Original Research

Escalating ischemic heart disease burden among women in India: Insights from GBD, NCDRisC and NFHS reports

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ARTICLE INFO

Keywords:
Ischemic heart disease
Epidemiology
Women
India
Risk factors

ABSTRACT

Objective: To determine trends in ischemic heart disease (IHD) mortality and burden among women in India we performed a study.

Methods: Data were obtained from three publicly available resources. Cardiovascular disease (CVD) and IHD mortality were obtained from 2017 Global Burden of Diseases (GBD) Study. Metabolic risk factor data (body-mass index, blood pressure and diabetes) were obtained from Non-Communicable Disease Risk Factor Collaboration (NCDRisC) and lifestyle factors were obtained from National Family Health Surveys (NFHS). Descriptive statistics are reported.

Results: GBD study reported that in year 2017 in India CVD caused 2.64 million deaths (women 1.18, men 1.45 million) and IHD 1.54 million (women 0.62, men 0.92 million). Burden of IHD related disability adjusted life years (DALYs) was 36.99 million (women 13.80, men 23.19 million). From 2000 to 2017 annual IHD mortality increased from 0.85 to 1.54 million (81.1%) with greater increase in women 0.32 to 0.62 million (93.7%) compared to men (0.53–0.92 million, 73.6%). Increase in age-adjusted IHD mortality rate/100,000 was also more in women (62.9–92.7, +47.4%) than men (97.5–129.5, +32.8%). Trends in cardiometabolic risk factors from 2000 to 2015 showed greater increase in body-mass index, diabetes, tobacco-use and periodontal infections among women than men.

Conclusion: IHD is increasing more rapidly among women than men in India and there is sex-associated convergence. This is associated with greater increase in overweight, diabetes, tobacco use and periodontal infections in women.

1. Introduction

Ischemic heart disease (IHD) is the most important cause of disease burden and mortality in women [1]. Pre-menopausal women are protected from IHD due to combination of hormonal and lifestyle influences but following this period, IHD occurs at same rate in women and men and the risk is greater among women at older age [2]. Cardiovascular diseases (CVD), especially IHD, are endemic in India [3]. Data from the Registrar General of India has shown that mortality from cardiovascular diseases, including IHD, has increased rapidly in the last 2 decades [4]. World Health Organization (WHO) and Global Burden of Disease (GBD) Studies have also reported increase in mortality and disability-adjusted life years (DALYs) from IHD in India in the last few decades. This is in contrast to most high- and middle-income countries where they are declining [5,6]. In India, epidemiological studies performed in 1960’s to 1990’s reported greater prevalence of IHD in women [7]. However, this higher prevalence of IHD in women could be due to inclusion of non-specific electrocardiographic (ECG) criteria such as non-specific T-wave changes [8,9], based on earlier WHO guidelines that recommended ECG ST-T changes as suggestive of CHD [10]. Million Death Study in India reported that in year 2015 age-standardized death rate from IHD in men was 173/100,000 and in women 96/100,000 but did not report secular trends [4,11,12]. On the other hand, GBD study has reported that IHD mortality rates have
declined in large countries including China, USA, Indonesia, Brazil, Russia and UK with identical rates of decline in women and men [13–20]. Secular-trends in sex-specific IHD mortality and disease burden at a national scale have not been previously reported from India. Therefore, to evaluate national burden of various CVDs, sex-specific trends in IHD mortality and DALYs and to determine macro-level association with risk factors, we performed the present study.

