

# BMJ Open 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

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## ABSTRACT

**Objective** To estimate educational and wealth inequalities in demand satisfied with modern methods of family planning (mDFPS).

**Design** A secondary data analyses of Demographic and Health Surveys.

**Setting** Six South Asian countries, Afghanistan (2015), Bangladesh (2014), India (2015–2016), Maldives (2016–2017), Nepal (2016) and Pakistan (2017–2018).

**Participants** Women aged 15–49 years. Primary and secondary outcome measures mDFPS was defined as married women aged 15–49 years or their partners, who desired no child, no additional children or to postpone the next pregnancy and who are currently using any modern contraceptive method. We estimated weighted and age-standardised estimates of mDFPS. We calculated the slope index of inequality (SII) and relative index of inequality (RII) as the measures of socioeconomic inequalities.

**Results** A total of 782 639 women were surveyed. The response rate was 84.0% and above. The prevalence of mDFPS was below 50% in Maldives (22.8%, 95% CI 20.7 to 25.0), Pakistan (42.0%, 95% CI 39.9 to 44.0) and Afghanistan (39.1%, 95% CI 36.9 to 41.3), whereas Bangladesh had achieved 76% (75.8%, 95% CI 74.2 to 77.3). Both wealth and educational inequalities varied in magnitude and direction between the countries. Except in Nepal and Bangladesh, mDFPS wealth inequalities showed a trend of increasing mDFPS as we moved towards richer, and richest wealth quintiles that is, pro-poor (RII (0.5 to 0.9); SII (–4.9 to –23.0)). In India and Nepal, higher versus no education was in favour of no education (higher mDFPS among not educated women) (RII 1.1 and 1.4; SII 4.1 and 15.3, respectively) and reverse in other countries ((RII (0.4 to 0.8); SII (–10.5 to –30.3)). Afghanistan, Maldives and Pakistan fared badly in both educational and wealth inequalities among the countries.

**Conclusions** South Asia region still has a long way ahead towards achieving universal access to mDFPS. Diverse patterns of socioeconomic inequalities between the countries call for national governments and international development agencies to target the population subgroups for improving the mDFPS coverage.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Comparable age-standardised prevalence of demand satisfied nationally representative samples of women.
- ⇒ Both absolute and relative inequalities on demand satisfied with modern methods of family planning by wealth and educational attainment by robust estimation methods.
- ⇒ Unmarried young sexually active women in need of contraception were not surveyed.
- ⇒ In conservative Asian societies, family members' presence during the surveys would have led to under-reporting about the need for contraception.
- ⇒ Non-inclusion of fertility awareness methods in multinational surveys leads to underestimation of demand satisfied.

## INTRODUCTION

Optimal use of modern contraceptives prevents unintended pregnancies and induced and unsafe abortions and improves maternal and child health outcomes.<sup>1–3</sup> Family planning (FP) has non-health benefits such as better care for children, improved educational and economic opportunities for women, reduced poverty and better quality of life leading to improvement in women's health and well-being and socioeconomic development.<sup>4–6</sup> Sustainable Development Goals (SDGs) launched in 2015 by the United Nations have underscored the importance of reproductive health, gender equality and women's empowerment by providing access to voluntary and high-quality FP services to meet the reproductive rights of individuals and couples to achieve universal access to sexual and reproductive health, including FP with 'leaving no one behind' as its main feature.<sup>7</sup>



To achieve the objectives of the international development agenda of improving women's health, providing safe, effective and affordable modern contraceptive methods is critical.<sup>8</sup> Although contraceptive prevalence rates worldwide have risen, intracountry and intercountry disparities still exist in demand satisfied for FP.<sup>7,9–11</sup> Therefore, to ensure the health and well-being of women, it is imperative to achieve universal access to sexual and reproductive healthcare services including FP.<sup>12,13</sup> Identifying those who are left behind to improve availability, accessibility and coverage is critical to achieving international development agenda.<sup>7,8</sup> Indicators about coverage and prevalence of demand satisfied for modern contraceptive methods that are more effective in preventing pregnancies are increasingly reported as an attempt to monitor the progress.<sup>9,14</sup> Demand satisfied with modern methods of family planning (mDFPS) is the proportion of women who are currently using modern contraceptives among those who need it is a better indicator than 'unmet need' and 'contraceptive prevalence' since the denominator for mDFPS is 'sexually active women'.<sup>9,14</sup> Time trends and inequalities in mDFPS have been reported using Demographic and Health Surveys (DHS) and multiple indicator cluster surveys (MICS).<sup>9,10</sup> These cross-country analyses have identified which sociodemographic groups are 'lagging behind' and where these groups are located by geographic area/regions and type of residence (urban-rural).<sup>10</sup> Experts have called for an expansion of FP services to meet the increasing need for all those women including those not in marriage to achieve universal mDFPS by 2030.<sup>15</sup>

