

Strengthening NCD prevention through risk factor surveillance

The burden of chronic non-communicable diseases (NCD), especially heart disease, stroke, hypertension, diabetes, cancer and chronic respiratory disease, is rising in low and middle-income countries, particularly in Asia (1). NCD deaths account for 60% of all deaths in the world and one in two deaths in the Asian region. Prevention programmes and policies are in their infancy in this region (2) and struggle to achieve priority because of the more established and pressing needs of infectious disease control; the recent outbreaks of Avian and H1N1 influenza are immediate examples (3). Comprehensive prevention programmes are underpinned by an understanding of the population levels of the major NCD risk factors which explain the occurrence of the vast majority of new episodes of NCD in all regions of the world.

The papers in this supplement on NCD risk factor distributions in nine Health and Demographic Surveillance System (HDSS) sites of the INDEPTH Network (www.indepth-network.org) in five countries in Asia (Bangladesh, India, Indonesia, Thailand and Vietnam) are welcome. The surveillance sites have been described as ‘...vibrant hotbeds, grounded in high quality research and training’ (4), and these papers mark a notable shift from the traditional emphasis on communicable diseases in rural populations in low and middle-income countries to the growing problem of NCD. The series begins with a description of the methodology used in the multi-site cross-sectional study (5) and the following papers provide strong support for public health efforts to reduce the harmful effects of tobacco (6), alcohol (7), low fruit and vegetable intake (8) and physical inactivity (9). The series continues with a focus on blood pressure (10), obesity (11), the way in which many of the risk factors cluster (12), and ends with an example of how one of the HDSS sites has used the surveillance process to stimulate actions at a broader societal level (13).

Ongoing surveillance of changes in population levels of the major NCD risk factors is crucial if we are to understand the success or otherwise of preventive efforts. Many countries embark on a one-off survey, often with their own definitions, which are not designed to measure secular trends. To address this problem, WHO developed a STEPwise approach to Surveillance (WHO STEPS) of a few key modifiable risk factors suitable for use in low and middle-income settings (14, 15); this methodology is used in this series of papers. The WHO STEPS approach

offers standard methods and measures, as well as accompanying detailed manuals and training materials to ensure that age and sex trends can be addressed adequately, as well as to guide quality control (16). Above all, the WHO STEPS approach establishes a baseline against which trends in these key risk factors can be measured through repeated cross-sectional surveys drawn from the same populations.

WHO STEPS had its origins in the WHO Monitoring the Trends and Determinants of Cardiovascular Disease (MONICA) Project which, during the 1980s and early 1990s, monitored the trends and determinants of cardiovascular disease by developing ongoing population-based heart disease and stroke registers as well as three risk factor surveys in the same populations at the beginning, middle and end of the duration of the disease registers (17). This was essentially a research project to understand how the changes in incidence and case fatality of heart disease and stroke related to the changing profile of risk factors. Because the restrictive nature of case-finding methods required access to vital statistics and clinical records, most of the 38 collaborating centres of the MONICA project were based in Europe; only one centre, Beijing, was in a developing country. Even so, the WHO MONICA project was the largest of its kind, monitoring the risk factor profile (tobacco use, serum cholesterol, blood pressure and body mass index) of over 100,000 adults 35–64 years of age. In the process it trained a large group of epidemiologists.

In building on the MONICA experience, WHO STEPS placed the focus on obtaining data on a few key risk factors in adults 25–64 years of age which would predict trends in disease incidence, rather than focussing on disease incidence. One of the features of WHO STEPS is that it is designed to ensure the inclusion of core items into existing surveillance systems in an attempt to move towards encouraging the reporting of core indicators in a standardised manner. For example, national health surveys in India, Thailand, Iran, Philippines, Chile, USA, France, Singapore and Indonesia, now incorporate selected items from WHO STEPS; 77 countries have completed at least one baseline national survey, 16 have completed the second survey and two have completed the third survey.

The INDEPTH Network was formed in 1998 and formally constituted in 2002 to bring together HDSS sites in low and middle-income countries. Today, INDEPTH

has a membership of 34 HDSS sites in 17 countries. The sites had been developed in many countries in Africa and Asia to address the lack of vital statistics and lack of representative data at the population level (18). Many of these HDSS have monitored population dynamics on a continuous basis over decades and together they represent a unique public health resource (4). One of INDEPTH's strengths is that although originally developed to monitor infectious disease, and maternal and child health trends in selected populations, the population database enables the generation of random samples of the adult population with relative ease in order to examine hitherto neglected measures of NCD risk (19).