2. Methods

This study is based on secondary data analyses using three publicly available datasets: Global Burden of Disease (GBD) Study at http://ghdx.healthdata.org/gbd-results-tool [21]; Non-Communicable Disease Risk Factor Collaboration (NCDRiSC) at www.ncdrisc.org/22 and National Family Health Surveys (NFHS) (India) at http://rchiips.org/nfhs/ [23]. All the three studies have been reviewed by institutional review boards and ethics committees at the study sites. GBD study provides comprehensive and systematic assessments from 1980 to 2017 of age-specific and sex-specific mortality and years of life lost (YLLs) for 264 causes; and years lived with disability (YLDs) and DALY’s for 328 diseases and injuries and 84 risk factors in 195 countries and territories [24]. Details of GBD study including cause-specific estimations for cardiovascular diseases and IHD have been previously published [25,26].

GBD 2017 data (latest available) used in the present study provides comprehensive and systematic assessments from 1980 to 2017 of age-specific and sex-specific mortality, prevalence and DALYs for cardiovascular diseases and IHD in India [6]. GBD 2019 data are not yet available. We extracted cardiovascular mortality and DALY data for the 5 most populous countries from the Global Health Data Exchange website, Institute of Health Metrics and Evaluation, University of Washington, Seattle, USA [21]. Sex-specific data on total CVDs, IHD and stroke were also obtained. For India, we extracted sex-specific data on IHD, ischemic stroke, hemorrhagic stroke and rheumatic heart disease (RHD) mortality, DALYs and age-adjusted rates/100,000. We extracted rates for these conditions from the year 2000 onwards because in earlier years the mortality data from India were non-representative as they were based on causes of death data from limited sources [27]. Data on urban versus rural CVD mortality or DALYs are not available at GBD website.

Data on cardiometabolic risk factors for India were obtained from the Global Burden of Metabolic Risk Factors study from Non-Communicable Disease Risk Factor Collaboration (NCDRiSC) website [22]. We obtained annual data on mean systolic blood pressure (BP), diastolic BP, body mass index (BMI) and total cholesterol levels in women and men in India from the years 2000–2015/6. Data on lifestyle risk factors (smoking, overweight or obesity, indoor air pollution, type of fuel used for cooking, cooking habits, etc.) were obtained from National Family Health Surveys (NFHS) [23]. The government of India periodically conducts these nationally representative surveys on health behaviors and anthropometric measures [28]. Data are available for 1992–93 (NFHS-1), 1998–99 (NFHS-2), 2005–06 (NFHS-3) and 2015–16 (NFHS-4). Data on prevalence of chronic periodontal infections were obtained from GBD website [21].

Statistical analysis: Descriptive statistics are reported. Secular trends in gender-specific IHD mortality, DALYs and rates have been plotted. Significance of trends has been determined using Pearson’s correlation coefficients (r). Non-parametric tests such as Spearman’s test for rank correlation (rho) and generalized estimating equations (GEE) were also evaluated but Pearson’s test provided the most robust estimate and was retained. SPSS package was used for analyses (SPSS version 13.0; SPSS Inc. Chicago). Risk factor trends (R² values) in women and men have been plotted using polynomial regression function in Microsoft PowerPoint (Version 14.0.0) package. P values < 0.05 are considered significant.

3. Results

Data on cardiovascular and IHD mortality and DALYs (absolute numbers and age-adjusted rates) for the year 2017 in 5 most populous countries are shown in Table 1. In 2017, in India there were 2,632,780 CVD related deaths of which 1,540,328 were due to IHD. Global comparison shows that CVD and IHD deaths are lower than in China, which has 4,377,972 CVD and 1,750,038 IHD deaths. IHD DALY’s, which is measure of disease burden and includes premature disease, are the highest in India (36.99 million). There is a high absolute burden of IHD deaths (n = 623,042) as well as DALYs (n = 13,798,687) in Indian women. However, women have lower IHD mortality than men in terms of absolute number of deaths and DALYs as well as rates/100,000 (Table 1).

