

ORIGINAL RESEARCH

China's Efforts on Management, Surveillance, and Research of Noncommunicable Diseases: NCD Scorecard Project



Xiao-Lei Zhu, MD, Jie-Si Luo, MD, Xiao-Chang Zhang, MD, Yi Zhai, PhD, Jing Wu, PhD
Beijing, China

Abstract

BACKGROUND The incidence of noncommunicable diseases (NCDs) is rising dramatically throughout the world. Aspects of researches concerned with the improvement and development of prevention and control of NCDs have been conducted. Furthermore, the influence of most determinants of the major NCDs has showed that a broad and deep response involving stakeholders in different sectors is required in the prevention and control of NCDs.

OBJECTIVE China has experienced an increase in NCDs in a short period compared with many countries. To address the burden of NCDs in China, it is important to learn about the progress that has been made in prevention and control of NCDs in China and worldwide, informed by opinions of stakeholders in different areas.

METHODS In 2014, GRAND South developed the NCD Scorecard instrument to evaluate progress of NCD prevention and control in 23 countries through a 2-round Delphi process. The scorecard included 51 indicators in 4 domains: governance, surveillance and research, prevention and risk factors, and health system response. Stakeholders were then selected in the areas of government, nongovernmental organizations, private sectors, and academia to join the NCD Scorecard survey. Indicators of progress were scored by stakeholders from 0 (no activity), 1 (present but not adequate), and 2 (adequate) to 3 (highly adequate) and then the percentage of progress in each domain was calculated, representing the current situation in each country.

FINDINGS There were 14 indicators in the domains of governance and surveillance and research. Of 429 stakeholders worldwide, 41 in China participated in the survey. China scored in the top 5 out of all participating countries in those 2 domains, scoring 67% in governance and 64% in surveillance and research. Indicators on which China scored particularly well included having a well-resourced unit or department responsible for NCDs, having a strong national system for recording the cause of all deaths, and having a system of NCD surveillance. Areas where China had the greatest need for improvement included increasing taxes on tobacco and addressing the needs of the population older than age 70 dying from major NCDs.

CONCLUSION In China the burden of disease of NCDs and disabilities remains serious, although China has put significant efforts into its governance and surveillance and research. To improve, further action is needed on reducing tobacco consumption, increasing investment in the national health budget, and increasing the focus on system construction.

KEY WORDS China, noncommunicable diseases, policy, scorecard, stakeholder.

Funding Source: The project is being funded by the United Health Foundation.

Conflicts of Interest: The authors declare that they have no conflict of interest.

All authors have made substantial contributions to all of the following: (1) analysis and interpretation of data; (2) drafting the article; (3) final approval of the version to be submitted.

From the Office of NCD Control and Community Health, Chinese Center for Disease Control and Prevention, Beijing, China. Address correspondence to J.W. (wujing@chinacdc.cn).

INTRODUCTION

Current global mortality from noncommunicable diseases (NCDs) remains unacceptably high and is still increasing.¹ Approximately 70% of global deaths were due to NCDs (38 million out of total 56 million) in 2012.² The 4 main types of NCDs (cardiovascular diseases [CVDs], cancers, diabetes, and chronic respiratory diseases) and shared 4 behavioral risk factors have greatly influenced aspects of people's life and health. The World Health Organization (WHO) has initiated 9 voluntary global targets, including a 25% relative reduction in overall mortality from the 4 major NCDs by 2025 (the 25 by 25 goal) on which all countries need to make progress.^{2,3} The United Nations (UN) held a first high-level meeting in 2011 and issued a political declaration to address the prevention and control of NCDs worldwide, particularly for developing countries.⁴

China is the world's most populous developing country and has experienced an acceleration of industrialization, urbanization, population aging processes, and rapid changes of national lifestyle.⁵ China is now also poised to address the world's greatest emerging health threat: NCDs. China has undergone major demographic and epidemiologic transitions.⁶ The overall mortality from NCDs was 533 per 100,000 in 2012, accounting for 86.6% of total deaths in China in 2012,⁷ which was higher than the global average. It is estimated that there are more than 300 million current cigarette smokers, and the prevalence of smoking among those older than 15 years in China was 28.1% in 2010.⁷ By 2030, China is predicted to face 1 or 2 times growth in the number of people with CVDs, chronic obstructive pulmonary disease, diabetes, and lung cancer, from which the working-age population's burden (in years of life lost) will increase nearly 50%.⁸ Prevention and control of NCDs deserve the highest priority.⁶

Responding to the challenges of NCDs, the Ministry of Health (MOH) of China established an Office of Non-Communicable Diseases, affiliated with the Department of Disease Control, in 1994.⁹ The National Health and Family Planning Commission^a has made notable progress in this field over the last 20 years, including actions in policymaking and administration, activities in surveillance and risk factors, and programs in research and cooperation. In May 2012, 15 ministries jointly issued the "China National Plan for NCDs Prevention and Treatment (2012-2015),"¹⁰

which was also the first national plan to deal with NCDs after the 2011 UN high-level meeting.

It is essential and important to measure and review progress and facilitate the actions that countries are making to reduce the burden of NCDs, and various groups are using a range of methods to monitor progress.¹¹⁻¹³ However, only a few studies have reported stakeholder perspectives on Chinese progress and follow-up actions on NCDs. Most reviews of this kind revealed China's situation in fighting NCDs according to individual authors' perspectives but failed to compare the situation in China with other countries from a variety of stakeholders' perspectives.

