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Variation in the Equity of Demand Satisfied by Modern Methods According to Exposure of Mass Media in India

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Abstract

India's National Family Welfare Programme has effectively promoted family planning (FP) and its benefits through various media channels, ensuring straightforward and accessible information dissemination to various societal segments. This study examines the variation in the equity of demand satisfied according to the level of mass media exposure in India. The fifth round of National Family Health Survey data has been utilized for the analysis. Univariate and bivariate analyses have been performed to see the level of demand for family planning satisfaction by modern methods (mDFPS). Concentration index, equity gap, and equity ratio have been performed to see the variation in the equity of mDFPS by mass media exposure. Television (TV) was the most common medium for FP messages (60.6%) and media exposure (53.5%). Women exposed to FP messages on wall painting/hoarding (55.4%) and reading newspapers (36.5%) had higher mDFPS from public and private sources, respectively. Mass media exposure, particularly TV & radio, increased mDFPS. Socioeconomic factors, such as age, education, wealth, and caste, showed inverse relationships with public sources and positive relationships with private sources in mDFPS. The findings of this study showed significant variation in the equity of mDFPS in India. Women exposed to any media and any FP messages with concentration index (CI)=0.00256 and CI=0.01527 showed higher equity in mDFPS. Women exposed to radio & TV (equity ratio (ER)=1.62) and exposed to TV & newspapers (ER=0.28) had the higher equity in mDFPS from public and private sources, respectively. These findings emphasize the importance of considering media exposure and targeting interventions to ensure equitable access to FP services among diverse demographic groups in India.

Keywords

Demand satisfied, equity, India, inequity, mass media exposure, modern methods.

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Introduction

India's National Family Welfare Programme has raised awareness about family planning and its benefits through various media channels. These public awareness campaigns have influenced people's attitudes and beliefs about family planning (FP) and acceptance (Retherford & Mishra, 1997). With the FP program, mass media campaigns and FP messaging focused on providing program information as well as educating women on the benefits of small family norms and contraceptive use. Mass media aids in disseminating information on various issues to different segments of society more straightforwardly. In the context of uneducated women, who currently account for one-third of married Indian women, it is instrumental in obtaining information on FP (IIPS & ICF, 2017). It also means that it helps women make decisions regarding using FP. Retherford and Mishra (1997) used NFHS-1 data to study the association between mass media exposure and contraceptive use. They found that women's use of contraception was positively impacted by their overall exposure to electronic mass media. A study conducted in Goa showed a positive effect of mass media exposure on women's FP methods (Kulkarni, 2003). Another study on the effect of mass media exposure on contraceptive use across the poverty line predicted that watching television had a significant impact on contraception use (Khandeparkar, Roy & Motiani, 2015). A Nigerian study revealed that newspaper reading was significantly associated with contraceptive use among women above the poverty line but not with women below the poverty line (Ajaero et al., 2016). A study based on the Indian state on factors influencing the use of contraceptives in Odisha suggests that women who had been exposed to mainstream media in any capacity were much more likely to use contraception than women who had two, three, or more living children (Sahoo, 2007). Meekers et al. (2007) observed that radio communication campaigns significantly affected condom use in Malawi. In Sub-Saharan Africa, exposure to mass media was found to be a significant predictor of the adoption of long-acting reversible contraceptive (LARC) methods among women (Adedini, Omisakin, & Somefu, 2019). A study based on low- and middle-income countries (LMICs) depicted that only 33% of women in West and Central Africa had their family planning needs met using modern contraception (Ewerling et al., 2018).

The findings of study based on 73 countries' national health surveys over 24 years present a positive picture with increased coverage and poor-rich gaps narrowing between 1993 and 2017. Based on wealth-related inequalities in coverage, the study suggests that all world regions managed to reduce absolute inequalities, except Europe & Central Asia, which have had low fertility levels and inequalities in DFPS since the 1990s (Hellwig et al., 2019). The boundary between inequality and unfairness is not always apparent or well-defined. Some studies use contraceptive use discrepancies between affluent and poor subgroups as a proxy for injustice. Other research uses contraception demand measures to capture inequalities better since they reflect preferences (Madsen & Greenbaum, 2018). The unmet need for contraception remains substantial in many countries, and making family planning services available to couples remains a critical target of the Sustainable Development Goals (SDGs): SDG target 3.7

and SDG target 5.6 (UN, 2016). Das et al. (2021) studied the relationship between media exposure and family planning in Myanmar and the Philippines. The results of this study indicate that family planning demand satisfaction in the Philippines and Myanmar was considerably boosted by mass media exposure. A study conducted in Kenya found that the following factors significantly predicted the satisfaction with modern method (mDFPS) family planning demand: country of residency, year of study, exposure to FP messages through mass media in the preceding year, and visits to health facilities (Gichangi et al., 2021).

Demand for family planning satisfaction (DFPS) is a more compact indicator to suggest that in society, what percentage of women are satisfied by the demand for contraceptives? DFPS is a refined indicator to indicate women's overall satisfaction without losing any women's information about those who are using contraception. The unmet need among women is defined as those women who are fecund and sexually active and want to stop or delay their childbearing but do not use any methods of contraceptives, whether spacing or limiting. Demand satisfied by modern methods is purely a program variable and should be directly influenced by mass media exposure. Mass media exposure is once again achieved through various government-sponsored campaigns. Hence, there is a need to conduct a study to examine the variation in the equity of demand satisfied according to the level of mass media exposure in India.

Materials & Method

Data Source

The fifth round of the National Family Health Survey (NFHS) data was used for the analysis. The survey provides national estimates of the household population, fertility, family planning, infant and child mortality, reproductive and child health, nutrition, morbidity and health care, women empowerment, and domestic violence, each state/union territory, and 707 districts. In the interviewed households, 747,176 eligible women aged 15-49 were identified for individual interviews. A total of 724,115 women completed the interviews, resulting in a response rate of 97 percent. NFHS-5 samples used a stratified two-stage design.

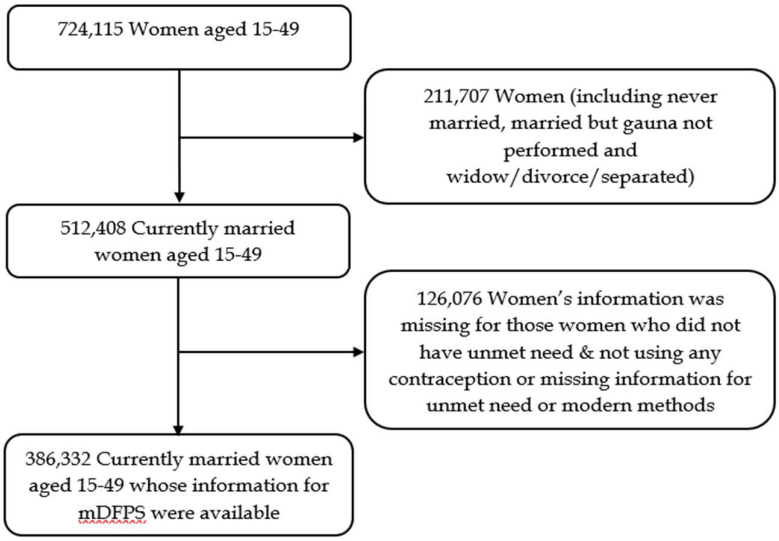

Figure 1 Analytical framework for determining the study's final sample size

The census served as a sampling frame for selected Primary Sampling Units (PSUs). Rural samples were chosen in two stages: PPS sampling, where villages were selected proportional to population size, and random selection of households within each PSU. Urban areas followed a three-stage procedure: PPS sampling, randomly selecting a census enumeration block (CEB) from each sample ward, and randomly selecting households within each CEB.