3.1. IHD mortality and disease burden trends

We plotted data on mortality trends from IHD in five most populous countries from the years 2000–2017 using GBD database (Fig. 1). China and India have the largest IHD related mortality and burden. China has overtaken India and currently has the highest number of IHD deaths while disease burden is the highest in India. Trends in IHD mortality and disease burden reveal that while the rates are decreasing in many high and middle income countries, e.g., USA, they are increasing in India. In India, from the years 2000–2017, total IHD mortality increased from 851,000 to 1,540,000 deaths (+81.1%), age-adjusted mortality rate increased from 80.2 to 111.1/100,000 (+38.5%) (Table 2). DALYs increased from 22,589,000 to 36,987,000 (+63.7%) and DALY rates increased from 2,124 to 2,663/100,000 (+25.4%) (Table 2). Trends show that total mortality has increased in both women and men and in year 2017, 623,042 deaths in women and 917,285 deaths in men were due to IHD. From the year 2000–2017, IHD mortality rate has increased in women from 62.9/100,000 to 92.7/100,000 and men from 97.5/100,000 to 129.5/100,000. The increase is significantly greater in women (+47.4%) vs. +32.8% in men (p < 0.05) with evidence of divergence in IHD mortality rates (Fig. 2). GBD data also show that IHD DALYs are increasing rapidly in both women and men. From years 2000–2017, DALY rates increased in women from 1567.9 to 2052.4/100,000 (+30.9%) while in men from 2680.6 to 3274.1/100,000 (+22.1%) with evidence of convergence (Fig. 2).

3.2. Risk factor trends

We obtained data on secular changes in proximate cardiometabolic risk factors from Global Burden of Metabolic Risk Factors study from NCDRiSC [22]. Data on mean body mass index (BMI), mean systolic BP and diabetes (%) in India from years 2000–2015/6 in women and men are shown in Table 3. Women have greater BMI while other risk factors-systolic BP, hypertension and diabetes are more in men. There is secular increase in all the risk factors from the year 2000 to 2015–2016. Risk factors such as BMI have increased more rapidly in women (R² = 0.99963) as compared to men (R² = 0.99953) while others have increased at the same rate. Chronic periodontal infection, which is a marker of chronic inflammatory state, also shows an increase, more in women (R² = 0.97764) than in men (R² = 0.97718). Trend graphs show that secular trends are greater in women than in men for BMI, diabetes and chronic dental infections. Increase in systolic BP is greater in men (Fig. 3).

We also determined trends in prevalence of various lifestyle risk factors in women using data from National Family Health Surveys- NFHS-1, NFHS-2, NFHS-3 and NFHS-4 [23]. Between NFHS-2 to NFHS-4 surveys (3 surveys, 20-year period) tobacco use among women increased from 3.0% to 10.8% and 6.8% while overweight or obesity (body-mass index > 25 kg/m²) increased from 10.6% to 14.8% and 20.6% (Table 4). On the other hand, the use of biological and unclean fuels, markers of indoor air pollution [29], declined. We reviewed data on various social determinants of cardiovascular health among women from NFHS. The risk factors included low educational status, low socioeconomic status, low social capital, social isolation, depression, psychosocial stress, unemployment, nuclear family, number of children and awareness and control of risk factors. There is substantial prevalence of many of these
risk factors among women. Secular trends reveal that low educational status, high fertility rate and household pollution levels are declining among women in India (Table 4).

4. Discussion

Ischemic heart disease is increasing more rapidly among women as compared to men in India. The IHD mortality and disease burden ratio in women vs. men from the years 2000–2017 has increased from 0.64 to 0.72 for mortality and 0.58 to 0.63 for DALYs showing a narrowing of the gender gap. Cardiometabolic risk factors (body mass index, diabetes), tobacco use and periodontal infections, have increased more rapidly among women in India and appear to have catalyzed this convergence.