Despite the improvement in mDFPS worldwide during the past few decades,<sup>6,11</sup> the coverage is still low in certain pockets and population subgroups.<sup>9,10,14</sup> Several barriers exist to the lack of universal access and coverage of mDFPS.<sup>16,17</sup> Previous studies have reported that stigma and lack of information about contraceptive use, and social norms about early marriage for women followed soon by motherhood usually discourage women from adopting contraception.<sup>18–20</sup> Son preference,<sup>21</sup> fear about side effects, family and male disapproval of contraception

also deter women from adopting contraception.<sup>17</sup> In South Asia, overall contraception prevalence is 70%, and rich-poor inequality is narrower.<sup>9,10</sup> However, a diverse religious, and geopolitical context among the South Asian (SA) countries calls for a more granular examination of the differentials in mDFPS across the SA countries. Despite the diversity, all these countries share a similar development status and sociocultural milieu in terms of conservatism that still exists about sexual and reproductive health matters. Existing reports based on survey data have examined wealth-related inequalities only.<sup>10</sup> However, the wealth index measured is of the household, which does not necessarily indicate either women's wealth or autonomy or empowerment. Women's education and empowerment continue to be important drivers of mDFPS in low-income and middle-income countries (LMICs) where universal female education is non-existent.<sup>22</sup> To achieve the target of universal coverage in mDFPS, identifying low-coverage population subgroups and a more granular assessment of within-country disparities is essential to inform the national reproductive health programmes and international development agencies to programmes and policies to narrow the gaps in mDFPS using newly developed indicators of unmet need in 2012.<sup>23</sup> In this report, we provided granular disaggregation of mDFPS in six SA countries: Afghanistan, Bangladesh, India, Nepal, Maldives and Pakistan. For each country, we estimated the age-standardised prevalence of mDFPS, and absolute and relative inequalities in mDFPS using wealth and education as markers of inequality.

## METHODS

### Data source

The study sample was women in the reproductive age group (15–49 years) from the DHS that were available in Afghanistan (2015), Bangladesh (2014), India (2015–2016), Maldives (2016–2017), Nepal (2016) and Pakistan (2017–2018) (Table 1). DHS are a series of cross-sectional, nationally representative household surveys that collect reliable data on health and nutrition, health

**Table 1** Survey characteristics, sample size and responses rates for women of reproductive age, weighted and age-standardised estimates of demand satisfied in six South Asian countries of Demographic and Health Surveys (2014–2018) (n=782 639)

Country (survey year)	Sample surveyed	Response rate (%)	Number (%) of women* (unweighted)	Weighted prevalence (%; 95% CI)	Age-standardised prevalence (%; 95% CI)
Nepal 2016	12 862	98.3	7655 (59.5)	56.0 (54.5 to 58.1)	52.1 (50.0 to 54.2)
Bangladesh 2014	17 863	97.9	12 448 (69.7)	72.6 (71.2 to 74.0)	75.8 (74.2 to 77.3)
India 2015–2016	699 686	96.7	332 076 (47.5)	72.8 (72.5 to 73.1)	68.3 (67.9 to 68.7)
Maldives 2016–2017	7699	84.0	2788 (36.2)	29.4 (27.2 to 31.6)	22.8 (20.7 to 25.0)
Pakistan 2017–2018	15 068	94.3	6030 (40.0)	49.0 (47.1 to 50.9)	42.0 (39.9 to 44.0)
Afghanistan 2015	29 461	96.8	13 153 (44.6)	42.2 (40.1 to 44.3)	39.1 (36.9, to 1.3)

\*Number of women with demand satisfied for modern contraception.

