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Non-communicable Disease-Related Sustainable Development Goals for 66 Belt and Road Initiative Countries

Lin Chen[1]¶ , Donghui Duan[2]¶ , Liyuan Han[1,3] , Lu Xu[1], Sixuan Li[2], Yuwei Zhang[4], Wei Feng[5], Qinghai Gong[2], Angela E. Micah[6] , Ruijie Zhang[1,3], Shiwei Liu[7]* , Hui Li[2]*

Abstract

Background: Since 2015, the Global Burden of Disease Study (GBD) has measured progress in achieving health-related Sustainable Development Goals (SDGs) annually worldwide. Little is known about the status and attainment of indicators of non-communicable diseases (NCDs) by 65 countries from the Belt and Road Initiative (BRI) proposed by China in 2013.

Methods: Data from GBDs were used to estimate 24 NCD-related SDG indicators in BRI countries from 1990 to 2017. Each indicator was scored from 0 to 100 to compare multiple indicators over the study period. The natural log of the annual change in each location and year and weighted annual rates of change were used to generate projections for 2030. National-level estimates were determined by socio-demographic index (SDI) quintiles in BRI countries with more than 1 million inhabitants.

Results: In 2017, the median overall score of NCD-related SDG index for the 66 BRI countries was 60 points, ranging from 29 points in Afghanistan to 84 points in Israel. More than 80% of countries achieved the SDG 2030 maternal mortality (MM) rate target in 2017, and the national skilled birth attendance rate was above 99% in more than 59% countries. However, none of the BRI countries achieved the goal for children's overweight, modern methods of contraception, and universal health coverage. It was predicted that 80.4% of NCD-related SDG targets would be achieved in these countries by 2030. The overall score of NCD-related SDG index were positively associated with SDI quintiles.

Conclusion: For many indicators, the achieved progress in many countries is less than the annual rate necessary to meet SDG targets, indicating that substantial efforts need to be made in the coming years. Progress should be accelerated through collaborations between countries, implementation of NCD prevention and control strategies, and monitoring of inequalities in NCD-related SDGs within populations.

Keywords: Non-communicable Disease, Sustainable Development Goals, Belt and Road Initiative, Burden of Disease Study

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¶Both authors contributed equally to this paper

*Correspondence to:
Hui Li
Email: lihui4329@163.com

Shiwei Liu
Email:
shiwei_liu@aliyun.com

Background

In 2013, China proposed the Belt and Road Initiative (BRI) to promote trade, infrastructure development, and commercial partnerships among 66 countries in Asia, Africa, and Europe.[1,2] The initiative aims to build a community of shared interests, goals, and responsibilities based on mutual political trust, economic integration, and cultural inclusiveness.[3] The global health perspective was formally included in BRI in 2015 and was firmly established during the first BRI Forum for International Cooperation in Beijing in May 2017, where plans for a Health Silk Road were announced and endorsed by beneficiary countries.[3-6]

In the past few years, China has become more proactive in global health governance. Meanwhile, the World Health Organization (WHO) has welcome China's efforts to integrate health into its ambitious development agenda and has been working with the country to explore opportunities and synergies for collaboration.[7] Early efforts have included participating insetting the WHO agenda (on essential and traditional medicine and universal health coverage) and prioritizing chronic disease treatment, drug innovation, and social determinants of health in other countries.[8] For instance, the promotion of health security was prioritized by China's response to the Ebola outbreak and long-term funding.[5] The second effort was the BRI, which will be accompanied by new multilateral institutional arrangements.[5] The third initiative as the significant increase in China's financing of global health through development assistance for health, overseas development assistance, and new investment vehicles.[5]

In September 2015, the United Nations (UN) General Assembly adopted "Transforming our World: The 2030 Agenda for Sustainable Development," a resolution outlining a new framework to form the cornerstone of the sustainable development agenda until 2030.[9] This new framework

Full list of authors' affiliations is available at the end of the article.

Key Messages

Implications for policy makers

- The health status of the population varies greatly by countries. Therefore, establishing long-term cooperation mechanisms and health information platforms, and strengthening health policy communication are fundamental.
- Improving counseling and coordination, and advice to policy-makers in bilateral health cooperation and multilateral health governance are vital.
- Encouraging academic institutions and experts to share experiences on health policy research and activities.
- Strengthening the monitoring of the health condition of the population and establishing regional disease surveillance and early warning systems.