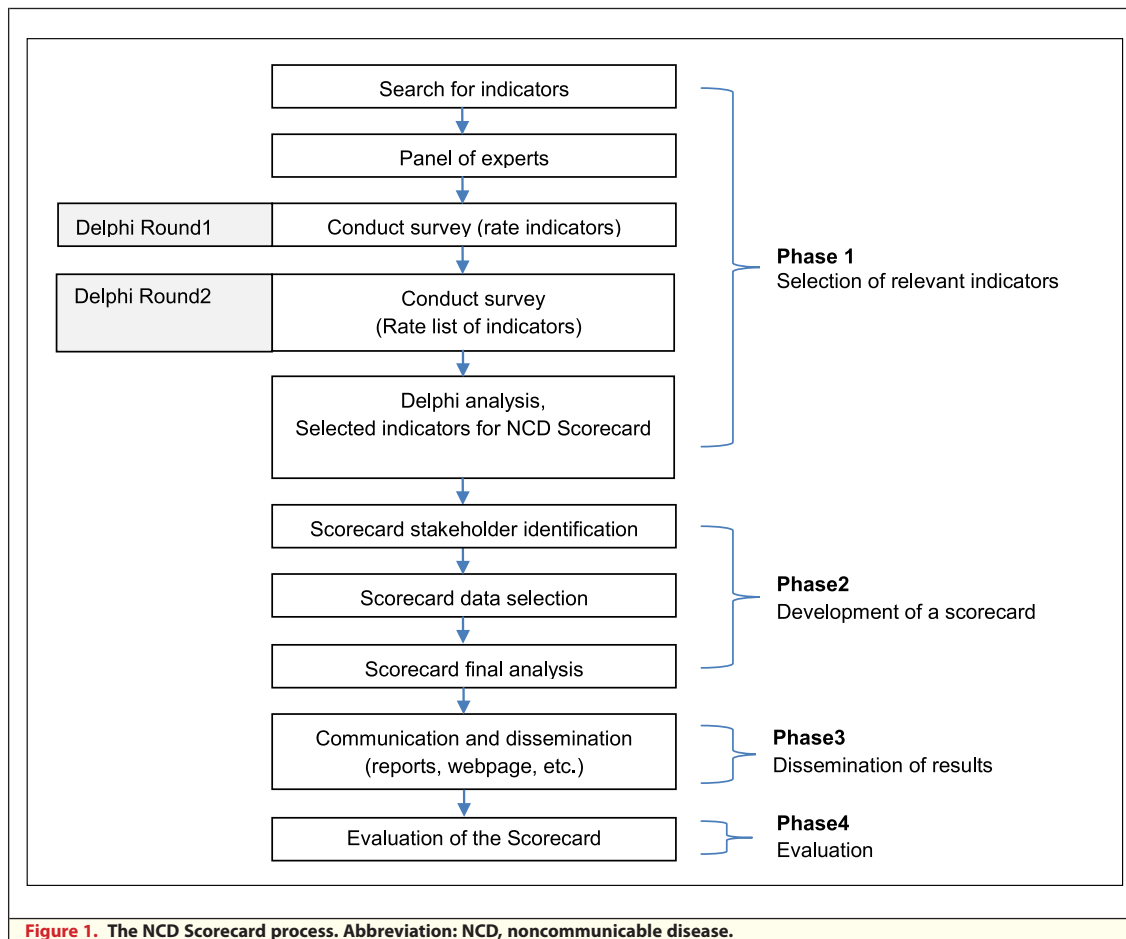
The NCD Scorecard Project is a collective effort of a network of 11 centers of excellence (CoE) that serve 23 countries (Supplementary Appendix 1 in the online version at doi:10.1016/j.aogh.2017.10.025) conducting research, building capacity, and advising on policy in relation to NCD in low- and middle-income countries. This network, now called GRAND South, developed a scorecard including 51 indicators divided into 4 domains to indicate the landscape of NCDs in the 23 countries.¹² The project provides an opportunity for each country's stakeholders to review progress and provide feedback to the government to better guide the work.

In this report we used the results of 14 out of 51 indicators in 2 areas (governance and surveillance and research), summarizing in detail the improvement and development in China compared with other countries. Other domains will be addressed in subsequent articles.

METHODS

Overview of the Survey. GRAND South developed the NCD Scorecard in 4 steps based on the 2011 UN Political Declaration and the Global NCD Action Plan 2013-2020.^{3,12,13} Figure 1 is a structured and succinct explanation of each step in the process. Phase 1 focused on the selection of relevant indicators, including a modified Delphi process in 2 rounds to further narrow the list of indicators.⁹ In Phase 2, a pilot study of the NCD Scorecard instrument was conducted in 3 countries (Guatemala, Bangladesh, and South Africa) in 2013, stakeholders were identified, and the scorecard was implemented in participating countries. In Phase 3, reports and results are being disseminated in all participating countries

^aThe National Health and Family Planning Commission was officially set up in 2013 after the existing MOH merged with the National Population and Family Planning Commission of China.



using a website. Evaluation of the NCD Scorecard is planned for Phase 4.

The field coordinator in each country selected at least 5 stakeholders in the 4 areas of government, non-governmental organizations (NGOs), private sectors, and academia. Potential stakeholders were identified by the CoE principal investigator according to proposed criteria. In 2014 the field coordinators sent the final instrument to participating respondents, and 429 stakeholders in total joined the survey.¹²

Survey in China. China conducted the training of field coordinators, discussion, and translation of questionnaire from May through August of 2014. Between September and December of 2014, invitation of Chinese stakeholders and data collection, correction, and uploading were undertaken. Meanwhile, systematic research and review of NCD prevention and control in China was conducted via Internet search of literature. A total of 48 stakeholders in China were invited and 1 excluded from the 42 agreed respondents; 41 respondents finally joined the survey. The instrument was completed individually.

Indicators and Delphi Process. Eighty relevant indicators were initially selected through literature review and expert consultation by a panel of experts. The final 51 indicators were selected through a 2-stage modified Delphi process with global experts from 23 countries (20 covered by the centers plus the United States, England, and Brazil). The list of 14 indicators in governance and surveillance and research are in [Table 1](#). In the first round, 28 experts scored each indicator from 1 (least important) to 9 (most important) and commented on the reasons. Each indicator's median and interquartile range (IQR) scores were computed. Indicators with median ≥ 8 and IQR of ≤ 2 were accepted, and indicators with a median < 4 were removed. In the second round, 23 experts scored indicators selected from the first round and additional indicators, including new indicators suggested by at least 10% of the experts or indicators that scored between 4 and 7. The median and IQR scores were computed.

After the final list of indicators was developed, the structured questionnaire was sent by field coordinators

Table 1. NCD Scorecard Indicators in 2 Domains

Domain	Indicators
Governance	<ol style="list-style-type: none"> 1. Inclusion of NCD in the national health plan and/or your national development agenda. 2. Existence of unit/branch/department in the Ministry of Health or equivalent with responsibility for NCD that is well-resourced. 3. Country/State/Province has tax legislation to increase the price of tobacco or has other financial interventions to reduce tobacco consumption. 4. A system ensures universal and equitable access to health system interventions for NCD and it is adequately resourced. 5. There are national projects, programmes and initiatives in the health sector to mobilise resources, build capacity, train health workers, and exchange information, lessons learnt and best practices on reducing the burden of NCD. 6. There is a high level multisectoral commission to coordinate initiatives and mobilise resources for NCD prevention and control. 7. There are specific budget line items within the national health budget devoted to prevention and control of NCD.
Surveillance & Research	<ol style="list-style-type: none"> 8. There is a national system for recording the cause of all deaths. 9. There is a national cancer registry. 10. There is a national system for measuring smoking rates. 11. There is a national system for measuring physical activity. 12. There is a national research programme for preventing and controlling NCD. 13. A system for NCD surveillance addresses each of the major conditions through sentinel surveillance of representative target populations. 14. Proportion of population under 70 years of age dying from cardiovascular diseases, cancer, diabetes, and chronic respiratory disease (total) during the last five years.