The demand satisfied by modern methods for India is estimated based on the 386,332 currently married women. The final sample size determination is shown in Figure 1. Of these, only 323,809 were used to estimate demand satisfaction of modern methods stratified by source of contraception. The difference in sample size is because the source of contraception was available only for modern methods.

Outcome variable

The outcome variable for this study is demand satisfied by modern method, which is the percentage of married women of reproductive age (15-49 years old) in need of contraception who are currently using a modern contraceptive technique was characterized as satisfied with modern method (mDFPS). Fecund women who do not want to become pregnant within the next two years or are undecided if or when they want to become pregnant were designated as the numerator of mDFPS, women in need of contraception. Pregnant women who had an unintended or mistimed pregnancy were also considered to be in need of contraception at the time of the study. Women were deemed infertile and were removed from the denominator if they were menopausal, had a hysterectomy, had never menstruated, had their last period more than six months ago, and were not postpartum amenorrhoeic, said they couldn't get pregnant, or were married for five years or more, had never used contraception, and had no children in the previous five years. The demand satisfied has been recorded into binary categories: met demand satisfied and unmet demand satisfied. Moreover, another outcome variable was created to measure the mDFPS by the sources of contraception. The variable is categorized into four categories: not satisfied, public, private, and other sources with demand satisfied by modern methods.

Exposure variables

The exposure variable of this study was mass media exposure through family planning (FP) messages and electronic & print media (radio, television & newspaper). Mass media exposure through the FP messages included mainly five components: "heard FP on the radio in the last few months," "heard FP on TV in last few months," "heard FP in newspaper/magazines in last few months," "heard of FP on wall painting on hoarding," and "heard of FP on the internet." All the yes categories are clubbed into a variable named mass media exposure through FP messages categories, such as all exposure and no exposure of mass media through FP. Furthermore, more combinations were made, such as only women who do not exposed to any FP messages, all women who were exposed to electronic media for FP messages, and all women with exposure other than electronic media for FP messages.

Moreover, mass media exposure through electronic & print media included three factors: frequency of reading newspapers, watching television, and listening to the radio. Furthermore, all the factors with “less than once a week” and "at least once a week" categories are clubbed into a variable named mass media exposure through frequency,

categorized as all exposure of mass media through frequency for less than once a week and at least once a week. Additionally, women who did not have exposure to all were categorized as not exposed, and women with any factors electronic and print media for "at least once a week" and "less than once a week" were categorized as any exposure with less than once a week, and at least once a week. There are three elements of mass media exposure by electronic & print media: weekly listening to the radio, weekly watching television, and weekly reading newspapers. These elements can form three possible combinations: radio & TV, radio & newspapers, and TV & newspapers. However, we included only two combinations—radio & TV and TV & newspapers—while excluding radio & newspapers. This decision was based on the distinct nature of the audience; radio is accessible to educated and uneducated women, whereas educated women predominantly read newspapers. Including the radio & newspapers combination might have distorted the interpretation of the outcomes.

Independent variables

Independent variables of this study included residence (urban and rural), age (15-24, 25-34, and 35-49 years), education (no education, primary, secondary, and higher education), religion (Hindu, Muslim, Christian, Sikh, and others), caste (Scheduled Caste, Scheduled Tribe, Other Backward Class, and other caste), wealth status (poorest, poorer, middle, richer and richest), and regions (North, Central, East, Northeast, West, and South), parity (0, 1, 2, 3, and 4 & above), and number of sons (no son, one son, two sons, and 3 & above sons).

Statistical Analysis

Univariate and bivariate analyses have been performed to assess the level of demand satisfied by modern methods with the characteristics of women and mass media exposures through FP messages and electronic & print media. The chi-square test and p-value have been used to see the significant association with independent variables. Further concentration index, equity gap, and equity ratio were performed to see the variation in the equity of demand satisfied by the level of mass media exposures.

Concentration Index

In order to analyze equity, married women were ranked according to their wealth quintile, stratified by exposure to mass media through FP messages and electronic & print media (radio, television, and newspaper). The concentration index is a statistical tool incorporating data from all wealth quintiles to analyze inequity. The concentration index has been used to measure the equity in India's exposure to mass media. The concentration index estimates the area between the concentration curve and the line of equality to show the degree of inequality. It is determined by dividing the weighted covariance twice by the variable mean, the relationship between the outcome, and fractional rank in the wealth distribution.

The concentration index can be written as follows:

$$CI = \frac{2}{\mu}\, cov(Y_i, R_i)$$

Where CI is the concentration index; Y_i is the outcome variable index whose concentration has to be calculated; R_i is the fractional rank of individual i in the distribution of socioeconomic position; μ is the mean of the

outcome variable of the sample, and '$cov(Y_i, R_i)$ denotes the covariance between Y_i and R_i (O'Donnell et al., 2016). The index value lies between -1 to +1.

Equity gap

The equity gap was calculated by differing the prevalence of mDFPS from the fifth quintile to the first quintile. The equity gap suggests that the higher the gap, the higher the inequity in the use of demand satisfaction, and the lower the gap shows the equitable use of demand satisfied by modern methods (Ross, 2015; Hosseinpoor et al., 2016). This is a kind of absolute measure of inequality, which can be represented as follows:

$$Equity\ gap = mDFPS\ (Q_5) - mDFPS\ (Q_1)$$

And Q_1 and Q_5 showed the first and fifth quintiles of wealth status.

Equity ratio

The equity ratio was calculated using the prevalence ratio of mDFPS in the first to fifth quintile. The equity ratio suggests that the value of the ratio closer to 1 represents the moves towards equity in the use of demand satisfied by modern methods, and far from 1 shows the inequity in the use of demand satisfied by modern methods (Hosseinpoor et al., 2016). This method is a kind of relative measure of inequality which can be written as follows:

$$Equity\ ratio = \frac{mDFPS\ (Q_1)}{mDFPS\ (Q_5)}$$

Results

Descriptive statistics of the currently married women in India

Figure 2 presents the demand satisfaction and demand satisfaction by sources of modern methods of contraception. The figure shows that about three-fourths (74%) of women's demand satisfied by modern methods. Furthermore, demand satisfied by the sources of contraception suggests that about 58% of women demand satisfied from public sources, and more than one-fifth of the women demand satisfied from private sources.

Table 1 shows the descriptive statistics of the currently married women whose information was available for total mDFPS and mDFPS by sources in India. The sample for total mDFPS and by sources of mDFPS are different, but the estimate of the proportion with characteristics mostly showed the same patterns. The results showed that over 68% of women were from rural areas. About half (48.8%) of women were in the higher age group (35-49 years), followed by women aged 25-34 years (38.7%). Most women (45.6%) had a secondary education, followed by uneducated women (27.9%). About 83% of women were Hindu and 12.5% were Muslim. The majority of the women belonged to the other backward class (45.2%), followed by scheduled caste (22.7%) and other caste (22.7%). The proportion of women was almost equal except for the poorest women (18.2). Most of the women were from the East (23.8%) and Central (23.7%), and the lowest proportion were from the Northeast (3.4%). Parity-wise, results showed that 40.2% of the women had two parities. Concerning exposure to FP messages, two-thirds (60.6%) of women heard FP on television (TV), and 15.5% of women heard FP on the radio. Concerning exposure to mass media through weekly exposure to newspapers, watching TV, and listening to the radio, it was shown that most (53.5%) of the women had weekly exposure to watching TV and lower exposure to listening to radio (3.8%).

