Availability of data for monitoring noncommunicable disease risk factors in India
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Objective To examine the availability of data measuring noncommunicable disease (NCD) risk factor indicators from household surveys conducted in India from 2000 to 2009.

Methods Questionnaires and publications used in household surveys were identified through internet and PubMed searches and examined to determine which core NCD risk factor indicators recommended by the World Health Organization (WHO) for NCD monitoring were being measured. Surveys with a sample size of 5000 or more were included to ensure a certain level of precision. The completeness of core indicator measurement and the geographical representativeness of the surveys were assessed.

Findings Twenty-six surveys met the inclusion criteria. Among the WHO-recommended core behavioural risk factor indicators, those monitoring tobacco use were measured completely in national and subnational surveys; those assessing dietary intake and physical inactivity were measured only in subnational surveys, and those assessing alcohol use were not measured at all. Among WHO-recommended core biological risk factors, only body mass index was measured in national and subnational surveys, whereas blood pressure, fasting blood glucose and blood cholesterol were measured only in subnational surveys. Due to the use of non-standard indicator definitions, measurement of core indicators in some of the national and subnational surveys was incomplete.

Conclusion The availability of data on core risk factor indicators to monitor the increasing burden of NCDs is inadequate in India. These indicators using standardized definitions should be included in the periodic national household health surveys to provide data at the national and disaggregated levels.

Introduction

Noncommunicable diseases (NCDs) were estimated to account for over 50% of the deaths and 43% of the disability-adjusted life years (DALYs) lost in India in 20041 and they are prevalent across all socioeconomic strata in the country.2,3 According to predictions, by 2030 NCDs will account for almost three-quarters of all deaths in India and the years of life lost due to coronary heart disease will be greater in that country than in China, the Russian Federation and the United States of America combined.4 To address the growing burden of NCDs, the government of India has launched several programmes that aim to reduce the prevalence of modifiable NCD risk factors.4,5 These risk factors, which include tobacco use, alcohol use, low fruit and vegetable intake, physical inactivity, overweight and obesity, high blood pressure, high blood glucose and high blood cholesterol, account for an estimated 61% of cardiovascular disease deaths in low- and middle-income countries.6 Information on the prevalence of NCD risk factors in the population is crucial for NCD programme monitoring and planning, and can assist in predicting the future burden of disease. Ideally, this information should be collected periodically as part of NCD surveillance to allow comparisons over time both nationally and at appropriate levels of disaggregation.

The STEPwise approach to surveillance (STEPS) of the World Health Organization (WHO), based on conducting population surveys to collect information on the major modifiable NCD risk factors, has been used in many studies globally and was designed for use in low- and middle-income countries.6,7 In 2009, WHO proposed a set of core indicators derived from STEPS for monitoring NCD risk factors nationally and globally. These core indicators were deemed practical and easily obtainable by countries at all levels of technical capacity (Box 1).8,9

In the light of the rising burden of NCDs and of government efforts to control NCDs in India, NCD risk factor surveillance should be a priority for the national health information system. To assess the current status of NCD risk factor information in India, we studied the availability of data measuring the WHO core indicators and the STEPS indicators from household surveys conducted in India over the 10-year period from 2000 to 2009.

Methods

Survey selection criteria

Household surveys that collected information on at least one risk factor in the general adult population included in the WHO-recommended core indicators and STEPS indicators (tobacco use, alcohol use, physical inactivity, diet, body mass index [BMI], waist and/or hip circumference, blood pressure, fasting blood glucose, blood cholesterol),8 with data collection completed in or after the year 2000 and with a minimum sample size of 5000 individuals, were included. This sample size would allow measurement of a risk factor with a prevalence of 15% and a 2% absolute margin of error in males and females at the 95% confidence level, taking into account survey design effect and response rate.8

Identification of household surveys

A previous study on the health information system in India identified household surveys that form part of the country’s routine health information system.12 The web sites of the organizations conducting these surveys were searched for ad-
Box 1. Core behavioural and biological noncommunicable disease (NCD) risk factor indicators recommended by WHO for NCD monitoring

