INTRODUCTION

Epidemiologic transition from infectious diseases to chronic diseases has been a hallmark of demographic change in the twentieth century. This change has been contributed by a complex process of aging populations, success of infectious disease control programs, and economic development contributing to a life-style change. In the past two decades, such a transition has been reported from urban low- and middle-income countries (LMICs). More recently however, such a change has also been documented in the rural areas. Globally chronic cardiovascular diseases are now the leading cause of death, with 6 of every 10 deaths due to this cause. In a cross-sectional study from rural Andhra Pradesh in India, a third of all deaths were due to chronic diseases, followed by injuries and infectious diseases.

Mortality records in LMICs are deficient, and registration systems for cause of death are weak. As a result most mortality studies rely on verbal autopsy methods, which depend on recall of events by the deceased family members. Most mortality studies from LMICs are based on verbal autopsy methods. In some other studies, the duration of recall in verbal autopsy methods is longer than a decade. It is estimated that the uncertainty in the cause of death is up to 15-20% in LMICs, largely due to differential data availability. This uncertainty is likely to be more, when we study temporal patterns of mortality from the distant past. Another source of mortality information is physician issued cause of death certificates. Since these are prepared at the time of death, with all available clinical information, these are likely to be more accurate. However, in India only a small proportion of all deaths occur in the hospitals, excluding those who are economically disadvantaged, and those choosing not to seek advanced medical care. Thus, despite the cause of death being more accurate, generalizability of this data source to an entire population is likely to be poor. Given the trade-offs involved with both verbal autopsy and certified cause of death, both these methods complement each other.
Evidence of epidemiological transition in India is largely based on cross-sectional studies performed in different settings and regions in the past.\textsuperscript{[14]} Most mortality studies from India have sampled deaths from a short period of time,\textsuperscript{[6,15]} and only one study has evaluated long-term trend, but based on verbal autopsy methods.\textsuperscript{[3]} Thus, there exists a gap in our understanding of mortality trend, especially from rural India. We performed this study to understand the temporal trends in mortality (based on physician issued death certificates) across all age-groups from a hospital in the Rural Central India.

\section*{MATERIALS AND METHODS}

\subsection*{Setting}

The study was conducted in Kasturba Hospital Sevagram, which is a 648-bedded teaching hospital. The teaching hospital was setup in 1969 at Sevagram, as a rural teaching institute. Treating physicians certify all deaths that take place in the hospital, and issue a three-part death certificate as per WHO guidelines. All death certificates are filed with the medical records department of the hospital. We conducted a review of death certificates from the hospital. The institutional ethics committee approved the study design. No personal identifiers were collected from the death certificates.

\subsection*{Data collection}

We conducted a survey of all deaths, which had taken place in the hospital from 1979 to 2008. We chose this study period as death certificates prior to this were not available. We physically examined each death certificate, and collected information about age and gender of the deceased, date month and year of death, and primary cause of death on the certificate. We used the above primary information to construct three secondary variables. First, two investigators classified each cause of death as per international classification of disease (ICD-10). We categorized each ICD-10 code into eight categories (Infections, chronic diseases, injuries, malignancies, maternal, perinatal/congenital, miscellaneous, and unclassified). This categorization is provided in [Table 1]. Second, we categorized time in six calendar-year intervals (1979-1983, 1984-1988, 1989-1993, 1994-1998, 1999-2003, 2004-2008). Each of these intervals is of 5-year duration. Third, we categorized age at death as less than 1 month (neonatal), 1 month to 1 year (infant), 1-12 years (child), 13-35 years (young adult), 36-60 years (middle aged), and 60 years or more (elderly).

