referral from the financial year 2018-2019 to 2019-2020. The total complicated and cesarean deliveries reported are more than 10 times higher in urban compared to rural areas but the utilization of transport facilities under JSSK is 5 to 6 times more compared to total complicated and cesarean deliveries. It is obvious that free transport services are more utilized in rural areas as compared to urban areas of Jodhpur.

Table-4

Number of Pregnant Women Given Free Transportation Service from Health Facility to Home under *Janani Shishu Suraksha Karyakram* (JSSK) during the Financial Year 2018-'19 and 2019-'20.

Utilization of free transportation facilities under JSSK	2018-2019 (N=70051)*		2019-2020 (N= 65991)*	
	Urban	Rural	Urban	Rural
Institutional ambulance	270	145	0	80
104 Janani express	0	12813	1	10286
108 ambulance	0	2779	29	3904
Authorized private vehicle	0	221	7	152
Private vehicle	151	12747	104	13843
Total from health facility to home	421	28705	141	28203
Total from home to health facility	3202	28566	3411	29023
Total deliveries registered	28124	39642	30053	30940

*N= number of pregnant women registered for ANC

Table 4 reflects that utilization of 104 Janani express and private vehicles was maximum by pregnant women in rural areas. It is worth mentioning that utilization of transportation from health facilities to home in urban areas is very less but in rural areas it was 72 per cent in 2018-19 to 92 per cent in 2019-'20.

Table-5

Number of Infants up to 1 Year of Age Given Free Entitled Services under *Janani Shishu Suraksha Karyakram* (JSSK) during the Financial Year 2018-'19 and 2019-'20

Free entitled services for infants	2018-2019 (N=52430)*		2019-2020 (N=51020)*	
	Urban	Rural	Urban	Rural
Free medicines	27047	12073	11213	8720
Free laboratory services	21163	3247	21992	3295
Free transportation for infants from home to institution	1461	3298	0	2940
Free transportation for infants in cases of referral	280	318	1673	810
Free transportation for infants from health facility to home	170	3940	0	3566
Free blood transfusion given to infants	910	10	544	0

*N= number of infants registered with PCTS

Figures in Table 5 shows that 3 times more free medicines and 7 times more free laboratory services were given to infants in urban areas compared to rural areas in the Jodhpur District. It is noteworthy to mention that a much higher number of infants from rural areas got free transport facilities from health facility to home compared to urban areas of Jodhpur.

Discussion

The present study was done to assess utilization of facilities under the *Janani Shishu Suraksha Karyakram* (JSSK) and also to assess challenges relating to free transportation, free drugs & diagnostics and free hospitalization to pregnant mothers and infants. In this study, we found that as compared to the number of ANC registered, the maximum number of pregnant females used 108 ambulance services for transportation from home to health institution, referral and from health institution to back home. Also, it was noted that in rural areas the majority of females used private vehicles and very few of them used institutional ambulances for the same. The reason for primarily using private vehicles as came up during stakeholders' interview was shortage of institutional ambulances, late services of 104 Janani express and 108 ambulances. Also, a major reason behind the same was government' scheme of reimbursement of traveling expenses for private vehicles.

This study reported that the Jodhpur district having a vast desert area posed a challenge for pregnant women to reach a health facility. Many people were not aware that government hospitals are offering free delivery and free C-sections. Not possessing an Aadhar card or Bhamashah card by the family of pregnant females hinders paperwork to avail benefits under the scheme. Delay in documentation/ problems in online registration also poses challenges. Many health facilities did not have all the drugs or all the diagnostics/lab technicians; therefore, pregnant women/infants were referred to higher health facilities. Since blood banks were not available at PHCs, complicated deliveries were referred to the higher facilities. Lack of infrastructure, shortage of skilled human resources, lack of pediatrician /trained health staff to

manage illness of infants at a lower health facility were identified as factors for low utilization of free diagnostics and drugs, etc.

The study found that maintenance of ambulances was very bad and air conditioners never work, also these ambulances do not have any windows so during the inside temperature increase which may kill a person who is already sick. Many respondents informed about timely non-availability of ambulances, inadequate number of ambulances. Government is providing reimbursement of the private transportation but sometimes private vehicles do not have required documents to process the cost utilized. Also, unauthorized private vehicles charge much more than what is being reimbursed by the government for transportation.

One of the reasons reported for less utilization of food provided at health facilities was poor quality. Sometimes, the caste of the person preparing food at the health facility acted as a barrier in consuming food. The scheme of free food was not functional at health facilities where the number of deliveries per month is very low i.e. around 5-7, Only higher centers are currently offering food service under the *Kalewa Yojana*.

Some studies conducted in different states of India reported similar findings reported by us. A study conducted in Pune district of Maharashtra had similar findings as described in the current study. That record maintenance regarding transport facilities seems to be a challenging task in many of the facilities. The study found that vehicles were not available timely. Vehicle's conditions were not good. Driver was not available at some places; and the area was inaccessible as reported by some PHCs.[3]

Similar to our study, poor awareness about the JSSK was found in a study conducted with 80 mothers who had recently delivered a live child. The study revealed that 52.5 per cent reported having heard of JSSK program services. None of the participants knew about free drop back services from institutions to home after 48 hours of delivery. Only few had knowledge regarding free referral services and exemption from user charges. All the eight neonates who required blood investigations and blood transfusion availed it for free, however no free transport to and fro from health institutions was availed by them. Analysis revealed that only 58.8 per cent incurred no expenditure on transport.[4]

Another study conducted with 200 delivered women found that 17% of the neonates were sick in the first 30 days. Quite a high 44 per cent of new-born could not avail transport services. Reasons for not availing free transport were being taken to a private facility, using their own vehicle and paid taxi and nearby health facility.[5] Low utilizations of entitled services was also reported in a study conducted with 120 beneficiaries. The findings revealed that free referral transport, free diet, free drugs and free diagnostics were availed by 46 per cent, 79 per cent, 32 per cent and only 14 per cent, respectively. Among infants, 18 per cent utilized free transportation service, 16 per cent utilized free drugs, 67 per cent used free diagnostic services.[6] Poor utilization of transport facilities under the scheme is not an exception. A study conducted by R. C. Goyal and Priya L. Singh reported that overall awareness about free referral transport services among study participants was 44.17 per cent. Nearly half of the sick new-born availed free referral transportation facility for transfer to higher level facility. [7] Study conducted by Khadse et al, reveals that though all the 78 respondents were enrolled under JSSK after admission to hospital, only 38.5 percent were aware about free delivery and free treatment under JSSK.[8] Another study conducted in Odisha by Sunder, revealed that 60 per cent of mothers received all the JSSK

benefits during hospitalization, while only 19% received full benefits for transport. Additionally, a mere 15 per cent of mothers were fully benefited during their stay and transportation.[9]

Conclusion

Overall JSSK has been relatively successful in its spheres and has encouraged people towards institutional deliveries. Our findings indicate that although pregnant females are using free medicines, free diagnostics and free transportation services; lack of specialists, lack of laboratory services, timely unavailability of transport and lack of skilled manpower at health facilities were barriers in the way of JSSK. Some priority areas for intervention are better availability of skilled manpower, improved IEC, active monitoring-supervision, regular adequate fund flow, ensuring timely availability of transport services seem to be the need of the hour for this flagship programme of government of India.

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References

1. India M. *Janani Shishu Suraksha Karyakaram* (JSSK) :: National Health Mission [Internet]. Nhm.gov.in. 2020 [cited on 14 November 2020]. Available on https://nhm.gov.in/index4.php?lang=1&level=0&linkid=150&lid=171.
2. Features: PIB - Aizawl, Mizoram [Internet]. Pibaizawl.nic.in. 2020 [cited on 14 November 2020]. Available on http://pibaizawl.nic.in/feature/english/fe2012/oct%2018.2.htm.
3. Sivanandan V. (July-Sept. 2017). Assessment of service provided in implementation of Janani Shishu Suraksha Karyakram service in Pune, Maharashtra. The Journal of Community Health Management [Internet]. 2017 [cited on 15 November 2020]; (4(3):109-115. Available on http://oaji.net/articles/2017/1773-1508231984.pdf.
4. Chellaiyan V, Christopher C & Daral S. (2018). Availing entitlements under Janani Shishu Suraksha Karyakram in Tamil Nadu: a reality. International Journal Of Community Medicine And Public Health; 5(3): 1127.
5. Rohilla R, Chaudhary S, Kumar V, Kumar S. (2017). Evaluation of *Janani Shishu Suraksha Karyakram* scheme and out of pocket expenditure in a rural area of Northern India. Journal of Family Medicine and Primary Care; 6 (3): 477.
6. Mitra S, Saha S, Haldar D, Sarkar AP, Biswas D, Sarkar GN. Evaluation of Janani-Shishu Suraksha Karyakram in a Community Development Block of Bankura District, West Bengal, India: A Mixed Methods Approach. Indian J Comm. Health. 2016; 28, 4: 344-351
7. Unnikrishnan B, Rathi P, Sequeira RM, Rao KK, Kamath S, K. MAK. Awareness and Uptake of Maternal and Child Health Benefit Schemes Among the Women Attending a District Hospital in Coastal South India. Journal of Health Management. 2020;22(1):14-24. doi:10.1177/0972063420908371.
8. Khadse S, Kartikeyan S & Zade R. (2018). Awareness of *Janani Shishu Suraksha Karyakram* and out of pocket expenses incurred for intra-partum and post-partum care in a tertiary care health facility: A pilot study. International Journal of Science Research; 7.
9. Sundar K. (2014). Out of Pocket Health Expenditure in Maternal and Neonatal Health and Coping Strategies in Urban Slums of Bhubaneswar, Odisha. (Doctoral Dissertation, SCTIMST).

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Premenstrual Syndrome: Awareness and Role of Physical Activities

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Abstract

Premenstrual syndrome (PMS) is a widespread issue affecting females in the reproductive age group before and during menstruation. PMS is associated with various socio-demographic factors, such as age, marital status, locality, and lifestyle. The present survey aims to study the awareness of both females and males about PMS and the role of physical activity in alleviating symptoms. An online survey was conducted from April to June 2023, with 601 female and 184 male respondents. Out of these, 427 females (71%), and 127 males (69%) fulfilled the inclusion criteria, ie., awareness of PMS, continued for further study. The majority of male respondents (89%, n = 113) were aware of PMS symptoms, while 71.2 per cent of female respondents experienced PMS symptoms. 96 per cent of women and 95.3 per cent of men believed that stress aggravated PMS symptoms. 92.5 per cent of female and 96.1 per cent of male respondents stated that physical activity plays an important role in alleviating PMS symptoms. The current study concluded that level of awareness regarding PMS is ~70 per cent, and >90 per cent believed in the positive role of physical exercise in comforting the symptoms. Thus, it is in the interest of public health to generate more awareness concerning PMS amongst both females and males; and the positive role of an active lifestyle.

Key words: Premenstrual syndrome, awareness, physiological, stress, physical activity

Introduction

Premenstrual syndrome (PMS) is a common occurrence that affects females during their reproductive years. It comprises physical, cognitive, clinical, and behavioral symptoms that occur repetitively between 6 to 12 days before menstruation and last up to 2-4 days after the menstrual bleeding during the luteal phase of the cycle[1,2]. According to previous studies, PMS impacts up to 75 per cent of females and varies in intensity[3-5].

Irritation, depression, and anxiety are the most common symptoms of PMS, along with other acute indicators like abdominal/back/lower back pain, breast tenderness, water retention, hyperphagia, bloating, weight gain (physical symptoms), nausea, fatigue (psychological symptoms), mood swings, insomnia, absent-mindedness, loss of libido (neurological symptoms), as well as dermatological symptoms such as acne and boils[4,6,7]. PMS has also been found to be strongly associated with suicidal tendencies among females with high anger issues[4]. The underlying cause of PMS is hormonal adjustments along with lifestyle factors including diet, physical activity, mental health, and stress[4,6]. As reported, females with PMS tend to be obese/overweight[8].

PMS is not a terminal disease and is part of the regular reproductive cycle of a female's life. Although, the discomfort experienced during PMS affects the quality of life and work efficiency, this is a matter of concern in today's scenario where a lot of females are educating themselves and want to execute their responsibilities efficiently[9]. Also, adolescent girls frequently miss school, score lower grades, and thus withdraw from their learning due to PMS[8]. Familial consequences such as conflicts and discomfort among couples necessitate addressing the issue and providing effective management strategies without any side effects[9]. Thus, it is worthwhile to study the awareness and sensitivity of males in society with respect to PMS as aware males would understand the partner's/colleague's state of discomfort; and provide support in the time of distress.