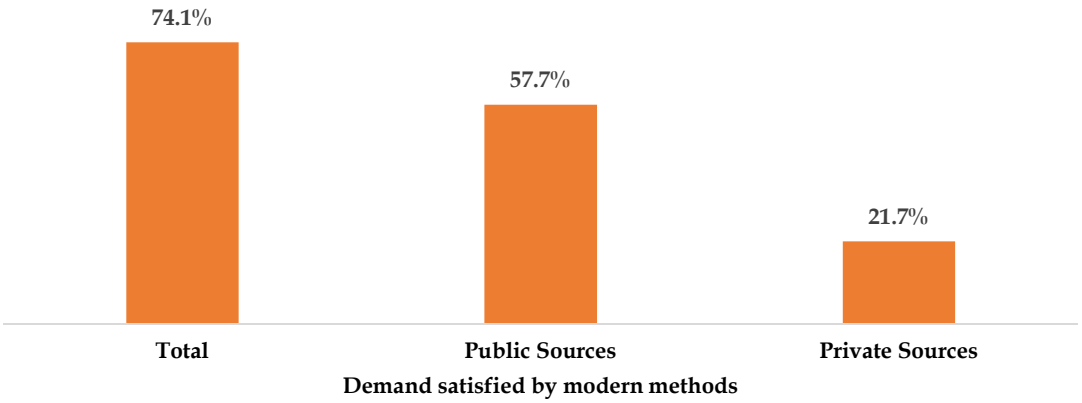

Figure 2 Demand for family planning satisfaction by modern methods (mDFPS) and by source of mDFPS in India

Table 1 Descriptive statistics of currently married women whose information for total mDFPS and mDFPS by sources in India, NFHS-5 (2019-21)

Characteristics	Women with available samples for mDFPS		Women whose sources for demand mDFPS are available	
	%	n	%	n
Residence				
Urban	32.0	1,23,542	31.9	1,03,441
Rural	68.0	2,62,790	68.1	2,20,368
Age (Years)				
15-24	12.6	48,598	11.5	37,334
25-34	38.7	1,49,304	38.1	1,23,451
35-49	48.8	1,88,431	50.4	1,63,024
Education				
No Education	27.9	1,07,642	28.3	91,585
Primary	14.4	55,613	14.5	46,921
Secondary	45.6	1,76,171	45.4	1,46,932
Higher	12.1	46,906	11.9	38,371
Religion				
Hindu	82.7	3,19,665	83.3	2,69,848
Muslim	12.5	48,099	11.8	38,189
Christian	2.1	7,996	2.2	6,991
Sikh	1.6	6,089	1.5	4,862
Others	1.2	4,482	1.2	3,919
Caste				
Scheduled Caste	22.7	83,709	22.8	70,368
Scheduled Tribe	9.3	34,388	9.4	28,906
Other Backward Class	45.2	1,66,639	45.5	1,40,472
Others	22.7	83,702	22.3	68,817
Wealth Status				
Poorest	18.2	70,166	17.5	56,748
Poorer	19.9	76,834	19.7	63,856
Middle	20.5	79,132	20.8	67,390
Richer	20.9	80,876	21.4	69,167
Richest	20.5	79,324	20.6	66,648
Regions				
North	14.3	55,138	14.0	45,264
Central	23.7	91,611	22.2	71,835
East	23.8	91,913	22.2	71,719
Northeast	3.4	13,254	3.1	9,974
West	14.3	55,094	15.5	50,018
South	20.5	79,322	23.2	74,999

Parity				
0	3.1	12,041	2.9	9,412
1	16.1	62,179	14.3	46,422
2	40.2	1,55,320	41.5	1,34,322
3	22.5	86,815	23.4	75,636
4 & above	18.1	69,977	17.9	58,018
Number of sons				
No Son	18.2	70,281	17.1	55,237
1 Son	46.6	1,79,864	46.3	1,50,021
2 Sons	28.5	1,10,106	29.9	96,709
3 & above Sons	6.8	26,082	6.8	21,842
Demand Satisfied				
No	25.9	99,898		
Yes	74.1	2,86,434		
Demand Satisfied by sources				
Not satisfied			14.5	47,052
mDFPS by Public			57.7	186,693
mDFPS by Private			21.7	70,290
mDFPS by Other			6.1	19,774
Exposure of Mass media				
Exposure of FP messages (last few months)				
Heard of FP on radio				
No	84.5	3,26,327	84.1	2,72,153
Yes	15.5	60,005	16.0	51,656
Heard of FP on TV				
No	39.4	1,52,237	39.3	1,27,398
Yes	60.6	2,34,095	60.7	1,96,411
Heard of FP in Newspaper/magazine				
No	65.8	2,54,095	65.5	2,12,178
Yes	34.2	1,32,237	34.5	1,11,631
Heard of FP on wall painting or hoarding				
No	43.7	1,68,694	43.7	1,41,359
Yes	56.3	2,17,638	56.4	1,82,450
Heard of FP on internet				
No	72.7	2,80,837	73.3	2,37,347
Yes	27.3	1,05,495	26.7	86,462
Mass Media Exposure (Electronic & Print)				
Reading Newspaper				
Not at all	70.3	2,71,740	70.0	2,26,650
Less than once a week	16.9	65,351	16.9	54,809
At least once a week	12.8	49,242	13.1	42,351
Listening radio				
Not at all	87.6	3,38,453	87.3	2,82,758
Less than once a week	8.6	33,352	8.8	28,477
At least once a week	3.8	14,527	3.9	12,574
Watching Television				
Not at all	26.6	1,02,601	25.8	83,373
Less than once a week	19.9	77,041	19.9	64,440
At least once a week	53.5	2,06,690	54.4	1,75,996
Total	**100.0**	**N=3,86,332**	**100.0**	**N=3,23,809**

Table 2 shows the degrees of mass media exposure of the women with available samples for mDFPS and women whose sources for mDFPS were available according to the different combinations of exposure to FP messages and electronic & print media in India. The degrees of mass media exposure result from both available information for

mDFPS and mDFPS by sources of contraception, suggesting that the proportion of all the degrees of exposure was almost the same in every case. The results revealed that more than three-fourths (75.5%) of women were exposed to any FP messages. About 30% of women were exposed to FP messages through other than electronic media (wall painting, newspaper), 6.5% were exposed to all FP messages, and 7.7% were exposed to FP messages through electronic media (radio, TV, and internet). Concerning media exposure (electronic & print), it was found that 23.5% of women were not exposed to any mass media, and more than half (56.3%) of them accessed mass media weekly. Furthermore, results suggested that only 1.6% of women were weekly exposed to all mass media. In the case of exposure of TV & radio, only 0.9% of women had weekly exposure to radio & TV. Lastly, 7.3% of women had weekly exposure to TV & newspapers.

Level of demand for family planning satisfaction by modern methods (mDFPS) by the characteristics of the women in India

Table 3 shows the level of mDFPS by sociodemographic characteristics of currently married women in India. All results were statistically significant with the mDFPS. The results showed that higher levels of mDFPS among women with two sons (82.7%), higher-aged women (35-49) (82.4%), with three parities (81.3%), other religions (78.5%), primary-educated (78.1%), middle and richer wealth class (76.4% and 76.2%), Scheduled Tribe (ST) and Scheduled Caste (SC) (74.8%) women. In contrast, women aged 15-24 (51.4%), women with no sons (60.3%), and Muslim religion (65.8%) had a lower level of mDFPS.