NCD, noncommunicable disease.

to selected respondents in electronic (Excel; Microsoft Corp., Redmond, WA) format. The respondents scored each indicator on a 4-point scale from 0-3 to indicate the country's progress on those indicators, with the criterial and objective support of field coordinators.

Data Analysis. Data were collected and analyzed after the first week in each country. Data recorded by each domain were stored and sent to the database management team. Respondents scored each question from 0-3 to indicate progress, and an overall score was calculated for each indicator using the median. The score for each domain was the sum of the median scores for all the indicators in that domain, which was divided by the total possible score and presented as percentage.¹² Table 2 shows the procedure on calculation of the percentage of progress of the NCD Scorecard.

The progress of the 4 domains of the NCD Scorecard are shown using a heat map. The final score was in a quintile ranking of progress for each domain of the NCD Scorecard (Table 3).






RESULTS

Countries and Respondents. This survey included 23 high- to low-income countries (using the World Bank Atlas method): 4 high-income countries (HICs), 11 upper middle-income countries (UMICs), 6 lower middle-income countries (LMICs), and 2 low-income countries (LICs). Countries were asked to participate via the CoE by the GRAND South network (Table 4). Progress in the governance domain ranged from 29% in Pakistan to 88% in the United States. The range of results in the surveillance and research domain was from 0% in Pakistan to 79% in

Table 2. An Example of Calculation of Each Domain

Domain	No. of Indicators (a)	Maximum Score Possible $b = (a \times 3)$	Total observed score $c = (b \times \text{indicator})$	% of Progress $(c \div b) \times 100$
Governance	7	21	8	$(8/21) \times 100$
Risk factors	20	60	6	$(6/60) \times 100$
Surveillance and research	7	21	3	$(3/21) \times 100$
Health system response	17	51	2	$(2/51) \times 100$

Table 3. A Heat Map to Interpret the Progress of Each Domain

Color	Score	Interpretation of Progress
	≤20%	Very low progress
	21%-40%	Low progress
	41%-60%	Moderate progress
	61%-80%	High progress
	>80%	Very high progress

England. Of the 11 UMICs, Argentina, China, and Costa Rica had the highest levels of progress in the 2 domains. Mexico also reported good progress (64%) in governance, whereas Brazil scored 48% in the surveillance and research domain (Figs. 2 and 3; Table 4).

A total of 429 stakeholders, around 8-41 stakeholders in each country, responded to the questionnaires. In China, 41 respondents joined the survey, including 10 government officials, 9 NGOs leaders, 16 academics, and 6 private sector leaders (Table 5).

Results From the Top 5 Countries and Different Scores From Stakeholders. The top 5 high-scoring countries in the progress of governance and surveillance and research were the United States, England, Chile, Argentina, and China. The United States and England scored the highest in governance, 88% and 86%, respectively. They also scored the highest in surveillance and research (both scoring 79%). Argentina scored at a similar level to China; Argentina scored 69% in governance and 62% in surveillance and research, compared with 67% and 64% in China. Among the 4 HICs, only Uruguay had lower progress than China in both domains, 57% in governance and 40% in surveillance and research. Chile scored 52% in surveillance and research, similar to all UMICs combined (Figs. 2 and 3).

Scorers from the private sector in the United States and China scored their country higher than stakeholders from the other 3 sectors both in the progress of governance and surveillance and research. NGOs in England gave a higher score than the other sectors in the progress of governance, and academia in England gave higher scores in the progress of surveillance and research (Tables 6 and 7).

Comparative Analysis of Indicator Performance. Nearly all countries scored particularly well on Indicator 8 (progress in developing and implementing systems for recording the cause of all deaths) with the exception of India and Kenya. However, fewer countries made progress on having a system for measuring smoking rates, mostly HICs and UMICs plus

Kenya. Legislation on or financial interventions for tobacco control have been implemented in 22 countries. China was 1 of 4 UMICs—also including Belize, Dominican Republic, and Tunisia—that received a score of 1 or 0 in tax legislation on reducing tobacco consumption, which is lower than many countries. Only a few countries made progress on the proportion of population younger than 70 years dying from main NCDs (total) during the last 5 years, including Kenya, which scored a 2, whereas the United States, Brazil, Mexico, and India each scored 1. No country achieved highly adequate level (score of 3) in the progress on a high-level multisectoral commission to coordinate initiatives, and only 7 out of 23 countries scored 2 in this area, whereas the others scored 1 or 0 (Table 4).

For China, among the 14 indicators, 9 out of 14 indicators were adequate (score of 2). The only areas that scored a 0 or 1 were the areas of tax legislation on tobacco price and the proportion of population younger than 70 years dying from main NCDs (total) during the last 5 years. Three indicators were evaluated highly adequate (score 3): existence of a unit in the MOH with responsibility for NCD, a system for recording causes of death, and existence of a national research program for preventing and controlling NCD.

DISCUSSION

Progress Within Countries Matters Most. One key finding of this investigation was that HICs and UMICs have put efforts in many aspects of NCD prevention and control, whereas LMICs and LICs have only made progress mostly in governance. The NCD scorecard confirms that progress and achievement on NCDs is varied across countries.

England and the United States lead the globe in terms of progress in the 2 domains examined in this article. England and the United States are also the 2 countries to take national or individual overall preventive actions on NCD risk factors. Additionally, research indicates that the United States and England have focused on NCDs at both the domestic and global levels, which fuels connection among health, diplomatic, and globalization sectors.¹⁴ Argentina, one of the UMICs in Latin America in the Pan American Health Organization (PAHO) system, has made progress in a short time. Literature indicates that there was no operational multisectoral national policy or action plan in Argentina before 2014.¹⁵ Argentina did better in tax legislation but worse in multisectoral cooperation compared with China. Uruguay, another