**Behavioural risk factors**
- Tobacco use:
  - Prevalence of tobacco use – use reported in three status categories: non-user, occasional user, daily user.
  - Prevalence of cigarette smoking – smoking reported in three status categories: non-smoker, occasional smoker, daily smoker.
- Alcohol use:
  - Prevalence of alcohol consumption – consumption reported in four status categories: lifetime abstainer, past-12-month abstainer, drank in last 12 months but not current user, and current user (defined as having drunk an alcoholic beverage in the past 30 days).
  - Prevalence of heavy episodic drinking (past week and past month) – episodic drinking defined as consumption of ≥5 drinks on a single occasion for men and of ≥4 drinks for women.
- Diet:
  - Prevalence of low fruit and vegetable consumption – consumption defined as number of daily servings of fruits and vegetables and reported in four groupings: 0; 1–2; 3–4; ≥5.
- Physical activity:
  - Total physical activity in adults reported in three categories: low level (insufficiently active) (<600 MET-minutes per week); moderate level (minimally active) (≥600 but <3000 MET-minutes per week); high level (sufficiently active) (≥3000 MET-minutes per week).

**Biological risk factors**
- Body mass index (height and weight measurements)
- Blood pressure
- Fasting blood glucose
- Blood cholesterol

Box 2. PubMed search strategy

The following keywords were searched in combination with “India” and “epidemiology OR prevalence OR distribution” for articles published in the year 2000 or onwards:

Documentation from surveys

For each identified survey we recorded the year(s) it was conducted, the states covered, sample size, age and sex included and rural/urban location. Surveys were ranked in decreasing order of coverage and in terms of geographic representativeness as follows: national, representative of states or regions: the sample covered the majority of the country and was designed to be disaggregated to the state or regional level; national, nationally representative only: the sample covered the majority of the country and was not designed to be disaggregated to the state or regional levels; multiple-state, representative: the sample was representative of the populations of more than one state; multiple-state, non-representative: the sample covered multiple states but was not representative of their populations; single-state, representative: the sample was representative of the population of one state; and single-state, non-representative: the sample was not representative of the population of the state covered. We also recorded whether the survey was periodic (i.e. whether earlier rounds had been conducted or not). A survey conducted once with planned future rounds did not qualify as periodic.

**Behavioural and biological risk factors**

We tried to access the survey questionnaires, either through web searches or by contacting the study investigators, to identify the WHO-recommended core and STEPS behavioural risk factor indicators measured. An indicator measured by the questionnaire was considered to be the same as the WHO-recommended core or STEPS indicator if it met the indicator definition, regardless of the questions used. To record the indicators measured by surveys whose questionnaires were unavailable, we accessed the survey publications and used the indicator definitions in the surveys, if described, or the indicators reported in them. For the STEPS behavioural risk factor indicators, if a given indicator was not measured by a survey, we examined the questionnaire or indicator definitions to determine and record if: (i) the definition differed from that used by STEPS, or (ii) it was not covered at all by the survey. We obtained the WHO-recommended core and STEPS biological risk factors measured by each survey from the relevant sections of the survey report, usually the methods section, or from the questionnaire, if available. We entered all information on the behavioural and biological risk factors measured by surveys into Microsoft Access 2007 (Redmond, United States of America).

The surveys measuring WHO-recommended core and/or STEPS indicators were examined according to their representativeness and periodicity. For WHO-recommended core behavioural risk factor indicators, we recorded which surveys measured the indicators for a particular risk factor completely or incompletely. A particular risk factor was considered to be incompletely measured if not all indicators...
for that risk factor or not all indicator categories were measured in a survey. For each STEPS behavioural indicator, we recorded any “missed opportunity for measurement”. We considered that an opportunity to measure a given STEPS indicator had been missed in either of the following situations: (i) for an indicator measured by at least one survey, an opportunity to measure the indicator was missed whenever another, more broadly representative survey failed to measure it because its definition differed from the one used by STEPS; (ii) for an indicator not measured by any survey, an opportunity to measure the indicator was missed whenever any survey failed to measure it because the indicator’s definition differed from the one used by STEPS. Since large surveillance surveys in India have been conducted roughly every five years, findings between two five-year blocks, namely 2000–2004 and 2005–2009, were compared.

