ORIGINAL RESEARCH ARTICLE

Contraceptive Use Before First Birth in North-East India: Trends and Socio-Demographic Inequalities Based on NFHS Data

Heisnam Ruhi Singh[1*], Kshetrimayum Anand Singh[2]

[1,2]Department of Statistics, Manipur University, Imphal, India

DOI: 10.55489/njcm.160420254842

ABSTRACT

Background: Taking part in human reproduction immediately after marriage will not be a good choice for those young couples from the point of view of population growth as well as the health of the mother and the newborn. As such, postponement of the first birth will benefit both the newborn's and the mother's health. The use of contraceptives before the first birth is a reasonable choice for delaying it. The objective of this paper is to analyse the trends in contraceptive use before first birth and to explore and identify potential socio-demographic covariates that significantly influence this trend in North-East India.

Methods: We analyse the trends of contraceptive use before first birth using data from the three latest National Family Health Surveys. We also investigate socio-demographic factors associated with contraceptive use before first birth using data from the latest round of NFHS-5. The method of multivariate logistic regression is applied to estimate the likelihood of contraceptive use before first birth among different socio-demographic groups.

Results: There is an increase in the percentage of women who use contraceptives before first birth from NFHS-3 to NFHS-4. However, there is a slight percentage decrease from NFHS-4 to NFHS-5. Place of residence, religion, family wealth, current age, and media exposure are some of the important covariates that significantly affect contraceptive use before first birth.

Keywords: Contraceptive use before first birth, logistic regression, NFHS

ARTICLE INFO

Financial Support: None declared

Conflict of Interest: The authors have declared that no conflict of interests exists.

Received: 08-11-2024, **Accepted**: 15-01-2025, **Published**: 01-04-2025

***Correspondence:** Heisnam Ruhi Singh (Email: heisnamruhi@gmail.com)

How to cite this article: Singh HR, Singh KA. Contraceptive Use Before First Birth in North-East India: Trends and Socio-Demographic Inequalities Based on NFHS Data. Natl J Community Med 2025;16(4):344-350.
DOI: 10.55489/njcm.160420254842

www.njcmindia.com | pISSN: 0976-3325 | eISSN: 2229-6816 | Published by Medsci Publications

INTRODUCTION

Family planning is universal worldwide because of the need to check population control. Demographers, policymakers, and program planners always look forward to effectively using family planning methods to lower population growth and address health concerns about mothers and children. Globally, women under the age of 20 have the highest unmet need for family planning, while women aged 35 and older have the lowest unmet need.[1] In India, the unmet need for family planning among married women ranges from 3% among women aged 45-49 years to a high of 22% among women aged 15-24.[2] In recent years, India has witnessed a significant decline in age at first marriage, both for women and men. Consequently, a decline in fertility has also been recorded across all the states of India. However, despite the decline in fertility rate, relatively low age at first birth still persists.[3] As per the NFHS-5 report, 38% of women aged 20-49 years married before the legal minimum age of marriage of 18 years, and 23 percentage of men aged 25-49 years married before the minimum legal age of marriage of 21years, which is an improvement over the previous NFHS-4 report where the two figures are 40% and 26% respectively. These reports show that a substantial number of women marry before 18 years of age in India.[3,4]

Risky pregnancies generally occur in early-age pregnancies.[5] It is of vital importance to postpone the first birth at least using a contraceptive method.[6] With this perspective, fulfilling the unmet needs for contraception to delay first birth is important. In India, the latest NFHS report (NFHS-5) indicates that women in the reproductive age of 15-49 reported nearly (9.4 %) of unmet needs for contraceptives.[7]

Couples can use contraceptive methods to limit or space the number of children they would have. With the help of contraception, a woman can take charge of her reproductive health and participate actively in a family planning programme.[8] The goal of contraceptive methods is to overcome biology through technological advancements. The most significant developments in female reproductive health, including an expansion of medical procedures, devices, and options, occurred in the 20th century. It will concentrate on the treatments, tools, and drugs that couples can use to avoid getting pregnant.[9]