services utilisation, health knowledge and behaviours, maternal and child health, fertility, FP, etc. DHS selects the households by a two-stage, stratified cluster sampling technique. Oversampling is done in less populated provinces. DHS sampling method identifies clusters from both urban and rural areas by probability proportional to size technique followed by a random selection of households from within the selected clusters. Thus, DHS samples are nationally representative, by urban/rural residence and at least one subnational regional/provincial level. Trained interviewers collect the data from all eligible men and women aged 15–49 years according to standard protocols on pretested questionnaires in local languages and their supervisors ensure that guidelines are strictly adhered to for quality control and minimising non-response. Full details of the methodology and country-level results are available in DHS programme website [dhsprogram.com](http://dhsprogram.com).<sup>24</sup>

### Variables

The main outcome variable mDFPS was defined as the per cent of reproductive age (WRA) (15–49 years) married women (or in union) or their partners who are currently using a modern contraceptive method at a given point in time. Women who were fecund but have no desire to become pregnant during the next 2 years or unsure about when to become pregnant and were currently in a mistimed or unwanted pregnancy were considered in the denominator. Women who had undergone hysterectomy, never menstruated, had last menstrual period >6 months ago, not in postpartum amenorrhoea, could not become pregnant, were married for 5 years or more, never used any contraception, and had no children in the last 5 years were considered infecund as were excluded.<sup>23</sup> Women using a traditional method are assumed to have an unmet need for modern contraception defined as any technological products or medical procedures that interfere with the natural reproduction process. These are oral contraceptive pills, condoms (male and female), intrauterine devices, male and female sterilisation (vasectomy and tubectomy respectively), hormonal methods (injectable, implants, patches), vaginal diaphragms (caps), spermicidal agents (foam/jelly) and emergency contraception.<sup>25</sup>

### Markers and measures of inequality

Based on the information on easy-to-collect data on socioeconomic variables and household possessions in the households' questionnaire wealth index is calculated. The wealth index includes the following items: type of flooring, refrigerator, water supply, type of vehicle, sanitation facilities, person per sleeping room, electricity, ownership of agricultural land, radio and television. Based on the scores generated by principal component analyses each household is classified under five quintiles where the first quintile represents the poorest 20% and the fifth quintile the wealthiest 20% of the households. This DHS method of household asset-based wealth index allows for cross-country comparison and time trends analyses across socioeconomic positions.<sup>26</sup> Based on the number of years

of schooling educational attainment was classified as 'no education' (0 years), 'primary' (1–5 years), 'secondary (6–10 years)' or 'higher (>10 years, university or vocational education after school)'.

Health inequalities measured across ordinal indicator variables such as education and wealth groups can be misled by the population size in each category, the reference category chosen to measure departure from equality and the scale used to measure the magnitude of inequality.<sup>27</sup> Therefore, to avoid misinterpretations and incorrect conclusions drawn, we estimated both absolute and relative measures of inequalities namely slope index of inequality (SII) and relative index of inequality (RII).<sup>28</sup> SII and RII are regression-based estimates that factor in the population size across education and wealth groups.

### Statistical analyses

For each country, we calculated overall weighted prevalence estimates of mDFPS and their 95% CIs (Wald method) and by education and wealth subgroups to account for the complex sampling design (online supplemental table 1). We calculated the SII and RII using marginal predicted rates of demand satisfied. To enable the comparison of the rates of mDFPS across the educational and wealth subgroups, *ridit* scores were calculated. These indicate the cumulative proportion of the population at each socioeconomic stratum, ordered from the lowest to highest.<sup>29</sup> Individuals with the same score were assigned an average rank. We used regression analysis with mDFPS as the outcome variable and the '*ridit*' score as the exposure variables to estimate the difference in log odds of demand satisfaction for a 1-unit change in socioeconomic rank (ie, from the bottom (0) to the top (1) of the socioeconomic scale). We used our model coefficients to estimate marginal predictions and SEs of the demand satisfied at the bottom and the top of the socioeconomic distribution and used linear and non-linear contrasts to calculate SII and RII, respectively.<sup>30</sup> The SII is estimated as the expected difference in mDFPS between the bottom versus the top of the socioeconomic distribution, and RII is the ratio of the same two estimates. Thus, if mDFPS decreases with increasing socioeconomic position, then SII >0 and RII >1, whereas if demand satisfied increases with increasing socioeconomic position, then SII <0 and RII <1. To enable comparisons across six SA countries, we estimated age-standardised rates of mDFPS applying the WHO global standard population. We also checked if the mDFPS varied by age groups, urban-rural residence, and spousal separation across the countries (online supplemental table 2). Spousal separation was operationalised as those women replied that their husbands were living away from them (non-cohabiting).