Results

The search strategy results are shown in Fig. 1. We identified 26 surveys – 16 for 2000–2004 and 10 for 2005–2009 (Table 1).14–19 Of these surveys, seven (26.9%) covered only rural or urban populations or only males. Two (7.7%) were national and representative of states or regions; two (7.7%) were nationally representative only; seven (26.9%) were multiple-state, representative surveys; eight (30.8%) were multiple-state, non-representative surveys; one (3.8%) was a single-state, representative survey, and six (23.1%) were single-state non-representative surveys. Six surveys (24.0%) were periodic. Survey questionnaires were available overall for 16 (61.5%) surveys. Indicator definitions were given in the published reports of seven of the 10 surveys (38.5%) whose questionnaire was not available.

Behavioural risk factors

Table 2 shows the national and multiple state surveys that completely measured the WHO-recommended core behavioural risk factor indicators for at least one risk factor. National surveys measured only the WHO-recommended core tobacco use indicators completely in 2005–2009; they did not measure any of the other risk factor core indicators completely during either five-year period. WHO-recommended core indicators for alcohol use were not measured completely by any survey, including single-state surveys, during 2000–2009. The other risk factors had their core indicators measured completely in at least one survey during 2000–2004 and 2005–2009. The representativeness of the surveys measuring the core indicators was somewhat better in 2005–2009 than in 2000–2004.

A substantial number of surveys measured the WHO-recommended core tobacco and alcohol use indicators incompletely (Table 2). Some of these surveys were representative of a larger geographic area than surveys that were already measuring tobacco use indicators completely. As for alcohol use, some surveys provided incomplete measurements; none measured core indicators of alcohol use completely.

Among the single-state, non-representative surveys, one measured tobacco use core indicators completely in 2000–2004, but none did so in 2005–2009. None measured the alcohol use, diet or physical inactivity indicators completely in 2000–2009 (data not shown).

Table 2 shows the percentage of STEPS behavioural risk factor indicators measured by the surveys. National surveys measured 20.0% of STEPS alcohol use indicators in 2000–2004 and 84.6% of tobacco use indicators in 2005–2009, and no indicators for diet and physical inactivity during 2000–2009. Overall, the percentage of STEPS indicators measured in nationally representative and multiple-state representative surveys was somewhat higher in 2005–2009 than in 2000–2004. Seven STEPS behavioural risk factor indicators were not measured by any survey after the year 2000 (Appendix A, available at: http://www.phf.org/images/Publications/journals/Raban_et_al_WHO_Bulletin_2011_Appendix.pdf). There were many missed opportunities for measuring STEPS indicators because the indicator definitions used in the surveys differed from those used by STEPS (Table 3 and Appendix A).

Biological risk factors

Table 2 shows the WHO-recommended core biological risk factors measured by national and multiple-state surveys. National surveys measured only BMI in the two five-year periods we studied, but in 2000–2004 only females’ BMI was measured. In 2005–2009, the
Table 1. Household surveys collecting information on noncommunicable disease risk factors in India that met inclusion criteria for study