Table 4. Overall Median (IQR) on Each Indicator in 2 Domains in 23 Countries

Domain	Indicator (List refer to Table 3)	High-Income Countries				Upper Middle–Income Countries						Lower Middle–Income Countries						Low-income Countries						
		Chile	England	USA	Uruguay	Argentina	Belize	Brazil	China	Costa Rica	Dominican Republic	Mexico	Panama	Peru	South Africa	Tunisia	El Salvador	Guatemala	Honduras	India	Nicaragua	Pakistan	Bangladesh	Kenya
Governance		71%	86%	88%	57%	69%	48%	52%	67%	64%	48%	64%	57%	57%	52%	43%	52%	38%	29%	57%	43%	29%	52%	50%
	1	3(2-3)	3(2-3)	3(3-3)	1(1-2)	2(1-2)	2(2-3)	2(2-2)	2(2-3)	2(2-3)	2(2-2)	2(1-2)	2(1-2)	2(1-3)	2(2-3)	1(1-2)	2(1-2)	1(1-2)	1(1-1)	2(1-2)	2(2-3)	1(1-2)	2(2-3)	2(2-3)
	2	3(3-3)	2(2-3)	3(3-3)	2(2-3)	3(3-3)	2(0-2)	2(1-3)	3(2-3)	2(1-3)	2(2-2)	3(1-3)	2(2-2)	3(2-3)	2(2-3)	2(2-3)	2(1-3)	2(2-2)	2(2-2)	2(1-3)	2(1-2)	1(0-2)	2(1-2)	2(2-2)
	3	3(3-3)	3(3-3)	3(3-3)	3(3-3)	2(0-3)	1(0-2)	2(2-3)	1(0-2)	3(3-3)	0(0-1)	3(2-3)	3(3-3)	3(1-3)	3(3-3)	1(1-2)	3(2-3)	2(0-3)	2(0-3)	3(2-3)	1(0-2)	1(0-2)	2(2-2)	3(2-3)
	4	2(2-2)	3(2-3)	2(1-2)	3(2-3)	2(1-2)	2(1-2)	2(1-2)	2(2-2)	2(2-3)	2(2-2)	1(1-2)	2(1-2)	1(0-2)	2(1-2)	2(0-2)	2(1-2)	0(0-1)	0(0-0)	1(0-1)	2(1-3)	1(1-2)	1(1-2)	1(1-2)
	5	2(1-2)	3(2-3)	3(2-3)	1(1-2)	2(1-2)	1(1-1)	1(1-2)	2(1-3)	1(1-2)	1(1-1)	2(1-2)	1(1-2)	1(1-1)	1(1-1)	1(1-2)	1(1-2)	1(1-1)	1(1-1)	1(1-2)	1(1-2)	1(0-1)	2(1-2)	1(1-1)
	6	0(0-1)	2(1-3)	2(2-3)	1(1-2)	1(0-2)	1(0-2)	1(1-2)	2(1-2)	2(2-2)	2(2-2)	2(1-3)	2(1-2)	1(0-1)	1(0-1)	1(1-2)	0(0-1)	1(0-2)	0(0-1)	1(0-1)	0(0-2)	1(0-1)	1(1-2)	1(1-1)
7	2(1-3)	2(2-3)	3(3-3)	1(0-1)	3(1-3)	1(0-1)	1(1-2)	2(1-3)	2(0-2)	1(1-2)	2(1-2)	1(1-2)	1(1-1)	0(0-1)	1(1-1)	1(1-2)	1(0-1)	0(0-1)	2(1-3)	2(1-2)	1(0-1)	1(0-2)	1(1-1)	
Surveillance & Research		52%	79%	79%	40%	62%	26%	48%	64%	52%	33%	48%	38%	29%	24%	29%	24%	29%	19%	26%	19%	0%	24%	29%
	8	3(3-3)	3(3-3)	3(3-3)	3(3-3)	3(3-3)	3(3-3)	2(2-3)	3(2-3)	3(3-3)	3(3-3)	3(3-3)	3(3-3)	3(2-3)	3(3-3)	3(1-3)	2(2-3)	3(1-3)	3(2-3)	1(1-2)	3(2-3)	0(0-1)	2(1-2)	1(1-3)
	9	1(3-3)	3(3-3)	3(3-3)	3(3-3)	1(1-2)	2(0-2)	2(2-3)	2(1-3)	3(3-3)	0(0-1)	2(1-3)	3(3-3)	2(1-2)	1(1-2)	2(1-3)	2(1-2)	1(0-1)	1(1-1)	2(2-2)	1(1-2)	0(0-1)	1(1-2)	1(0-1)
	10	3(3-3)	3(3-3)	3(3-3)	2(1-3)	3(2-3)	0(0-0)	1(1-2)	2(2-2)	3(0-3)	0(0-0)	2(0-3)	2(1-3)	0(0-3)	0(0-3)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	0(0-2)	0(0-0)	0(0-0)	0(0-0)	2(2-3)
	11	3(2-3)	3	3(2-3)	1(0-3)	3(0-3)	0(0-0)	1(0-2)	2(0-2)	0(0-1)	0(0-0)	0(0-2)	0(0-0)	0(0-1)	0(0-1)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	0(0-0)
	12	0(0-2)	2(0-3)	2(2-2)	0(0-1)	2(0-2)	0(0-0)	2(1-2)	2(2-2)	1(0-2)	2(0-0)	1(0-2)	0(0-1)	0(0-0)	1(0-2)	1(0-2)	1(0-2)	0(0-2)	0(0-0)	2(0-2)	0(0-0)	0(0-0)	1(1-2)	1(0-1)
	13	1(0-2)	3(1-3)	2(2-3)	0(0-1)	1(0-2)	1(0-1)	1(1-2)	3(2-3)	1(0-2)	2(1-2)	1(0-2)	0(0-0)	1(0-1)	0(0-0)	0(0-0)	0(0-1)	0(0-0)	0(0-0)	0(0-0)	0(0-1)	0(0-0)	1(1-1)	0(0-1)
14	0(0-0)	0(0-0)	1(0-1)	0(0-1)	0(0-1)	0(0-0)	1(0-1)	0(0-1)	0(0-1)	0(2-2)	1(0-1)	0(0-0)	0(0-0)	0(0-2)	0(0-0)	0(0-0)	0(0-1)	0	1(0-0)	0(0-2)	0	0(0-0)	2(1-3)	