With respect to the management of PMS, various home remedies are used, and medicinal treatment is recommended in acute cases where the patients do not respond to other treatment types. Active lifestyles, healthy dietary habits, regular physical exercise, and sports activity are known to reduce overall stress and are thus likely to alleviate various symptoms associated with PMS without any side effects[10,11].

PMS does impact the quality of life; thus, it is imperative to study the prevalence and awareness of PMS amongst the Indian females. Since very few studies have been conducted with males as subjects/respondents, the present study was an effort to study the awareness of Indian males and their sensitivity towards females experiencing PMS. Also, it is in the interest of public health that a management strategy be discussed/studied for PMS that has no side effects like physical exercise.

Methodology

Data Collection and Segregation: The present cross-sectional study was carried out from April to June 2023. The responses were collected from 601 females and 184 males. However, from the obtained responses, 71 per cent (n = 427) females and 69 per cent (n = 127) males fulfilled the inclusion criteria. So, the data set used in the study consisted of these samples only, and the remaining 29 per cent (n = 174) females and 31 per cent (n = 57) males were unaware of the PMS and thus, excluded from the study.

Survey Questionnaire: Two bilingual (English and Hindi) Google Form questionnaires, consisting of 27 and 21 closed-ended questions, were formulated for female and male participants, respectively. The forms were shared via different online platforms like Email, WhatsApp, Instagram, and other social media handles all over India. The respondents were presented with the purpose and scope of the study before filing the questionnaire. The female questionnaire was designed to collect data about basic socio-demographic details, the prevalence and symptoms of PMS, and various remedies/ways including physical activity, for alleviating PMS. The questionnaire designed for male respondents was also designed to enquire about their socio-demographic details, general awareness, and sensitivity to PMS.

Data Analysis: The data collected were compiled and analyzed using percentage statistics.

Consent and Confidentiality: Respondents were well informed about the confidentiality of the survey, and their participation was voluntary. Participants were invited to check a consent box before submitting the questionnaire.

Findings

The responses to both the questionnaires formulated for females and males are summarized in Tables 1-4 and Table 5-8 respectively.

Analysis of Female Responses (Tables 1-4):

Study of Socio-demographic Parameters, Education and Menstrual Pattern: A total of 601 responses from females in the age group 13–60 years were obtained. The maximum responses were received from urban females (89.4%; n = 537) residing in Delhi (41.3%; n = 248), Haryana (17.9%; n = 108), Uttar Pradesh (15.5%; n = 93), and other states of India (25.3%; n = 152). The majority of respondents were working class (76%; n = 456) and qualified up to senior secondary (52.1%; n = 313).

The maximum number of female respondents (89.7%, n = 539) experienced menarche at the age of 11–15 years. The mean age of menarche was 13 years, and only 3.3% of females menstruated for more than 7 days. 76.9% (n = 462) of the respondents in the present survey had a regular menstrual cycle. With respect to awareness regarding PMS, 71% (n = 427) were affirmative and were allowed to participate in the survey (Table 1; Figure 1).

Table 1

Study of Socio-Demographic Parameters, Education, and Menstruation Pattern

Question	Parameter	Numbers	%
Age (in years)	13-39	549	91.4
	40-49	38	6.3
	50-60	14	2.3
	TOTAL	N=601	100
State	Delhi	248	41.3
	Haryana	108	18
	Uttar Pradesh	93	15.5
	Other States	152	25.2
	TOTAL	N=601	100
Locality	Urban	537	89.4
	Rural	64	10.6
	TOTAL	N=601	100
Highest Education	Up to Senior Secondary (XII)	313	52.1
	Graduate	206	34.3
	Postgraduate	70	11.6
	Doctorate	12	2
	TOTAL	N=601	100
Occupation	Non-working class	145	24.1
	Working class	456	75.9
	TOTAL	N=601	100
Menarche age (in years)	At the age of 8-10	20	3.3
	At the age of 11-15	539	89.7
	At the age of 16-19	42	7

	TOTAL	N=601	100
Normal duration of menstruation (in days)	5	417	69.4
	7	164	27.3
	Above 7	20	3.3
	TOTAL	N=601	100
Is your menstruation cycle regular?	Yes	462	76.9
	No	139	23.1
	TOTAL	N=601	100
Awareness of pre-menstrual syndrome (PMS)?	Yes	427	71
	No	174	29
	TOTAL	N=601	100

Study of Prevalence, and Awareness about Symptoms and Impact of PMS among Females:

Out of the 427 females who were aware of PMS, 71.2 per cent (n = 304) suffered from PMS, and 98.4 per cent (n = 420) believed that PMS really exists and impacts females. According to these female respondents, abdominal pain (78.2%) and backache (63.9%) were found to be the most common physical symptoms that occurred during PMS. The other major symptoms included bloating: 58.3 per cent, fatigue: 57.8 per cent, acne: 53.4 per cent, swollen or tender breasts: 48.9 per cent, vaginal discharge: 48.2 per cent, headache: 40.5 per cent, and nausea: 34.9 per cent. With respect to behavioral symptoms, mood swing (93.4%), and irritation (78.2%) had the highest occurrence followed by anger outbursts 67.7 per cent, food cravings 62.3 per cent, anxiety 62.1 per cent, tension 41.2 per cent, depression 40 per cent, social withdrawal 36.8 per cent, and insomnia 32.3 per cent.

It is interesting to note that the majority of female participants (47.5%) believed that lifestyle (sedentary lifestyle/eating habits/lack of exercise) and physiology (43.3%) were the major underlying factors for symptoms associated with PMS. 96 per cent (n = 410) of females responded that PMS symptoms become more prevalent in stressful situations, and 83.8 per cent believed that it does impact interpersonal relationships. PMS is an integral part of women's lives, and it is essential to spread awareness about it through all media sources. Despite that, only 50.8 per cent (n = 217) of females surveyed reported having seen or read content related to PMS on various media sources (Table 2).

Table 2

Study of Prevalence and Awareness about Symptoms and Impact of PMS among Females

Question	Parameter	Numbers	%
Suffered or had symptoms of PMS?	Yes	304	71.2
	No	123	28.8
	TOTAL	N=427	100
PMS really exist and impact females	Yes	420	98.4
	No	7	1.6
	TOTAL	N=427	100
Physiological symptoms experienced during PMS	Abdominal Pain	334	78.2
	Backache	273	63.9
	Bloating	249	58.3

(Respondents were able to select more than one option)	Fatigue	247	57.8
	Acne	228	53.4
	Swollen or tender breast	209	48.9
	Vaginal Discharge	206	48.2
	Headache	173	40.5
	Nausea	149	34.9
	Others (BP/shivering etc.)	64	15
Behavioral symptoms experienced during PMS (Respondents were able to select more than one option)	Mood Swings	399	93.4
	Irritation	334	78.4
	Anger outbursts	289	67.7
	Food cravings	266	62.3
	Anxiety	265	62.1
	Tension	176	41.2
	Depression	171	40.0
	Social withdrawn	157	36.8
	Insomnia	138	32.3
Underlying cause of symptoms associated with PMS (Respondents were able to select more than one option)	Lifestyle related (sedentary lifestyle/eating habits/lack of exercise)	203	47.5
	Physiological	185	43.3
	Psychological	123	28.8
	Behavioural	108	25.3
	Social and cultural	24	5.6
	All the above	176	41.2
PMS symptoms become more prevalent under stressful situations	Yes	410	96
	No	17	4
	TOTAL	N=427	100
Have you ever seen or read content about PMS on social media platforms?	Yes	217	50.8
	No	210	49.2
	TOTAL	N=427	100
Taken or required medical assistance for PMS	Yes	286	67
	No	141	33
	TOTAL	N=427	100
PMS affected/ is believed to affect interpersonal relationship	Yes	358	83.8
	No	69	16.2
	TOTAL	N=427	100

Management of Symptoms Associated with PMS

To alleviate symptoms associated with PMS, various home remedies are used in Indian families to avoid allopathic treatment. The majority of respondents were in agreement that exercise (72.8%) helps in overcoming PMS, followed by a hot water bottle (70.5%), sleeping (48.7%), or any other way of distraction (41.7%). 79.2% (n = 338) of respondents felt that the diet plan should be changed to deal with PMS and that a vegetarian diet (48.5%) should be followed. 65.6% of respondents believed that childbirth does impact PMS. 39.1% (n = 167) of females also reported

that symptoms of PMS worsen during menopause, whereas 48.5% (n = 207) agreed on reduced symptoms during menopause (Table 3).

Table 3
Management of Symptoms Associated with PMS

Question	Parameter	Numbers	%
If you ever had PMS, how did you deal with it? (Respondents were able to select more than one option)	Exercise	311	72.8
	Hot water bottle	301	70.5
	Sleeping	208	48.7
	Binge eating	54	12.6
	Crying	50	11.7
	Any other way of distraction	178	41.7
Do you think there is a need to change the diet plan to deal with PMS?	Yes	338	79.2
	No	89	20.8
	TOTAL	N=427	100
Different diet plans	Vegetarian	207	48.5
	Vegan	22	5.2
	Gluten-free	38	8.9
	Non- vegetarian	18	4.2
	High fat	9	2.1
	High sugar intake	22	5.2
	None	111	26
	TOTAL	N=427	100
Observed any change in PMS after childbirth	Yes	280	65.6
	No	147	34.4
	TOTAL	N=427	100
In your opinion, which of the following may happen to the symptoms related to PMS during menopause?	PMS symptoms are reduced	207	48.5
	PMS symptoms become worse	167	39.1
	No change in PMS symptoms	53	12.4
	TOTAL	N=427	100

Role of Physical Exercise in Alleviating PMS and Associated Symptoms

Physical activity/exercise, plays an important role in reducing the symptoms of PMS. 92.5 per cent (n = 395) of females in the present survey responded that physical activity/exercise can help in dealing with PMS, and 73.3 per cent (n = 313) agreed that it eased the symptoms of PMS. The majority of females responded that the inclusion of yoga (72.6%), walking (52%), cycling (36.1%), running (34.7%), aerobics (30%), gym (23.4%), etc. would help in dealing with PMS. 53.6 per cent (n = 229) of respondents agreed that daily exercise would be more helpful as compared to alternate days (37.2%, n = 159) or weekends (4%, n = 17). 87.8% (n = 375) of females were affirmative that PMS subsides after including exercise in their daily routine (Table 4).

Table 4

Role of Physical Exercise in Alleviating PMS and Associated Symptoms

Question	Parameter	Numbers	%
Do you think that physical activity/exercise can help in dealing with PMS?	Yes	395	92.5
	No	32	7.5
	TOTAL	N=427	100
Increased physical activity helps to alleviate the symptoms associated with PMS	Yes	313	73.3
	No	114	26.7
	TOTAL	N=427	100
If yes, What type? (Respondents were able to select more than one option)	Yoga	310	72.6
	Walking	222	52
	Cycling	154	36.1
	Running	148	34.7
	Aerobics	128	30
	Gym	100	23.4
	Swimming	68	15.9
	Badminton	65	15.2
	Squash	35	8.2
	Football	34	8
	Tennis	32	7.5
	Cricket	32	7.5
	I don't exercise	57	13.3
According to you, how often should one exercise to deal with PMS?	Every day	229	53.6
	Alternate days	159	37.2
	Weekends	17	4
	N/A	22	5.2
	TOTAL	N=427	100
Do you think symptoms of PMS subside after including exercise in daily routine?	Yes	375	87.8
	No	52	12.2
	TOTAL	N=427	100

Analysis of Males' Responses (Table 5-8)

Study of Socio-demographic Parameters, Education, and Awareness about PMS of Male Respondents: A total of 184 male respondents of various age groups participated in the present online survey. The majority of respondents, 61.4% (n = 113), belonged to Delhi, Haryana, and Uttar Pradesh. 81.5% (n = 150) of respondents were from urban areas. With respect to educational qualifications, 47.9% (n = 88) of participants had completed their senior secondary education, and 52.2% (n = 96) went for higher education. 46.2% (n = 85) belonged to the non-working class, whereas 53.8% (n = 99) were from the working class. 69% (n = 127) gave positive replies about their awareness of premenstrual syndrome and thus were included in the survey (Table 5)

Table 5

Study of Socio-demographic Parameters, Education, and Awareness about PMS of Male Respondents

Question	Parameters	Number	%
Age (In years)	15-19	62	33.7
	20-29	74	40.2
	30-49	37	20.1
	50-60	11	6
	TOTAL	N=184	100
State	Delhi	41	22.3
	Haryana	44	23.9
	Uttar Pradesh	28	15.2
	Other States	71	38.6
	TOTAL	N=184	100
Locality	Urban	150	81.5
	Rural	34	18.5
	TOTAL	N=184	100
Highest education	Up to Senior Secondary (XII)	88	47.9
	Graduate	57	31
	Post Graduate	34	18.4
	Doctorate	5	2.7
	TOTAL	N=184	100
Occupational status	Non-Working class	85	46.2
	Working class	99	53.8
	TOTAL	N=184	100
Are you aware of pre-menstrual syndrome (PMS)?	Yes	127	69
	No	57	31
	TOTAL	N=184	100

Awareness of male respondents with respect to symptoms of PMS

In the present survey, a majority of respondents (89%, n = 113) were aware of the symptoms associated with PMS. 73.2% (n = 93) of respondents believed that females experience PMS symptoms before menstruation. Additionally, 30 respondents (23.6%) said that women suffer from PMS during menstruation. Mood swings are the most common symptom, according to 52.8% of male respondents, followed by irritation (44.1%), anxiety (35.4%), depressed mood (34.6%), anger outbursts (33.1%), and food craving (32.3%). According to 56.7% of male participants, PMS symptoms can be attributed to a combination of behavioral, physiological, psychological, and lifestyle-related factors, followed by physiological factors (38.6%) alone. According to 89.8% (n = 114), PMS has a strong impact on the working efficiency of females, and a large number (95.5%, n = 121) of males responded that symptoms become more prevalent in females under stressful situations. Only 56.7% (n = 72) of males have seen or read content about PMS on various media platforms, such as TV, and OTT (Over-the-Top) platforms (Table 6).