### Ethical review

Except in India and Afghanistan, DHS underwent a second human subjects review with the Bangladesh Medical Research Council, Maldives National Health Research Committee, National Bioethics Committee,

Pakistan Health Research Council and the Nepal Health Research Council. In all DHS, the respondents were explained about details of the survey voluntary participation and data confidentiality. Since we used de-identified data of DHS available in the public domain and obtained the permission from measuredhs, a separate ethical approval was not needed.

### Patient and public involvement

Patients and the public were not involved in the design and conduct of this research.

## RESULTS

Country-wise sample sizes, response rates and estimates of demand satisfied are shown in [table 1](#). Overall, in six countries 782 639 were surveyed, and the response rates were over 90% in most countries except in Maldives (84.0%). Among the surveyed women, unweighted numbers and proportions of women who had mDFPS ranged from 2788 (36.5%) in Nepal to 332 076 (47.5%) in India. Among the six countries, weighted estimates of overall prevalence were also low in the Maldives (29.4%) and high in India (72.6%) and Bangladesh (72.8%). In terms of age-standardised estimates, Maldives (22.8%) had much lower mDFPS, and Bangladesh stood highest at 75.8%.

A country-wise comparison of age-standardised estimates showed that mDFPS estimates were only marginally higher in urban areas in five countries (0.5–3.2 percentage points) except in Afghanistan where urban was higher than rural (46.5% vs 36.1%). The difference in mDFPS by spousal separation was highest in Bangladesh (42.4%), Nepal (36.0%) and India (27.4%). In all countries, the difference between 15–19 and 35–49 years was >31% except for Bangladesh (1.4%). In Bangladesh, mDFPS among the 15–19 years and 20–34 years age group was also highest as well as overall mDFPS (online supplemental table 2).

### Wealth-related inequalities

[Table 2](#) describes wealth-related differentials in terms of raw rates, rate ratios and rate differences followed by summary measures of inequality that is, SII and RII. In all countries except Nepal and Bangladesh, there was a gradient of increasing mDFPS as we moved towards richer, and richest wealth quintiles. Rate differences varied widely between the six countries; for example, in Afghanistan, there was a 20-point rate (%) difference between the poorest and richest whereas in Bangladesh rate differences were much narrow (1.8–4.4 percentage points). In Nepal, rate differences were much higher but varied very little across the wealth groups (6.6–7.9 percentage points). Thus, RII was pro-rich in Nepal and Bangladesh by only a small factor >1, implying that the mDFPS differed by a factor of 1.2 between the poorest and richest across the wealth groups in Nepal. In India, Maldives, Pakistan and Afghanistan, RII were pro-poor by a smaller

factor of <1.0. However, Afghanistan showed the widest pro-poor inequalities (RII 0.5) among these four countries. Absolute measures of inequalities (SII) also showed a pattern like relative measures (RII), that is, Nepal (8.3) and Bangladesh (4.7) had pro-rich inequalities. Among the four countries having pro-poor absolute inequalities, Afghanistan had the highest magnitude (–23.0) in absolute terms implying that mDFPS was 23% points lowest at the richest versus the poorest.

### Educational inequalities

[Table 3](#) describes the educational differentials in estimates of mDFPS presented as raw rates, rate ratios, rate differentials and the summary measures of inequality that is, SII and RII. In India and Nepal, rates of mDFPS were lower among higher educated women than uneducated, but the rate differences between groups were much higher in Nepal (4.5–9.8 percentage points) than in India (2.2–6.9 percentage points). However, in the other four countries, the raw rates of mDFPS increased with educational attainment; Afghanistan (11.3–20.6 percentage points) had the widest rate differentials followed by Bangladesh (13.8–18.3 percentage points). It is of interest to note that raw rates were higher among secondary education groups than higher education in most countries except in the Maldives. In India and Nepal RII was >1, suggesting that mDFPS was higher among uneducated or lower-educated women, whereas in the other four countries, RII <1 suggesting that the mDFPS rate was higher among higher educated women. Absolute educational inequalities also showed a pattern like that of relative educational inequality. The SII of 30.3 and 20.6 was highest in Afghanistan and Bangladesh, respectively. The SII of 30.3 suggests that the estimated mDFPS was 30 percentage points higher among the highest educated versus uneducated women. Noticeably, the magnitude of both absolute and relative educational inequalities was much higher than the wealth-related inequalities.