<table>
<thead>
<tr>
<th>Survey and year(s)</th>
<th>Population (age in years)</th>
<th>No. of states/UTs covered</th>
<th>Rural/urban/both</th>
<th>n</th>
<th>Periodic survey</th>
<th>Method for assessing behavioural risk factor indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National, representative of states or regions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Adult Tobacco Survey, 9,10 2009–10</td>
<td>≥ 15</td>
<td>31</td>
<td>Both</td>
<td>69,296</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>National Family Health Survey – 3,11 2005–06</td>
<td>Females 15–49; males 15–54</td>
<td>35</td>
<td>Both</td>
<td>198,754</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td><strong>National, nationally representative only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian Human Development Survey, 12 2004–05</td>
<td>Households</td>
<td>33</td>
<td>Both</td>
<td>41,000</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>National Household Survey of Drug and Alcohol Abuse, 13 2000–01</td>
<td>Males 12–60</td>
<td>24</td>
<td>Both</td>
<td>40,697</td>
<td>No</td>
<td>Indicator definitions</td>
</tr>
<tr>
<td><strong>Multiple-state, representative</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHO World Health Survey/Study on Global Ageing and Health, 14,15 2007–2008</td>
<td>≥ 18</td>
<td>6</td>
<td>Both</td>
<td>12,198</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>2003</td>
<td>≥ 18</td>
<td>6</td>
<td>Both</td>
<td>9,994</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Integrated Disease Surveillance Project Non-Communicable Disease Risk Factor Survey, 16 2007–08</td>
<td>15–64</td>
<td>7</td>
<td>Both</td>
<td>38,054</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Population Council’s Youth in India Survey, 17 2006–08</td>
<td>Females 15–24; males 15–29</td>
<td>6</td>
<td>Both</td>
<td>50,848</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td><strong>National Nutrition Monitoring Bureau Surveys,18,19 2005–06</strong></td>
<td>≥ 1</td>
<td>10</td>
<td>Rural</td>
<td>51,700</td>
<td>Yes</td>
<td>Indicators reported</td>
</tr>
<tr>
<td>2000–01</td>
<td>≥ 1</td>
<td>9</td>
<td>Rural</td>
<td>51,300</td>
<td>Yes</td>
<td>Indicators reported</td>
</tr>
<tr>
<td><strong>Multiple-state, non-representative</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian Study on Epidemiology of Asthma, Respiratory Symptoms and Chronic Bronchitis Phases 1 &amp; 2, 20 2006–09</td>
<td>15–85</td>
<td>14</td>
<td>Both</td>
<td>169,575</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>2002–04</td>
<td>15+</td>
<td>4</td>
<td>Both</td>
<td>73,605</td>
<td>Yes</td>
<td>Questionnaire</td>
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<tr>
<td><strong>Indian Council of Medical Research Risk Factor Surveillance, 21 2005–06</strong></td>
<td>15–64</td>
<td>6</td>
<td>Both</td>
<td>7,874</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>2003–04</td>
<td>15–64</td>
<td>5</td>
<td>Both</td>
<td>39,429</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Cardiovascular Disease Surveillance in Industrial Settings, 22 2002–03</td>
<td>20–69</td>
<td>10</td>
<td>Both</td>
<td>19,973</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td><strong>Prevalence of Diabetes in India Study, 23 1999–2002</strong></td>
<td>25+</td>
<td>108 centres</td>
<td>Both</td>
<td>41,270</td>
<td>No</td>
<td>Indicator definitions</td>
</tr>
<tr>
<td>National Urban Diabetes Survey, 24 2000</td>
<td>≥ 20</td>
<td>6</td>
<td>Urban</td>
<td>11,216</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Coronary Heart Disease Risk Factors in Northern India, 25 1995–2000</td>
<td>≥ 15</td>
<td>3</td>
<td>Both</td>
<td>7,169</td>
<td>No</td>
<td>Indicator definitions</td>
</tr>
<tr>
<td><strong>Single-state, representative</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kerala Risk Factor Study, 26 2003–04</td>
<td>30–74</td>
<td>1</td>
<td>Both</td>
<td>6,579</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td><strong>Single-state, non-representative</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamil Nadu Diabetes and Risk Factor Survey, 27 2006</td>
<td>≥ 20</td>
<td>1</td>
<td>Both</td>
<td>7,066</td>
<td>No</td>
<td>Indicator definitions</td>
</tr>
<tr>
<td>Diabetic Retinopathy Study, Theni District, Tamil Nadu, 28 2005–06</td>
<td>≥ 30</td>
<td>1</td>
<td>Both</td>
<td>25,969</td>
<td>No</td>
<td>Indicator definitions</td>
</tr>
<tr>
<td>Chennai Urban Rural Epidemiology Study, 29 2001–04</td>
<td>≥ 20</td>
<td>1</td>
<td>Both</td>
<td>26,001</td>
<td>No</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Trivandrum Oral Cancer Screening Study, 30 1996–2004</td>
<td>≥ 35</td>
<td>1</td>
<td>Rural</td>
<td>164,072</td>
<td>Yes</td>
<td>Indicator definitions</td>
</tr>
<tr>
<td>Mumbai Cohort Study Follow-Up, 31 1997–2003</td>
<td>≥ 35</td>
<td>1</td>
<td>Urban</td>
<td>90,282</td>
<td>Yes</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Substance abuse in Arunachal Pradesh, 32 1998–2000</td>
<td>≥ 10</td>
<td>1</td>
<td>Rural</td>
<td>5,135</td>
<td>No</td>
<td>Indicator definitions</td>
</tr>
</tbody>
</table>