Table 6

Awareness of Male Respondents with Respect to Symptoms of PMS

Question	Parameters	Number	%
Are you aware of the symptoms associated with PMS?	Yes	113	89
	No	14	11
	TOTAL	N=127	100
When does a woman suffer from PMS?	Before Menstruation	93	73.2
	During Menstruation	30	23.6
	Just after Menstruation	4	3.2
	TOTAL	N=127	100
According to you, what are the symptoms of PMS? (Respondents were able to select more than one option)	Mood swings	67	52.8
	Irritation	56	44.1
	Anxiety	45	35.4
	Depressed Mood	44	34.6
	Anger outburst	43	33.1
	Food cravings	41	32.3
	Tension	38	29.9
	Social withdrawal	28	22
	Insomnia	26	20.5
	All of the above	81	63.8
What do you think is the underlying cause of symptoms associated with PMS? (Respondents were able to select more than one option)	Physiological	49	38.6
	Psychological	26	20.5
	Lifestyle-related (sedentary lifestyle/eating habits/lack of exercise)	21	16.5
	Behavioural	17	13.4
	All of the above	72	56.7
Do you think PMS impacts the working efficiency of females?	Yes	114	89.8
	No	13	10.2
	TOTAL	N=127	100
Do you think symptoms of PMS become more prevalent in females under stressful situations?	Yes	121	95.3
	No	6	4.7
	TOTAL	N=127	100
Have you ever seen or read content about PMS on social media platforms?	Yes	72	56.7
	No	55	43.3
	TOTAL	N=127	100

Sensitivity of males towards the subject: 70.9% (n = 90) of males responded that their female colleagues/partners/spouses/friends were comfortable discussing symptoms of PMS with them, and 42.5% heard jokes about PMS on social media or print media. However, the majority of male respondents, 89% (n = 113), made fun of their female colleagues/partners/spouses/family members during their PMS. Despite this, 80.3% (n = 102) of male respondents advised their female colleagues/partners/spouses/friends to seek medical help to overcome PMS (Table 7).

Table 7

Sensitivity of Males towards the Subject

Question	Parameter	Number	%
Are your female colleagues/partners/spouse/friends comfortable discussing PMS with you?	Yes	90	70.9
	No	37	29.1
	TOTAL	N=127	100
Have you ever heard jokes being made about PMS on social media or print media?	Yes	54	42.5
	No	73	57.5
	TOTAL	N=127	100
Do you make fun of your family colleagues/partners/spouse/family members while you get to know about their PMS?	Yes	113	89
	No	14	11
	TOTAL	N=127	100
Do you suggest them to take medical help to deal with PMS (if required)?	Yes	102	80.3
	No	25	19.7
	TOTAL	N=127	100

Awareness of males towards the role of lifestyle/physical activity in alleviating PMS in females:

76.6% (n = 97) and 96.1% (n = 122) of male participants reported that changes in eating habits and physical exercise are beneficial in combating PMS, respectively. The majority of males (96.9%, n = 123), responded that men in our society should be aware of PMS (Table 8).

Table 8

Awareness of Males towards Role of Lifestyle in Alleviating PMS in Females

Question	Parameter	Number	%
Do you think a change in eating habits can help dealing with PMS?	Yes	97	76.4
	No	30	23.6
	TOTAL	N=127	100
Do you think physical exercise is beneficial in combating PMS?	Yes	122	96.1
	No	5	3.9
	TOTAL	N=127	100
Do you think men in our society should be aware of PMS?	Yes	123	96.9
	No	4	3.1
	TOTAL	N=127	100

Discussion

India is a nation of cultural beliefs, and a lack of awareness regarding menstruation and associated phenomena was extensive in past years, where 'periods' were associated with the notion of 'impurity'. However, menstruation is a cyclical and recurrent biological process preceded by the presentation of multiple symptoms associated with PMS. Typically, menarche begins between 10-16 years of age, with an average age of commencement of 12.4 years (12). The mean age of menarche was reported to be 13 years in the present survey of Indian females' majority of them residing in Delhi, UP, and Haryana (Table. 1). As reported earlier, PMS is a recurrent and cyclical process that impacts females generally during the luteal phase of reproductive age (13,14). Globally, PMS is prevalent in 75% of females (4), while 71.2% (n=304) of females from the present study suffered from PMS. Awareness plays a pivotal role in the management of various disorders, and the same holds true for PMS. It was analyzed in the present survey that 71% of females were aware of PMS, and the level of awareness was higher among females living in urban areas (71.3%) as compared to rural areas (68.8%) (Table 1; Figure 2, 3). These findings are in concordance with earlier reports (15), stating that urban females experience more severe symptoms of PMS than rural females. Since urban females experience PMS symptoms more, they want to know more about this issue, and hence, this may be a causative factor for higher awareness among them as compared to rural females.

Many studies have already reported on the increased awareness of females regarding PMS, but very few studies have been carried out on male awareness with respect to PMS in India. So, in the present study, a deliberate attempt was made to find out if males are equally aware of PMS and associated symptoms and if they are empathetic towards females with respect to PMS. It has been found in previous studies that Indian males have an amalgam of curiosity and awkwardness regarding menstruation and its associated occurrences. There is a lack of accurate knowledge and usually misinformation (16). Surprisingly, it was found that the awareness level of males (69%) is very similar to that of females (71%), though rural males are less aware (53%) as compared to their female counterparts (68.8%) in the present survey. More than 95% males were correctly aware about of the timings of PMS and 89% of the males were aware of the symptoms associated with PMS (Table 6). It is evident from the results obtained in this study that knowledge of PMS is comparable among Indian females and males. One of the major factors regarding increased awareness among males is the willingness of females to discuss their PMS symptoms with their male colleagues/partners/friends/spouses. This finding also corroborates a previous report stating that females with severe PMS are more likely to discuss their PMS conditions (17). Also, education plays an important role in discussing female issues openly, and in the present survey, >90% of males and females had cleared their senior secondary education (Table 1, 5; Figure 4).

The symptoms and causes of PMS are diverse, including physiological, behavioral, psychological, lifestyle-related, and vary among individuals (4). Appropriate knowledge about various symptoms, and causes, along with acceptance of their occurrence, is imperative to improving the working efficiency of females during PMS. 98.4% (n = 427) of females who fulfilled the inclusion criteria and completed the survey believed that PMS exists and were aware of various symptoms associated with it (Table 2). Awareness about different symptoms was equally high among male respondents included in the survey (89%, n = 113) (Table 6). Social media is

a powerful and widespread platform which may play an instrumental role in spreading awareness about various health issues as only 50.8% of females and 56.7% of males were affirmative that they had seen or read content about PMS on social media platforms (Table 2, 6). PMS is also associated with childbirth and menopause (18). It was studied that, 65.6% of the females' observed changes in PMS after childbirth (Table 3).

It has been studied that high levels of psychological stress and neuroticism are strongly associated with PMS and sympathetic activity in the brain, which further results in menstrual pain by significantly increasing the intensity of uterine muscle contraction (19). Present findings in the Indian population are consistent with the above study, wherein more than 95% of the population (96% females, 95.3% males) reported that PMS symptoms become more prevalent in stressful situations (Table 2, 6). 89.8% of male, and 83.8% of female respondents were aware of the impact of PMS on working efficiency, and interpersonal relationships, respectively (Table 2, 6). This is in accordance with an earlier report, which stated that higher perceived stress precedes an increased severity of premenstrual symptoms and leads to the reduced working efficiency of females (17). Thus, the management of symptoms associated with PMS is very important for improving the quality of life for females, as discomfort, irritation, and depression during PMS lead to conflicts and relationship disturbances.

Lifestyle, dietary habits, and physical activity are underlying factors for determining the overall health of an individual, including reproductive health. Various studies have reported that regular physical and aerobic activity, including sports (endurance), will improve women's PMS symptoms during luteal phase by increasing the level of beta endorphins which increases the tolerance for pain and thus improve physical symptoms (20, 2,11). Females who engage in physical activities on a regular basis are less likely to experience PMS, and the use of medications with long-term side effects can be avoided. According to the data of current survey, majority of females (92.5%) and males (96.9%) agreed that physical activity is beneficial in managing PMS (Table 4, 8; Figure 5).

Various home remedies and changes in diet plans are practiced to alleviate the symptoms, and in some extreme cases, medical assistance is also sought (21). In addition to changes in diet, increased awareness and sensitivity of males with respect to PMS result in positive and better attitudes towards their female counterparts. Females feel comfortable sharing their negative thoughts and overwhelming demands with their friends/partner/colleagues/spouse. It also gives them the freedom to discuss their discomfort openly, which relieves some of the mental stress, and they do not need to hide their discomfort (22,11). 70% of males responded that their female counterparts felt comfortable discussing PMS with them, 89% males made fun of the females later, which is a reflection of low sensitivity in males (Table 7).