Globally, the number of women of reproductive age (those between the ages of 15 and 49 years) increased by 46%, from 1.3 billion in 1990 to 1.9 billion in 2021.[10] An even more significant rise was observed in the proportion of women in the reproductive-age group who require family planning; this includes those who are fecund, married, in a relationship, single, and plan to postpone or forego having children. More specifically, the number of women needing family planning increased by 62% from 0.7 billion in 1990 to 1.1 billion in 2021.[10]

Indian women are culturally very dominant, whereas they practice various cultural norms. Ignoring the negative impacts on health, Indian couples tend to give birth to the first child as soon as possible after marriage, using it as evidence of their fecundity.[11] As such, the use of contraceptives, especially before first birth, is still very unpopular among young couples. Women of younger ages are lack of proper information on pregnancy, contraception and sex education. This lack of information is a hindrance to the use of contraception before their birth. Further, limited mobility and freedom to access clinics and contraceptives also aid in discouraging contraceptive use before the first birth.[12] Delaying early pregnancies will be an assured benefit for the health of the mother and the child as well because the morbidity and mortality of women in the reproductive age groups are associated with complications of pregnancies and childbirth.[13]

According to (Singh et al.)[14], the use of contraceptives uses before first birth, women in India are significantly affected by socio-economic factors such as place of residence, religion, age at marriage, education of women, wealth of family, exposure to mass media, etc. Pandey and Singh[15] have analysed contraceptive use before the first birth using multivariate logistic regression using data from NFHS-3. They found that "Place of residence" does not play a significant role in the event of interest.

Objectives of the study

The primary objective of the present study is to examine the levels and trends of contraceptive use before first birth among ever-married women aged 15-34 years in North-East India. The North-east region of India comprises eight small states with a population of 3.78% (Census 2011, excluding Sikkim) in an area of nearly 8% of the country's total area.[16] The region has remarkably different socio-economic and cultural diversities, which are also different from mainland India. We use data from the latest three rounds of the NFHS for the current analysis.

The specific objectives of the present study were to analyse the trends of contraceptive use before first birth in the Northeast region of India during NFHS-3(2005-06) to NFHS-5 (2019-2021) and to identify significant socio-demographic factors associated with contraceptive use before first birth by using a multivariate logistic regression method.

METHODOLOGY

Source of Data: The present study uses data from the latest three rounds of National Family Health Surveys, i.e. NFHS-3 (2005-06)[17], NFHS-4 (2015-16)[2] and NFHS-5 (2019-21)[3]. The International Institute for Population Sciences, Mumbai, acts as the nodal agency under the Ministry of Health and Family Welfare, Government of India's aegis for conducting the National Family Health Surveys. For examining the

trends of contraceptive use before first birth, all the relevant information available from the three NFHSs is used**.** The data from the 5th round of the National Family Health Survey (NFHS-5) data, which was gathered between 2019 and 2021, served as the secondary source of data for exploring socio-demographic factors influencing contraceptive use before first birth in the region. The NFHS-5 provides information on fertility, mortality, family planning methods, maternal and child health, reproductive health, HIV/AIDS, nutritional status, and the quality and availability of health and family planning facilities for all eight states in North-East India. NFHS-5 collected information from individuals in the reproductive age ranges of 15–49 years for women and 15–54 years for men. The round-specific reports thoroughly explain the study design, sampling strategy, frame, and non-response rate. In total, 103,433 women (aged 15-49 years) were successfully interviewed in NFHS-5. In the present analysis using NFHS-5 data, we have included 25,336 ever-married women aged 15-34 years at the time of the survey in the Northeast states of India.

Description of study variables

Dependent variable: The study's outcome variable is the usage of the contraceptives, which we classified into two categories: - It assigns a value of 1 for a woman who uses any form of contraceptive method before her first birth and 0 for those who either never used any contraceptive method before first birth or used it after having their first birth. Information on contraceptive use was gathered through the women's questionnaire.