The series of papers in this supplement of *Global Health Action* is a testimony to the collaboration, cooperation and coordination of a large number of people, ranging from the field workers and data collectors, to the principal investigators in each INDEPTH Asian HDSS, as well as the leadership offered by the Centre for Epidemiology and Global Health, a WHO Collaborating Centre in Surveillance and Public Health Training at Umeå University, Sweden. Over 18,000 adults were included in the nine site survey. The financial support of the INDEPTH Network and the technical support by WHO through materials provided on the WHO web site (<http://who.int/chp/steps>) made this collaborative exercise possible. The core set of indicators now available in summary form for each of the different HDSS, offer an important resource for generating hypotheses for further analyses, as well acting as a repository of the baseline data against which future changes in these indicators can be measured. Further surveys might explore the use of electronic data collection systems which further simplify the collection of STEPS information, both in terms of acceptability of the methods and accuracy of the data (20).

As would be expected, the results present an intriguing pattern of risk factors in these widely divergent settings; however, each indicator is related to a sub-population, comparisons and explanations are limited. The main results raise issues which will inevitably require further exploration, including with the use of qualitative studies. Tobacco use, whether smoked or chewed, was common across all sites with some notable variations. Few women smoked tobacco daily in any of the sites. However, women, especially older women, were more likely to chew tobacco than men in all sites. Only four of the five countries involved in this multi-site study have ratified the WHO Framework Convention on Tobacco Control, and even then, implementation is uneven.

Low levels of physical activity were recorded across the sites with over one in four men and one in three women physically inactive. Contextual issues related to urbanisation and the working environment need to be explored to explain these patterns; the two HDSS in Vietnam are in

an excellent position to further explore differences in alcohol consumption and physical activity patterns. Fruit and vegetable intake may be a simple marker of a healthy food pattern for useful monitoring of changes in food patterns. However, the surprisingly low intake suggests that this marker of nutrition may need to be supplemented with other more relevant local foods. Measures of salt intake are cumbersome in the context of surveys, but reduction in population salt levels has been shown to be the most cost-effective population-based intervention, because of its association with blood pressure (21), and some measure may need to be included in future surveys (22). This is especially important because even in these rural populations, the mean levels of systolic blood pressure are already greater than the optimal levels (10) and individual-based solutions are not likely to be cost-effective.

Experience from these nine INDEPTH HDSS is a cause for optimism which will be fully realised when surveillance becomes an integral and funded component of national prevention programmes and when the data from these surveys are used to inform policy and evaluate the outcome of the resulting actions. There is now sufficient evidence upon which to base the prevention programmes. The focus should be on population-wide measures, especially tobacco control and salt reduction (21), but individually based risk approaches will also be important in the presence of a functioning primary health care system (23).

The papers in this supplement represent only a first step. Many of the comparisons of the core indicators require deeper exploration including further analyses of exposures and the inclusion of additional contextual factors in the sites concerned. In addition, qualitative studies addressing barriers to implementation of policy and local control measures are required. The key challenge is to translate research into action. The paper by Anand et al. concludes that most of the sites are only in the early stage of this process; assessing the size of the problem and making recommendations to address the burden, is only a beginning (12). Many of the suggested solutions are dependent on policies and changes in environments, which will require political leadership to implement evidence-based interventions. Ballabgarh, the HDSS site in India offers a hopeful example of the possibility of successfully integrating surveillance with prevention. The critical success factors identified in the Indian HDSS involvement of a premier medical institution, pre-existing links to policy makers and programme managers, strong commitment of the HDSS team and adequate human resource capacity – may not be available in all settings. Even so, it is clear that all INDEPTH HDSS sites now need to strengthen their links to health systems at different levels and enhance their capacity to

engage different stakeholders in order to benefit the health of the population they serve.

The extent to which there is national capacity to prevent and control NCDs in these countries has not been addressed. However, this series of papers has demonstrated that collaboration between surveillance sites in very different populations is possible and, at least within the context of the INDEPTH Network, there is capacity to continue surveillance of these risk factors. Building the capacity to turn the information into policy and programmes is the next critical step. Failure to do so would be a lost opportunity; success would ensure that national policies are set in place to forestall an increase in these modifiable risk factors which would hold back the growing NCD pandemic in these countries. At its 10th anniversary in 2008, the INDEPTH Network reaffirmed its commitment to develop its capacity and strengthen its effort to move from knowledge generation to improved health policy and practice (21). The information from this multi-site study should stimulate the INDEPTH Network to assume a stronger leadership role in using its unique status to promote policies, especially tobacco control, for the prevention of chronic NCD in low-and middle-income countries.