Studies from developed countries in North America and Europe have reported decline in IHD mortality and disease burden in the last 50 years [6]. Data from these countries reveal that the decline among women has been similar to men barring some age-group specific variations [30]. For example, in the US there has been a continuous decline in IHD mortality in the last two decades but a slower decline has been reported in younger women [31]. In Europe there has been variable decline in IHD mortality from the years 1980–2009 [32]. The largest decrease has been reported in the Netherlands (–73.8% males, –72.0% females) and United Kingdom (–67.3% males, –65.9% females) while modest reductions have been reported in eastern European countries. A sex-based convergence, similar to the present study, is observed in some of these countries.

The different rates of decline of IHD mortality in women could be due to biological and sociocultural differences in IHD and its outcomes [33]. Women, especially younger women, suffer from a number of biases that lead to lower rates of diagnosis and inferior management [1,2]. Prospective Urban Rural Epidemiology (PURE) study has also reported that socioeconomic factors are important for incident IHD in India and other low-income countries [39]. Low educational status is one of the most important risk factor for all-cause mortality, cardiovascular mortality and incident IHD events [29]. Literacy levels among women in India are lower than in men and this combined with other women-specific social factors could be important driver of more rapid increase of IHD in them. Stressors in women in India are macro-level societal factors- social isolation, neglect, low job prospects, inferior working conditions, limited promotional avenues and societal inequity [40]. Individual level factors are also important and are due to neglect from social stigmas and customs leading to psychosocial stress and depression. A low social capital, large number of children and nuclear families add to the burden of social constraints [41]. Content analysis of studies shows a mixture of low self-esteem, entrenched beliefs, pre-conceived notions, lack of true knowledge, and negative affect and emotions as important factors [42]. The lower educational status amongst women also results in general lack of awareness of risk factors for health, especially cardiovascular diseases, hypertension, diabetes, etc., and understanding the rationale for their control [43]. Low socioeconomic status, unemployment and poverty also increase the burden of transportation costs, stress and difficulties accessing services and in following expensive and complex medication regimens [44]. Overwhelming communication problems with healthcare professionals in developing a trusting relationship hinders adequate information exchange [44]. The low risk factor burden and greater cardiovascular

| Country | Cardiovascular diseases | Ischemic heart disease |
|---------|-------------------------|------------------------|
|         | Absolute Number          | Absolute Number        |
|         | Deaths                   | Deaths                 |
|         | Total        | Women | Men     | Total        | Women | Men     | Total        | Women | Men     | Total        | Women | Men     | Total        | Women | Men     |
| China   | 4,377,972   | 1,972,013 | 2,405,959 | 309.9 | 285.2 | 333.6 | 1,750,038 | 806,485 | 943,553 | 123.9 | 116.7 | 130.8 |
| India   | 2,652,780   | 1,182,812 | 1,449,968 | 190.7 | 175.9 | 204.7 | 1,540,328 | 623,042 | 917,285 | 111.6 | 92.7 | 129.5 |
| USA     | 902,271     | 446,731   | 455,540   | 277.8 | 270.9 | 284.9 | 533,166   | 248,199 | 284,967 | 164.1 | 150.5 | 178.2 |
| Indonesia | 597,995     | 278,654   | 319,141   | 231.7 | 217.9 | 245.2 | 234,755   | 95,739  | 139,016 | 96.9  | 74.8 | 106.8 |
| Brazil  | 388,268     | 183,987   | 204,281   | 183.3 | 169.9 | 197.3 | 175,792   | 77,960  | 97,831  | 83.0  | 72.0 | 94.5  |