Explanatory variables: Socio-economic variables, such as place of residence, religion, caste, educational qualification, wealth index, current age, age at marriage, and exposure to mass media, which are thought to be potential covariates to influence the dependent variables, are considered for the present study. The respondents' places of residence were divided into two categories: urban and rural. Religion is categorised into Hindus, Muslims, Christians, and others. The "others" category of religion consists of Sikhs, Buddhists/ Neo-Buddhists, Jewish, Jain, and other local faiths. Women's educational level has been divided into four levels: illiterate, primary, secondary, and higher education. The Wealth Index is categorised into rich, middle, and poor. At the time of the survey, the current age groups of women had been classified into four groups: 15-19, 20-24, 25-29, and 30-34 years. The respondent's ages at marriage were classified into three groups: less than 16 years, 17-22 years, and 23 years and above. Three questions are used to define exposure to mass media viz: (a) Do you read a magazine or newspaper nearly every day, once a week or less often, or not at all? (b) Do you listen to the radio virtually every day, once a week, or less frequently, or not at all? and (c) how often do you watch television- nearly daily, once a week or less than a week, or not at all? If a woman answers yes to one of the above three questions, then she is considered exposed to mass media and put in the corresponding category; otherwise, she is considered not exposed to mass media at all. The ultimate variable of media exposure is subsequently transformed into three categories: (i) exposure not at all, (ii) exposure weekly or less frequently, and (iii) exposure daily.

Data management and analysis: Descriptive statistics are computed to compile the data after some variables were cleaned up and recoded to fit the study's goal better. Multivariate Logistic regression[18] is a statistical method used for multivariate analysis where the outcome variable of interest is a dichotomous variable. Since the dependent variable for the present study is a dichotomous variable, logistic regression is employed to assess the net influence of multiple explanatory variables on the use of contraceptives use before the first birth after controlling other relevant outcome variables. The accuracy of the model fit to the data has been evaluated using the Hosmer-Lemeshow statistic and Nagelkerke R square[19]. The 95% confidence interval (CI) for the crude and adjusted odds ratio are estimated. Each variable's frequencies and percentages are cross-tabulated. A Chi-square test for association was also used to conclude the statistical significance of the association between the socio-demographic characteristics and the use of contraceptives before first birth.

RESULTS

Figure 1 shows the trends of contraceptive use before first birth in the Northeast region of India from NFHS-3 (2005-06) to NFHS-5 (2019-21). From NFHS-3 and NFHS-4, there is an increase in the percentage of women who use contraceptives before first birth. However, it is observed that the percentage decreases by a small number between NFHS-4 and NFHS-5. For the age 15-34 years and 15-49 years of women, it has decreased to 10.4% and 8.1% in NFHS-3, 23% and 18.6% in NFHS-4, and 20.8% and 18% in NFHS-5, respectively.

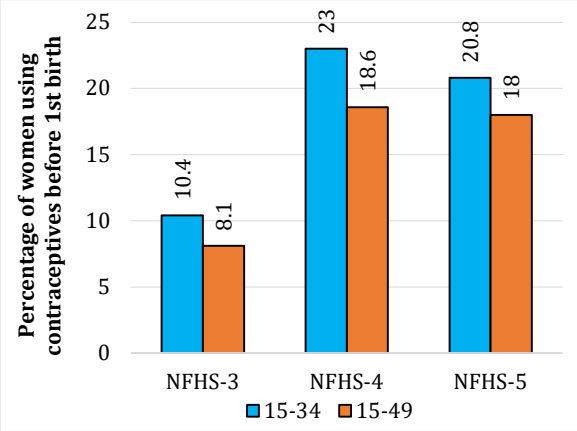

Figure 1: Contraceptive use before first birth in the Northeast region of India

Table 1: Percentage of contraceptive use by ever-married women before first birth