Figure 1

Study of Menstrual Pattern of Female Respondents

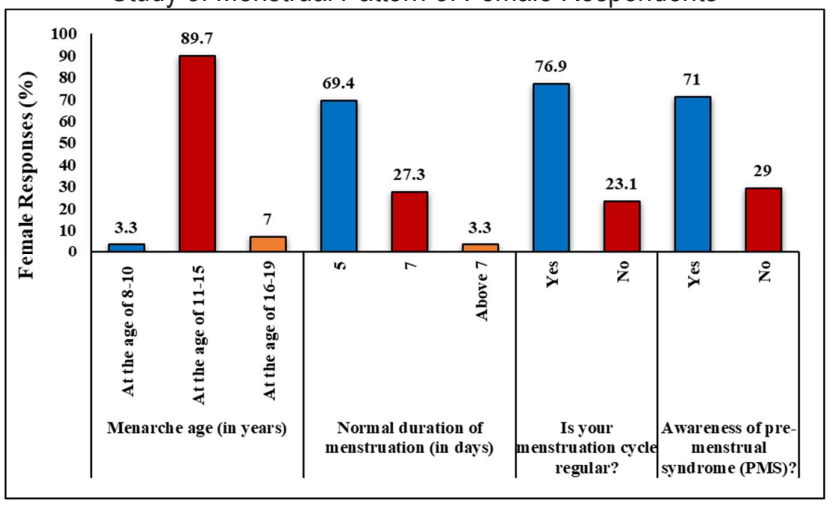


Figure 2

Comparative Presentation of Awareness of Females vs. Males

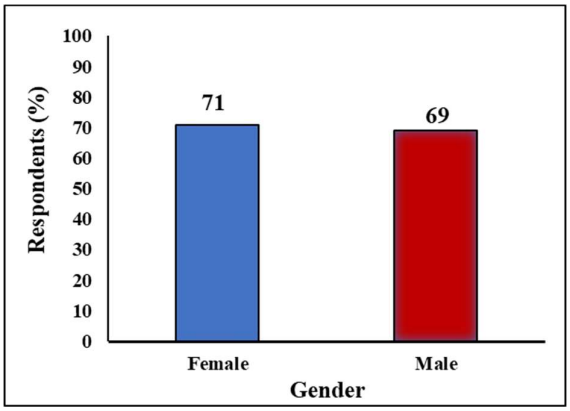


Figure 3

PMS Awareness of Males and Females Residing in Urban vs. Rural Areas

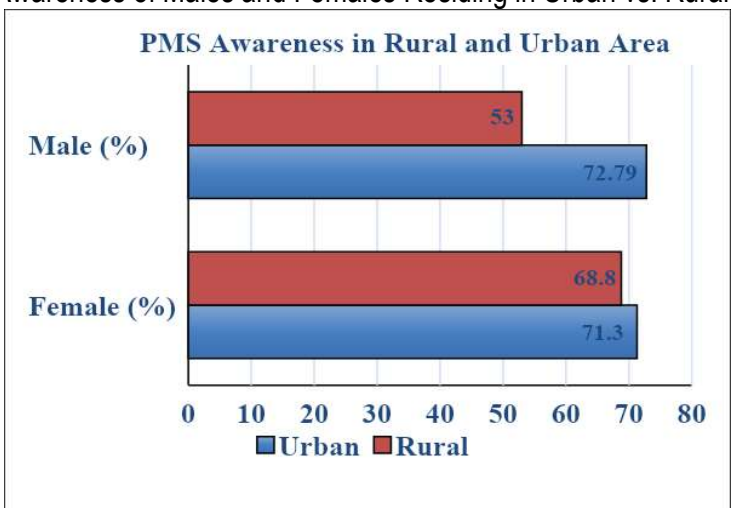


Figure 4
Educational Qualifications of Respondents

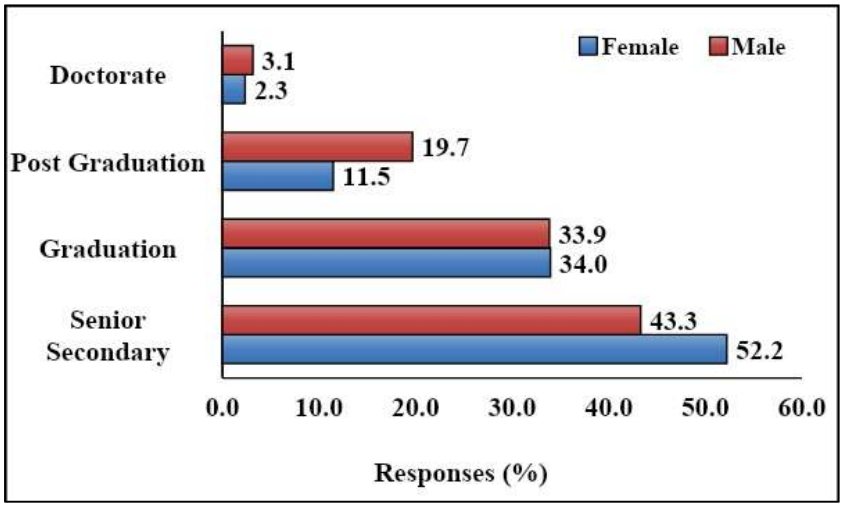
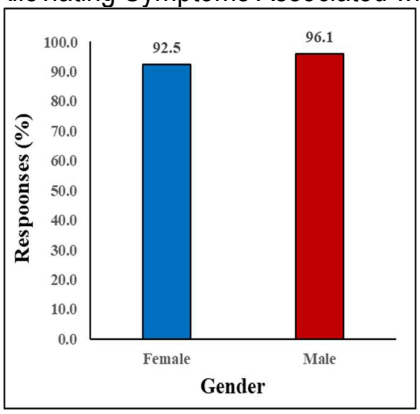


Figure 5
Role of Physical Activity in Alleviating Symptoms Associated with PMS: Females vs. Males



Conclusion

Premenstrual syndrome and associated symptoms are cyclical and recurrent phenomena experienced by females during their reproductive years, impacting the quality of life due to distress, irritation, pain, etc. Thus, it is imperative that both females and males are suitably aware of the topic, as mutual support and sensitivity are the foundation for a good quality life. It is important to highlight that very few studies have been carried out regarding the awareness and sensitivity of males with respect to PMS. Thus, the present survey-based study was designed not only to assess the awareness of Indian females but also males about PMS. The awareness level was comparable for both females and males (~70%) as the majority of the respondents were from urban areas (>80%) with satisfactory educational qualifications (>95% senior secondary). Although the sensitivity level was very low for the male respondents (11%). A major reason for that can be the lack of visibility of this topic through media sources. It is still taboo to talk about it openly, and most females are not comfortable discussing the discomfort with their male counterparts. The effective management of PMS is of the utmost importance, and the strategy

should be devoid of any side effects. The inclusion of physical exercise in daily routines is an effective way to alleviate the symptoms associated with PMS without any side effects, as observed in the present survey. It is of utmost importance that awareness programs are organized at regular intervals to sensitize society about premenstrual syndrome. It will empower the females with knowledge about different ways to alleviate the symptoms and ensure a quality life without any hesitation.

References

1. Dalton K (1982). What is this PMS? J. R. Coll. Gen. Pract., 32, 717–23.
2. Pearce E, Jolly K, Jones L L, Matthewman G, Zanganeh M & Daley A (2020). Exercise for premenstrual syndrome: a systematic review and meta-analysis of randomised controlled trials. BJGP Open. 4(3); bjgpopen20X101032. https://doi.org/10.3399/bjgpopen20X101032.
3. Allais G, Gabellari C I, Burzio C, Rolando S, De Lorenzo C, Mana O & Benedetto C (2012). Premenstrual syndrome and migraine. Neurological Sciences, 33: 111-115. https://link.springer.com/article/10.1007/s10072-012-1054-5.
4. Gao, M., Gao, D., Sun, H., Cheng, X., An, L., & Qiao, M. (2021). Trends in research related to premenstrual syndrome and premenstrual dysphoric disorder from 1945 to 2018: a bibliometric analysis. Frontiers in Public Health, 9, 596128. https://www.frontiersin.org/articles/10.3389/fpubh.2021.596128/full.
5. Kues J N, Janda C, Kleinstäuber M & Weise C (2016). How to measure the impact of premenstrual symptoms? Development and Validation of the German PMS-Impact Questionnaire. Women & Health, 56(7): 807-826. https://pubmed.ncbi.nlm.nih.gov/26624615/.
6. Siminiuc R & Ţurcanu D (2023). Impact of nutritional diet therapy on premenstrual syndrome. Frontiers in Nutrition, 10, 1079417. https://doi.org/10.3389/fnut.2023.1079417
7. Yonkers, K. A., O'Brien, P. S., & Eriksson, E. (2008). Premenstrual syndrome. The Lancet, 371(9619), 1200-1210. https://doi.org/10.1016/s0140-6736(08)60527-9.
8. Adewuya AO, Loto OM & Adewumi TA (2009). Pattern and correlates of premenstrual symptomatology amongst Nigerian University students. Journal of Psychosomatic Obstetrics & Gynecology: 30 (2): 127-132. https://pubmed.ncbi.nlm.nih.gov/19533493/.
9. Tavassoli A, Ahmadian M, Abu Samah A, Latiff LA & Taheri N (2018). A survey on men's awareness of premenstrual syndrome and marital satisfaction in married women in Tehran, Iran. The Open Public Health Journal, 11(1), 104-111. https://doi.org/10.2174/1874944501811010104.
10. Kraemer WJ & Ratamess NA (2005). Hormonal responses and adaptations to resistance exercise and training. Sports Medicine, 35: 339-361. https://pubmed.ncbi.nlm.nih.gov/15831061/.
11. Safarzadeh A, Zare S, Yousefabadi SR & Ghoreishinia G (2016). The relationship between Exercise and premenstrual syndrome. International Journal of Medical Research & Health Sciences: 5 (9): 183-189.
12. Marques P, Madeira T & Gama A (2022). Menstrual cycle among adolescents: girls' awareness and influence of age at menarche and overweight. Rev. Paul. Pediatr., 5(40), e2020494. http://doi.org/10.1590/1984-0462/2022/40/2020494.

13. Pallikadavath S, Ogollah R, Singh A, Dean T, Dewey A & Stones W (2016). Natural menopause among women below 50 years in India: A population-based study. The Indian Journal of Medical Research, 144(3), 366. https://pubmed.ncbi.nlm.nih.gov/28139535/
14. Sinha I, Tigga P, Mondal N & Sen J (2020). Association between age at menarche and age at menopause among women of an indigenous population of North Bengal, India. Journal of Biosocial science, 53(3), 319-335. https://doi.org/10.1017/s002193202000019x.
15. Sahu R, Barnwal SL & Vishvakarma S (2022). Prevalence and severity of premenstrual syndrome among young females in Chhattisgarh, India. Asian Pacific Journal of Health Sciences, 9(1): 120–125. https://doi.org/10.21276/apjhs.2022.9.1.34.
16. Gundi M & Subramanyam MA (2020). Curious eyes and awkward smiles: Menstruation and adolescent boys in India. Journal of Adolescence, 85, 80-95. https://pubmed.ncbi.nlm.nih.gov/33122150/.
17. Hardy C & Hunter MS (2021). Premenstrual symptoms and work: exploring female staff experiences and recommendations for workplaces. International Journal of Environmental Research and Public Health; 18(7): 3647. https://www.mdpi.com/1660-4601/18/7/3647.
18. Takayama E, Tanaka H, Kamimoto Y, Sugiyama T, Okano T, Kondo E & Ikeda T (2020). Relationship between a high Edinburgh Postnatal Depression Scale score and premenstrual syndrome: A prospective, observational study. Taiwanese Journal of Obstetrics and Gynecology, 59(3): 356-360. https://doi.org/10.1016/j.tjog.2020.03.003.
19. Gudipally PR & Sharma GK (2023). Premenstrual Syndrome. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. Retrieved on 17 July 2023, from https://www.ncbi.nlm.nih.gov/books/NBK560698/.
20. Daley A (2009). Exercise and premenstrual symptomatology: a comprehensive review. J Womens Health (Larchmt)., 18(6): 895-899. http://doi.org/10.1089/jwh.2008.1098.
21. Abu A R, Badrasawi M & Haj Hamad R (2021). Prevalence of premenstrual syndrome and its association with psychosocial and lifestyle variables: A cross-sectional study from Palestine. BMC Women's Health, 21(1): 233. https://doi.org/10.1186/s12905-021-01374-6
22. Rabiepoor S & Yas A (2018). Awareness, Altitude and Performance of Men Regarding Premenstrual Syndrome. International Journal of Women's Health and Reproduction Sciences; 6(4): 459-464. http://DOI.org/10.15296/ijwhr.2018.76.

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Effectiveness of Planned Teaching Programme: An Assessment of Nursing Students' Knowledge on Respectful Maternity Care in a University in New Delhi

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Abstract

Knowledge about Respectful Maternity Care among nursing students. The aim of the study to assess the effectiveness of PTP in terms of knowledge regarding Respectful Maternity Care (RMC) among nursing students in a selected University, New Delhi. The setting and design is pre- experimental research using pretest posttest design was used and study was conducted in RCON, Jamia Hamdard, New Delhi. The data were collected from 70 participants for quantitative data analysis by using a total enumerative sample in a selected University, New Delhi. Data collection was done by using a structured knowledge questionnaire. The posttest mean knowledge score was found higher in the finding of the study related to the pre-test mean knowledge score. Subsequently, the difference in the level of knowledge was found to be significant at p<0.005 level. The current study revealed that Respectful Maternity Care was effective in improving the knowledge of nursing students. The Majority of nursing students have moderately adequate knowledge regarding RMC

Key words: Planned Teaching Programme (PTP), Respectful Maternity Care (RMC), Nursing students and Knowledge

Introduction

The term Respectful Maternity Care (RMC) translates as care arranged for and provided to all women in a manner that maintains their dignity, privacy, and confidentiality, ensures protection from violence and abuse, facilitates informed decision-making, and provides ongoing support during labor and birthing.[1] Disrespect and abuse (D&A) transgress fundamental ethical standards, human rights, and patient care obligations[2]. In Nepal, there were a total of 239 maternal deaths in 2016 for 100,000 live births.[3] Maternal and infant health in India has seen significant improvements in the recent years. Birth rate has seen a downward from 556 new-borns per 1 lakh in 2000 to 130 live births in 2015. Maternal mortality in India has fallen by 77 per cent.[4] The third sustainable development goal, which was endorsed by the UN in 2015, is to guarantee healthy lifestyles and promote wellbeing for all at all ages.[5]

The right to Respectful Maternity Care (RMC) belongs to every woman. On the other hand, issues like disrespect, mistreatment, abuse, and the demand for unofficial fees, as well as infrastructure issues like an absence of electricity, an absence of clean water, and an absence of space in the

rooms, are widespread worldwide. Another issue raised is the notion that women either receive aid "too much and too soon or too little and too late."[6] Facility-based RMC must be ensured to improve mothers' and babies' health, especially in low-and centre pay nations where maternal mortality and untrained delivery care are still pervasive. The White Ribbon Alliance (WRA) developed seven domains for the Universal Declaration of the Freedoms of Childbearing Ladies.[7] The (WHO) also urges the adoption of evidence-based Respectful Maternal Care (RMC), which respects ladies' interesting social, individual, and clinical necessities, as a critical step to ensure everyone has a chance for high-quality care[8]. The "LaQshya" project was announced in 2017 by the Service of Wellbeing and Family Government assistance, Legislature of India, with the objective to enhance standards of care in delivery rooms and maternity operation rooms. As a result, states are asked to work together to make ensure every woman obtains responsive, high-quality care during her pregnancy, delivery, and immediate postpartum[9].