Table 2 Degrees of mass media exposure by different combinations of exposure of FP messages and media among currently married women in India, NFHS-5 (2019-21)

Degrees of Mass Media Exposure	Women with available samples for mDFPS		Women whose sources for mDFPS are available	
	(%)	n	(%)	n
Exposure of FP Messages				
Not Exposed	24.5	94,701	24.6	79,520
Any exposure	75.5	2,91,631	75.4	2,44,289
All exposure	6.5	24,992	6.6	21,346
Electronic media (Radio, Television & Internet)	7.7	29,754	7.8	25,282
Other than electronic media (Newspaper & hording or wall)	29.6	1,14,385	29.8	96,448
Hording or wall & TV	43.7	1,68,978	43.8	1,41,914
Media Exposure (Electronic & Print)				
Not Exposed	23.5	90,917	22.8	73,785
Any Exposure				
Less than once a week	20.2	78,037	20.0	64,892
At least once a week	56.3	2,17,377	57.2	1,85,132
All exposure				
Less than once a week	1.1	4,249	1.1	3,685
At least once a week	1.6	6,242	1.7	5,408
Exposure of radio & TV				
Less than once a week	1.4	5,308	1.4	4,474
At least once a week	0.9	3,386	0.9	3,018
Exposure of TV & newspaper				
Less than once a week	3.3	12,840	3.3	10,670
At least once a week	7.3	28,182	7.5	24,140

The regionwide results showed that the South region (87.4%) women had the highest level of mDFPS, and the Northeast region (60.6%) had the lowest mDFPS level. Furthermore, in the case of exposure to FP messages and media exposure, the mass media exposure of FP showed that those women who heard FP messages on the radio revealed a higher level (75.7%) of mDFPS, followed by those women who heard FP messages on TV (75.1%). In the case of electronic & print media, women with weekly exposure of watching TV (76.8%) had the highest level of mDFPS. Afterward, degrees of mass media exposure results suggest that Women exposed to any five messages (74.6%) and other than electronic media (74.5%) had significantly higher levels of mDFPS. Furthermore, results for mass media exposure through electronic and print media suggest that women had higher mDFPS (76.7%) with exposure to any three mass media. Additionally, those women who were not exposed to all mass media had the lowest level (69.2%) of mDFPS, and women with weekly exposure to all media showed 76.6% of mDFPS, whereas those women weekly exposed to radio & TV (79.7%) showed the highest level of mDFPS.

Coming to the mDFPS by public and private sources, the results for the sociodemographic characteristics of women suggest that uneducated women (72.8%) had the highest mDFPS from public sources, followed by three and above sons (69.6%). However, women with 0 parity (15.6%), higher educated (26.8%), and younger women (31.5%) had the lowest mDFPS by public sources. In the case of mDFPS by private sources, higher educated (40%), richest (38%), and northeast region women (35.6%) showed the highest mDFPS, whereas scheduled tribe (10.6%), poorest (12.5%), and uneducated (12.7%) women had the lowest mDFPS. Degrees of Mass media exposure results suggest that the women who were not exposed of all three FP messages and exposure of radio & TV at least once a week showed the highest mDFPS, each 62.5% by the public sources. Furthermore, women with exposure to TV & newspapers (38.4%) and exposure to all three media (32.1%) had the highest mDFPS from private sources.

Table 3 Level of total mDFPS and mDFPS by public and private sources with background characteristics of women, with family planning messages, and media exposures in India, NFHS-5 (2019-21)

Characteristics	mDFPS (%)		
	Total	Public Sources	Private sources
Residence* **			
Urban	75.3	47.4	31.8
Rural	73.6	62.5	17.0
Age (Years) * **			
15-24	51.4	31.5	18.9
25-34	71.1	52.1	23.1
35-49	82.4	67.9	21.3
Education* **			
No Education	77.7	72.8	12.7
Primary	78.1	68.1	16.0
Secondary	72.6	53.0	24.4
Higher	67.1	26.8	40.0
Religion* **			
Hindu	75.4	59.9	20.7
Muslim	65.8	43.6	27.2
Christian	75.5	55.2	27.1

Sikh	69.3	48.3	24.6
Others	78.5	57.6	25.9
Caste* **			
Scheduled Caste	74.8	63.9	16.5
Scheduled Tribe	74.8	71.6	10.6
Other Backward Class	74.5	57.9	21.7
Others	72.4	47.2	29.8
Wealth Status* **			
Poorest	68.9	64.4	12.5
Poorer	73.3	65.3	14.7
Middle	76.4	64.4	17.7
Richer	76.2	56.6	24.0
Richest	75.3	38.8	38.0
Regions* **			
North	74.4	58.8	18.3
Central	67.2	55.3	15.5
East	68.1	54.1	23.7
Northeast	60.6	39.4	35.6
West	79.8	58.1	23.5
South	87.4	64.7	24.8
Parity* **			
0	44.7	15.6	22.9
1	55.8	31.2	26.9
2	79.2	58.6	24.8
3	81.3	68.7	17.9
4 & above	75.6	69.0	15.3
Number of Sons* **			
No Son	60.3	37.5	25.3
1 Son	73.9	56.0	23.2
2 Sons	82.7	69.1	18.7
3 & above Sons	77	69.6	15.9
Exposure of FP messages (last few months)			
Heard of FP on radio*			
No	73.9	58.0	21.6
Yes	75.7	56.1	22.5
Heard of FP on TV*			
No	72.6	61.6	17.3
Yes	75.1	55.1	24.6
Heard of FP in Newspaper/magazine*			
No	74	62.4	18.0
Yes	74.5	48.6	28.8
Heard of FP on wall painting or hoarding*			
No	73.4	60.6	18.5
Yes	74.7	55.4	24.2
Heard of FP on internet*			
No	75.4	62.5	19.1
Yes	70.9	44.3	28.8
Mass Media Exposure (Electronic & Print)			
Frequency of reading Newspaper*			
Not at all	74.0	62.8	17.4
Less than once a week	73.2	48.7	28.2
At least once a week	76.0	41.5	36.5
Frequency of listening radio*			
Not at all	73.9	58.2	21.2
Less than once a week	75.2	54.2	24.6
At least once a week	76.6	53.9	25.9
Frequency of watching Television*			
Not at all	68.9	61.2	14.8
Less than once a week	73.9	59.0	20.2
At least once a week	76.8	55.5	25.5
Degrees of Mass Media Exposure			

Exposure of FP Messages			
Not Exposed***	72.7	62.5	16.5
Any exposure****	74.6	56.1	23.4
All exposure	74.2	48.1	26.9
Electronic media (Radio, Television & Internet)	73.3	48.3	26.4
Other than electronic media (Newspaper & hording or wall) **	74.5	48.6	28.9
Hording or wall & TV	75.3	53.6	25.9
Media Exposure (Electronic & Print)			
Not Exposed*	69.2	62.5	14.0
Any Exposure*			
Less than once a week	72.9	59.3	19.0
At least once a week	76.7	55.1	25.7
All exposure*			
Less than once a week	73.7	52.9	23.0
At least once a week	76.6	47.2	32.1
Exposure of radio & TV*			
Less than once a week	74.1	63.6	15.6
At least once a week	79.7	62.6	19.1
Exposure of Television & newspaper*			
Less than once a week	71.6	45.9	28.9
At least once a week	76.5	39.9	38.4
Total	**74.1**	**57.7**	**21.7**

Note: ****p<0.001, **p<0.001 and *p<0.05*

Variation in the equity of mDFPS according to the FP messages and media exposure

Table 4 shows the variation in the equity of mDFPS according to FP messages and media exposure levels. All the factors of mass media exposure of FP and media exposure were statistically significant. The overall results showed that women with any mass media exposure through electronic & print media were more equitable in mDFPS with a CI value of 0.00256 than those with any mass media exposure with FP messages with a CI value of 0.01527. The results of the CI showed that those women who had exposure to watching TV had a higher level of equity with a CI value of 0.00146 in mDFPS, followed by those women who heard of FP messages on TV with a CI value of 0.00979 in mDFPS. Among the exposed FP messages, those women who heard FP messages on the radio had higher inequity in mDFPS with a CI value of 0.02180, followed by those who heard on the internet with a CI value of 0.01826. Regarding media exposure, those women listening to the radio had a higher level of inequity in mDFPS with a CI value of 0.02341. This showed that women exposed to radio for FP messages and listening to radio were highly inequitable in mDFPS.