Implications for the public

Since 2015, the Global Burden of Disease Study (GBD) has measured progress in achieving health-related Sustainable Development Goals (SDGs) annually worldwide. However, little is known about the status and attainment of indicators of non-communicable diseases (NCDs) by 66 countries from the Belt and Road Initiative (BRI) proposed by China in 2013. In this study, data from GBDs were used to estimate 24 NCD-related SDG indicators in BRI countries from1990 to 2017. We found that the median overall score of NCD-related SDG index for the 66 BRI countries was 60 points, ranging from 29 points in Afghanistan to 84 points in Israel, indicating a large variability. For many indicators, the achieved progress in many countries is less than the annual rate necessary to meet SGD targets, indicating that substantial efforts need to be made in the coming years. Progress should be accelerated through collaborations between countries, implementation of NCD prevention and control strategies, and monitoring of inequalities in NCD-related SDGs within populations.

replaced the Millennium Development Goal (MDG) framework, which expired in 2015, and established Sustainable Development Goals (SDGs), including 17 universal goals and 169 targets.[10] The SDG initiative is currently in its fourth year, and progress towards the global aspirations of this initiative is gradual and ongoing.[11] An example includes the WHO's 13th General Programme of Work (GPW13) for 2019-2023,[12] which involves an ambitious agenda of measurable goals and interconnected strategies to ensure healthy living and well-being for people of all ages.[13]

Non-communicable diseases (NCDs) pose an increasing economic and health burden on low- and middle-income countries.[14] In this respect, the WHO estimated that 42% of premature death aged 30-70 years globally were attributed to NCDs and that 48% of these fatalities occurred in these countries.[11,15,16] The total number of deaths from NCDs increased by 22.7% (21.5%-23.9%) from 2007 to 2017, representing an estimated 7.6 million (7.2-8.0) additional deaths in 2017 than in 2007.[9] Although NCD prevention has been apriority by the UN, and evidence-based policies and programs have been developed to target NCDs, a substantial gap remains in implementation.[10] Therefore, preventing NCDs was proposed as a vital task in GPW13.[17] The *Lancet* announced that 2018 was the year for action against NCDs,[17] and the WHO Independent High-Level Commission on NCDs declared in the Time to Deliver[12,18] that there was no excuse not to act.[11] These events have paved the way for the actions proposed in the present study.

The health level of populations across BRI countries varies significantly because of variations in the geographical distribution of populations and health status across continents. With the progress of globalization and the continuous promotion of the BRI, health services and the health status of populations are gradually improving in BRI countries.[19-21] However, the prevention of NCDs in BRI countries is facing several challenges, such as inadequate healthcare investment,[22] poor health literacy and lack of awareness,[23] which have left no country untouched and bridges the divide between rich and poor countries.[24] In GPW13, there were 41 health-related SDGs, of which 25 were associated with NCDs.[13] The Global Burden of Disease Study (GBD) measured global progress in achieving health-related SDGs since 2015,[10] which is useful to assess health-related SDG indicators across BRI countries over time in a comparable manner.[11,25]

Understanding of how past rates of progress translate into future trajectories for the NCD-related SDGs is an important input for decision makers, particularly during these initial years of SDG policy development and implementation. In order to help to address public health challenges of NCDs in BRI countries, we use GBD data to estimate scores for 24 NCD-related SDGs, analyze new challenges in NCD prevention, and propose suggestions to improve health literacy and reduce risk factors.

Methods

Overview of 65 Belt and Road Initiative Countries

As of 2017, 65 countries (except China) spanning three continents were included in the BRI, including two countries in East Asia, 11 countries in Southeast Asia, seven countries in South Asia, five countries in Central Asia, nineteen countries in West Asia, one country in North Africa, and twenty countries in Central and Eastern Europe (Supplementary file 1, Table S1). The gross domestic product (GDP) of these countries is approximately US\$ 23.32 trillion, accounting for 30% of the global GDP.[26] However, it is of note that 2 low-income countries, 23 lower-middle income countries, 22 upper-middle income countries, and 18 high-income countries were included in the BRI.[27] Moreover, the number of people living in low-, middle-, and high-income countries is currently 290 million, 2.39 billion, and 300 million, respectively, accounting for 6.7%, 55.2%,and 6.9% of the global population, respectively.[28]

Overview of the Global Burden of Disease 2017

The GBD produces age-, sex-, and location-specific estimates of all-cause and cause-specific mortality, non-fatal outcomes,

overall disease burden, risk factor exposure, and attributable burden from 1990 to the current study year using standardized and replicable methods that conform to the Guidelines for Accurate and Transparent Health Estimates Reporting.[10,29] The GBD 2017 measured progress in achieving 41 health-related SDGs in 195 countries and territories from 1990 to 2017 around the world, including the 66 countries in BRI, projected indicators for the year 2030, and measured global performance.[11] Therefore, we included data for all 66 BRI countries from the GBD 2017 in this study.