\begin{table}[h]
\centering
\caption{Classification of diagnoses into categories and sub-categories}
\begin{tabular}{|c|c|c|}
\hline
Disease category & Code & Disease sub-category \\
\hline
Infectious diseases & 1.1 & Diarrhea \\
& 1.2 & Pneumonia \\
& 1.3 & Ac encephalitis syndrome \\
& 1.4 & HIV \\
& 1.5 & Septicemia \\
& 1.6 & Malaria \\
& 1.7 & Tuberculosis \\
& 1.8 & Tetanus \\
& 1.9 & Others \\
Malignancies & 2.0 & All malignancies \\
Chronic diseases & 3.1 & Acute coronary syndromes \\
& 3.2 & Cerebrovascular conditions \\
& 3.3 & Diabetes mellitus/hypertension \\
& 3.4 & Rheumatic heart disease \\
& 3.5 & Chronic hematologic diseases \\
& 3.6 & Chronic respiratory diseases \\
& 3.7 & Chronic kidney conditions \\
& 3.8 & Chronic hepatic conditions \\
& 3.9 & Others \\
Maternal mortality & 4.0 & All maternal deaths \\
Perinatal causes & 5.0 & All perinatal causes, and congenital anomalies \\
Injuries & 6.1 & Trauma or hemorrhage \\
& 6.2 & Burn \\
& 6.3 & Poisonings \\
& 6.4 & Venous bites \\
& 6.5 & Other \\
Miscellaneous & 7.1 & Post-operative death \\
& 7.2 & Acute gastrointestinal cause \\
& 7.3 & Acute hepatic cause \\
& 7.4 & Acute renal and endocrine cause \\
& 7.5 & Anemia and nutritional \\
& 7.6 & Dermatologic \\
& 7.7 & Neurologic \\
& 7.9 & Others \\
Unclassified & 8.0 & All unclassified (cause mentioned either as cardiopulmonary arrest, or cause to be determined after a post-mortem) \\
\hline
\end{tabular}
\end{table}

HIV: Human immunodeficiency virus

\subsection*{Statistical analysis}

We entered data in Epidata software, and analyzed using the statistical software STATA version 12 (College Station, TX). We performed a descriptive analysis and determined number of deaths in each disease, time-period, and age categories. We estimated proportional mortality ratio (PMR) by disease categories in each time and age categories. We compared the difference in PMR in first fifteen years of the study period (period A, 1979-1993) with the later (period B, 1994-2008) across disease and age categories. These study periods were so defined as PMR for infectious and chronic diseases showed a reversal in these time-periods. We used Chi-square test to evaluate if the difference in PMR in periods A and B was significant ($P < 0.01$ as a level of significance).
RESULTS

We found 20,494 death certificates between 1979 and 2008 in hospital records and included these in the analysis. A total of 39.4% of these deaths were in females, and 17% in elderly. In each time period, number of hospital admissions as well as deaths showed an incremental rise. Overall deaths were 3.3% of hospital admissions, which significantly correlated with hospital admissions ($r = 0.94, P < 0.001$). PMR for infections showed a declining trend while that for chronic diseases and injuries showed a rise across time-periods [Table 2]. Proportion of infectious disease related mortality was 35.1% in 1979-1983, which declined to 26.1% in 2004-2008. In the same periods, injury related mortality increased from 4.6% to 13.4%, and chronic disease mortality from 19.2% to 28.7%. In the first two time-periods (1979-1983, and 1984-1988) proportion of mortality due to infectious causes was greater than chronic diseases and injuries put together. After 1994-1998, proportion of chronic disease mortality became higher than infections while mortality due to injury remained constant [Figure 1]. A total of 6617 deaths took place between 1979 and 1993, and 13,876 between 1994 and 2008. The difference in PMR (per 1000 deaths) was statistically significant across these time-periods for infections (a decline of 80.67 [95% CI 66.97-94.03]), chronic diseases (an increase of 45.85 [95% CI 33.49-58.55]), and injuries (an increase of 42.98 [95% CI 33.87-52.26]) [Table 3].

Reduction in proportional mortality due to infectious was consistent across age and gender categories [Table 4, Figure 2]. Reduction was significant in neonates, infants, children, and young adults, and overall reduction was similar in females and males. We compared PMR across disease subcategories. We found that reduced mortality due to diarrhea, encephalitis, septicemia, tuberculosis, and tetanus contributed to decline in PMR for infectious etiologies. PMR for pneumonia remained unchanged while that for malaria and human immunodeficiency virus increased across periods A and B [Figure 2].

Rise in proportional mortality due to injuries was significant in children, young adults, and middle-aged [Tables 3 and 4]. There were some important gender differences in mortality pattern as the increase in PMR due to injuries was significantly more in females as compared to males (67.65 vs. 26.71 per 1000 deaths, $P < 0.0001$) [Figure 2]. This difference was largely because of more deaths in females due to burns in the 13-35 year and 36-60 year age-groups. Of the 1553 deaths due to burns, 1236 (79%) were in females. Of the 481 deaths due to poisoning, 155 (32%) were in females. Burns and poisonings significantly contributed to a rise in proportional mortality due to injuries.
Increased mortality due to cerebrovascular diseases and chronic liver disease contributed to a rise in PMR for chronic diseases. PMR for other chronic diseases remained unchanged. There was no consistent rise in chronic disease PMR across age categories. Age-stratified PMR due to perinatal or congenital causes was not different in neonates, and significantly higher in infants. There was no significant difference in maternal mortality, and mortality due to malignancies [Tables 3 and 4].