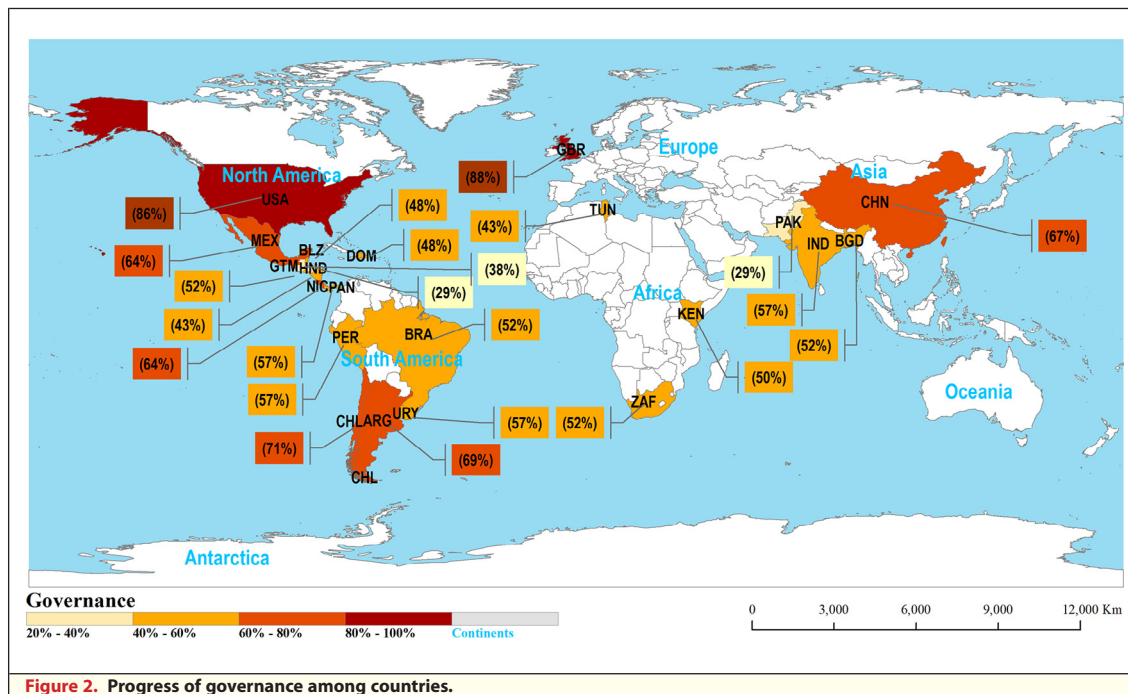


Figure 2. Progress of governance among countries.

country in the PAHO system, had no national policy and plan until 2011 but has bans and regulations on tobacco products with the Framework Convention on Tobacco Control.¹⁶

In comparison, China has prioritized NCDs in both the whole population and the high-risk

population as a national health major task since the National 12th 5-Year Plan (2011-15) and now with the 13th 5-Year Plan (2016-2020). Compared with other HICs, China started relatively late in this focus because of a weak economic foundation and technical barrier constraints. Other HICs have put

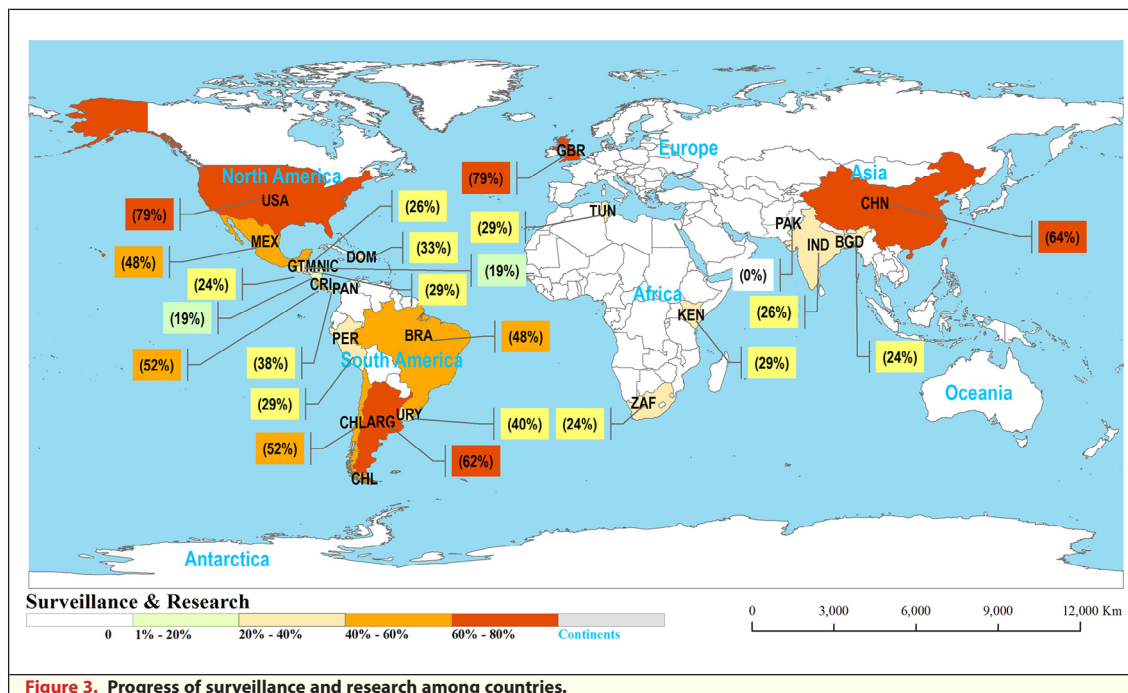


Figure 3. Progress of surveillance and research among countries.

Table 5. Progress of 2 Domains Within 4 Income Groups

Income group	Progress		Countries	Stakeholders (N)
	Governance	Surveillance & Research		
High income	81%	71%	Chile, England, United States, Uruguay	79
Upper middle income	52%	38%	Argentina, Belize, Brazil, China, Costa Rica, Dominican Republic, Mexico, Panama, Peru, South Africa, Tunisia	225
Lower middle income	43%	14%	El Salvador, Guatemala, Honduras, India, Nicaragua, Pakistan	97
Low income	48%	21%	Bangladesh, Kenya	28

more emphasis on information construction in recent years.¹⁷

A total of 178 out of 194 WHO member states have reported data on NCDs, of which 95% have established an NCD department in their national ministries of health. The burden of NCDs is also felt across countries regardless of income. It is projected that in the next 10 years China and India will lose \$558 and \$237 billion as a result of NCDs, and England will lose \$33 billion in national income as a result of largely preventable heart disease, strokes, and diabetes.¹⁸ In LMICs such as Bangladesh, the little evidence available suggests that NCDs are responsible for half of annual mortality (51%) and almost half of the burden of disease (41%).^{19,20} To fulfill the 25 by 25 goal, each country not only has

mutual but also independent accountability for NCD prevention and control. Some developing countries, particularly UMICs and LMICs, have to face the burden of communicable diseases in addition to the rising burden of NCDs. This research indicates that UMICs need to take action and arouse attention nationwide to strengthen their health systems. Meanwhile, LMICs should focus on capacity building for both training and research.²¹⁻²³ Furthermore, HICs and UMICs in the forefront of NCD surveillance and research could assist LMICs and LICs.