State-wise in N-E India	NFHS-3		NFHS-4		NHFS-5	
	15-49	15-34	15-49	15-34	15-49	15-34
Arunachal Pradesh	6.6	9.9	15.1	17.8	24.2	28.3
Assam	13.8	16.7	26.6	32.3	21.7	24.2
Manipur	4.8	8.1	19.4	22.4	5.6	8.4
Meghalaya	1.3	1.9	9.1	11.2	16.3	15.9
Mizoram	2.2	2.3	13.9	18.2	3.8	4.5
Nagaland	3.1	4.2	5	6.6	10.9	13.5
Sikkim	16.4	8.7	16.4	22.1	9.9	13
Tripura	26.7	29.2	33.6	40.7	19.9	21.5

Table 2: Percent distribution of women (15-34 years) according to different socio-demographic variables (NFHS-5)

Socio-demographic Variable	Percentage distribution	Women using contraception before first birth (%)
Place of Residence		
Urban	15.7	18.9
Rural	84.3	21.2
Religion		
Hindu	43.7	23.8
Muslim	17.3	22.7
Christian	30.2	15.6
Others	8.8	19.6
Educational Level		
No education	12.9	18.3
Primary	15.9	18.2
Secondary	64.4	21.1
Higher	6.7	28.3
Wealth Index		
Poor	65.5	20.1
Middle	20.8	21.7
Rich	13.7	22.8
Age Group		
15-19	2.4	35.5
20-24	19.2	25.5
25-29	38.2	20.4
30-34	40.2	18
Age at Marriage		
<=16	28.2	19.6
17-22	51.3	20.1
>=23	19.9	24.2
Media Exposure		
Not at all	28.4	19.6
Weekly or less	28.3	19.5
Everyday	43.4	22.4
State-wise in Northeast India		
Arunachal Pradesh	17.3	28.3
Assam	42.3	24.2
Manipur	8.2	8.4
Meghalaya	8.3	15.9
Mizoram	4.1	4.5
Nagaland	6.2	13.5
Sikkim	3.3	13
Tripura	10.4	21.5

The percentage of contraceptive use by ever-married women before their first birth in North-East states of India for NFHS-3 to NFHS-5 is presented in Table 1. In three states viz, Arunachal, Meghalaya and Nagaland, there is a continued increase from NFHS-3 to NFHS-5 in the percentage of women using contraceptives before first birth by ever-married women in the age groups 15-34 and 15-34 years. All other states show an increased percentage of women from NFHS-3 to NFHS-4 but the same decrease from NFHS-4 to NFHS-5 in both age groups. In Manipur, Mizoram and Tripura, there are sharp declines in the trend from NFHS-4 to NFHS-5.

In Table 2, the percentage distribution of ever-married women in the age group 15-34 years by different socio-demographic variables that are considered in the analysis are presented. The last column of the table gives the percentage of women using contraceptives before their first birth.

The adjusted odd ratio and its p-value for significance along 95% confidence intervals are presented in the last three columns of Table 3. The odds ratio gives the likelihood of occurring the event in a particular category of the variable as associated with the reference category of the variables. For example, 'place of residence' has two categories, viz. urban and rural, in which 'urban' is taken as the reference category. The OR for rural women is 1.24, which means that rural women are 1.24 times more likely to use contraceptives before 1st birth as compared to urban women in North-East India.

In the 'Religion' variable, 'Hindu' is the reference category. The p-value for 'Muslim' is not significant, whereas for 'Christian' and others, the p-value is highly significant. The OR of 0.76 for Christians indicates that women belonging to Christianity have 24% less chance of using contraceptives before 1st birth, and further, women belonging to other categories have 32% less chance of using contraceptives before 1st birth as compared to Hindu women. The education level of women is expected to play a significant role when considering contraceptive use before 1st birth. However, only the OR for 'Higher' level of education is significant with OR 1.48, which shows that highly educated women are 1.48 times more likely to use contraceptives to delay first birth.

Similarly, the wealth of the family also significantly influences married women to use contraceptives before 1st birth. The richer the family, the higher the chance of using contraceptives before first birth in the region. The age group of women also plays a significant role in motivating them to use contraceptives before 1st birth. Older women show a lower chance of using contraceptives as compared to younger women. Exposure to mass media for women of all ages is also an important covariate that significantly influences the use of contraceptives before first birth. Women who read a newspaper or watch T.V. every day are 1.25 times more likely to use contraceptives before first birth as compared to women who do not read a newspaper or watch TV at all.