## DISCUSSION

We reported country-level, educational and wealth-related inequality measures for one of the world's most populous regions. Six of the eight countries (except Sri Lanka and Bhutan) included in the analyses cover >95% of the region's population. Country-level mDFPS varied widely among the six countries (75.8 in Bangladesh vs 22.8 in the Maldives). In Nepal and Bangladesh, both absolute and relative wealth-related inequalities had pro-rich inequalities by a small factor, while the other four countries had pro-poor inequalities—Afghanistan having the widest wealth inequalities in both absolute and relative terms. Educational inequalities, too, showed a diverse pattern in both magnitude and direction of inequalities. In India and Nepal, higher versus no education was in favour of no education (higher mDFPS among not educated women) and converse in other countries. Afghanistan



**Table 2** Age-standardised prevalence by wealth quintiles, prevalence rate ratios, rate differences and wealth-related inequalities in six South Asian countries

Country (survey year)	Age-standardised prevalence (%; 95% CI)	Prevalence rate ratios†	Prevalence rate difference‡	Slope index of inequality	Relative index of inequality
Nepal 2016					
R1*	52.2 (47.4 to 57.0)	Ref.	Ref.	8.3 (1.6, 15.0)	1.2 (1.0, 1.3)
R2	54.8 (51.0 to 58.7)	1.1 (0.9, 1)	6.6 (0.4, 12.8)		
R3	55.3 (51.8 to 58.8)	1.1 (1.0, 1)	9.2 (4.0, 14.5)		
R4	53.5 (50.0 to 57.0)	1.0 (0.9, 1)	9.7 (4.6, 14.8)		
R5	45.6 (41.9 to 49.3)	0.9 (0.8, 1)	7.9 (2.9, 12.9)		
Bangladesh 2014					
R1	76.6 (73.2 to 80.1)	Ref.	Ref.	4.7 (−0.0, 9.4)	1.1 (1.0, 1.1)
R2	77.7 (75.3 to 80.1)	1.0 (1.0, 1)	3.4 (−1.0, 7.7)		
R3	76.4 (74.1 to 78.8)	1.0 (0.9, 1)	4.4 (0.8, 8.0)		
R4	75.1 (72.1 to 78.1)	1.0 (0.9, 1)	3.1 (−0.4, 6.7)		
R5	73.3 (70.6 to 76.0)	1.0 (0.9, 1)	1.8 (−1.9, 5.6)		
India 2015–2016					
R1	58.3 (57.5 to 59)	Ref.	Ref.	−10.8 (−11.9, −9.7)	0.9 (0.8, 0.9)
R2	68.2 (67.6 to 68)	1.2 (1.2, 1)	−10.5 (−11.5, −9.5)		
R3	72.3 (71.8 to 72)	1.2 (1.2, 1)	−0.6 (−1.5, 0.4)		
R4	71.7 (71.0 to 72)	1.2 (1.2, 1)	3.6 (2.7, 4.5)		
R5	68.8 (68.0 to 69)	1.2 (1.2, 1)	2.9 (2.0, 3.8)		
Maldives 2016–2017					
R1	21.5 (18.5 to 24)	Ref.	Ref.	−4.9 (−13.7, 3.8)	0.8 (0.6, 1.2)
R2	23.7 (19.1 to 28)	1.1 (0.9, 1)	−7.5 (−15.2, 0.1)		
R3	21.6 (17.9 to 25)	1.0 (0.8, 1)	−5.3 (−13.8, 3.1)		
R4	18.9 (12.8 to 25)	0.9 (0.6, 1)	−7.5 (−15.6, 0.6)		
R5	29.1 (22.2 to 35)	1.4 (1.0, 1)	−10.1 (−19.4, −0.9)		
Pakistan 2017–2018					
R1	34.3 (28.7 to 39)	Ref.	Ref.	−10.7 (−17.6, −3.8)	0.8 (0.7, 0.9)
R2	39.9 (35.4 to 44)	1.2 (1.0, 1)	−8.6 (−15.1, −2.1)		
R3	43.9 (39.6 to 48)	1.3 (1.1, 1)	−2.9 (−8.6, 2.8)		
R4	46.8 (42.7 to 50)	1.4 (1.1, 1)	1.0 (−4.5, 6.5)		
R5	42.9 (39.3 to 46)	1.3 (1.0, 1)	3.9 (−1.9, 9.7)		
Afghanistan 2015					
R1	30.9 (27.0 to 34)	Ref.	Ref.	−23.0 (−31.6, −14.4)	0.5 (0.4, 0.7)
R2	35.3 (31.4 to 39)	1.1 (1.0, 1)	−20.0 (−27.4, −12.5)		
R3	33.8 (29.0 to 38)	1.1 (0.9, 1)	−15.5 (−22.9, −8.2)		
R4	41.2 (36.6 to 45)	1.3 (1.1, 1)	−17.1 (−24.8, −9.4)		
R5	50.9 (44.6 to 57)	1.6 (1.4, 2)	−9.6 (−17.1, −2.1)		