Approaching the degrees of mass media exposure, among those exposed to FP messages, results showed that any exposure of FP messages had a lower CI (0.01527) and equity gap (5.91) and higher equity ratio (0.9218), describing more equitable in mDFPS. In contrast, women exposed to FP messages through other than electronic media have a higher equity gap (7.21), and a lower equity ratio (0.9054) describes the lower equity in mDFPS. Additionally, in the case of media exposure, the women with exposure to media suggest that women with any exposure to media were significantly more equitable in mDFPS with lower CI (0.00256), equity gap (1.48), and equity ratio (0.9805). However, women with all exposure to media suggest lower equity in mDFPS with CI (0.02465), equity gap (8.89), and

equity ratio (0.8874). Exposure of any two media indicates that women exposed to radio & TV were more equitable in mDFPS, followed by those exposed to newspaper & TV.

Wealth-related variation in the equity of demand satisfied by sources according to the FP messages and media exposure

Table 5 shows the wealth-related variation in the equity of demand satisfied by public and private sources of contraception with women's exposure of FP messages and media exposures in India. Results suggest that women from the lower wealth quintile who heard FP on wall painting (64.9%), TV (64.5%), and radio (63.1%) were satisfied mainly by public sources, whereas women of the lower wealth quintile who heard FP in newspapers/magazines (14%) were highly satisfied by private sources. However, women of higher wealth status who heard FP on the radio (39.7%) were highly satisfied by public sources, while women of higher wealth status who heard FP in newspapers/magazines (41.4%) were highly satisfied by private sources. The equity results suggest that women exposed to FP messages showed higher equity among those who heard FP messages on the radio with an equity ratio (ER)=1.59, and ER=0.32 for public and private sources, and higher inequity among those who heard FP on the internet. Results for weekly media exposure suggest that lower wealth quintile women who watched TV (69.3%) were highly satisfied with public sources, while those reading newspapers (14.1%) were more satisfied with private sources. The equity results indicated that those women listening to the radio had higher equity (ER=1.71) for public sources, and those women reading newspapers (ER=0.30) had higher equity for private sources.

Concerning degrees of mass media exposure, women with the lowest wealth status and having all exposure to mass media (75.3%) were highly demand-satisfied by public sources. However, women with the highest wealth status and exposure to TV & newspapers (47.6%) were highly demand-satisfied from private sources. The equity results among those exposed to mass media suggest that women exposed to radio & TV (ER=1.62) had higher equity from public sources, whereas women exposed to radio & TV and TV & newspapers (ER=0.28) showed higher equity in mDFPS from private sources.

Education-related variation in the equity of demand satisfied by sources according to the FP messages and media exposure

Table 6 shows the education-related variation in the demand satisfied by public and private sources. Concerning not educated women; this group of women is always lacking in every aspect of society. Therefore, there is a need to select a better comparison group for mDFPS by sources of contraceptives. Overall results suggest that primary educated women (68%) mainly had higher mDFPS from public sources, and higher educated women (40%) mainly had higher mDFPS from private sources. Concerning mass media exposure, results suggest that primarily educated women (70.8%) who watched television were highly demand-satisfied with public sources. Concerning mass media exposure, results suggest that primarily educated women (70.8%) who watched television were highly demand-satisfied with public sources, whereas higher-educated women reading newspapers (46.8%) were highly satisfied with private sources.

Table 4 Variation in the equity of demand satisfied according to the level of family planning messages and media exposures in India, NFHS-5 (2019-21)

Covariates	mDFPS (Q5)	mDFPS (Q1)	Concentration Inex	Standard Error	Equity gap	Equity ratio	p-value
Mass media Exposure of FP							
Heard of FP on the radio	77.5	69.5	0.0218	0.0014	7.98	0.897	
Heard of FP on TV	75.9	71.0	0.00979	0.0007	4.88	0.9357	
Heard of FP in Newspaper/magazine	76.2	68.6	0.01606	0.001	7.57	0.9006	<0.001
Heard of FP on wall painting or hoarding	75.9	69.1	0.01709	0.0008	6.79	0.9106	
Heard of FP on the internet	73.8	66.6	0.01826	0.0012	7.25	0.9018	
Media Exposure (At least once a week)							
Frequency of reading Newspaper	77.2	67.5	0.01476	0.0017	9.68	0.8745	
Frequency of listening to radio	78.7	71.0	0.02341	0.0029	7.72	0.9019	<0.001
Frequency of watching Television	75.9	74.8	0.00146	0.0008	1.03	0.9864	
Degrees of Mass Media Exposure							
Exposure of FP Messages							
Not Exposed	73.1	67.9	0.02766	0.0012	5.2	0.9289	<0.001
Any Exposure	75.6	69.7	0.01527	0.0007	5.91	0.9218	<0.001
All Exposure	75.3	69.2	0.02331	0.0023	6.16	0.9182	<0.001
Electronic media (TV, radio & internet)	76.1	69.1	0.02081	0.0021	6.97	0.9084	<0.001
Other than electronic media (wall painting & newspaper/magazine	76.2	69.0	0.01612	0.0011	7.21	0.9054	<0.001
Hording or wall & TV	76.2	70.4	0.01073	0.0009	5.84	0.9233	<0.001
Mass Media exposure (at least once a week)							
Not exposed	69.6	69.1	0.02091	0.0013	0.51	0.9927	<0.001
Any Exposure	75.9	74.4	0.00256	0.0007	1.48	0.9805	0.005
All Exposure	78.9	70.0	0.02465	0.0046	8.89	0.8874	<0.001
Exposure of radio & TV	78.5	73.7	0.00932	0.0053	4.79	0.9390	<0.001
Exposure of TV & newspaper	77.1	66.7	0.00835	0.0022	10.4	0.8650	<0.001
Total	**75.3**	**68.9**	**0.01949**	**0.0006**	**6.43**	**0.9146**	**<0.001**

Note: mDFPS= demand for family planning satisfied by modern methods, Q1=poorest quintile, Q5= richest quintile,

Now, concerning the degrees of mass media exposure, results suggest that primary educated women with all the exposure to media (76.6%) were highly demand-satisfied with the public sources, whereas higher educated women with exposure to TV & radio (48.7%) were highly demand-satisfied from the private sources.

Caste-related variation in the equity of demand satisfied by sources according to the FP messages and media exposure

Table 7 presents the caste-relate variation in the prevalence of mDFPS from public and private sources with exposure of FP messages and media in India. The result suggests that ST women had the highest access of mDFPS from public sources (71.6%), whereas other caste women had the highest mDFPS from private sources (29.8%). Concerning the mass media exposure of women, the results suggest that ST women (70.1%) who heard FP on wall painting or hoarding had the highest mDFPS from the public sources, whereas other castes (44.8%) women with exposure of reading newspapers had the highest mDFPS from private sources. Afterward, regarding degrees of mass media exposure, among the exposed group of women, ST women (77.3%) with exposure of radio & TV had the highest mDFPS from public sources, while other caste (46.9%) women with exposure to TV & newspaper had the highest mDFPS from the private sources.

Discussion

This study highlights the variation in equity of demand satisfied as per mass media exposures among currently married in India. The findings of this study suggest that around three-fourths (74%) of women had the demand for family planning satisfied by modern methods (mDFPS), and about two-thirds (58%) and more than one-fifth (22%) of women were demand satisfied by public and private sources, respectively. The mDFPS is covered by intervention indicators among the 100 core health indicators defined by the WHO (WHO, 2015). Studies conducted by Hellwig et al. (2019) and Gichangi et al. (2021) showed that the use of modern methods significantly increased the mDFPS. India (74.1%) is close to achieving the 75% target for mDFPS to achieve equality for the fifth SDGs (UNDP, 2017).