UT, union territory.

India has 28 states and 7 union territories.

Designed to be representative of six regions of India.

Designed to be representative of states of India.

This survey is planned to be periodic, but no other rounds conducted thus far.

Post-intervention follow-up survey conducted in 2006 in intervention group (n = 5899) and control group (n = 907).

representativeness of the surveys in which blood pressure was measured improved with respect to 2000–2004, but blood glucose and blood cholesterol showed no change. Single-state surveys (data not shown) measured all biological risk factors during both five-year periods with the exception of blood cholesterol, which was measured only in 2005–2009 in a single-state survey.

**Discussion**

Surveillance of the major modifiable NCD risk factors in the population is essential for programme and policy planning, implementation and evaluation. This is particularly important for India, where the burden of NCDs has been increasing. In this study we examined the availability of data measuring the WHO core and STEPS NCD risk factor indicators as collected by household surveys in India since the year 2000, and we highlight the gaps that need to be addressed to better inform NCD control in India.

The national-level survey data collected did not adequately cover the behavioural risk factor indicators and biological risk factors for NCDs. The WHO-recommended core tobacco use indicators and BMI were measured in a national survey only in 2005–2009. Multiple-state surveys, both representative and non-representative, filled some of the data gaps pertaining to behavioural and biological risk factors. The data collected in 2005–2009 showed improvements over the data collected in 2000–2004. This is not surprising since NCDs have begun to draw more attention as a public health issue in India in recent years. However, while many surveys included indicators of tobacco use, the remaining behavioural risk factors, namely alcohol use, diet and physical inactivity, were covered less frequently and less extensively. Additionally, many surveys measured the WHO-recommended core indicators incompletely, and opportunities to measure STEPS indicators were often missed because of the use of different indicator definitions. This underscores the need to standardize the approach to collecting NCD risk factor data.

The biological risk factors requiring blood samples (fasting blood glucose and blood cholesterol) were covered by surveys of smaller geographic representativeness than the surveys that included the biological risk factors requiring physical measurement (BMI and blood pressure). This is not surprising given that blood samples are more difficult and costly to collect. While biological risk factor data should ideally be collected on a larger scale than at present, it would be more practical for the health information system in India to begin by adequately covering core behavioural risk factors, with efforts to incorporate biological risk factors requiring physical measurements and blood samples when feasible. In this regard, the capacity for collecting biological samples in national surveys does exist in India, as has been demonstrated by the National Family Health Survey and the District Level Household Survey, in which blood samples...
samples to test for anaemia and HIV have been collected. The collection and analysis of dried blood spots on filter paper have been investigated in India in recent years for the measurement of blood cholesterol as an easier alternative to collecting venous blood in large surveys. Thus, with careful planning, blood sample collection for NCD risk factors could be incorporated into existing national surveys in India.