China's Action in NCDs Prevention and Control. New major policies have been published by the government in recent years. "The Plan of Health China 2030" and the "Long-term Planning for NCDs Prevention and Treatment in China (2017-2025)" were published by the

Table 6. Progress of Governance in Top 5 Countries by Sector

Respondent Country	Government		NGO/Civil		Private Sector		Academia & Research Institutions	
	%	N	%	N	%	N	%	N
Chile	69	8	71	1	62	2	74	10
United States	79	3	81	2	90	2	88	5
England	83	4	86	11	79	5	76	5
Argentina	74	11	43	3	69	5	52	10
China	60	10	62	9	71	6	69	16

NGO, nongovernmental organization.

Table 7. Progress of Surveillance and Research in Top 5 Countries by Sector

Respondent Country	Government		NGO/Civil		Private Sector		Academia & Research Institutions	
	%	N	%	N	%	N	%	N
Chile	67	8	67	1	62	2	45	10
United States	81	3	81	2	83	2	74	5
England	76	4	67	11	64	5	86	5
Argentina	76	11	62	3	45	5	45	10
China	62	10	57	9	67	6	60	16

State Council in 2016 and 2017.^{24,25} The “China National Plan for NCD Prevention and Treatment (2012–2015)” was jointly issued by 15 ministries in 2012, the “China Tobacco Control Plan (2012–2015)” was issued by 8 ministries in 2012, and so on. Some other remarkable developments in NCD prevention and control in national governance and surveillance in last 20 years include: the establishment of the National Cancer Centre and National Centre for Cardiovascular Diseases in 2009; the establishment of a national program for basic public health service in 2009; the proposed amendments to regulations for controlling smoking in public places in 2014; the extension of disease surveillance points in 2013; and integration of NCDs and nutrition surveillance in 2014.¹⁰ In addition, many influential national projects and research have been carried out by China's government and research institutions. For example, national chronic disease comprehensive control demonstration areas were established in 2010. The Healthy Lifestyle for All initiative began in 2007.²⁶ Additional projects include the national program of cancer early detection and treatment and cancer registries, the Shandong Ministry of Health Action On Salt and Hypertension, the Global Burden of Disease Study, and the China Kadoorie Biobank. Additionally, the Ministry of Science and Technology initiated key programs in NCD research in the Major State Research Development Program beginning in 2016.

China has taken action in NCD prevention and control since the hypertension prevention and cancer registration in 1959.^{27,28} Jun Lv *et al*⁹ conducted a Delphi survey on national expert consensus on NCD prevention and control, reaffirming progress made by China in promoting national action against NCDs during the 21st century. Eighteen cities have now come up with local legislation regarding tobacco control, Beijing being the first.²⁹ There are 605 disease surveillance points, 302 NCD and nutrition surveillance monitoring sites, and 265 national chronic disease comprehensive control demonstration areas.

Nevertheless, many efforts on NCD prevention and control are still needed because of the national health situation in China. For officials, professionals, and stakeholders, knowing the burden and risk factors of NCDs and evaluating the process of NCD prevention and control are helpful in identifying bottlenecks and opportunities for NCD management. The increase in and epidemics of NCDs³⁰ have been different not only in different areas but also different in income groups in the same area, which

requires well-directed policies and sufficient resources. Additionally, the aging of the population and the prevalence rate of NCDs by age could expand NCDs burden trends and cause high medical costs. The prevalence and risk factors for major NCDs are a source of concern in the National Status Report on Chinese Nutrition and Chronic Diseases in 2015.^{7,31} The prevalence of hypertension and diabetes in adults older than 18 years climbed to 25.2% and 9.7%, respectively, in 2012, and both were dramatically higher than in 2002. The prevalence of cigarette smoking in the population older than age 15 was 28.1%, and the prevalence of passive smoking in nonsmokers was 72.4%. Several studies reported that smoking increased disease burden and costs, and increasing prices of tobacco products had considerable health and economic benefits.^{32,33}

Some Indicators Worth Attention. Of special concern are some indicators in the governance and research and surveillance domains. Indicators should be measurable and sensitive to changes in policy and practice. The research indicates that timely and accurate monitoring, participatory review and evaluation, and effective remedy are necessary in a country's surveillance system.^{3,21}

In the area of tobacco control, 14 out of 23 countries in the PAHO system have undertaken tobacco control laws and regulations for 5 measures^b since 2008.² Some have also monitored the tobacco epidemic under the Global Tobacco Surveillance System (GTSS)^c since 1998, with the exception of countries such as Belize and the Dominican Republic, which have not responded to the WHO Framework Convention on Tobacco Control.¹⁹ China has twice completed the Global Adult Tobacco Survey, in 2010 and 2015, and conducted nationwide campaigns encouraging citizens to quit smoking. The research indicated that China made comparatively little progress in tax legislation to increase the price of tobacco compared with the top 5 countries. According to the National Cancer Institute, although China has made efforts to increase prices of tobacco, the tax increases are still insufficient.^{34,35}

In terms of universal and equitable access to a public health system, England has set an example with its National Health Service and with the cooperation shown by nurses, physicians, and therapists in providing economic and practical supports to NCD prevention and control.³⁶ China's program of basic

^bFive measures are protection from second-hand smoke; packaging and labeling; advertising, promotion, and sponsorship; tobacco taxes and prices; and cessation services.

^cGTSS collects data from 4 surveys: 3 schoolbased—the Global Youth Tobacco Survey, the Global School Personnel Survey, the Global Health Professions Student Surveys; and 1 household-based—the Global Adult Tobacco Survey.

public health service promotes equal opportunity and access to health services but challenges also exist.³⁷ For example, in some areas, such as the Yangtze River region, basic public health service equalization still has significant economic disparities in terms of access to public health services.³⁸ Nearly 80% of NCD deaths occur in LMICs and LICs. CVDs also place a massive socioeconomic burden on individuals and societies in LMICs, particularly in locations experiencing rapid industrialization.^{39,40} Universal health coverage and “best buy” interventions benefit health and strengthen research in LMICs. The World Health Report, WHO's leading publication,⁴¹ devoted chapters to epidemics of noncommunicable disease and tobacco control early in 1999.⁴² The UN's policymaking from Millennium Development Goals (MDGs, 2010-2015) to Sustainable Development Goals (SDGs, 2016-2030) has prioritized NCDs. In the 17 SDGs,⁴³ it has clearly declared its support for reduction of premature mortality from NCDs through prevention and treatment. The SDGs also address the importance of ensuring availability and sustainable management of water and sanitation for all, because the relation of water to NCDs is worth studying^{43,44} as one of the “Big Food” issues.⁴⁵

Limitations. The Delphi method, which has the advantage of anonymity and an information feedback loop and makes use of statistical inference, is widely applied in research fields. This investigation determined that the Delphi survey is an appropriate method for officials, professionals, and related stakeholders. However, the limitations of this research deserved attention. For example, with the Delphi method, there were issues with questionnaire design, the selection of experts, subject and researcher bias, and lack of representation, as well as challenges in managing larger groups.⁴⁶ One bias in the research could be unequal numbers or different subjective understandings of the respondents in the 4 sectors in different countries. In light of this situation, the field coordinators may have played essential roles in communicating and explaining to respondents to reduce possible confusion and misunderstanding. Nevertheless, the Delphi method provided an opportunity for continuous and systematic understanding of NCD prevention and control within and across countries.