Table 3: Logistic regression analysis for contraceptive use before first birth among ever-married women (15-34 years in North-East India, 2019-21)

Socio-demographic variable	COR (95% of CI)	P-Value	AOR (95% of CI)	P-value
Place of Residence				
Urban	Ref.		Ref.	
Rural	1.15 (1.05-1.25)	0.002	1.24 (1.12-1.37)	<0.05
Religion				
Hindu	Ref.		Ref.	
Muslim	0.94 (0.86-1.02)	0.13	0.99 (0.91-1.09)	0.856
Christian	0.59 (0.55-0.64)	<0.05	0.76 (0.69-0.87)	<0.05
Others	0.78 (0.69-0.87)	<0.05	0.68 (0.59-0.78)	<0.05
Educational Level				
No education	Ref.		Ref.	
Primary	0.99 (0.88-1.12)	0.94	1.09 (0.97-1.24)	0.142
Secondary	1.19 (1.08-1.31)	<0.05	1.1 (0.99-1.22)	0.067
Higher	1.76 (1.53-2.02)	<0.05	1.48 (1.26-1.73)	<0.05
Wealth Index				
Poor	Ref.		Ref.	
Middle	1.09 (1.02-1.18)	0.015	1.09 (1.01-1.19)	0.034
Rich	1.17 (1.07-1.28)	<0.05	1.18 (1.05-1.31)	0.004
Current Age group				
15-19	Ref.		Ref.	
20-24	0.62 (0.52-0.74)	<0.05	0.58 (0.48-0.69)	<0.05
25-29	0.47 (0.39-0.55)	<0.05	0.39 (0.33-0.47)	<0.05
30-34	0.39 (0.33-0.47)	<0.05	0.33 (0.27-0.39)	<0.05
Age at marriage				
<=16	Ref.		Ref.	
17-22	1.03 (0.91-1.07)	0.824	1.18 (1.09-1.27)	<0.05
>=23	1.3 (1.18-1.45)	<0.05	1.81 (1.64-1.99)	<0.05
Media				
Not at all	Ref.		Ref.	
Weekly or less weekly	0.99 (0.91-1.08)	0.94	1.06 (0.97-1.16)	0.167
Everyday	1.18 (1.1-1.27)	<0.05	1.25 (1.15-1.36)	<0.05
North-East region				
Arunachal Pradesh	Ref.		Ref.	
Assam	0.81 (0.75-0.87)	<0.05	0.67 (0.61-0.75)	<0.05
Manipur	0.23 (0.19-0.27)	<0.05	0.19 (0.16-0.23)	<0.05
Meghalaya	0.48 (0.42-0.54)	<0.05	0.47 (0.41-0.55)	<0.05
Mizoram	0.12 (0.08-0.16)	<0.05	0.12 (0.08-0.16)	<0.05
Nagaland	0.39 (0.34-0.46)	<0.05	0.4 (0.33-0.48)	<0.05
Sikkim	0.37 (0.31-0.47)	<0.05	0.33 (0.27-0.42)	<0.05
Tripura	0.69 (0.61-0.77)	<0.05	0.57 (0.49-0.65)	<0.05

COR – Crude Odds ratio, AOR – Adjusted Odds Ratio, CI- Confidence interval
Hosmer-Lemeshow Statistic, P- value = 0.297, Nagelkerke R^2 = 0.079

DISCUSSION

The main finding of the study: The present study shows that there is an increasing trend in contraceptive use before birth from NFHS – 3 to NFHS – 4 and to NFHS -5 in all the states of Northeast India. However, in some states like Assam, Manipur, Mizoram, Sikkim and Tripura, there is a decreasing trend from NFHS–4 to NFHS-5. The present study also investigated the significant factors influencing the behaviour of North-East Indian women to use contraceptives before their first birth. It is clear that the use of contraception before first birth in the Northeast region of India is significantly influenced by factors such as place of residence, religion, wealth of family, current age of women, age at marriage and exposure to mass media. There are significant differences in the risk of using contraceptives before first birth among the states of the region as well. However, the educational level of women does not affect the behaviour of using contraceptives before first birth significantly except in the highest level of education as compared to the lowest level of education.