The findings of this study showed that urban, educated, middle-class, and women with parity three had higher levels of mDFPS. This is consistent with previous research by Gichangi et al. (2021) and Zegeye et al. (2021), which suggest that women living in urban areas, higher educated, wealthy, and exposed to mass media had higher mDFPS. Primary educated women were more likely to use modern contraceptives, which leads to higher mDFPS; this recommendation is supported by an Ethiopian study (Hailegebreal et al., 2023). Furthermore, findings showed that after achieving the desired family size and number of sons, women often seek permanent solutions like sterilization from public sources (Anita, Nzabona & Tuyiragize, 2020).

Table 5 Wealth-related variation in the equity of demand satisfied by public and private sources with the level of FP messages and media exposures in India, NFHS-5 (2019-21)

Covariates	mDFPS (Q5)		mDFPS (Q1)		Equity gap (EG)		Equity ratio (ER)	
	Public	Private	Public	Private	Public	Private	Public	Private
Mass media Exposure of FP								
Heard of FP on the radio***	39.7	37.8	63.1	12.0	-23.5	25.8	1.59	0.32
Heard of FP on TV***	38.0	39.0	64.5	13.9	-26.6	25.1	1.70	0.36
Heard of FP in Newspaper/magazine***	34.2	41.9	60.6	14.0	-26.4	27.9	1.77	0.33
Heard of FP on wall painting or hoarding***	37.5	39.4	64.9	13.1	-27.4	26.3	1.73	0.33
Heard of FP on the internet***	31.6	41.4	57.5	13.9	-25.8	27.5	1.82	0.34
Media Exposure (At least once a week)								
Frequency of reading Newspaper***	30.9	46.3	59.3	14.1	-28.4	32.2	1.92	0.30
Frequency of listening to radio***	38.8	39.4	66.2	12.7	-27.4	26.7	1.71	0.32
Frequency of watching Television***	37.8	39.5	69.3	12.5	-31.4	27.0	1.83	0.32
Degrees of Mass Media Exposure								
Exposure of FP Messages								
Not Exposed***	44.6	32.3	64.3	11.6	-19.7	20.7	1.44	0.36
Any Exposure***	38.1	38.7	64.5	13.3	-26.4	25.4	1.69	0.34
All Exposure***	35.6	39.5	59.9	12.3	-24.3	27.2	1.68	0.31
Electronic media (TV, radio & internet) ***	35.6	39.3	59.9	20.7	-24.3	26.4	1.68	0.33
Other than electronic media (wall painting & newspaper/magazine***	34.3	41.8	60.9	13.9	-26.6	27.9	1.78	0.33
Hording or wall & TV***	37.1	39.8	64.7	13.8	-27.7	26.1	1.75	0.35
Mass Media exposure (at least once a week)								
Not exposed***	50.0	22.4	63.4	12.1	-13.4	10.3	1.27	0.54
Any Exposure***	37.5	39.7	68.5	12.6	-31.0	27.0	1.83	0.32
All Exposure***	36.9	41.8	75.3	10.8	-38.3	31.0	2.04	0.26
Exposure of radio & TV***	42.2	36.1	68.3	10.3	-26.1	25.8	1.62	0.28
Exposure of TV & newspaper***	29.6	47.6	60.3	13.3	-30.6	34.3	2.03	0.28
Total	**38.8**	**38**	**64.4**	**12.5**	**-25.6**	**25.5**	**1.66**	**0.33**

Note: ***p<0.001, **p<0.01, *p<0.05

Table 6 Education-related variation in the demand satisfied by public and private sources with the level of FP messages and media exposures in India, NFHS-5 (2019-21)

Covariates	No education		Primary		Secondary		Higher	
	Public	Private	Public	Private	Public	Private	Public	Private
Mass media Exposure of FP								
Heard of FP on the radio***	70.2	12.6	68.5	15.7	57.4	21.7	30.3	39.2
Heard of FP on TV***	73.7	13.5	69.0	17.1	53.3	25.6	26.8	41.2
Heard of FP in Newspaper/magazine***	71.2	13.6	68.1	17.6	52.0	27.0	26.6	41.8
Heard of FP on wall painting or hoarding***	74.3	12.7	69.1	16.6	53.8	25.1	27.3	40.6
Heard of FP on the internet***	66.8	14.4	61.8	18.3	47.5	26.7	25.3	40.9
Media Exposure (At least once a week)								
Frequency of reading Newspaper***	71.7	18.0	69.1	18.1	51.0	30.6	25.1	46.8
Frequency of listening to radio***	73.8	11.5	66.7	16.8	58.1	23.0	30.1	42.8
Frequency of watching Television***	76.8	13.8	70.8	17.1	53.7	26.3	26.4	42.3
Degrees of Mass Media Exposure								
Exposure of FP Messages								
Not Exposed***	71.7	12.3	66.5	14.4	51.2	21.5	25.5	35.2
Any Exposure***	73.6	12.9	68.7	16.7	53.3	25.0	26.9	40.4
All Exposure***	69.7	12.0	65.5	15.1	53.9	22.6	29.3	40.1
Electronic media (TV, radio & internet) ***	67.9	12.8	63.6	16.5	52.9	23.1	29.1	39.7
Other than electronic media (wall painting & newspaper/magazine***	71.4	13.8	67.8	17.7	52.3	26.8	26.9	41.7
Hording or wall & TV***	74.0	13.6	69.4	17.2	53.6	25.9	27.1	41.4
Mass Media exposure (at least once a week)								
Not exposed***	69.3	12.0	62.5	14.7	49.6	17.7	27.3	23.3
Any Exposure***	76.7	13.7	70.8	17.1	53.6	26.3	26.3	42.2
All Exposure***	65.7	34.3	76.6	11.4	57.4	24.5	31.1	43.9
Exposure of radio & TV***	75.1	11.2	72.9	12.8	59.3	22.6	19.1	39.0
Exposure of TV & newspaper***	77.0	15.7	68.8	21.1	50.0	32.1	23.6	48.7
Total	**72.8**	**12.7**	**68.0**	**16.0**	**53.0**	**24.4**	**26.8**	**40.0**

Note: ***p<0.001, **p<0.01, *p<0.05

Table 7 Caste-wise variation in the demand satisfied by public and private sources with the level of FP messages and media exposures in India, NFHS-5 (2019-21)