\*For each country, R1–R5 represent the age-standardised prevalence rates in poorest (R1) to wealthiest (R5) among the wealth quintile categories.

†Calculated as the ratio of estimated frequency in each wealth category and the reference category based on log-linear regression models.

‡Calculated as the difference between the estimated frequency in each wealth category and the reference category based on logistic regression models.

faring poorly in both absolute and relative inequalities. A closer country-wise examination of socioeconomic inequalities revealed more diverse patterns

in both magnitude and direction by both wealth and education, emphasising that more granular analyses are needed to identify those groups who are ‘lagging

**Table 3** Age-standardised prevalence by educational attainment, prevalence rate ratios, rate differences and education-related inequalities in six South Asian countries

Country (survey year)	Age-standardised prevalence (% , 95% CI)	Prevalence rate ratios*	Prevalence rate difference†	Slope index of inequality	Relative index of inequality
Nepal 2016					
R1‡	56.6 (53.6 to 59.6)	Ref.	Ref.	15.3 (9.4, 21.2)	1.4 (1.2,1.5)
R2	52.1 (48.1 to 56.1)	0.92 (0.8,1.0)	-4.5 (-8.8,-0.1)		
R3	47.6 (44.4 to 50.7)	0.84 (0.8,0.9)	-9.0 (-13.2,-4.9)		
R4	46.8 (42.7 to 50.9)	0.83 (0.7,0.9)	-9.8 (-14.7,-4.9)		
Bangladesh 2014					
R1‡	62.4 (58.5 to 66.3)	Ref.	Ref.	-20.6 (-26.4,-14.9)	0.8 (0.7,0.8)
R2	76.3 (73.7 to 78.8)	1.22 (1.1,1.3)	13.8 (9.8, 17.9)		
R3	80.8 (79.2 to 82.3)	1.29 (1.2,1.4)	18.3 (14.1, 22.5)		
R4	77.3 (74.2 to 80.5)	1.24 (1.2,1.3)	14.9 (9.9, 19.9)		
India 2015–2016					
R1‡	67.0 (66.4 to 67.6)	Ref.	Ref.	4.1 (3.0, 5.3)	1.1 (1.0,1.1)
R2	72.3 (71.6 to 72.9)	1.08 (1.1,1.1)	5.3 (4.5, 6.1)		
R3	69.2 (68.7 to 69.7)	1.03 (1.0,1.0)	2.2 (1.6, 2.9)		
R4	60.1 (59.0 to 61.2)	0.90 (0.9,0.9)	-6.9 (-8.1,-5.7)		
Maldives 2016–2017					
R1‡	18.5 (10.8 to 26.3)	Ref.	Ref.	-10.5 (-18.9,-2.0)	0.6 (0.5,0.9)
R2	21.5 (18.4 to 24.7)	1.16 (0.7,1.8)	3.0 (-5.4, 11.5)		
R3	20.3 (17.4 to 23.1)	1.09 (0.7,1.7)	1.7 (-6.5, 10.0)		
R4	31.5 (25.3 to 37.7)	1.70 (1.1,2.7)	13.0 (3.3, 22.6)		
Pakistan 2017–2018					
R1‡	36.2 (33.1 to 39.3)	Ref.	Ref.	-15.2 (-22.4,-8.0)	0.7 (0.6,0.8)
R2	49.3 (44.2 to 54.5)	1.36 (1.2,1.5)	13.1 (7.3,18.9)		
R3	45.7 (42.2 to 49.2)	1.26 (1.1,1.4)	9.5 (4.9,14.2)		
R4	44.3 (39.8 to 48.8)	1.22 (1.1,1.4)	8.1 (2.6,13.7)		
Afghanistan 2015					
R1‡	36.0 (33.6 to 38.4)	Ref.	Ref.	-30.3 (-40.7,-20.0)	0.4 (0.3,0.6)
R2	47.3 (41.5 to 53.2)	1.31 (1.1,1.5)	11.3 (5.1,17.6)		
R3	56.7 (50.3 to 63.0)	1.57 (1.4,1.8)	20.6 (13.9,27.4)		
R4	54.7 (38.6 to 70.7)	1.52 (1.1,2.1)	18.7 (1.8,35.5)		