Objective

This study aimed at assessing the knowledge level of all the 3rd year DGNM nursing students who are studying obstetrics and gynaecology and 4th year B.Sc. (H) Nursing students on the effectiveness of Planned Teaching Programme (PTP) on Respectful Maternity Care.

Methodology

Information was gathered by applying a structured knowledge questionnaire and statistical analysis, both descriptive and inferential in the study's pre-experimental (pre-test and post-test) design. 70 nursing students from Rufaida College of Nursing (RCON), Jamia Hamdard in New Delhi were selected as the respondents in the current study through total enumerative sampling technique. In this study, CIPP (Context, Input, Process, and Product) conceptual framework was assessed.

PTP on Respectful Maternity Care is the independent variable in the study while knowledge of the nursing students on Respectful Maternity Care is the dependent variable. The structured questionnaire was used to assess the effectiveness of PTP in terms of knowledge of nursing students on RMC. This consisted of two parts, namely- demographic profile of nursing students and their knowledge on RMC. Content validity of the structured questionnaire was obtained in December 2022. Nine experts from the field of nursing, and obstetrics and gynaecology validated the questionnaire. Reliability of the structured questionnaire was worked out by using split half formula which was found to be r= 0.82; which was highly reliable for the study. Tool is separated into two sections: Part I included the information regarding demographic information like gender, age, religion and educational status; and Part II included the structured questionnaire with 24 questions centred around Respectful Maternity Care.

The method of descriptive analysis and inferential statistics was used to analyse the data. Jamia Hamdard Institutional Ethics Committee (JHIEC), located in Hamdard Nagar, New Delhi, authorized the ethical clearance for this research study.

Findings

The data presented in Table 1 and Figure1 represent the age of the sample students. It shows that 45 per cent of them were 20-21 years of age, 38 per cent were 22-23 years old, 14 per cent were 24-25 years old while 3 per cent were >25 years. Majority of the respondent students (70%) were females while only 30 per cent were males. 69 per cent of them were DGNM 3rd year nursing students and 31 per cent were 4th year B.Sc. (Hons.) nursing students. 58.5 per cent of nursing students belonged to the Islam religion while 38.5 per cent belonged to the Hindu religion and 3 per cent belonged to the Christian religion.

Table 1

Frequency and Percentage Distribution of Nursing Students by Their Demographic Characteristics (Age, Gender, Educational Status and Religion) n=70

S.no.	Sample characteristics	Frequency	%
1	Age in years		
	20-21years	31	45
	22-23years	27	38
	24-25years	10	14
	>25years	2	3
2	Gender		
	Male	21	30
	Female	49	70
	Transgender	0	0
3	Educational status		
	B.Sc. (H)Nursing 4th year	22	31
	DGNM Nursing 3rd year	48	69
4	Religion		
	Hindu	27	38.5
	Islam	41	58.5
	Sikhism	0	0
	Christian	2	3
	Others	0	0

The data presented in Table 2 indicate that before administering the training, more than half of the students 44 (62.9%) had average knowledge whereas only 24 (34.2%) had good information on RMC. The findings show that after attending sessons on Respectful Maternity Care, 16 (22.9%) showed average knowledge whereas 54 (77.1%) nursing students showed improvement in their knowledge level by scoring higher numbers.

Figure 1
Bar Diagram Representing Percentage Distribution of Nursing Students by Their Age, Gender, Educational Status and Religion

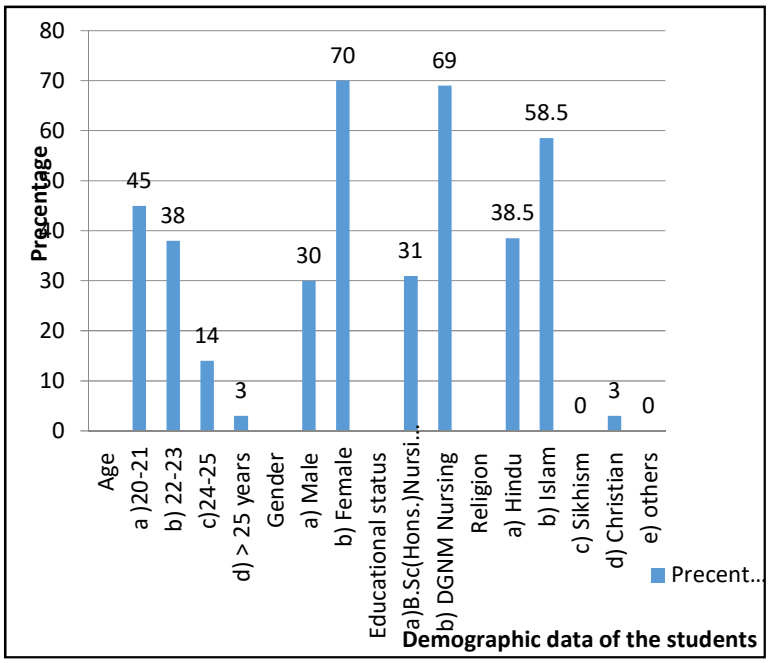


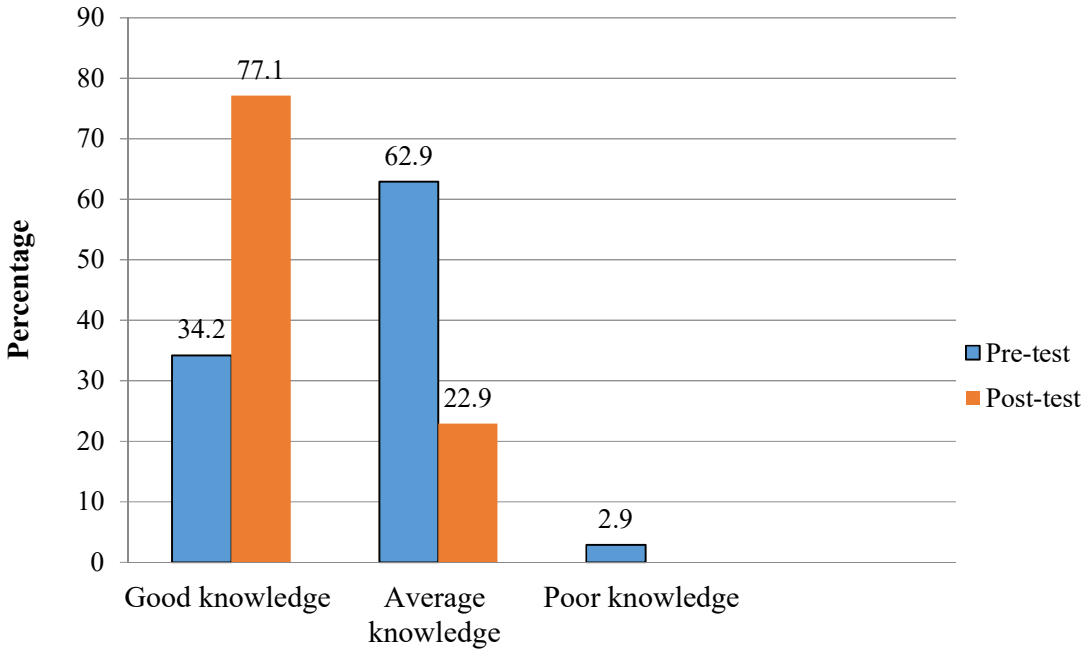
Table 2
Frequency and Percentage distribution of Pre-test and Post-test Scores among Nursing Students on the Basis of Their Knowledge Level on Respectful Maternity Care (n =70)

Level of knowledge	**Pre-test**		**Post test**	
	Frequency	Percentage	Frequency	Percentage
Good knowledge	24	34.2	54	77.1
Average knowledge	44	62.9	16	22.9
Poor knowledge	2	2.9	0	0

The root-mean square deviation of pre- test results for knowledge (2.82) was higher than the post-test root-mean square deviation (2.75). The distinction in the standard deviation was slight however the bearing demonstrates that the gathering in more heterogeneous to pre-test before administration of PTP on RMC. The 't' value (12.725) was more noteworthy than the table worth t_{69} =2.045 at 0.05 degree of importance.

Figure 2

Bar diagram showing Percentage of Level of Knowledge of nursing students in pre-test and post-test scores regarding planned teaching programme regarding Respectful Maternity Care



Percentage distribution of level on knowledge among nursing students .

Table 3

Range Mean, Mean difference, Median, standard deviation and 't' value of mean pre-test and post-test knowledge scores of nursing students regarding Respectful Maternity Care (n =70)

Observation	Possible range of score	Range of obtained scores	Mean	Median	Standard deviation	Mean difference	t. value	d.f	P value
Pre-test	0-24	7-23	15.0	16	2.82	4.185	12.725	69	0.00*
Post-test	0-24	12-23	19.18	19.5	2.75				

$t_{(69)=}$ 2.045, *p<0.05 significant

Table - 4

Chi-Square Value with Yates Correction Showing Association between Post-Test Knowledge Scores of Nursing Students with Their Selected Demographic Variables (N =70)

S.no.	Demographic variables	Frequency distribution			Total	d.f	χ2 value with yates correction	P value
		Good	Average	Poor		3	7.104	*0.03
1	**Age in years**							
	20-21 years	24	7	0	31			
	22-23 years	20	7	0	27			
	24-25 years	8	2	0	10			
	>25 years	2	0	0	2			
2	**Gender**					1	0.147	0.416
	Male	16	5	0	21			
	Female	39	10	0	49			
	Transgender	0	0	0	0			

3	**Educational status**					1	0.018	0.866
	B.Sc. (H) Nursing 4th year	17	5	0	22			
	DGNM Nursing 3rd year	38	10	0	48			
4	**Religion**					2	0.98	0.521
	Hindu	21	6	0	27			
	Islam	31	10	0	41			
	Sikhism	0	0	0	0			
	Christian	2	0	0	2			
	Others	0	0	0	0			

Non-significant at 0.05 level of significance as p>0.05

There was no significant relationship between post-test knowledge scores of nursing students with their gender, educational status and religion furthermore; there is a significant relationship between age at 0.05 level of significance among nursing students as estimated by an structured knowledge questionnaire regarding Respectful Maternity Care

Discussion

In the on-going study is meant to assess the efficacy of a PTP on information in regard RMC among 70 nursing students of Diploma in General Nursing and Midwifery, Third-year and Bachelor of Science Hons. in Nursing, fourth-year utilizing a structured knowledge questionnaire the finding of the present study revealed that 34.2 per cent students had good information in pre-test and 77.1 per cent students had good knowledge in post-test. The discoveries on the on-going study are in accordance while comparing with past study directed on behalf of Manimegalai et al. to assess the adequacy of a STP on knowledge regarding RMC among nurses in their study findings reveal that in pre-test not a single one of them had great information while in post-test 26.67 per cent of students had good knowledge.

The discoveries of the current study reveal that the post-test generally speaking mean of 19.18 of nursing students were the highest as compared to the pre-test overall mean of 15.5. The discoveries on the on-going study are in accordance while comparing with past study directed on behalf of Das et al. [11] to assess the effects of an awareness programme on West Bengali citizens' knowledge of Respectful Maternity Care (RMC). The results of their study showed that the experimental group's post-test overall mean of 32.53 antenatal women was greater than the pre-test group overall mean of 18.5.