Ruth Bonita

Professor Emeritus

Member of GHA International Advisory Board

References

- World Health Organization. Preventing chronic diseases – a vital investment. Geneva: World Health Organization; 2005.
- Reddy KS. Cardiovascular disease in developing countries: dimensions, determinants, dynamics, directions for public health action. *Public Health Nutr* 2002; 5: 231–7.
- Zhang H, Chen L. Possible origin of current influenza A H1N1 viruses. *Lancet Infectious Dis* 2009; 9: 456–7.
- Evans T, AbouZahr C. INDEPTH @ 10: celebrating the past and illuminating the future. *Global Health Action* 2008. DOI: 10.3402/gha.v1i0.1899.
- Ng N, Minh HV, Juvekar S, Razzaque A, Bich TH, Kanungsukkasem U, et al. Using the INDEPTH HDSS to build capacity for chronic non-communicable disease risk factor surveillance in low and middle-income countries. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1984.
- Ashraf A, Quaiyum MA, Ng N, Minh HV, Razzaque A, Ahmed SM, et al. Self-reported use of tobacco products in nine rural INDEPTH Health and Demographic Surveillance Systems in Asia. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1997.
- Bich TH, Nga PTQ, Quang LN, Minh HV, Ng N, Juvekar S, et al. Patterns of alcohol consumption in diverse rural populations in the Asian region. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.2017.
- Kanungsukkasem U, Ng N, Minh HV, Razzaque A, Ashraf A, Juvekar S, et al. Fruit and vegetable consumption in rural adults population in INDEPTH HDSS sites in Asia. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1988.
- Ng N, Hakimi M, Minh HV, Juvekar S, Razzaque A, Ashraf A, et al. Prevalence of physical inactivity in nine rural Health and Demographic Surveillance Systems in five Asian countries. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1985.
- Minh HV, Soonthornthada K, Ng N, Juvekar S, Razzaque A, Ashraf A, et al. Blood pressure in adult rural INDEPTH population in Asia. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.2010.
- Razzaque A, Nahar L, Minh HV, Ng N, Juvekar S, Ashraf A, et al. Social factors and overweight: evidence from nine Asian INDEPTH network sites. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1991.
- Ahmed SM, Hadi A, Razzaque A, Ashraf A, Juvekar S, Ng N, et al. Clustering of chronic non-communicable disease risk factors among selected Asian populations: levels and determinants. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1986.
- Krishnan A, Baridayne N, Kapoor SK, Pandav CS. A role for INDEPTH Asian sites in translating research to action for non-communicable disease prevention and control: a case study from Ballabgarh, India. *Global Health Action Supplement 1*, 2009. DOI: 10.3402/gha.v2i0.1990.
- Armstrong T, Bonita R. Capacity building for an integrated noncommunicable disease risk factor surveillance system in developing countries. *Ethn Dis* 2003; 13: S13–8.
- Bonita R, Douglas K, Winkelmann R, De Courten M. The WHO STEPwise approach to surveillance (STEPS) of non-communicable disease risk factors. In: McQueen D, Puska P, eds. *Global behavioral risk factor surveillance*. London: Kluwer Academic/Plenum; 2003, pp. 9–22.
- World Health Organization. WHO STEPS surveillance manual: the WHO STEPwise approach to chronic disease risk factor surveillance. Geneva: World Health Organization. Available from: <http://who.int/chp/steps>; 2005 [cited 4 September 2009].
- Tunstall-Pedoe H, editor. Prepared by Tunstall-Pedoe H, Kuulasmaa K, Tolonen H, Davidson M, Mendis S with 64 other contributors for The WHO MONICA project. MONICA monograph and multimedia sourcebook. Geneva: World Health Organization; 2003. ISBN 92 4 156223 4.
- INDEPTH Network. Population and health in developing countries. Ottawa: INDEPTH Network, IDRC; 2002.
- Ng N, Minh HV, Tesfaye F, Bonita R, Byass P, Stenlund H et al. Combining risk factors and demographic surveillance: potentials of WHO STEPS and INDEPTH methodologies for assessing epidemiological transition. *Scand J Public Health* 2006; 34: 199–208.
- Yu P, de Courten M, Pan E, Galea G, Prior J. The development and evaluation of a PDA-based method for public health surveillance data collection in developing countries. *Int J Med Informatics* 2009; 78: 532–42.
- Asaria P, Chisholm D, Mathers C, Ezzati M, Beaglehole R. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. *Lancet* 2007; 370: 2044–53.
- Tesfaye F, Byass P, Wall S. Population based prevalence of high blood pressure among adults in Addis Ababa: uncovering a silent epidemic. *BMC Cardiovasc Disord* 2009; 9: 39. DOI: 10.1186/1471-2261-9-39.
- Lim SS, Gaziano TA, Gakidou E, Reddy KS, Farzadfar F, Lozano R, et al. Prevention of cardiovascular disease in high-risk individuals in low-income and middle-income countries: health effects and costs. *Lancet* 2007; 370: 2054–63.