\*Calculated as ratio of estimated frequency in each wealth category and the reference category based on log-linear regression models.

†Calculated as the difference between the estimated frequency in each educational category and the reference category based on logistic regression models.

‡For each country, R1–R4 represent the age-standardised prevalence rates in no education (R1) to higher education (R4) among the educational categories.

behind'. Furthermore, we identified that mDFPS also varied by age groups, urban-rural residence as well as spousal separation across the countries.

Hellwig *et al* reported that in LMICs, mDFPS has overall improved but slowly progressed in the South Asia region where mDFPS was already higher and wealth-related inequalities had also decreased over time.<sup>10</sup> However, our results show that mDFPS varied widely between six SA countries. In Maldives, Afghanistan and Pakistan, mDFPS prevalence was below 50% and wealth inequalities were pro-poor and educational inequalities were

unfavourable towards the less/uneducated. Ewerling *et al* reported an average mDFPS coverage of 70% in South Asia, while only three countries India, Nepal and Bhutan were included in their analyses.<sup>9</sup> Nevertheless, country-wise disaggregated estimates of mDFPS are comparable to country-level reports of couple protection rates (CPR), for example, CPR rates reported by World Bank estimates for India (54%), Maldives (19%), Bangladesh (62%) and Nepal (53%) are similar to age-standardised rates of mDFPS.<sup>31</sup> Lower rates of mDFPS in Maldives, Afghanistan and Pakistan are attributable to factors reported in

the literature.<sup>16–21</sup> Research has shown that a low level of women's empowerment is the main barrier to mDFPS in SA countries.<sup>32</sup> Biswash and Kabir using a composite index based on decision-making power, autonomy, ownership of household assets, awareness, contribution to family income and reproductive rights reported that women's empowerment is critically low in Pakistan and Afghanistan.<sup>33</sup> DHS from Pakistan and Afghanistan report low proportions of gainful employment, ownership of a house and participation in household decisions among the women supporting a low level of empowerment and autonomy among women.<sup>24</sup> These three low mDFPS coverages countries are also known to have higher child marriage rates, where the society has very strong conservative religious and social norms promoting early marriage and childbearing.<sup>34</sup> Lower coverage of mDFPS suggests that in addition to supply-side, demand-side interventions also need to be stepped up to improve the uptake of modern contraceptive methods. Addressing these barriers to social norms, and women's empowerment needs to be addressed at a broader level to offset societal changes leading to acceptance of FP methods by increasing the demand.

The prevalence of mDFPS in India was about 70% but in Nepal, mDFPS was only 50%. In India and Nepal however, the direction of wealth and educational inequalities were opposite to those of low-performing countries. In India and Nepal, the magnitude of inequalities was much narrower which is a sign of the closing gap between subgroups as the coverage increased. A diverse pattern of direction in socioeconomic inequalities suggests that mDFPS increased first among the rich and better educated at first followed by poorer and lesser-educated groups. In Nepal and Bangladesh, inequality was still pro-poor while in Bangladesh, educational inequality was favourable towards higher educated as a quarter of higher educated women had mDFPS. This pattern of educational inequality in higher prevalence countries highlights that education would improve demand perhaps by women's empowerment and more autonomy among women contrary to the low level of mDFPS among even higher educated women in low performing countries.