One more comparable study was led by Moridi et al.[12] Iranian midwives' knowledge and expertise in providing respectful maternity care. 250 qualified midwives were recruited for this study. The majority of midwives (44%) were between the ages of 26 and 35, and their overall mean (SD) knowledge scores were 89.90 (3.54), in the present study 70 nursing students were recruited and most nursing students were females70 per cent, and overall mean (SD) scores of nursing students knowledge were 19.18 (2.7).

The finding of the current study reveal that there was no critical relationship between post-test information scores of nursing students with their gender, educational status and religion and there was a critical association between age at 0.05 level of significance among nursing students as

measured by structured knowledge questionnaire regarding RMC. The invalid hypothesis $H0_2$ subjected to dismissed and research hypothesis H_2 was to some degree acknowledged. The current study's findings include reliable with a preceding study that Manimegalai et al.[10] conducted to survey the effect of an organized showing program on staff medical attendants' information on RMC. In that study, the result revealed that the information on the outcome of post-test was exceeding the mean outcome of pre-test. As a result, it was concluded that the knowledge gap was considerable at the p0.01 level. At the degree of p0.05 and p0.01, individually, staff nurses with between 28 and 32 years of experience and those with more than 10 years of experience have a significant correlation with knowledge scores.

Methodological limitation and Strengths

A pre-experimental study plan was performed for this exploration. The information was gathered in December 2022 and addressed the information on those nursing students who were welcome to participate then, at that point. The structured knowledge questionnaire was utilized in this study, the size of the sample was only 70 nursing students hence it proved difficult to draw broad conclusions and Sample was less because of the attrition which limited the generalizability of the study. The structured knowledge questionnaire, which was created in collaboration with a group of specialists, was based on research literature, which is one of this study's strengths. Additionally, it underwent a pilot test based on the outcomes.

Conclusion and Recommendations

The PTP was fruitful in raising the degree of knowledge among the nursing students. Most of them have a lot of information regarding Respectful Maternity Care. The average post-test awareness scores of the planned teaching programme was found to be greater than their pre-scores. These findings can be utilized in maternity care and nursing training. Future studies must focus more on implementing Respectful Maternity Care in all obstetrical and gynaecological areas; and in-service education programmes must impart theory as well as practical knowledge on Respectful Maternity Care.

References

1. WHO. WHO recommendation on respectful maternity care during labour and childbirth. Assessed on 14 May 2019]; Available on https://extranet.who.int/rhl/topics/preconception-pregnancy-childbirth-and-postpartum-care/care-during-childbirth/who-recommendation-respectful-maternity-care-during-labour-and-childbirth.
2. Freedman LP & Kruk ME (2014). Disrespect and abuse of women in childbirth: challenging the global quality and accountability agendas. Lancet; 384 (9948): e42-4.
3. Government of Nepal, Ministry of Health, and Department of Health Services (2015). Annual health report department of health services 2072/73 (2015/2016), Tech. Rep., Government of Nepal, Ministry of Health, Department of Health Services, Kathmandu, Nepal, 2015. Viewed on Google Scholar.
4. Gov.in. [cited 2023 Mar 6]. Available on https://nhm.gov.in/New_Updates_2018/Presentation/NHM_Orientation_workshop_2019/Maternal_Health.pptx.

5. United Nations Development Programme. What are the Sustainable Development Goals? Available on https://www.undp.org/sustainable-development-goals. Accessed on 15 Dec. 2021.
6. World Health Organization. (2018). WHO recommendations: Intrapartum care for a positive childbirth experience. Geneva, Switzerland: World Health Organization.
7. White Ribbon Alliance. Respectful Maternity Care: The Universal Rights of Childbearing Women. Available from: https://www.whiteribbonalliance.org/wp-content/uploads/2017/11/Final_RMC_Charter.pdf; Accessed on 15 Dec. 2021.
8. World Health Organization. WHO recommendations Intrapartum care for a positive childbirth experience. (2018). Available on https://apps.who.int/iris/bitstream/handle/10665/260178/9789241550215-eng.pdf; cited on 15 Dec. 2021.
9. Labour Room Quality Improvement Initiative (LaQshya), National Health Mission, Ministry of Health and Family Welfare, Government of India. (2017). Accessed on 21 June 2022.
10. Manimegalai M, Pandey S, Srivastava S, Mourya S, Singh S, Singh S et al. (2022). Effectiveness of structured teaching programme on knowledge regarding respectful maternity care among staff nurses. International Journal of Advanced Research; SSN 2320-5407.
11. Das D & Mani S. Effect of Awareness Programme on knowledge regarding Respectful Maternity Care (RMC) [Internet]. Nurseszone.in. [cited on 12 Feb 2023]. Available on https://www.nurseszone.in/nurseszone/effect-of-awareness-programme-on-knowledge-regarding-respectful-maternity-care-rmc/165.html.
12. Moridi M, Pazandeh F, Potrata B (2022). Midwives' knowledge and practice of Respectful Maternity Care: a survey from Iran. BMC pregnancy and childbirth; 22: 752.

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A Comprehensive Survey of Lifestyle Patterns among College-going Young Adults

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Abstract

The phase of early adulthood holds significant importance as it is when many aspects of one's lifestyle take shape, ultimately impacting their future health. This research explored the lifestyle elements such as physical activity, sleep patterns, screen usage, weight management and mental well-being among young adults. The study's findings revealed positive and negative changes amongst the college students as they transitioned into young adulthood. Some students actively engaged in physical activities whereas others faced challenges maintaining an active routine for various reasons. Excessive screen time consumed a substantial portion of these young adults' daily hours. Academic obligations and the influence of social media led to insufficient sleep for many students, despite their awareness of the benefits of quality sleep. Students attempted various strategies to improve their sleep but faced difficulties due to their commitments. A significant percentage of the participants encountered problems in managing their weight according to their ideal standards. Lack of knowledge about nutritional sources resulted in consuming foods with unknown nutritional value. Recognizing signs of poor mental health such as depression, insomnia, irritability and social isolation were common among the participants. Raising awareness among young adults about their lifestyle choices is crucial. This knowledge empowers them to make necessary adjustments where needed, paving the way for a healthier future in the years to come.

Key words: Adulthood, Lifestyle, Physical activity, Weight management, Mental health.

Introduction

Young adulthood, which spans roughly between the ages of 20 and 30, is a crucial transition phase between adolescence and adulthood. It usually entails substantial shifts in education, employment, and interpersonal connections. It is a vital stage of development where individuals face significant challenges and are expected to take on responsibilities and obligations. The transition from school to college is often accompanied by various stressors that can significantly impact students' choices regarding a healthy lifestyle[1]. This transitional period is critical in developing lifelong healthy habits and practices. Today's young adults live in a more interconnected world with increased knowledge and information sharing, but they also face heightened risks, limited social mobility, and greater economic inequality. Maintaining a healthier lifestyle is of utmost importance for young adults as it plays a crucial role in shaping their well-

being and future. Adopting healthy habits during this phase of life sets the strong foundation for a lifetime of good health and reduces the risk of numerous physical and mental health problems.

The period from the early twenties to mid-thirties has been identified as the time when individuals experience the fastest weight gain throughout their lives[2 3]. Developing obesity at a younger age is linked to a higher likelihood of chronic illness and death during later adulthood. Recently, the focus of obesity prevention efforts has primarily been on children and adolescents while neglecting to address other crucial age groups[2]. Engaging in physical activities helps young adults maintain a healthy weight, strengthens their cardiovascular system, improves muscle tone, and enhances flexibility. Regular physical exercise has been shown to decrease symptoms of depression, anxiety, and stress by triggering the release of endorphins that act as natural mood elevators. Spending time in mindfulness activities like meditation or yoga can help young adults manage stress, improve focus, and enhance overall mental well-being. Sufficient sleep is equally important as it supports cognitive function, boosts the immune system, and aids in the body's recovery and repair. The connection between a healthy lifestyle and sound mental health cannot be overstated. Proper nutrition, especially consuming foods rich in omega-3 fatty acids and B vitamins, supports brain health and can positively influence mood and cognitive function. Prolonged screen time has caused issues related to its impact on physical and mental health. Associations between screen time and poor health outcomes, such as obesity and lack of exercise, have been well-documented. Excessive screen time is associated with many adverse mental health outcomes like psychological problems, low emotional stability, and a greater risk for depression or anxiety[4,5].

Methodology

Despite the well-documented negative consequences of unhealthy behaviours, a significant proportion of young adults, particularly university students, still engage in practices detrimental to their health[1] . Unhealthy habits, like poor dietary choices and sedentary behaviour, tend to form early in life and often persist into young adulthood[6,7]. Poor dietary habits, physical inactivity, snacking, skipping breakfast, and higher body weight have all been linked to long-term adverse health outcomes, including increased mortality and morbidity. Against the backdrop of this information, this study was planned to study five lifestyle-related factors in young adults- physical activity, sleep, screen time, weight management, and mental health. In this study, 200 college students volunteered to be study subjects.

Findings

Physical activity

Physical activity means any movement involving the use of skeletal muscles, which leads to the expenditure of energy. It encompasses various activities, whether during leisure time, for transportation purposes, or as part of one's job. Both moderate and vigorous forms of physical activity have positive effects on health. Regular physical activity has been scientifically proven to be essential in preventing and managing noncommunicable diseases, such as heart problems, stroke, diabetes, and several types of cancers. The WHO suggests that individuals should engage in a minimum of 150–300 minutes of aerobic physical activity at a moderate intensity level or at least 75–150 minutes of intense aerobic physical activity per week. Alternatively, they

can opt for a combination of moderate- and vigorous-intensity activities that provide equivalent exercise throughout the week. Studies have shown that physical activity plays an important role in health promotion and disease prevention, and lack of physical activity leads to many chronic diseases[8,9].

All participants considered physical activity an essential component of a healthy lifestyle. Most participants (51%) believed that physical activity should be done for one to two hours per day. According to 26% of participants, less than 30 minutes of physical activity daily is sufficient. Ten percent of participants believed physical activity should be more than two hours. Rest participants think there is no need for physical activity. Lack of time, laziness, late sleeping hours, work pressure, and more screen time were the main reasons given by the participants for not giving sufficient time for physical activity. According to a few participants, dependency on other people and everyday stress also contributed to fewer hours of physical activity. For some participants, menstrual cycles were also a hindrance to physical activity. Participants were aware of the beneficial effects of physical activities like physical fitness, maintenance of body weight, increased stamina, improved mental health, increased metabolism, disease-free, and immunity development. Some found physical activity had a relaxing and calming effect. Physical activity helped some participants to improve their focus on their studies.

Sleep

Sleep is gaining increasing recognition as a vital aspect of overall cognitive, emotional, and physical well-being. A healthy sleep pattern involves sufficient duration, good quality, appropriate timing, and the absence of sleep disorders[10]. Research indicates that sleep plays a crucial role in learning, memory, and neural plasticity[11]. Specifically, it is believed to have a significant impact on memory consolidation. While the exact mechanisms connecting sleep, memory, and neural plasticity remain unclear; the prevailing understanding is that certain synaptic connections active during waking periods are strengthened during sleep. This strengthening process allows for the consolidation of memories while inactive synaptic connections are weakened. Inadequate sleep has become a significant public health concern in numerous countries due to its widespread prevalence and associated with increased mortality and morbidity[12]. Adolescents and young adults often experience the most significant inconsistency in their sleep patterns. They tend to stay up late but are then constrained by early morning schedules, which can lead to sleep-related issues. Similarly, oversleeping to compensate for inadequate weekday sleep offers a brief respite from sleepiness. Nonetheless, it comes with consequences such as disturbed sleep patterns, worsening the typical delay in circadian rhythm among adolescents, and maintaining reduced alertness during the weekdays.

Nineteen percent of the participants slept for less than 6 hours, while fourteen percent slept for 6 to 7 hours. Twenty-two percent of the participants slept 7 to 8 hours, and the other nineteen percent slept for more than eight hours. The participants showed awareness of the benefits of good sleep, which included increased energy levels, a refreshed mind, improved physical health, enhanced concentration, better thinking, protection from diseases, and increased strength. Some participants even mentioned experiencing a healthier skin glow and reduced dark circles with good sleep.

To achieve better sleep, participants made special efforts, such as listening to music, drinking milk, avoiding heavy meals, practicing meditation, and maintaining a proper sleep schedule. Additionally, having good pillows and mattresses was essential for many to ensure quality sleep. Participants also recognized the negative impact of excessive phone usage on their sleep, and as a result, they often kept their phones on silent mode and turned off notifications. Some even chose to keep all electrical gadgets out of their bedroom to promote better sleep.