Surveillance of NCD risk factors should involve periodic standardized data collection to monitor, at appropriate levels of disaggregation, how risk factors in populations change over time. The health information system in India includes several large-scale surveillance surveys, but not all of them collect NCD risk factor data at present. Three rounds of the District Level Household Surveys have been conducted, each with a sample of 530,000 to 720,000 households. However, the last two rounds conducted in 2002–2004 and 2007–2008 have not collected data on NCD risk factors. The National Family Health Survey, the Demographic and Health Survey in India, has begun including additional NCD risk factor data in the more recent rounds, but this could be further strengthened by also covering the core behavioural indicators and perhaps even blood pressure and blood cholesterol measurement, as in the Demographic and Health Surveys in other countries. The new Annual Health Survey, conducted in the nine least developed states of India where half of the country’s population lives, sampled over 3.6 million households in 2010 and included some NCD risk factor questions (results not yet published), with collection of biomarkers planned for subsequent rounds. These three large surveys are valuable resources, particularly because they are periodic, and they could be used to obtain the complete set.

Table 3. Number and percentage of STEPS indicators with a missed opportunity for measurement by any survey

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>No. of STEPS indicators</th>
<th>Indicators not measured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%b</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Dietc</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

STEPS, STEPwise approach to surveillance.

a For an indicator measured by at least one survey, an opportunity to measure the indicator was missed whenever another, more broadly representative survey failed to measure it because its definition differed from the one used by STEPS, for an indicator not measured by any survey, an opportunity to measure the indicator was missed whenever any survey failed to measure it because its definition differed from the one used by STEPS.

b Percentage of total indicators for each risk factor.

c Includes measures of fruit and vegetable consumption, oil or fat most frequently used for cooking and meals eaten outside the home.
of WHO-recommended core NCD risk factors in future rounds. This would improve NCD risk factor surveillance and strengthen India’s health information system by making it more compatible with current and projected disease distribution, while enabling the efficient use of resources. Careful consideration of priority indicators and their definitions would ensure standardized data collection and the core indicators and STEPS instrument could be a useful guide for this process.

Lessons can be learnt from countries comparable to India. In Brazil, NCD risk factor surveillance covers the STEPS behavioural risk factors and BMI.44 Several surveys contribute to this information and a national health survey planned for 2013 will include blood pressure and other biological risk factor measurements.44 In 2004 China initiated nationally-representative NCD risk factor surveillance surveys that are conducted every three years.45,46 Both countries have longitudinal data on NCD risk factors, which is also possible in India if the collection of such data is integrated into the health information system, particularly in national surveys.

The inability to access all survey questionnaires is a limitation of this study, since it made it more difficult to document which indicators were measured by the surveys. Some of the indicators that were measured could have been missed because complete data are not always reported in publications. On the other hand, the number of indicators measured by some surveys may have been overestimated owing to the absence of indicator definitions. Importantly, this issue highlights the need for improved information sharing within the public health research community to contribute to the common goal of improving population health.47 Another limitation of the study is that only surveys with sample sizes of 5000 or more were included in the analysis. Collecting data involving physical measurements and blood samples is usually easier in smaller surveys. However, since all the core and STEPS biological risk factors were collected by the surveys we examined, the exclusion of smaller surveys is not likely to bias our main findings.

Ideally, the list of NCD risk factors to be monitored in a country should be titrated with the country’s needs and capacity. We have suggested a shortlist of WHO-recommended core indicators, composed of the subset of STEPS indicators that is considered measurable in low- and middle-income countries,10 as the minimum data set required for India. Measuring these core indicators should be feasible in large-scale national household surveys in India, which have relatively advanced capacity and are already collecting blood samples.15,40 This will raise the cost of these surveys somewhat, but the benefits from having a complete small list of WHO-recommended core indicators would be far-reaching and would amply justify the expenditure. Additional STEPS indicators specifically relevant for India could also be considered. For example, data on chewable tobacco use and bidi smoking, both of which are highly prevalent in India, should be available. Indicators other than the WHO-recommended core and STEPS indicators may also be necessary for comprehensive programme monitoring and evaluation.40

NCDs are now recognized as a leading global public health problem, as demonstrated by the convening of the United Nations Summit on NCDs scheduled for September 2011.48 As our findings suggest, efforts to control the increasing burden of NCDs in low- and middle-income countries involve establishing adequate systems for monitoring NCD risk factors and using these data to refine control strategies. The methods employed in this study could be applied in other countries to assess gaps in NCD risk factor data and integrate NCD risk factor surveillance into national health information systems. A clear assessment of the data gaps would be helpful in developing relevant policy for better monitoring of NCD risk factors. At present, a lack of adequate risk factor data at the national and disaggregated levels and missed opportunities to measure indicators owing to a lack of standardized indicator definitions represent the most important gaps. Both could be addressed by adding appropriate standardized NCD risk factor indicators to existing large-scale periodic surveys that are national in scope but that can also be disaggregated to the state and regional levels.