Deaths categorized as unclassified were from three broad categories. First, those patients who were dead on arrival (brought dead) and proportion of such deaths significantly increased in period B. Second, those where a foul play was suspected, law enforcing authorities were informed, and death occurred within 24 h of hospital admission (medico-legal death < 24 h). In such cases, treating doctors usually write “cause to be decided after post-mortem.” Third, where the primary cause of death is missing, and cause of death is written as cardiac or cardio-respiratory arrest. Proportion of deaths in this category was small and reduced in period B [Tables 2 and 3].

**DISCUSSION**

In the current study of causes of in-hospital mortality over three decades, we found a significant and consistent reduction in deaths due to infectious etiologies, and rise in deaths due to injuries and chronic diseases. Proportion of mortality due to other etiologies remained unchanged. These findings suggest epidemiological transition in causes of mortality, as after 1998 infectious diseases were no longer the single largest contributor to mortality. These findings from Rural Central India document important gains in infectious disease control, and suggest injuries and chronic diseases as future disease control priorities.

These results need to be interpreted carefully as these represent a small proportion of all deaths in the community, which occurred at a single hospital. While the population of Wardha district increased by 57% from 0.82 million (1981) to 1.29 million (2011), number of hospital admissions as well as deaths increased by more than three-folds. This suggests increased health seeking and possible increase in the catchment population of the hospital beyond a single district. However, these factors are likely to have a minimal impact on PMR, as the proportion of deaths to hospital admissions remained similar across time-periods. Other factors such as increasing longevity and more births change demographic structure of the population. Standardized mortality rates are used to adjust for these effects at a population level, we however, limited ourselves to proportional mortality rates, as our study was limited to a single hospital. While our study is deficient in this regard, it is informative about the trend in mortality over a long period.

While studies from the developed countries, where death-records are available for longer than hundred years showed a decline in infectious diseases and rise in chronic diseases around 1950s,\[16\] such a change has been more recent in LMICs. Most compelling evidence about epidemiological transition comes from a study from rural Bangladesh.\[13\] This study used concurrent verbal autopsy methodology with recall period of less than 4 weeks from 1986 to 2003,

![Table 2: Frequency and proportional mortality ratio of cause of death in each disease category in each time-period (n = 20494)](image-url)

*All values for disease categories indicate number (PMR in percent) for the specified time period. MLC: Medico-legal case, where death occurs in less than 24 h of hospitalization, and attending doctor writes cause of death "to be decided after post-mortem". PMR: Proportional mortality ratio

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**Table 2: Frequency and proportional mortality ratio of cause of death in each disease category in each time-period (n = 20494)**