The findings of this study confirm the existence of pro-poor inequalities in mDFPS in LMICs such as Asia and Africa.<sup>9 10 35–37</sup> Time trends analyses of 73 LMICs also reported that global coverage of mDFPS is increasing while the wealth inequalities were narrowing.<sup>10</sup> On the other hand, educational inequalities were in favour of no/less educated in Nepal and India agreeing with multinational Performance Monitoring and Accountability 2020 data for Rajasthan, India.<sup>14</sup> Comparisons of inequalities across different studies need careful interpretation since the methods, measures and markers of inequalities vary across the studies. Nevertheless, the distribution of mDFPS prevalence by socioeconomic groups is comparable to the magnitude and direction of reported inequalities.

Our study draws on the source data that are comparable to multinational surveys using standardised questionnaires that enabled cross-country comparison.<sup>9 34 38</sup>

Measuring both absolute and relative inequalities by two commonly reported markers of socioeconomic inequalities and studying the distribution of mDFPS by other socio-demographic markers provided a more granular analysis of mDFPS not reported previously.<sup>14 35</sup> A more detailed analysis identified the underperforming and on-target countries helping us identify the population subgroups lagging in each of these six SA countries. Spousal cohabitation needs to be considered in SA countries where the economic migration of men is very common. Our analyses also revealed that improved coverage of younger women increased overall coverage in Bangladesh. In SA countries, early marriage and childbearing are very common. Reproductive health programmes and policies that should focus on increasing demand among young women could help achieve the mDFPS targets.

The following limitations should be considered while interpreting our results. DHS covers only those women who are currently married and/or in union, hence a proportion of women perhaps in the younger age group who are not yet married and sexually active are left out.<sup>34</sup> DHS in Bangladesh and Pakistan, unmarried women were not interviewed hence mDFPS is under-represented for those women who are sexually active and require contraception.<sup>23</sup> Furthermore, unmarried women in a conservative society of South Asia are highly unlikely to report sexual activity thus underestimating the need for contraception. Since mDFPS includes the need for current and future pregnancies, their perception about this is very subjective and may change with life or family circumstances. Contraception is a sensitive topic for women in LMICs. So, their responses may be biased due to the presence of family members during the interview. Women from higher education perhaps have been following some fertility awareness methods but DHS and UNICEF-MICS questionnaires do not ask about fertility awareness methods. Although WHO classifies fertility awareness as modern methods, most multinational reports have not included fertility awareness methods to define mDFPS.<sup>9–11</sup>

Comparable serial survey data should be used to estimate disaggregated FP indicators to better understand intercountry variations within the regions sharing socio-cultural milieu and development status. Such information would assist the international FP programmes to formulate regionally tailored policies and programmes. Identification of groups 'lagging behind' helps to focus FP programmes to target these groups to increase coverage to achieve universal coverage for SDG target. Population subgroups such as lower-educated, from poor households and young women living in rural areas should be targeted through country-specific initiatives to improve the uptake of FP. Nevertheless, the FP programmes should respect, protect and fulfil the women's individual choices upholding the rights-based approach. Future surveys and studies should cover those women who are not married



or in the union who are also in need of contraception covering all women who are sexually active. Migration leading to spousal separation should be considered as their contraceptive needs are different from cohabiting couples. Our analyses showed wide differentials in mDFPS by spousal separation across the six SA countries where males migrate for economic reasons. Multinational surveys should cover more detailed questions to cover lactational amenorrhoea and fertility regulation methods and comprehensively estimated the mDFPS as per WHO definition. The measures taken to improve FP should also consider the spousal separation and women's age that determines the need for FP.

## CONCLUSION

South Asia region still has a long way ahead towards universal access to reproductive health with vast inter-country and socioeconomic differences in the region. mDFPS among women in Pakistan, Maldives and Afghanistan was less than half, and Bangladesh had achieved more than three-quarters coverage. Varied and diverse patterns of wealth and educational inequalities highlight that these socioeconomic inequalities are narrowing as coverage increases. Demand for contraception, not just availability, needs to be increased in those population subgroups which are 'lagging behind'. Regional inter-country and intracountry monitoring would help track global reproductive health targets.

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