Disability adjusted life years

| Country | Cardiovascular diseases | Ischemic heart disease |
|---------|-------------------------|------------------------|
|         | Absolute Number          | Absolute Number        |
|         | Deaths                   | Deaths                 |
|         | Total        | Women | Men     | Total        | Women | Men     | Total        | Women | Men     | Total        | Women | Men     |
| China   | 85,040,846  | 34,837,814 | 50,203,032 | 6021  | 5039.5 | 6961.1 | 30,106,299 | 11,909,687 | 18,196,612 | 2131  | 1723  | 2523  |
| India   | 65,117,830  | 27,804,195 | 37,315,635 | 4717  | 4135.6 | 5268.5 | 36,987,505 | 13,798,687 | 23,188,817 | 2679  | 2052  | 3274  |
| USA     | 15,639,790  | 6,079,034  | 9,560,756  | 4815  | 4049.7 | 5603.6 | 8,025,817  | 3,020,202 | 5,005,614  | 2471  | 1831  | 3130  |
| Indonesia | 14,617,323  | 6,343,068  | 8,274,255  | 5663  | 4956.1 | 6357.5 | 5,717,632  | 2,087,089 | 3,630,544  | 2215  | 1631  | 2790  |
| Brazil  | 8477,770    | 3,671,748  | 4,806,022  | 4003  | 3390.4 | 4642.9 | 3,678,316  | 1,405,476 | 2,271,840  | 1737  | 1299  | 2195  |
mortality paradox in South Asian and Sub-Saharan African lower income countries as reported in the PURE study points to inferior quality of acute and chronic IHD management and poor risk factor control, especially in women [34,45]. The study has a few strengths and limitations. This is one of the first reports that highlight greater increase of IHD mortality among women in India using nationally representative data from GBD, NCDRiSC and NFHS. The IHD mortality data in the GBD study are similar to nationally representative Million Death Study, which has reported trends from the years 2003–2015. Although the verbal autopsy process used in this study has been validated, suboptimal availability of physician certified causes of deaths data in India is a study limitation [24]. Similarly the NCDRiSC study estimates for risk factors in India are based on modeling using regional studies and may not be nationally representative. Data regarding
Table 2
Secular trends in mortality and DALYs from IHD in women and men in India from 2000 to 2017.

| Year | Women IHD Absolute numbers | Women Mortality rate/100,000 | Women:Men ratio | Men IHD Absolute numbers | Men Mortality rate/100,000 | Men:Women ratio |
|------|-----------------------------|-----------------------------|----------------|--------------------------|---------------------------|-----------------|
| 2000 | 318,417                     | 62.9                        | 0.60           | 975                      | 63.3                      | 0.64            |
| 2001 | 326,739                     | 63.3                        | 0.60           | 98.4                     | 63.6                      | 0.65            |
| 2002 | 334,833                     | 63.6                        | 0.60           | 97.9                     | 66.0                      | 0.65            |
| 2003 | 338,095                     | 63.1                        | 0.61           | 96.9                     | 60.5                      | 0.65            |
| 2004 | 330,145                     | 60.5                        | 0.60           | 94.0                     | 61.0                      | 0.64            |
| 2005 | 339,202                     | 61.0                        | 0.59           | 96.7                     | 63.9                      | 0.63            |
| 2006 | 361,422                     | 63.9                        | 0.59           | 100.7                    | 62.9                      | 0.64            |
| 2007 | 382,241                     | 66.4                        | 0.59           | 105.2                    | 64.4                      | 0.63            |
| 2008 | 398,775                     | 68.0                        | 0.58           | 110.0                    | 69.9                      | 0.61            |
| 2009 | 416,490                     | 73.4                        | 0.58           | 119.2                    | 69.9                      | 0.61            |
| 2010 | 444,604                     | 75.8                        | 0.58           | 124.4                    | 76.3                      | 0.61            |
| 2011 | 469,981                     | 78.3                        | 0.57           | 128.7                    | 81.2                      | 0.61            |
| 2012 | 490,569                     | 78.3                        | 0.57           | 128.7                    | 81.2                      | 0.61            |
| 2013 | 517,215                     | 81.2                        | 0.60           | 128.1                    | 80.5                      | 0.60            |
| 2014 | 553,356                     | 85.5                        | 0.64           | 126.3                    | 85.5                      | 0.68            |
| 2015 | 586,543                     | 89.4                        | 0.67           | 125.8                    | 89.4                      | 0.71            |
| 2016 | 612,629                     | 92.2                        | 0.68           | 128.5                    | 92.2                      | 0.72            |
| 2017 | 623,042                     | 92.7                        | 0.68           | 129.5                    | 92.7                      | 0.72            |