| Variable                | 1979-1983 | 1984-1988 | 1989-1993 | 1994-1998 | 1999-2003 | 2004-2008 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Hospital admissions     | 60864     | 6729      | 78040     | 94685     | 132229    | 173636    |
| Number of deaths        | 1200      | 2457      | 2961      | 3669      | 4870      | 5337      |
| Percent deaths          | 1.97      | 3.64      | 3.79      | 3.87      | 3.68      | 3.07      |
| Disease category*       |           |           |           |           |           |           |
| Infectious diseases     | 421 (35.1)| 882 (35.9)| 937 (31.6)| 972 (26.4)| 1212 (24.8)| 1396 (26.1)|
| Chronic diseases        | 237 (19.7)| 588 (23.9)| 679 (22.9)| 964 (26.2)| 1318 (27.0)| 1504 (28.2)|
| Injuries                | 55 (4.6)  | 202 (8.2) | 388 (13.1)| 558 (15.2)| 672 (13.8)| 719 (13.4)|
| Malignancy              | 34 (2.8)  | 90 (3.6)  | 146 (4.9) | 150 (4.1) | 227 (4.6) | 250 (4.7) |
| Maternal                | 9 (0.7)   | 12 (0.5)  | 25 (0.8)  | 31 (0.8)  | 17 (0.3)  | 21 (0.4)  |
| Perinatal/congenital    | 226 (18.8)| 438 (17.8)| 443 (14.9)| 562 (15.3)| 732 (15.0)| 630 (11.8)|
| Miscellaneous           | 160 (13.3)| 198 (8.1) | 304 (10.2)| 250 (6.8) | 253 (5.2) | 233 (4.3) |
| Unclassified            | 58 (4.8)  | 47 (1.9)  | 39 (1.3)  | 183 (4.9) | 439 (9.0) | 584 (10.9)|
| Brought dead            | 0 (0)     | 2 (0.08)  | 3 (0.40)  | 64 (1.74) | 68 (1.40) | 11 (0.21) |
| Cardiac arrest          | 57 (4.75) | 43 (1.75) | 34 (1.15) | 16 (0.44) | 25 (0.51) | 46 (0.86) |
| MLC death<24 h          | 1 (0.08)  | 2 (0.08)  | 3 (0.10)  | 103 (2.82) | 346 (9.10)| 527 (9.87)|
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In another study from rural Bangladesh, about two-thirds of all deaths in adults in 2003-04 was due to chronic diseases. Rise in prevalence of chronic diseases has also been documented from rural India. In a mortality-study from Northern India, which sampled deaths between 1992 and 2009 and used verbal autopsy methods to determine the cause of death, chronic non-communicable conditions were the leading causes of death (47.6%) followed by communicable diseases including maternal, perinatal and nutritional conditions (34.0%), and injuries (11.4%). Deaths due to cardiovascular diseases showed a significant rise, whereas deaths due to diarrheal diseases showed a decline. In another mortality study from Southern India, which sampled deaths from 2003 to 2004, chronic diseases of the circulatory system were the leading causes of mortality (32%), followed by injuries (13%) and infectious and parasitic diseases (12%). Results of our study are broadly consistent with these findings. However, there are important differences. While there has been a consistent decline in mortality due to infectious diseases, and rise in mortality due to injuries the proportion of chronic disease mortality is inconsistent across age-strata. Although overall chronic disease mortality showed a rise, there was no significant change in chronic disease mortality within age-strata, especially in middle-aged and

Table 3: Difference in proportional mortality across two time periods (1979-1993 versus 1994-2008) by disease categories