Covariates	Scheduled Caste		Schedule Tribe		OBC		Others	
	Public	Private	Public	Private	Public	Private	Public	Private
Mass media Exposure of FP								
Heard of FP on the radio***	63.5	16.4	68.9	12.2	56.0	22.5	46.1	30.2
Heard of FP on TV***	62.0	18.8	68.8	13.8	56.3	23.8	44.8	32.7
Heard of FP in Newspaper/magazine***	55.8	22.3	61.2	17.4	50.5	27.4	39.0	36.7
Heard of FP on wall painting or hoarding***	62.0	18.4	70.1	12.6	56.3	23.7	44.5	32.5
Heard of FP on the internet***	50.7	23.0	58.5	17.7	46.3	26.6	35.1	36.9
Media Exposure (At least once a week)								
Frequency of reading Newspaper***	52.4	26.9	50.7	23.4	45.0	34.2	31.5	44.8
Frequency of listening to radio***	61.2	18.3	69.1	11.7	55.0	25.5	43.4	34.8
Frequency of watching Television***	63.2	19.1	68.5	14.8	57.2	24.9	43.9	34.1
Degrees of Mass Media Exposure								
Exposure of FP Messages								
Not Exposed***	67.2	12.7	73.9	7.5	61.5	17.8	54.1	22.0
Any Exposure***	62.6	18.0	70.5	12.1	56.8	22.9	45.5	31.7
All Exposure***	54.9	20.5	59.9	18.7	49.7	25.0	39.1	34.2
Electronic media (TV, radio & internet) ***	55.3	20.4	58.6	17.4	49.6	24.7	39.5	33.8
Other than electronic media (wall painting & newspaper/magazine) ***	55.6	22.4	61.6	17.8	50.4	27.5	39.0	36.5
Hording or wall & TV***	60.8	19.6	67.3	15.2	55.1	24.9	43.1	34.0
Mass Media exposure (at least once a week)								
Not exposed***	65.5	11.8	75.8	5.9	60.4	14.8	55.4	18.7
Any Exposure***	63.0	19.2	67.9	14.8	56.8	25.1	43.7	34.2
All Exposure***	58.6	20.3	57.6	19.0	49.6	30.6	36.6	40.8
Exposure of radio & TV***	64.0	16.6	77.3	6.6	64.2	19.6	51.4	25.1
Exposure of TV & newspaper***	50.1	29.2	50.3	26.5	44.1	35.5	29.3	46.9
Total	**63.9**	**16.5**	**71.6**	**10.6**	**57.9**	**21.7**	**47.2**	**29.8**

Note: ***p<0.001, **p<0.01, *p<0.05

These women in India mainly access public sources for contraceptive information due to free or low-cost services. The northeast region, educated and wealthy women have better access to contraceptive information and are more likely to consult with private consultants for reproductive health and contraceptive use (Asamoah, Agardh & Östergren, 2013; Assaf, Wang, & Mallick. 2016). Mass media plays a crucial role in public health prevention and control, with studies showing that South and Southeast Asian women better understand modern methods (Majumder & Ram, 2015; Bakht et al., 2013). Studies from India, Myanmar, the Philippines, Ethiopia, and Nigeria also suggest that women who watch weekly TV had a higher mDFPS, while internet-based FP messages led to lower mDFPS (Sahoo, 2007; Das et al., 2021; Majumder & Ram, 2015; Tsehay, Zegeye & Yilma, 2017; Bakht et al., 2013; Konkor et al., 2019; Babaloa, Figueroa & Krenn, 2017). India's internet usage has surged in recent decades, leading to the rise of digital health interventions. However, exposure to digital FP messages was negatively associated (Okunlola et al., 2023).

Degrees of mass media exposure by FP messages and media exposure suggest that women with weekly exposure to radio and TV have the highest levels of mDFPS (Ghosh et al., 2021) and higher mDFPS from public sources, while those exposed to electronic media for FP messages have the lowest levels of mDFPS. Women exposed to TV and newspapers had the highest mDFPS from private sources because women with higher education and wealth have access to contraceptives from private sources without privacy breaches. The study indicates that digital media users were more comfortable sharing FP information without compromising privacy (Zinke-Allmang et al., 2022).

The equity results significantly revealed that women with media exposure exhibit higher equity in mDFPS than those exposed to FP messages. No other studies have been found that make a difference in mDFPS based on mass media exposure by FP messages and mainstream media in India. Mainly, women exposed to watching TV showed higher equity in mDFPS. Afterward, a combination of any media and combination of any exposure to FP messages showed higher equity in mDFPS. Moreover, those exposed to reading newspapers and hearing FP messages on the radio and exposed to other than electronic media showed higher inequity in mDFPS. A comparative study by Das et al. (2021) suggests that media exposure significantly had higher odds of mDFPS in Myanmar and the Philippines. The study conducted by Rogers, Snyder & Rego (2021) indicates that mass media-delivered FP campaigns positively affect the behavior of FP methods. Wealth-related variation in the equity of mDFPS suggests that women exposed to FP messages showed higher equity among those who heard FP messages on the radio and higher inequity among those who heard FP on wall paintings/magazines. The equity results among mass media exposure suggest that women exposed to radio & TV had higher equity in mDFPS from public and private. A study examining family planning levels and inequalities across 57 low- and middle-income countries found that women from the richest quintile relied more on private sources for mDFPS than the poorest women (Campbell et al., 2016). The widespread accessibility of radio and television across all wealth classes in India, including the poorest and richest, has significantly enhanced

women's access to family planning information, highlighting the critical role of mass media exposure in bridging information gaps.

Higher-educated women generally have greater equity in accessing family planning methods and mDFPS from private sources, while uneducated and primary-educated women have lower equity. Our study findings suggest that mostly uneducated and primary educated women who watched TV had higher mDFPS by public sources, and highly educated women reading newspapers had higher mDFPS by private sources. The study on inequalities in mDFPS for India suggests that women with no education had higher demand for mDFPs than educated women (Sreeramareddy, Acharya & Tiwari, 2022) and higher educated women have higher information related to contraceptives used, resulting in higher mDFPS (Asamoah, Agardh & Östergren, 2013; Assaf, Wang, & Mallick. 2016). Caste-related variation in mDFPS by public and private sources according to mass media exposure has not been studied before. One study conducted in India, considering the only reversible methods of modern contraception, suggested caste as a positive contributing factor (Ghosh et al., 2021). However, our study findings indicate that other caste women have the highest mDFPS by private sources, and ST women have the highest mDFPS by public sources. The findings suggest that ST women who heard FP messages on wall painting or hoarding exposure to radio & TV have higher mDFPS with public sources. Evidence indicates that ST women, primarily poor and uneducated, have limited knowledge about family planning (Prusty, 2014). Therefore, public sources are the only option to reach and access their desired contraceptives (Ajaero et al., 2016).

Conclusion

The findings of this study reveal a significant variation in the equity of total mDFPS and mDFPS from public and private sources with exposure to mass media in India. Media exposure was crucial in improving the mDFPS, particularly TV & radio. Women exposed to FP messages and media were crucial in improving the mDFPS from public sources, and exposure to TV & radio, reading newspapers predicted higher mDFPS from private sources. Women exposed to any media with FP messages showed higher equity in mDFPS. Women exposed to radio & TV had higher equity from public sources, and women exposed to TV & newspapers had the highest equity in mDFPS from private sources. Variation in equity of mDFPS recommended that lowest wealth status, primary educated and ST women who watched TV and heard FP messages on wall paintings or hording had higher mDFPS from public sources, and the highest wealth status, higher educated and other caste women with exposure to TV & newspapers had the highest mDFPS from private sources. These findings emphasize the importance of considering media exposure and targeting interventions to ensure equitable access to FP services among diverse demographic groups in India. Addressing these inequities is crucial for ensuring fair access to FP services for all.

Conflict of Interest

The authors declare that they have no competing interests.

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References

Adedini, S. A., Omisakin, O. A., & Somefun, O. D. (2019). Trends, patterns and determinants of long-acting reversible methods of contraception among women in sub-Saharan Africa. *PloS one*, *14*(6), e0217574.

Ajaero, C. K., Odimegwu, C., Ajaero, I. D., & Nwachukwu, C. A. (2016). Access to mass media messages, and use of family planning in Nigeria: a spatio-demographic analysis from the 2013 DHS. *BMC public health*, *16*(1), 1-10.

Anita, P., Nzabona, A., & Tuyiragize, R. (2020). Determinants of female sterilization method uptake among women of reproductive age group in Uganda. *Contraception and reproductive medicine*, *5*, 1-10.

Asamoah, B. O., Agardh, A., & Östergren, P. O. (2013). Inequality in fertility rate and modern contraceptive use among Ghanaian women from 1988–2008. *International journal for equity in health*, *12*, 1-12.