Screen Time

Over the last two decades, there has been a remarkable surge in the adoption of digital technology, leading to an increase in the amount of time people spend on screens, which has become a significant concern. Digital technology involves using electronic devices to store, create, or manipulate data, facilitating communication and virtual interactions through internet-based social media platforms[13]. These electronic devices include computers, laptops, palmtops, smartphones, tablets, and similar gadgets with screens.

However, there is a growing concern about the impact of screen time on the health of children and young individuals. Studies have found a connection between screen time and obesity, potentially due to increased energy intake, reduced physical activity caused by screen use, or a direct impact on metabolic rate[14]. Moreover, prolonged screen time has been associated with adverse effects on mood, cognitive and socioemotional development and can ultimately lead to poor academic performance[15].

Most participants reported spending around 3-4 hours on screens, while some spent approximately two hours, and a few even had six hours of screen time. The harmful effects mentioned by the participants included eye strain, headaches, cervical problems, mental stress, and sleeping difficulties. Reasons for being on screens included online studies, assignments, WhatsApp, Facebook, Instagram, listening to music, and other entertainment. Interestingly, none of the participants kept a screen diary, but they knew how to reduce screen time. Some suggestions for reducing screen time included spending time with family, engaging in exercise and other physical activities, reading books, exercising self-control on phone usage, setting timers, and using screens only for essential tasks.

Weight Management

Young adulthood presents a critical phase where adopting unhealthy lifestyles and gaining excess weight can become more likely. The reasons for age-related weight gain during this period are primarily linked to lifestyle factors. These include significant decreases in physical activity, increased sedentary behaviours, and changes in dietary patterns[16–18]. Research indicates that young adults aged 18 to 24 face the highest absolute and relative risk of transitioning to a higher BMI category compared to older age groups[19]. Several common barriers contribute to the challenges of maintaining a healthy weight among young adults. These barriers encompass time constraints, a lack of discipline, insufficient self-regulation skills, and inadequate environmental support for healthy eating and physical activity[18].

Some participants were either underweight or overweight, while only a few didn't face any weight-related issues. Upon investigating the reasons for weight management difficulties, it was

discovered that unhealthy dietary habits, such as consuming fast foods and excessive snacking, along with factors like boredom eating, lack of physical activity, irregular sleep patterns, and health problems contributed to being overweight. On the other hand, anxiety, meal skipping, and trying to achieve a skinny body like models were some of the reasons mentioned by participants experiencing underweight issues. Those who could maintain their ideal weight followed healthy practices, including balanced diets, regular exercise, yoga, outdoor activities, proper sleep routines, limited screen time, and meditation. They also made sure not to skip meals, reduced sugar intake, and were conscious of consuming high-energy foods.

Interestingly, many participants were unaware of what foods were high or low in energy. Some identified cereals, eggs, milk, peanut butter, and bananas as high-energy foods, while others mentioned fruits and vegetables. Similarly, they lacked knowledge about low-energy foods. According to most participants, cold drinks, fast foods, bread, and burgers were perceived to be low in calories, while a few mentioned that fruits and vegetables were also considered lacking in calories.

Mental Health

Mental health is essential to overall well-being, extending beyond the mere absence of mental illnesses. It forms the basis for effective functioning and the general state of individuals. The mental health of university students has become a growing concern worldwide[20]. Upon completing higher secondary school, students often face a range of challenges in their new academic environment, including dormitory life, study-related stress, poor time management, unhealthy eating habits, sleep disorders, smoking, excessive internet usage, and a sedentary lifestyle[21]. Consequently, over time, students may encounter significant stress, anxiety, self-harm, and even thoughts or attempts of suicide, among other issues.

The participants in the study were well-informed about the symptoms of mental illnesses. These symptoms included headaches, depression, aggression, insomnia, restlessness, difficulty focusing, isolation, emotional changes, anxiety, overthinking, and stress. Some participants also mentioned being introverted, experiencing memory loss, low confidence, irritability, and engaging in discussions about suicide. In a separate study conducted on University of Delhi students, approximately 70-80 per cent of the subjects demonstrated good awareness of identifying individuals with mental disorders. In comparison, more than half (54%) were explicitly aware of identifying depression[22].

Conclusion

The current research discovered that college students exhibited a mixed response regarding adopting a healthy lifestyle. While most participants engaged in some form of healthy practices, a minority struggled to maintain an active routine. The participants had a wide range of sleeping patterns, spanning from less than six hours to more than eight hours. Being aware of the significance of proper sleep, they tried various strategies to improve their sleep quality. Screen time varied from three to four hours, with a few exceeding six hours. Screens were used for both academic purposes and entertainment. One of the central concerns observed among the participants was weight management. A significant number of them were either underweight or overweight. The primary reasons for this included insufficient physical activity, skipping meals,

adopting flawed dietary habits, and lacking nutrient knowledge. The participants possessed a reasonable understanding of mental illness symptoms.

Prioritizing a healthy lifestyle is paramount for young adults, establishing the groundwork for long-term well-being. Embracing regular physical activity, maintaining a well-balanced diet, practicing effective sleep routines, and focusing on mental health yield immediate advantages and contribute to sustained vitality and productivity well into the future. By investing in a healthy lifestyle now, young adults can build a strong foundation for a healthier and more fulfilling life ahead.

References

1. Dodd LJ, Al-Nakeeb Y, Nevill A & Forshaw MJ (2010). Lifestyle risk factors of students: A cluster analytical approach. *Prev Med (Baltim),* 51: 73–77.
2. Zheng Y *et al.* (2017). Associations of Weight Gain from Early to Middle Adulthood with Major Health Outcomes Later in Life. *JAMA,* 318: 255–269.
3. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD & Ogden CL (2016). Trends in Obesity Among Adults in the United States, 2005 to 2014. *JAMA,* 315: 2284.
4. Allen MS, Walter EE & Swann C (2019). Sedentary behaviour and risk of anxiety: A systematic review and meta-analysis. *J Affect Disord,* 242: 5–13.
5. Dumuid D *et al.* (2017). Health-Related Quality of Life and Lifestyle Behavior Clusters in School-Aged Children from 12 Countries. *J Pediatr,* 183: 178-183.e2 (2017).
6. Plaza-Díaz J *et al.* (2020). Clustering of Dietary Patterns and Lifestyles among Spanish Children in the EsNuPI Study. *Nutrients,* 12: 1–25.
7. Movassagh E Z, Baxter-Jones ADG, Kontulainen S, Whiting SJ & Vatanparast H (2017). Tracking Dietary Patterns over 20 Years from Childhood through Adolescence into Young Adulthood: The Saskatchewan Pediatric Bone Mineral Accrual Study. *Nutrients,* 9: 1–14.
8. Booth FW, Roberts CK & Laye MJ (2012). Lack of exercise is a major cause of chronic diseases. *Compr Physiol,* 2: 1143–1211.
9. Ahmad Bahathig A, Abu Saad H, Md Yusop NB, Mohd Shukri NH & El-Din MME (2021). Relationship between Physical Activity, Sedentary Behavior, and Anthropometric Measurements among Saudi Female Adolescents: A Cross-Sectional Study. *Int J Environ Res Public Health,* 18: 8461.
10. Chaput JP & Shiau J (2019). Routinely assessing patients' sleep health is time well spent. *Prev Med Rep,* 14: 100851.
11. Kopasz M *et al.* (2010). Sleep and memory in healthy children and adolescents - a critical review. *Sleep Med Rev,* 14: 167–77.
12. Liu Y *et al.* (2016). Prevalence of Healthy Sleep Duration among Adults--United States, 2014. *MMWR Morb Mortal Wkly Rep,* 65: 137–41.
13. Vizcaino M, Buman M, DesRoches T & Wharton C (2020). From TVs to tablets: the relation between device-specific screen time and health-related behaviors and characteristics. *BMC Public Health,* 20: 1295.
14. Marsh S, Ni Mhurchu C & Maddison R (2013). The non-advertising effects of screen-based sedentary activities on acute eating behaviours in children, adolescents, and young adults. A systematic review. *Appetite,* 71: 259–73.

15. Domingues-Montanari S (2017). Clinical and psychological effects of excessive screen time on children. *J Paediatr Child Health,* 53: 333–338.
16. Hankinson A L *et al.* (2010). Maintaining a high physical activity level over 20 years and weight gain. *JAMA,* 304: 2603–2610.
17. Karabulut US, Romero Z, Conatser P & Karabulut M (2018). Assessing Overweight/Obesity, Dietary Habits, and Physical Activity in Hispanic College Students. *Exercise Medicine,* 2: 5.
18. Sand AS, Emaus N & Lian OS (2017). Motivation and obstacles for weight management among young women - a qualitative study with a public health focus - The Tromsø study: Fit Futures. *BMC Public Health,* 17: 417.
19. Katsoulis M *et al.* (2021). Identifying adults at high-risk for change in weight and BMI in England: A longitudinal, large-scale, population-based cohort study using electronic health records. *Lancet Diabetes Endocrinol,* 9: 681–694.
20. Macaskill A (2012). The mental health of university students in the United Kingdom. *Br J Guid Counc,* 41: 426–441.
21. Mohammad M *et al. (2021).* Health awareness, lifestyle and dietary behavior of university students in the northeast part of Bangladesh. *Int J Adolesc Med Health,* 33: 20180105.
22. Dev A, Gupta S, Sharma KK & Chadda RK (2017). Awareness of mental disorders among youth in Delhi. *Curr Med Res Pract,* 7: 84–89.

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Bone Density Patterns: A Cross-Sectional Study of Age-Related Decline and Gender Differences in a Sample Population

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Abstract

Osteoporosis is a disease which involves the thinning of bones with age. Osteoporosis is a disease that afflicts many people irrespective of gender or age. The paper attempts to study the correlation between age, gender, and reduction in Bone Mineral Density; and draw inferences using the T- Score. The authors also make suggestions based on the findings of the study. The paper is based on a raw data base of 4900 respondents who had underwent a bone density test in selected areas of the three states viz. Maharashtra, Karnataka and Goa. STATA software has been employed for the analysis of the study findings. Statistical tools such as frequency, percentages, correlation have been used in the data analysis.

The study finds that while 1523 (60.01%) and 365 (14.38%) of females are detected with osteopenia and osteoporosis respectively while the corresponding percentages among the males stood at 50.34 per cent (1189) and 8.64 per cent (204). The study showed that 719 women in the age group of 41-60 were osteopenic while 146 women were already in the second stage of osteoporosis. There is a positive correlation between age and reduction in bone mineral density. However, bone mass depletion is not an occurrence exclusive to the older population. It strikes irrespective of age.

Key words: Osteoporosis; Bone density; Gender, Age, Calcium, T-Score.

Introduction

Bones generally thin out and become fragile with age. Osteo means bones. Osteoporosis literally means porous bones. Osteoporosis is described as a skeletal disorder characterized by low bone density and microarchitectural deterioration of bony tissue[1]. Osteoporosis refers to degeneration of the bone density. In osteoporosis, the bones become porous and fragile. It is characterized by a reduction in the quality and density of the bones. It has been shown that the lower the BMD, the higher the fracture risk. According to recent statistics from the International Osteoporosis Foundation, 1 in 3 women and 1 in 5 men aged 50 years and above around the world will experience osteoporotic fractures in their lifetime. In fact, an osteoporotic fracture is estimated to occur every 3 seconds. It is reported that 42.5 per cent of women and 24.6 per cent of men above the age of 50 years suffer from osteoporosis in India[2]. A 2013 study finds that 50 million people in India are either osteoporotic (T-score lower than-2.5) or have osteoporosis[3]. Another study

reported a high prevalence of osteoporosis in post-menopausal women and a high prevalence of osteopenia in both men and premenopausal women[4]. While calcium has been viewed as a positive risk factor, intake of salt has been considered as negative risk factors contributing to bone density loss in menopausal women[5]. A research study which aimed at exploring the connect between dietary protein intake and the risk of osteoporosis in elderly population found that as the intake of daily dietary protein increases, the prevalence of Osteoporosis decreases[6]. Researchers also found that the for osteoporosis, the main pathophysiological concepts arise from menopause causing estrogen deficiency and aging. The study concludes that there is a positive correlation between the lower daily dietary intake and the ascending risk of osteoporosis in the middle aged and older population in the US[7]. Earlier, one assumed that this debilitating ailment would afflict a person in his/her old age. However, it is a fact today that osteoporosis afflicts population of all age groups not sparing even children. Several factors condition bone mass and density and lead to loss of bone mass– body weight, consumption of alcohol, cigarettes, low calcium diet, a sedentary lifestyle, lack of physical exercise, consumption of certain medications, genetic factors, hormonal changes particularly in women, onset of early menopause, etc.