CONCLUSION

This study revealed that the majority of countries surveyed have made progress in NCDs prevention and control under the global context; moreover, China has

put the prevention and control of NCDs high on the development agenda. Recently in China, governing bodies, academia, relevant agencies, and organizations have recognized that addressing NCDs is a priority for social development nationwide. The past 5 years have witnessed major policy and action developments in further support of tackling the NCD epidemic. However, enhancing government accountability can improve health service delivery. Chinese government policy of 13th 5-year plan, the One Road One Belt initiative, and its intention to carry out the UN sustainable development agenda all mention NCDs as a significant concern in national and international cooperation.⁴⁷⁻⁵⁰

NCDs are equal opportunity, blind to affluence or poverty, linking them to inevitable consequences across global, regional, and country barriers and causing invisible and global burdens. They act as key barriers to poverty alleviation and sustainable development. Countries need to develop longer-term solutions that are effective, feasible, and in line with NCD prevention and control. The engagement with relevant governmental agencies, organizations, health professionals, civil society, and the private sector is also an irresistible general trend.

The third UN high-level meeting on NCDs in 2018 aims to develop a set of very cost-effective and affordable NCD interventions can be implemented in countries.⁵¹ The NCD Scorecard project identifies bottlenecks and priority actions for NCD prevention and control both within and across countries through exchange of information among countries, international organizations, and stakeholders, which echoes WHO's programming goal of “Health For All” and promotes development of global health. NCDs are preventable if we take a positive attitude and implement measures based on evidence.⁵² Coordinated and coherent action should be taken at all levels, local to national. World Health Report 1998 described the desire for a healthier and better world with longer, better quality of life for all generations.⁵³ Certainly the prevention and control of NCDs through fulfillment of the 9 global voluntary targets is a shared responsibility of the global community.²

ACKNOWLEDGMENTS

The authors would like to extend sincere gratitude to Editor Terri Schwartzbeck, Public Health Specialist, Ying Cai at the US Centers for Disease Control and Prevention (CDC), and Professor Shenghan

Lai at the Johns Hopkins University for their contributions and help in valuable suggestions for the article and final manuscript preparation. Special thanks to colleagues at China CDC and all of the participants in this project.

APPENDIX SUPPLEMENTARY MATERIAL

Supplementary data to this article can be found online at doi:10.1016/j.aogh.2017.10.025.

REFERENCES

1. World Health Organization. Noncommunicable Diseases Country Profiles 2014. Geneva, Switzerland: World Health Organization; 2014.
2. World Health Organization. Global Status Report on Noncommunicable Diseases 2014. Geneva, Switzerland: World Health Organization; 2014.
3. World Health Organization. Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020. Geneva, Switzerland: World Health Organization; 2013. Available at: <http://www.who.int/nmh/publications/ncd-action-plan/en/>. Accessed December 30, 2016.
4. United Nations General Assembly. Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Noncommunicable Diseases. New York, NY: United Nations; 2016. Available at: www.un.org/ga/search/view_doc.asp?symbol=A/66/L.1. Accessed December 11, 2016.
5. Wang L. Exploration of strategies for chronic disease prevention and control and relevant system construction in China. *Engineer Sci* 2014.
6. Liu Y, Yang G, Zeng Y, et al. Policy dialogue on China's changing burden of disease. *Lancet* 2013;381:1961-2.
7. National Health and Family Planning Commission, China. National Status Report on Chinese Nutrition and Chronic Diseases 2015. Beijing, China: National Health and Family Planning Commission; 2016.
8. World Bank. Create Healthy and Harmonious Life, Limit NCDs Epidemic in China. Washington, DC: World Bank; 2011.
9. Lv J, Liu M, Jiang Y, et al. Prevention and control of major noncommunicable diseases in China from 1990 to 2009: results of a two-round Delphi survey. *Glob Health Action* 2013;6:2000411.
10. National Health and Family Planning Commission China (NHFPCC). Notice on China National Plan for NCD Prevention and Treatment (2012-2015). Beijing, China: NHFPCC; 2012. Available at: <http://www.nhfpcc.gov.cn/zw/gk/ztwj/201304/b8de7b7415ca4996b3567e5a09e43300.shtml>. Accessed January 30, 2017.
11. Beaglehole R, Bonita R, Ezzati M, et al. NCD Countdown 2025: accountability for the 25 x 25 NCD mortality reduction target. *Lancet* 2014;384:105-7.
12. Roman AV, Perez W, Smith R. on behalf of GRAND South. A scorecard for tracking actions to reduce the burden of non-communicable diseases. *Lancet* 2015;386:1131-2.
13. World Health Organization. Framework for Action to Implement the United Nations Political Declaration on Noncommunicable Diseases. Geneva, Switzerland: World Health Organization; 2012. Available at: <http://www.emro.who.int/noncommunicable-diseases/ncd-infocus/declaration-ncds.html>. Accessed December 30, 2016.
14. Wang YP, Liu PL, Yang HW, et al. Comparative study on the global health strategies of seven OECD countries. *Chinese J Health Policy* 2014;7:9-16.
15. World Health Organization. Argentina. Noncommunicable Diseases (NCD) Country Profiles 2014. Geneva, Switzerland: World Health Organization; 2014. Available at: http://www.who.int/nmh/countries/arg_en.pdf?ua=1. Accessed January 20, 2017.
16. Hospedales CJ, Barcelo A, Luciani S, et al. NCD Prevention and Control in Latin America and the Caribbean-A Regional Approach to Policy and Program Development. *Glob Heart* 2012;7:73-81.
17. Jing WU, Keqin RAO, Fan WU, et al. Community health information system based on the standard electronic health record. *Chinese Health Econ* 2009;28:49-51.
18. Narayan KM, Ali MK, Koplan JP. Global noncommunicable diseases—where worlds meet. *N Engl J Med* 2010;363:1196-8.
19. Bangladesh Bureau of Statistics. Statistical Pocketbook of Bangladesh 2007. Dhaka: Bangladesh: Bangladesh Bureau of Statistics; 2007. Available at: <http://www.bbs.gov.bd/dataindex/pwbpage.pdf>. Accessed December 30, 2016.
20. World Health Organization. Death and DALY Estimates for 2002 by Cause for WHO Member States. Geneva, Switzerland: World Health Organization; 2004.
21. Beaglehole R, Bonita R, Horton R. Independent global accountability for NCDs. *Lancet* 2013;381:566, 575, 585.
22. Engelgau MM, Sampson UK, Rabadan-Diehl C, et al. Tackling NCD in LMIC: achievements and lessons learned from the NHLBI-UnitedHealth Global Health Centers of Excellence Program. *Glob Heart* 2016;11:5-15.
23. Bleich SN, Koehlmoos TLP, Rashid M, et al. Noncommunicable chronic disease in Bangladesh: overview of existing programs and priorities going forward. *Health Policy* 2011;100:282-9.
24. General Office of the State Council, China. Issue on the Long-term planning for NCDs prevention and treatment in China (2017-2025); 2017. Available at: http://www.gov.cn/zhengce/content/2017-02/14/content_5167886.htm. Accessed February 15, 2017.
25. The Central People's Government, China. Issue on Plan of Health China 2030; 2016. Available at: http://www.gov.cn/xinwen/2016-10/25/content_5124174.htm. Accessed December 30, 2016.
26. Chinese Center for Disease Control and Prevention. Healthy Lifestyle for All; 2011. Available at: <http://www.jiankang121.cn/>. Accessed December 30, 2016.
27. Kong LZ. Thoughts on chronic diseases prevention and control in China. *Chin J Health Pol* 2012;5:2-5.
28. Wei KR, Liang ZH, Liu J, et al. History of cancer registration in China. *Zhonghua Yi Shi Za Zhi* 2012;42:21-5.
29. Xinhua Network, China. 18 cities have local legislation on tobacco control;