During recent years, the percentage of contraceptive use has fallen, which is a severe apprehension for healthcare authorities since we are still a victim of population growing as well as maternal deaths.[20] Maternal deaths are probable to be 1.8 times higher in women with contraceptive use.[21,22] Among many involvements, contraceptive use to avoid undesirable pregnancies is one of the most profitable ways of falling maternal deaths.[23] The less use of contraception and quite having an unmet need in the population will grow unwanted pregnancies, which is directly going to increase abortion in culture. Greater contraceptive use allows births to be spread out better and reduces the chances of accidental pregnancies and population increase.[24,25]

The study on the trends and determinants of contraceptive use before first birth has been found in the literature for many countries, including India, using reliable data. The findings are similar, but differences occur at regional levels. The Northeast region of India, including eight states, depicts distinct sociocultural norms from the mainland Indian states. As such, the present study is a deliberate attempt to derive some regional-specific findings on the levels, trends and determinants of contraceptive use before first birth. This study will thus add some more insights into the topic at the regional level.

Limitations

There are certain limitations in the present study. Under-reporting cannot be dismissed as a possibility, given the sensitive and stigmatized nature of discussing contraceptive use in India and the region. Young women might hesitate to reveal whether they are using contraception. The study sample is restricted to fecund, ever-married women in the age group 15–34 years. The data on contraceptive use is determined by whether any form of contraception was used before the first birth rather than the specific method used due to a lack of information in NFHS data.

Conclusion

The present study investigated the significant factors influencing the behaviour of North-East Indian women to use contraceptives before their first birth. It is clear that the use of contraception before first birth is significantly correlated with factors, i.e., place of residence, religion, wealth index, current age of mother, and exposure to mass media. The study's conclusions also showed a decrease in the previous 15 years in the use of contraception before first birth. This result might be explained by young women marrying later in life. A lot of the responsibility for the success of North-East states family planning programmes rests with the government, researchers, service providers, and users. Consequent to the findings of the present study, we need to further strengthen family planning practices and incorporate a special focus on young women to educate them properly on the risks associated with early pregnancies and childbearing. Further, the authorities have to equip them properly to gain the ability and access to resources to delay their first pregnancy in the region.

Author Contribution: HRS: Contributed to study conception, data analysis, interpretation, and manuscript preparation for a comprehensive research approach. **KAS**: Led study design, data analysis, interpretation, and contributed to manuscript preparation, ensuring thorough research methodology.