The Bone Mineral Density (BMD) or a Bone Mass Measurement test is carried out to ascertain the bone strength. The test uses a machine to measure bone density. It estimates the amount of bone in the hip, spine and other bones in the body. The bone density test indicates if one has normal or low bone density or if osteoporosis has already set in. Carrying out this test assumes significance from the point of view of detecting bone health and taking necessary precautions and medication to deal with the ailment and prevent further deterioration.

Many studies on this bone density degeneration have been carried out by researchers. The objectives of the research were screening and diagnosis (36.7%) and risk factor identification (40%)[8].

Given the extent and severity of the problem in India, the problem of reduction in bone density requires mediate attention and necessary action.

Objectives of the Study

The primary objectives of this study are to:

- profile the respondents and study the bone density pattern among the sample;
- find out if a reduction in the Bone Mineral Density is positively co-related to age;
- find out if there is any difference in the extent and severity of the deterioration of bone mineral density among males and females; and
- make suggestions.

Methodology

The present study is based on a retrospective database that has been sourced from the ISHA Health Care a company, with its headquarters in Jaipur and a registered office in Goa. It carries out a variety of screening tests– tests to detect osteoporosis, diabetes, blood pressure levels, etc. for its clientele which includes hospitals, clinics, and corporates as also individuals all over the country. The ISHA Health Care has also been involved in organizing a large number of health

check-up camps to detect calcium deficiency at different locations of the three states which comprise the sample of the current study. The bone density was measured at one site viz. the heel bone i.e. the calcaneus which is the large bone that forms the foundation of the foot.

Confidentiality of the data base has been ensured as the respondents in the data base made available to the researchers were identified by numbers only and their names and identity were not disclosed. The data has been collected from multiple centres across three states.

The study also relies on secondary data sources such as journals, information from flyers and online resources.

Sample: The data base comprises of a total of 4900 respondents /subjects across the States of Maharastra, Goa and Karnataka. The respondents/subjects belonged to both male and female gender and their ages ranged from a minimum of fourteen to a maximum of eighty-nine years. The database made available pertained to gender, age and the T-Score i.e. BMD (Bone Mineral Density). The sample is more specifically described in Table 1.

Table 1
Sample Selection

Sr. No.	State	Locations	No. of Respondents/Subjects	Total
1.	Maharashtra	Ichalkaranji	23	764
		Kolhapur	210	
		Phaltan	70	
		Sawantwadi	91	
		Gadhinglaj	34	
		Sagar	61	
		Miraj	30	
		Khed	63	
		Kudachi	65	
		Lanja	60	
		Kajarekond	41	
		Sangli	16	
2.	Karnataka	Belgaum	837	3563
		Bangalore	693	
		Bailhangal	363	
		Hubli	172	
		Chitradurga	115	
		Davangere	90	
		Gadag	82	
		Chickmangalur	138	
		Sankeshwar	42	
		Dharwad	20	
		Nipani	461	
		Chikkodi	48	
		Bankapura	30	

		Udupi	85	
		Shiggaon	43	
		Maski	37	
		Bagalkot	23	
		Kalburgi	51	
		Anegundi	51	
		Mungund	39	
		Vijayapura	82	
		Gulbarga	61	
3.	Goa	Mapusa	216	573
		Margao	357	
4.	**TOTAL**			**4900**

Data Analysis Tools: The data have been analysed using STATA. Regression analysis and the paired t-test have been used to test the constructed hypothesis. Besides, simple statistical tools such as frequency, percentages and correlation were also employed. The calculated T-Score from the data base was also used in the analysis of the data. Tables and charts have also been used to present the data findings.

T-Score: The T-Score indicates the extent to which bone density is higher or lower than the bone density of a healthy thirty-year-old adult. A T-Score of -1.0 or above represents normal bone density. A T-Score ranging between -1.0 and -2.5 is an indicator of low bone density or osteopenia. A person who has been detected with osteopenia has greater chances of developing osteoporosis if there is any further loss of bone mass. A T-Score of -2.5 and below is a diagnosis of osteoporosis. The lower the T-Score, the lower the bone density.

Hypothesis

The following two hypotheses have been constructed:

Hypothesis 1
H_0: Bone Mineral density is not positively related to age.
H_1: Age and deterioration of bone density is positively related.

Hypothesis 2
H_o: There is no significant difference in bone mineral density reduction among males and females.
H_1: There is a significant difference in bone mineral density reduction among males and females.

Findings

Demographic Profile

Gender Composition: The sample comprises of subjects/respondents of both genders. Of the 4900 respondents, 2362 (48.20%) are male, 2538 (51.80%) are females. 1.32 per cent and 16.96% of the sample was below the age of 20 and above 61 years respectively. 81.72 per

cent of the respondents were aged between 21 and 60 years. A larger percentage of the sample was in the age group 41-60 years (44.76%).

Relationship between Gender, Age and Bone Mineral Density: The study also attempts to ascertain whether there is any relationship between (1) Gender and Bone Mineral Density and (2) Age and Bone Mineral Density. The data is presented in Table 2.

Table 2

Gender, Age and Bone Mineral Density

Age Group (Years)	Male (N =2362)			Female (N =2538)		
	Normal	Osteopenic	Osteoporotic	Normal	Osteopenic	Osteoporotic
Upto 20	12	11	-	26	16	-
21-40	373	378	33	348	602	77
41-60	482	561	91	194	719	146
61 & above	102	239	80	82	186	142
Total	**969 (41.02%)**	**1189 (50.34%)**	**204 (8.64%)**	**650 (25.61%)**	**1523 (60.01)**	**365 (14.38%)**

The findings of the study show that 1619 respondents/subjects (33.04%) of the sample depict normal bone mass while 66.96 per cent of the sample i.e 3281 respondents have unhealthy bones. Further, it was found that out of the total sample of 4900, 1619 respondents (33.04%) had normal bone mass; 2712 (55.35%) were osteopenic while 569 (11.61%) suffered from osteoporosis. A large percentage of the sample size is thus found to be in the first stage(osteopenia) of osteoporosis and this finding calls for the need to pay more attention to bone management.

It was observed that females are more prone to reduction in BMD compared to males. The findings indicate that cases of osteopenia and osteoporosis are more prevalent among the females than the males. While 1523 (60.01%) and 365 (14.38%) of females were detected with osteopenia and osteoporosis respectively, the corresponding percentage among males stands at 50.34 per cent (1189) and 8.64 per cent (204).

There is a positive correlation between age and reduction in bone mineral density. However, bone mass depletion is not an occurrence exclusive to the older population. It strikes irrespective of age. Study findings indicate that out of the total of 65 respondents who were 20 years and below, 41.54 per cent were Osteopenic while 58.46% had normal bone density. The minimum age at which a female respondent was detected to be osteopenic was 16 years while the male was 19 years of age. No cases of osteoporosis were detected among respondents in the age group up to 20 years.

Hypotheses Testing

Table 3
T-Score and Age

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
TScore	4900	-1.231776	.0153794	1.076559	-1.261926	-1.201625
Age	4900	45.83327	.2001119	14.00783	45.44096	46.22557
combined	9800	22.30074	.2580372	25.54438	21.79494	22.80655
diff		-47.06504	.200702		-47.45846	-46.67162

diff = mean(TScore) - mean(Age) t = -2.3e+02
Ho: diff = 0 degrees of freedom = 9798

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 1.0000

The null hypothesis in the t-test is that the Bone Mineral Density is not positively related to age, which means that there is no significant difference between the T-Score and Age. The p-value of the t- test is <0.05 (i.e. significant), so the null hypothesis is rejected. The alternative hypothesis that the age and deterioration of bone density is positively related is accepted.

Table 4
T-Score and Gender

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	2538	-1.313436	.0216481	1.090601	-1.355886	-1.270986
1	2362	-1.14403	.0216967	1.054468	-1.186577	-1.101484
combined	4900	-1.231776	.0153794	1.076559	-1.261926	-1.201625
diff		-.1694053	.0306865		-.2295646	-.109246

diff = mean(0) - mean(1) t = -5.5205
Ho: diff = 0 degrees of freedom = 4898

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 1.0000

The p-value of the t-test is zero, which means that the null hypothesis is rejected and the alternative hypothesis is accepted. The t-value of -5.5 <0.05 (i.e., significant), so the null hypothesis of no significant difference in the prevalence of osteoporosis among males and females is rejected and conclude the presence of difference in the prevalence of osteoporosis among males and females.

Discussion

Ensuring Good health and well- being is one of the core sustainable goals of development. A network of public and private health care systems is in place in order to realize this objective of development. Poverty and inequality inhibit citizens' access to the heath delivery mechanisms as also to the requirements of a balanced diet. Improper dietary habits are one among other factors that has led to many lifestyle diseases, osteoporosis being one of them.

The results of the study indicate several important findings related to bone-density patterns and their relationship to age and gender. Firstly, the sample population was found to have a range of bone density levels with some individuals exhibiting normal bone density and others showing evidence of osteopenia or osteoporosis. This variability in bone density underscores the importance of regular screening and monitoring for bone health, particularly as individuals age.
Secondly, the study found a significant positive correlation between age and reduced bone mineral density. This finding is consistent with previous research that has shown that bone density tends to decrease with age, as bone turnover slows and calcium absorption becomes less efficient. This highlights the need for targeted interventions and lifestyle modifications to maintain bone health as individuals age and increased intake of supplements such as calcium and Vitamin D, besides weight bearing exercises.

The study also found a significant difference in the extent and severity of bone density deterioration between males and females with the latter exhibiting a greater loss of bone density, osteopenia and osteoporosis compared to the former. This could be attributed to several factors such as diet, lack of exercise, hormonal differences as also differences in the size and structure of bones.

Conclusion and Recommendations

Prognosis of the disease depends on how early the condition is diagnosed and treatment initiated. The BMD test enables one to determine how healthy are one's bones. The results can therefore be used to initiate measures and medication to improve bone health and prevent deterioration of the same.

There is a need for awareness to be created in schools and colleges among youngsters of both genders about bone health. Lectures on bone health need to be conducted in educational institutions. Screening camps to check Bone Mineral Density need to be conducted in each and every panchayat in order to find out the extent of the problem. Involvement of corporates in not just creating awareness of the need to have healthy bones and how to ensure the health of bones but also to carry out screening tests as a part of their corporate social responsibility initiatives.

Adhering to a healthy diet rich in Calcium and Vitamin D, involvement in physical activity, minimizing alcohol and cigarette consumption, regular screening for Bone Mineral Density to ascertain health of bones, medication are other measures to ensure a healthy bone structure.
Further research is also needed to understand the underlying mechanisms driving age related bone density decline and gender differences in bone health as well as to identify effective interventions to promote bone health.

References

1. C Christodoulou C Cooper (2003). What is Osteoporosis? Post Graduate Medical Journal 2003; 79: 929.
2. Marwaha RK, Tandon N, Garg MK, Kanwar R, Narang A, Sastry A, Saberwal A, Bhadra & Mithal A (2011). Bone health in healthy Indian population aged 50 years and above. Osteoporosis International. 2011; 22:2829–2836.
3. Mithal A, Bansal B, Kyer CS, Ebeling P (2014). The Asia-pacific regional audit-epidemiology, costs, and burden of osteoporosis in India 2013: A report of international osteoporosis foundation. Indian Journal of Endocrinology and Metabolism 2014; 18: 449-54.
4. Kadam NS, Chiplonkar SA, Khadilkar AV & Khadilkar VV (2018). Prevalence of Osteoporosis in apparently healthy adults above 40 years of age in Pune City, India. Indian Journal of Endocrinology and Metabolism 2018; 22: 67-73.
5. BE Christopher Nordan et al. (2006). Nutrition, Osteoporosis and Aging, Annals of the New York Academy of Sciences/ Vol 854/Issue I: 336-351. https://doi.org/10.1111/j.1749-6632.1998.tb09914.x.
6. YW Zhang, MM Cao et al. (2022). Dietary Protein Intake in relation to the risk of osteoporosis in middle aged and older individuals: A Cross-Sectional Study, The Journal of Nutrition, Health and Aging, 26: 252-258.
7. Ursula Föger-Samwald et al. (2022). Age related osteoporosis: Targeting Cellular Senescence, Int. J. Mol. Sci, 23: 2701. https://doi.org/10.3390/ijms 2305270.
8. Jyoti Thulkar & Shalini Singh (July-Sept 2015). Overview of research studies on osteoporosis in menopausal women since the last decade. Journal of Midlife Health, 6 (3): 104–107.

GUIDELINES FOR AUTHORS

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