| Disease category                  | Period A (1979-1993) | Period B (1994-2008) | Difference in PMR | P value |
|----------------------------------|----------------------|----------------------|-------------------|---------|
|                                 | Number | PMR (per 1000 deaths) | Number | PMR (per 1000 deaths) | Period B-Period A |         |         |
| Total deaths                     | 6617   | 13876                | 19586  | 258.00                | −80.67          | <0.0001 |         |
| Infectious diseases              | 2241   | 338.67               | 3580   | 258.00                | −80.67          | <0.0001 |         |
| Diarrhea                         | 79     | 11.94                | 57     | 4.40                  | −7.53           | <0.0001 |         |
| Pneumonia                        | 337    | 47.91                | 687    | 69.98                | −20.07          | <0.0001 |         |
| Encephalitis                     | 569    | 85.99                | 781    | 56.28                | −29.71          | <0.0001 |         |
| HIV                              | 0      | 0.00                 | 61     | 4.40                  | −4.40           | <0.0001 |         |
| Septicemia                       | 627    | 94.76                | 971    | 69.98                | −24.78          | <0.0001 |         |
| Malaria                          | 10     | 2.51                 | 62     | 4.47                  | −1.96           | <0.0001 |         |
| Tuberculosis                     | 417    | 63.02                | 598    | 43.10                | −19.92          | <0.0001 |         |
| Tetanus                          | 122    | 18.44                | 62     | 4.47                  | −13.97          | <0.0001 |         |
| Others                           | 100    | 15.11                | 120    | 8.65                  | −6.46           | <0.0001 |         |
| Chronic diseases                 | 1503   | 227.14               | 3798   | 272.99               | 45.85           | <0.0001 |         |
| Coronary artery disease          | 372    | 56.22                | 893    | 64.36                | 8.14            | 0.02    |         |
| Cerebrovascular disease          | 465    | 70.27                | 1499   | 108.03               | 37.75           | <0.0001 |         |
| Diabetes/hypertension            | 89     | 13.45                | 228    | 16.43                | 3.98            | 0.30    |         |
| Rheumatic heart disease          | 46     | 6.95                 | 116    | 8.36                 | 1.41            | 0.28    |         |
| Sickle cell disease              | 27     | 4.08                 | 71     | 5.12                 | 1.04            | 0.31    |         |
| Chronic airway disease           | 140    | 21.16                | 258    | 18.59                | −2.56           | 0.21    |         |
| Chronic kidney disease           | 130    | 19.65                | 214    | 15.42                | −4.22           | 0.02    |         |
| Chronic liver disease            | 120    | 18.14                | 354    | 26.23                | 10.80           | 0.0004  |         |
| Others                           | 114    | 17.23                | 145    | 10.45                | −6.78           | <0.0001 |         |
| Injuries                         | 645    | 97.48                | 1949   | 140.46               | 42.98           | <0.0001 |         |
| Trauma                           | 151    | 22.82                | 243    | 17.37                | −5.45           | 0.007   |         |
| Burns                            | 362    | 54.72                | 1192   | 85.90                | 31.20           | <0.0001 |         |
| Poisoning                        | 84     | 12.69                | 398    | 28.68                | 15.99           | <0.0001 |         |
| Venousous bite                   | 39     | 5.89                 | 105    | 5.77                 | 0.12            | 0.38    |         |
| Other                            | 9      | 1.36                 | 13     | 0.94                 | −0.42           | 0.38    |         |
| Malignancies                     | 270    | 40.80                | 627    | 45.19                | 4.38            | 0.15    |         |
| Maternal mortality               | 46     | 6.95                 | 69     | 4.97                 | −1.98           | 0.07    |         |
| Perinatal/congenital             | 1106   | 167.15               | 1923   | 138.68               | −28.56          | <0.0001 |         |
| Miscellaneous                    | 662    | 100.05               | 735    | 52.97                | −47.08          | <0.0001 |         |
| Unclassified                     | 144    | 21.76                | 1205   | 86.84                | 65.08           | <0.0001 |         |
| Brought dead                     | 4      | 0.60                 | 143    | 10.30                | 9.70            | 0.0001  |         |
| Cardiac arrest                   | 134    | 20.25                | 87     | 6.26                 | −13.98          | <0.0001 |         |
| MLC death<24 h                   | 6      | 0.90                 | 975    | 70.26                | 69.35           | <0.0001 |         |

PMR: Proportional mortality ratio, HIV: Human immunodeficiency virus. Negative values for PMR indicate reduction, and positive values indicate increase.
elderly. Further, it is expected for South Asia that 45% of all deaths will occur in age-groups of 60 years or more, 30% in 15-59 years, and 25% in those 14 years or less.[3] In our study only 17% of all deaths were in those above 60 years of age. This gap is likely to be due to reduced access to health-care among elderly, and it is likely that most of them would die at home. Thus, proportion of chronic disease mortality in our study is an underestimate. Cerebrovascular diseases were the most important etiology responsible for the rise in chronic diseases, consistent with other studies from rural areas.

Among infectious diseases, proportional mortality due to pneumonia remained unchanged while that of malaria increased. Mortality due to all other causes showed a decline. Thus, there are un-met challenges in infectious disease control. About a quarter of all deaths are still due to infectious diseases, representing a significant mortality burden. Another dramatic rise has been in injuries, especially burns and poisonings. About four-fifths of all burn related mortality was among females. Most burn related deaths among women are either homicides or suicides, representing gender-inequality and social oppression. Most deaths categorized as “unclassified” are also likely to be due to injuries. While the rise in injury related mortality may partly be due to improved health seeking behavior especially among women, other societal and environmental factors are also likely. These include increased motor vehicles, reduced land-holdings, financial pressures, and higher stress levels. Many of these factors are however, speculative and further studies are needed to better delineate factors contributing to their rise.