References

1. Olszynko-Gryn J. Contraceptive technologies. Twent Century Popul Think A Crit Read Prim Sources. 2015;(April):172-209. DOI: https://doi.org/10.4324/9781315707365-8
2. IIPS ICF. National Family Health Survey (NFHS-4):2015-16,India. Mumbai Int Inst Popul Sci. 2016;
3. IIPS ICF. National Family Health Survey (NFHS-5): 2019-21 India. Mumbai Int Inst Popul Sci. 2021;
4. NFHS 5. NFHS 5 report on child marriage. 2022;5(May):4-5.
5. Riley T. ADDING IT UP-Investing in Sexual and Reproductive Health 2019. 2020;
6. Hammad AEB, Sayegh J, Turmen T, Shabanah MA, Mullholland, C A, Aguirre, I Y. Women's health : towards a better world, report of the First Meeting of the Global Commission on Women's Health [Internet]. 1994. p. 21-3. Available from: https://apps.who.int/iris/handle/10665/62706
7. Bruce J, Bongaarts J. The new population challenge. A Pivotal Moment Popul Justice Environ Chall. 2009;260:275.
8. Sowdamini T, SeethaLakshmi R. Sustainable Development and Curbing Gender Inequality Through Inclusion of Women in Policymaking. In: Gender Aspects of Climate Change and Sustainable Development: A Global Overview. Springer; 2024. p. 71-89. DOI: https://doi.org/10.1007/978-981-97-1192-5_6
9. Hall D. Promoting the health of children. Practitioner. 2001;245(1624):614-8.
10. United Nations. World Family Planning. United Nations Deparment of Economic and Social Affairs, Population Division. 2022. 43 p.
11. Jejeebhoy SJ, Santhya KG, Zavier AJF. Demand for Contraception to Delay First Pregnancy among Young Married Women in India. Stud Fam Plann. 2014;45(2):183-201. DOI: https://doi.org/10.1111/j.1728-4465.2014.00384.x PMid:24931075
12. Presler-Marshall E, Jones N. Empowering girls to prevent early pregnancy. Oversees Dev Inst. 2012;
13. Jina R, Thomas LS. Health consequences of sexual violence against women. Best Pract Res Clin Obstet Gynaecol. 2013;27(1):15-26. DOI: https://doi.org/10.1016/j.bpobgyn.2012.08.012 PMid:22975432
14. Singh P, Singh KK, Singh A, Pandey A. The levels and trends of contraceptive use before first birth in India (2015-16): A cross-sectional analysis. BMC Public Health. 2020;20(1):14-30. DOI: https://doi.org/10.1186/s12889-020-08917-w
15. Pandey A, Singh KK. Contraceptive use before first pregnancy by women in India (2005-2006): Determinants and differentials Biostatistics and Methods. BMC Public Health [Internet]. 2015;15(1):1-9. DOI: https://doi.org/10.1186/s12889-015-2652-y PMid:26714857 PMCid:PMC4696327
16. India C of. Provisional population totals. Regist Gen Census Comm India, New Delhi, Minist Home Aff Gov India. 2011;
17. IIPS Orcm. National Family Health Survey (NFHS-3), 2005-06: India. Vol I Mumbai Int Inst Popul Sci. 2007;
18. Xun P, He Q. Multivariate Analysis. Handbook Of Medical Statistics. 2017. 103-144 p. DOI: https://doi.org/10.1142/9789813148963_0004
19. Hosmer Jr DW, Lemeshow S, Sturdivant RX. Applied logistic regression. John Wiley & Sons; 2013. DOI: https://doi.org/10.1002/9781118548387
20. Ahmed S, Li Q, Liu L, Tsui AO. Maternal deaths averted by contraceptive use: an analysis of 172 countries. Lancet. 2012;380(9837):111-25. DOI: https://doi.org/10.1016/S0140-6736(12)60478-4 PMid:22784531
21. Stover J, Ross J. How increased contraceptive use has reduced

maternal mortality. Matern Child Health J. 2010;14(5):687-95. DOI: https://doi.org/10.1007/s10995-009-0505-y

22. Kelly SL, Walsh T, Delport D, Ten Brink D, Martin-Hughes R, Homer CSE, et al. Health and economic benefits of achieving contraceptive and maternal health targets in Small Island Developing States in the Pacific and Caribbean. BMJ Glob Heal. 2023;8(2):1-11. DOI: https://doi.org/10.1136/bmjgh-2022-010018 PMid:36750273 PMCid:PMC9906181

23. Bongaarts J, Sinding SW. A response to critics of family planning programs. Int Fam Plan Perspect. 2009;35(1):39-44. DOI: https://doi.org/10.1363/3503909

24. Singh S, Bankole A, Darroch JE. The Impact of Contraceptive Use and Abortion on Fertility in sub-Saharan Africa: Estimates for 2003-2014. Popul Dev Rev. 2017;43(Bongaarts 2008):141-65. DOI: https://doi.org/10.1111/padr.12027

25. Schoumaker B. Stalls in Fertility Transitions in sub-Saharan Africa: Revisiting the Evidence. Stud Fam Plann. 2019;50(3):257-78. DOI: https://doi.org/10.1111/sifp.12098 PMid:31385318 PMCid:PMC6771655