| Year | Women DALY Absolute numbers | Women DALY Rate/100,000 | Women:Men ratio | Men DALY Absolute numbers | Men DALY Rate/100,000 | Men:Women ratio |
|------|-----------------------------|-------------------------|----------------|--------------------------|------------------------|-----------------|
| 2000 | 7,942,114                   | 1567.9                  | 0.54           | 2680.6                   | 1558.2                 | 0.54            |
| 2001 | 8,045,690                   | 1558.2                  | 0.54           | 2674.6                   | 1548.2                 | 0.54            |
| 2002 | 8,146,528                   | 1548.2                  | 0.54           | 2655.4                   | 1521.2                 | 0.58            |
| 2003 | 8,155,317                   | 1521.2                  | 0.54           | 2618.6                   | 1452.5                 | 0.57            |
| 2004 | 7,940,951                   | 1452.5                  | 0.52           | 2531.8                   | 1425.5                 | 0.56            |
| 2005 | 8,076,668                   | 1425.5                  | 0.52           | 2592.9                   | 1500.0                 | 0.56            |
| 2006 | 8,489,950                   | 1500.0                  | 0.52           | 2692.0                   | 1548.0                 | 0.55            |
| 2007 | 8,916,271                   | 1548.0                  | 0.52           | 2810.6                   | 1582.0                 | 0.54            |
| 2008 | 9,271,798                   | 1582.0                  | 0.51           | 2922.6                   | 1615.5                 | 0.53            |
| 2009 | 9,629,759                   | 1615.5                  | 0.50           | 3035.4                   | 1698.6                 | 0.54            |
| 2010 | 10,241,192                  | 1698.6                  | 0.51           | 3137.9                   | 1742.5                 | 0.53            |
| 2011 | 10,745,101                  | 1742.5                  | 0.50           | 3260.7                   | 1772.6                 | 0.53            |
| 2012 | 11,109,469                  | 1772.6                  | 0.50           | 3348.5                   | 1830.1                 | 0.55            |
| 2013 | 11,662,247                  | 1830.1                  | 0.52           | 3309.8                   | 1876.0                 | 0.55            |
| 2014 | 12,448,911                  | 1923.8                  | 0.56           | 3239.2                   | 2051.6                 | 0.63            |
| 2015 | 13,118,984                  | 2051.6                  | 0.59           | 3274.1                   | 2199.7                 | 0.62            |
| 2016 | 13,630,185                  | 2199.7                  | 0.59           | 3211.9                   | 2380.1                 | 0.63            |
| 2017 | 13,798,687                  | 2380.1                  | 0.60           | 3247.4                   | 2052.4                 | 0.63            |

IHD ischaemic heart disease; DALY disability adjusted life years.

Fig. 2. Trends in IHD mortality/100,000 and DALYs/100,000 among women and men in India from 2000 to 2017 (GBD Study). Polynomial regression in women vs. men shows greater escalation of IHD mortality ($R^2 = 0.98$ vs 0.89) as well as DALYs ($R^2 = 0.97$ vs 0.83).
trends in various macrolevel and microlevel social, economic, political and psychosocial factors, especially important in women are not available in India and this is also a study limitation.

In conclusion, our study shows that IHD is increasing more rapidly among women than men in India with sex-related convergence. This is associated with greater increase in overweight, diabetes, tobacco use and periodontal infections. The increase in IHD mortality in women calls for attention of researchers and policy makers. More research is required to identify social determinants of IHD risk factors in women. Focus on identification of individual level social stressors in women and determining differential physiological responses is needed. While quantitative studies can lead to identification of social determinants, qualitative studies can provide inputs for policy and program initiatives. It is also essential to develop strategies to empower women to reduce inequities and prevent IHD and to provide equitable prevention and treatment for IHD, the most important cause of death in women in India.