This research highlights important deficiencies in India’s health information system. Greater attention needs to be paid to this area of health systems research, which is largely neglected in India, to effectively and sustainably improve the health of India’s population.49,50

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Noncommunicable disease risk factor monitoring in India

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Purpose To examine the availability of data measuring non-communicable disease (NCD) risk factor indicators from household surveys in India from 2000 to 2009. Methods Publications and questionnaires used in household surveys were identified from Internet and PubMed searches. They were then studied to determine which key non-communicable disease risk factor indicators recommended by the World Health Organization for monitoring were measured. Surveys of 5,000 or more were included to ensure a certain level of precision. The representativeness of the key indicators and the geographical representation of the surveys were evaluated. Results Twenty-six surveys conformed to the inclusion criteria. Among the key behavioral risk factor indicators recommended by the World Health Organization, those evaluating tobacco use were measured in national and subnational surveys, while those evaluating dietary intake and physical activity were only measured in subnational surveys. Among the key biological risk factor indicators recommended by the World Health Organization, only body mass index was measured in national and subnational surveys, while blood pressure, fasting glucose and blood lipid concentrations were measured only in subnational surveys. Due to the use of non-standard indicator definitions, the key indicators were incompletely measured in some national and subnational surveys. Conclusion The availability of data on key risk factor indicators for monitoring the increasing burden of non-communicable diseases is insufficient in India. These indicators, using standardized definitions, should be included in national periodic health surveys to provide national and subnational data.
Resumen

Disponibilidad de datos para la supervisión de los factores de riesgo de enfermedades no transmisibles en India

Objetivo Examinar la disponibilidad de datos que miden los indicadores de factores de riesgo para enfermedades no transmisibles (ENT) a partir de las encuestas domésticas realizadas entre los años 2000 y 2009 en India.

Métodos A través de búsquedas en Internet y en PubMed se identificaron los cuestionarios y publicaciones empleados en las encuestas domésticas. A continuación, se examinaron para determinar qué indicadores fundamentales de factores de riesgo se habían medido para las ENT siguiendo las recomendaciones de la Organización Mundial de la Salud (OMS) para la supervisión de enfermedades no transmisibles. Se incluyeron encuestas con un tamaño de muestra de 5000 personas o más para garantizar un nivel de precisión adecuado. Se evaluaron la integridad de la medición del indicador principal y la representatividad geográfica de las encuestas.

Resultados Veintiséis encuestas cumplieron los criterios de inclusión. De los principales indicadores de factores de riesgo conductuales recomendados por la OMS, los que controlaban el consumo de tabaco se medieron en su totalidad en encuestas nacionales y regionales; los que evaluaban la dieta y el sedentarismo se midieron únicamente en encuestas regionales y los que evaluaban el consumo de alcohol no se midieron en absoluto. De los principales factores de riesgo biológicos recomendados por la OMS, solo se midió el índice de masa corporal en las encuestas nacionales y regionales, mientras que la presión arterial, los niveles de glucosa en sangre en ayunas y los de colesterol en sangre se midieron únicamente en encuestas regionales. Debido al uso de definiciones de indicadores no estandarizadas, la medición de los indicadores principales en algunas de las encuestas nacionales y regionales fue incompleta.

Conclusión La disponibilidad de datos en India sobre los principales indicadores de factores de riesgo para controlar la creciente carga de enfermedades no transmisibles es insuficiente. Estos indicadores que emplean definiciones estandarizadas se deben incluir en las encuestas domésticas que se realizan periódicamente en el país para proporcionar datos a nivel nacional y desagregado.

Referencias