Our study has certain strengths. Our study included only the physician certified in-hospital deaths, where determination of cause of death is likely to be more reliable. We included all available death certificates to minimize sampling bias, and two investigators classified all deaths to minimize information bias. However, our study has important limitations. First, we did not include deaths, which occurred outside the hospital. It is known that about one-third of all deaths take place either at home, or during transportation, especially in economically disadvantaged communities. In-hospital mortality may not be truly representative of overall mortality in the community. The deaths in elderly and in women are likely to be under-represented. Second, about 6% of all deaths were unclassified as in these cases either the primary cause of death was not mentioned, or cause was to be determined after post-mortem. Most of these are medico-legal deaths, especially after an injury.
either brought-dead to the emergency services or die after a brief stay in the hospital. Thus, the proportion of deaths due to injuries in our study is likely to be an underestimate, due to non-inclusion of unclassified cases. Third, this is a single-hospital study which has a predominantly rural catchment. Thus, while the results do not represent urban areas, our results are likely to be similar with those in other similar settings. Fourth, while death certificates are likely to be more accurate than verbal-autopsy methods, their validity depends on training, experience, and information available with treating doctors. Over the three decades of the study period, more than hundred different doctors made decisions about the cause of death. Considerable inter-observer variability is expected in individual methods and information sources, in any study of this nature.

To conclude, temporal trend in mortality in rural areas over the past three decades shows decline in infectious diseases, and rise in injuries and chronic diseases. This trend documents epidemiologic transition, but also highlights the double burden of diseases which exists in rural India. We need effective strategies to address this double burden through public health actions, which still have an infectious disease focus.

REFERENCES

1. Manton KG. The global impact of noncommunicable diseases: Estimates and projections. World Health Stat Q 1988;41:255-66.
2. Zhai S, McGarvey ST. Temporal changes and rural-urban differences in cardiovascular disease risk factors and mortality in China. Hum Biol 1992;64:807-19.
3. Shen J. Analysis of urban-rural population dynamics of China: A multiregional life table approach. Environ Plan A 1993;25:245-53.
4. Collins VR, Dowse GK, Cabealawa S, Ram P, Zimmer PZ. High mortality from cardiovascular disease and analysis of risk factors in Indian and Melanesian Fijians. Int J Epidemiol 1996;25:59-69.
5. Kumar R, Kumar D, Jagnoor J, Aggarwal AK, Lakshmi PV. Epidemiological transition in a rural community of northern India: 18-year mortality surveillance using verbal autopsy. J Epidemiol Community Health 2012;66:890-3
6. Joshi R, Cardona M, Iyengar S, Sukumar A, Raja CR, Raja KR, et al. Chronic diseases now a leading cause of death in rural India – Mortality data from the Andhra Pradesh rural health initiative. Int J Epidemiol 2006;35:1522-9.
7. Ahsan Karar Z, Alam N, Kim Streetfield P. Epidemiological transition in rural Bangladesh, 1986-2006. Glob Health Action 2009;19:2
8. Mathers CD, Boerma T, Ma Fat D. Global and regional causes of death. Br Med Bull 2009;92:7-32.
9. van Eijk AM, Adouz K, O’Riware P, Vulule J, Hamel M, Slutsker L. Causes of deaths using verbal autopsy among adolescents and adults in rural western Kenya. Trop Med Int Health 2008;13:1314-24.
10. Sacarlal J, Nhacolo AQ, Sigaúque B, Nhalungo DA, Abacassamo F, Sacoor CN, et al. A 10 year study of the cause of death in children under 15 years in Manhiça, Mozambique. BMC Public Health 2009;9:67.
11. Garenne M, Darkaoui N, Braikat M, Azelmat M. Changing cause of death profile in Morocco: The impact of child-survival programmes. J Health Popul Nutr 2007;25:212-20.
12. Alam N, Chowdhury HR, Bhuiyan MA, Streetfield PK. Causes of death of adults and elderly and healthcare-seeking before death in rural Bangladesh. J Health Popul Nutr 2010;28:520-8.
13. Minh HV, Byass P, Wall S. Mortality from cardiovascular diseases in Bavi District, Vietnam. Scand J Public Health Suppl 2003;62:26-31.
14. Gupta R. Recent trends in coronary heart disease epidemiology in India. Indian Heart J 2008;60(2 Suppl B):B4-18.
15. Singh RB, Singh V, Kulsbretha SK, Singh S, Gupta P, Kumar R, et al. Social class and all-cause mortality in an urban population of North India. Aeta Cardiol 2005;60:611-7.
16. Wolkerwinkel-van den Bosch JH, Looman CW, Van Poppel FW, Mackenbach JP. Cause-specific mortality trends in The Netherlands, 1875-1992: A formal analysis of the epidemiologic transition. Int J Epidemiol 1997;26:772-81.

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