### Table 3
Trends in major cardiometabolic risk factors in India from 2000 to 2016 (NCDRiSC).

| Year | Mean body mass index (kg/m²) | Mean systolic BP (mmHg) | Diabetes (%) | Chronic periodontal infection (%) |
|------|-----------------------------|-------------------------|--------------|---------------------------------|
|      | Women | Men | Women | Men | Women | Men | Women | Men |
| 2000 | 20.80 | 20.68 | 123.32 | 125.47 | 7.3 | 7.3 | 11.9 | 9.7 |
| 2001 | 20.86 | 20.75 | 123.49 | 125.66 | 7.4 | 7.5 | 12.0 | 9.8 |
| 2002 | 20.94 | 20.83 | 123.66 | 125.87 | 7.5 | 7.6 | 12.1 | 9.9 |
| 2003 | 21.03 | 20.90 | 123.84 | 126.08 | 7.6 | 7.8 | 12.3 | 10.0 |
| 2004 | 21.10 | 20.97 | 124.01 | 126.28 | 7.7 | 8.0 | 12.4 | 10.1 |
| 2005 | 21.18 | 21.04 | 124.16 | 126.47 | 7.8 | 8.1 | 12.5 | 10.2 |
| 2006 | 21.26 | 21.11 | 124.29 | 126.64 | 7.9 | 8.3 | 12.7 | 10.4 |
| 2007 | 21.33 | 21.17 | 124.40 | 126.80 | 7.9 | 8.4 | 12.8 | 10.5 |
| 2008 | 21.41 | 21.24 | 124.48 | 126.92 | 8.0 | 8.5 | 12.9 | 10.6 |
| 2009 | 21.48 | 21.30 | 124.52 | 127.02 | 8.1 | 8.6 | 13.0 | 10.7 |
| 2010 | 21.56 | 21.37 | 124.53 | 127.10 | 8.1 | 8.7 | 13.1 | 10.8 |
| 2011 | 21.63 | 21.44 | 124.51 | 127.14 | 8.2 | 8.8 | 13.3 | 10.9 |
| 2012 | 21.70 | 21.51 | 124.48 | 127.18 | 8.2 | 8.9 | 13.4 | 11.1 |
| 2013 | 21.78 | 21.58 | 124.43 | 127.21 | 8.3 | 8.9 | 13.6 | 11.3 |
| 2014 | 21.85 | 21.66 | 124.38 | 127.24 | 8.3 | 9.0 | 13.8 | 11.4 |
| 2015 | 21.93 | 21.73 | 124.32 | 127.26 | – | – | 14.1 | 11.7 |
| 2016 | 22.00 | 21.81 | – | – | – | – | 14.3 | 12.0 |

* Mean values.

### Table 4
Various lifestyle and other risk factors in women in India (%) from National Family Health Surveys (NFHS-1 to NFHS-4).

| Survey          | Smoking/Tobacco use (%) | Unclean fuels (%) | Overweight/Obesity (%) | Literacy rate (%) | >10y education (%) | Total fertility rate (%) |
|-----------------|-------------------------|------------------|------------------------|------------------|---------------------|--------------------------|
| NFHS-1 (1992–94) | –                       | 85.2             | –                      | 43.3             | –                   | 3.4                      |
| NFHS-2 (1998–99)| 3.0                     | 81.3             | 10.6                   | 51.4             | –                   | 2.9                      |
| NFHS-3 (2005–06)| 10.8                    | 74.5             | 14.8                   | 55.1             | 22.3                | 2.7                      |
| NFHS-4 (2015–16)| 6.8                     | 56.2             | 20.6                   | 68.4             | 35.7                | 2.2                      |

* Data on unclean fuels is household percentage while for others is individual level prevalence.
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