2016. Available at: http://news.xinhuanet.com/health/2016-06/01/c_129032094.htm. Accessed January 19, 2017.
30. Lancet. What to expect for China's health in the future. *Lancet* 2017;389:226.
 31. State Council Information Office, China. Briefing of National Status Report on Chinese Nutrition and Chronic Diseases in 2015; 2015. Available at: http://www.gov.cn/xinwen/2015-06/30/content_2887279.htm. Accessed December 30, 2016.
 32. Alcaraz A, Caporale J, Bardach A, et al. Burden of disease attributable to tobacco use in Argentina and potential impact of price increases through taxes. *Rev Panam Salud Publica* 2016;40:204-12.
 33. Pinto MT, Pichon-Riviere A, Bardach A. The burden of smoking-related diseases in Brazil: mortality, morbidity and costs. *Cad Saude Publica* 2015;31:1283-97.
 34. Ministry of Finance, China. Notice on Adjustment of the Consumption Tax Rate of Cigarettes. Beijing, China: Ministry of Finance; 2012. Available at: <http://www.chinatax.gov.cn/n810341/n810755/c1601367/content.html>. Accessed January 20, 2017.
 35. Lancet. Editorial. Tobacco elimination: an economic and public health imperative. *Lancet* 2017;389.
 36. Feng YT, Chen CY. The role and enlightenment of British nurses in noncommunicable diseases management. *Chin J Nurs* 2016;51:381-4.
 37. Zhang Y, Chen M, Shi XQ. Challenges of basic public health services provided by village doctors in Guizhou, China. *Asia Pac J Public Health* 2015;27(2 Suppl):69S-76S.
 38. Zhang J, Yan N. The evaluation and characteristics analysis of the basic public service equalization of the Yangtze River middle reaches urban agglomerations. *Ecol Econ* 2017;1:102-6.
 39. World Health Organization. Global Status Report on Noncommunicable Diseases 2010. Geneva, Switzerland: World Health Organization; 2011. Available at: http://www.who.int/nmh/publications/ncd_report2010/en/. Accessed January 20, 2017.
 40. World Health Organization. Cardiovascular Diseases. Geneva, Switzerland: World Health Organization. Available at: <http://www.wpro.who.int/china/mediacentre/factsheets/cvd/en/>. Accessed January 20, 2017.
 41. World Health Organization. Publications. Geneva, Switzerland: World Health Organization. Available at: <http://www.who.int/publications/en/>. Accessed January 11, 2017.
 42. World Health Organization. The World Health Report 1999: Making a Difference. Geneva, Switzerland: World Health Organization; 1999. Available at: http://www.who.int/whr/1999/en/whr99_en.pdf?ua=1. Accessed January 11, 2017.
 43. United Nations General Assembly. Transforming our World: The 2030 Agenda for Sustainable Development. New York, NY: United Nations; 2015. Available at: http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E. Accessed January 11, 2017.
 44. Yang GH, Zhuang DF. Atlas of the Water Environment and Digestive Cancer Mortality in the Huai River Basin. Beijing, China: Sino-Maps Press; 2013.
 45. Chan M. Opening address. Presented at: The 8th Global Conference on Health Promotion. Helsinki, Finland; June 10, 2013.
 46. Colagiuri R, Boylan S, Morrice E. Research priorities for NCD prevention and climate change: an international Delphi survey. *Int J Environ Res Public Health* 2015;12:12941-57.
 47. 13th 5 Year Plan: Promote Health China in Eight Aspects. Beijing, China: Xinhua Network; 2016. Available at: http://news.xinhuanet.com/health/2016-03/18/c_128810198.htm. Accessed November 11, 2017.
 48. People's Network, China. Interpretation of Plan of Health China 2030. Beijing, China: People's Network; 2017. Available at: <http://sh.people.com.cn/n2/2017/01/10/c138654-29578875.html>. Accessed January 19, 2017.
 49. Xi JP. China-Bangladesh Cooperation Will Bear Golden Fruits. *The Daily Star News*; 2014. Available at: <http://www.thedailystar.net/frontpage/china-bangladesh-cooperation-will-bear-golden-fruits-1298536>. Accessed January 17, 2017.
 50. Interview: China's Belt and Road Initiative Conducive to Efforts to Carry Out UN Sustainable Development Agenda. Beijing, China: Xinhua Network; 2016. Available at: http://news.xinhuanet.com/english/2016-07/20/c_135525365.htm. Accessed January 17, 2017.
 51. World Health Organization. Sixty-Ninth World Health Assembly Update. Geneva, Switzerland: World Health Organization; 2016. Available at: <http://www.who.int/mediacentre/news/releases/2016/wha69-27-may-2016/en/>. Accessed January 17, 2017.
 52. Wang Y, Yang GH, Wu ZL, et al. Public Health in China. Beijing, China: Pecking Union Medical College Press; 2013.
 53. World Health Organization. World Health Report 1998 Press Kit. Geneva, Switzerland: World Health Organization; 1998. Available at: http://www.who.int/whr/1998/media_centre/en/. Accessed January 17, 2017.