Assaf, Shireen, Wenjuan Wang, and Lindsay Mallick. 2016. "Provider Counseling and Knowledge Transfer in Health Facilities of Haiti, Malawi and Senegal." *DHS Analytical Studies No. 60*. Rockville, MD: ICF International. https://dhsprogram.com/pubs/pdf/AS60/AS60.pdf

Babalola, S., Figueroa, M. E., & Krenn, S. (2017). Association of mass media communication with contraceptive use in Sub-Saharan Africa: a meta-analysis of Demographic and Health Surveys. *Journal of health communication*, *22*(11), 885-895.

Bakht, M. B., Arif, Z., Zafar, S., & Nawaz, M. A. (2013). Influence of media on contraceptive use: a cross-sectional study in four Asian countries. *J Ayub Med Coll Abbottabad*, *25*(3-4), 3-8.

Campbell, O. M., Benova, L., MacLeod, D., Baggaley, R. F., Rodrigues, L. C., Hanson, K., ... & Goodman, C. (2016). Family planning, antenatal and delivery care: cross-sectional survey evidence on levels of coverage and inequalities by public and private sector in 57 low-and middle-income countries. *Tropical medicine & international health*, *21*(4), 486-503.

Das, P., Samad, N., Al Banna, H., Sodunke, T. E., Hagan, J. E., Ahinkorah, B. O., & Seidu, A. A. (2021). Association between media exposure and family planning in Myanmar and Philippines: evidence from nationally representative survey data. *Contraception and reproductive medicine*, *6*(1), 1-12.

Ewerling, F., Victora, C. G., Raj, A., Coll, C. V., Hellwig, F., & Barros, A. J. (2018). Demand for family planning satisfied with modern methods among sexually active women in low-and middle-income countries: who is lagging behind?. *Reproductive health*, *15*(1), 1-10.

Ghosh, R., Mozumdar, A., Chattopadhyay, A., & Acharya, R. (2021). Mass media exposure and use of reversible modern contraceptives among married women in India: An analysis of the NFHS 2015–16 data. *PLOS ONE*, *16*(7), e0254400.

Gichangi, P., Waithaka, M., Thiongo, M., Agwanda, A., Radloff, S., Tsui, A., ... & Temmerman, M. (2021). Demand satisfied by modern contraceptive among married women of reproductive age in Kenya. *PloS one*, *16*(4), e0248393.

Hailegebreal, S., Dileba Kale, T., Gilano, G., Haile, Y., & Endale Simegn, A. (2023). Modern contraceptive use and associated factors among reproductive-age women in Ethiopia: multilevel analysis evidence from 2019 Ethiopia mini demographic and health survey. *The Journal of Maternal-Fetal & Neonatal Medicine*, *36*(2).

Hellwig, F., Coll, C. V., Ewerling, F., & Barros, A. J. (2019). Time trends in demand for family planning satisfied: analysis of 73 countries using national health surveys over a 24-year period. *Journal of global health*, *9*(2).

Hosseinpoor, A. R., Bergen, N., Barros, A. J., Wong, K. L., Boerma, T., & Victora, C. G.

(2016). Monitoring subnational regional inequalities in health: measurement approaches and challenges. *International journal for equity in health*, *15*, 1-13.

International Institute for Population Sciences (IIPS) and ICF. 2017. *National Family Health Survey (NFHS-4), 2015-16: India*. Mumbai: IIPS.

International Institute for Population Sciences (IIPS) and ICF. 2021. *National Family Health Survey (NFHS-5), 2019-21: India*. Mumbai: IIPS.

Khandeparkar, K., Roy, P., & Motiani, M. (2015). The effect of media exposure on contraceptive adoption across "poverty line". *International Journal of Pharmaceutical and Healthcare Marketing*.

Konkor, I., Sano, Y., Antabe, R., Kansanga, M., & Luginaah, I. (2019). Exposure to mass media family planning messages among post-delivery women in Nigeria: testing the structural influence model of health communication. *The European Journal of Contraception & Reproductive Health Care*, *24*(1), 18-23.

Kulkarni, M. S. (2003). Exposure to mass media and its impact on the use of family planning methods by women in Goa. *Health Popul Perspect Issues*, *26*(2), 87-93.

Madsen E.L., Greenbaum C. (2018) Family planning equity among youth: Where are we now? *Washington, DC: Population Reference Bureau*.

Majumder, N., & Ram, F. (2015). Contraceptive use among poor and non-poor in Asian countries: a comparative study. *Social Science Spectrum*, *1*(2), 87-105.

Meekers, D., Van Rossem, R., Silva, M., & Koleros, A. (2007). The reach and effect of radio communication campaigns on condom use in Malawi. *Studies in family planning*, *38*(2), 113-120.

O'Donnell, O., O'Neill, S., Van Ourti, T., & Walsh, B. (2016). Conindex: estimation of concentration indices. *The Stata Journal*, *16*(1), 112-138.

Okunlola, D. A., Alawode, O. A., Awoleye, A. F., & Ilesanmi, B. B. (2023). Internet use, exposure to digital family planning messages, and sexual agency among partnered women in Northern Nigeria: implications for digital family planning intervention. *Sexual and Reproductive Health Matters*, *31*(4), 2261681.

Prusty, R. K. (2014). Use of contraceptives and unmet need for family planning among tribal women in India and selected hilly states. *Journal of health, population, and nutrition*, *32*(2), 342.

Retherford, R. D., & Mishra, V. K. (1997). Media exposure increases contraceptive use.

Rogers, D., Snyder, L. B., & Rego, M. (2021). The impact of mass media-delivered family planning campaigns in low-and middle-income countries: a meta-analysis of advertising and entertainment-education format effects. *Studies in Family Planning*, *52*(4), 439-465.

Ross, J. (2015). Improved reproductive health equity between the poor and the rich: an analysis of trends in 46 low-and middle-income countries. *Global Health: Science and Practice*, *3*(3), 419-445.

Sahoo, H. (2007). Determinants of contraceptive use in Orissa: an analysis from national family health survey III. *Health Popul Perspect Issues*, *30*(3), 208-21.

Sreeramareddy, C. T., Acharya, K., & Tiwari, I. (2022). Inequalities in demand satisfied with modern methods of family planning among women aged 15–49 years: a secondary data analysis of Demographic and Health Surveys of six South Asian countries. *BMJ open*, *12*(6), e049630.

Tsehay, A. K., Zegeye, D. T., & Yilma, T. M. (2017). Impact of mass media exposure on family planning: analysis of the Ethiopian demography and health survey. *Journal of*

Public Health in Developing Countries, *3*(2), 405-412.

United Nations (2016). Family Planning 2020 Washington, DC: United Nations Foundation. Available from: http://www.familyplanning2020.org/

United Nations Development Programme (2017). Sustainable Development Goals. Shttps://www.undp.org/sustainable-development-goals/gender-equality

World Health Organization (WHO) (2015). Global reference list of 100 core health indicators. WHO. 2015. https://www.who.int/healthinfo/indicators/2018.

Zegeye, B., Ahinkorah, B. O., Idriss-Wheeler, D., Olorunsaiye, C. Z., Adjei, N. K., & Yaya, S. (2021). Modern contraceptive utilization and its associated factors among married women in Senegal: a multilevel analysis. *BMC Public Health*, *21*, 1-13.

Zinke-Allmang, A., Hassan, R., Bhatia, A., Gorur, K., Shipow, A., Ogolla, C., ... & Cislaghi, B. (2022). Use of digital media for family planning information by women and their social networks in Kenya: A qualitative study in peri-urban Nairobi. Frontiers in sociology, 7, 886548.