Socio-demographic Index

The socio-demographic index (SDI) is a composite measure of overall development based on rescaled values of fertility, education, and income, and is used to compare progress in achieving health-related SDGs across quintiles of overall development.[30] The SDI was updated to include fertility rates among women younger than 25 years rather than total fertility rates in the GBD 2017.[11] In this study, quintile breaks were generated from the SDI distribution at the national level in BRI countries with more than 1 million inhabitants.[11]

NCD-Related Sustainable Development Goal Index

Health-related SDG data were extracted from the GBD 2015,[10] and 41 indicators were updated included in the GBD 2017 (population census coverage was excluded because of its binary status and absence of forecasts).[11] These indicators were created by a preference-weighted approach, in which SDGs represented the expressed preferences of UN member states and therefore assumed that each SDG target should be weighted equally.[11] The data sources and estimation approaches used in this analysis were detailed in previous publications.[10,11,25]

In this study, NCD-related SDG indicators were defined as indicators for health outcomes, and environmental, occupational, behavioral, maternal and infant conditions, and metabolic risks with well-established causal connections to NCDs, except for acute infection related, and injuries related factors.[31] We provided updated estimates for 24 NCD-related SDGs in 66 BRI countries (the score of indicator 17.19.2a census was not included because of its binary status and absence of predictions), and all analyses were based on GBD 2017 methods.[11] Each indicator was scored from 0 to 100, with 0 being the lowest (worst) observed value and 100 being the highest (best) value, to allow comparisons between indicators from 1990 to 2030.[11] Conversely, negative indicators, for which lower values were more desirable than higher values, were assigned a value from 0 to 100, reflecting the worst to the best performance.[11] The applied formula was:

$$\text{Scaled score} = \frac{(\text{observed value} - \text{worst observed value}) \times 100}{\text{best observed value} - \text{worst observed value}}$$

where the observed value is the actual value of the country in the current year, and the worst and best observed value is the lowest and highest value of each indicator in BRI countries in the period 1990-2017, respectively.

We calculated the geometric mean of scaled NCD-related SDG indicators by target, and measured the geometric mean across all NCD-related SDGs to obtain a median total score. The geometric mean allows indicators with very high values to partly compensate for low values on other indicators (referred to as partial substitutability).[10,11] Furthermore, the minimum value was restricted to 1 when calculating the overall score to reduce the effect of values close to 0.

Additionally, four newly estimated scores including healthy lifestyle (Lif), healthy pregnancy and infant (P-I), growth and development (G&D), as well as healthy environment (Env) were generated in this study. The Lif index is an overall estimate measure of four scaled NCD-related indicator, which is calculated the geometric mean of overweight, alcohol, smoking and meet the need for family planning (FP) and contraception. The P-I index is an overall estimate measure for four scaled NCD-related indicators, which is calculated the geometric mean of maternal mortality (MM) ratio, skilled birth attendance, under-5 mortality, and neonatal mortality. The G&D index is an estimate measure for two scaled NCD-related indicators, which is calculated the geometric mean of stunning and wasting. The last is Env, an overall estimate measure for six NCD-related indicators, which is calculated the geometric mean of air pollution mortality, water, sanitation, hygiene, household air pollution, and mean $PM_{2.5}$.

Projection of NCD-Related Sustainable Development Goals for 2030

To generate projections for 2030, we used a forecasting method[32] by calculating the natural log of the annual change in each location and year from 1990 to 2017 and weighted annual rates of change. This modeling framework was used to analyze the relationships between risk factors and other independent drivers of NCDs and better assess the causes of health problems reported in randomized controlled trials and cohort studies.[11] The targets of some NCD-related SDGs are clearly defined in the UN decision-making document,[33] whereas other goals were not defined. Moreover, the thresholds of 16 indicators with defined targets were used in this study. We replaced "all popular" or "full coverage" in the target specification with ">99%," the "elimination" target in the health environment with "<1%," and "eliminate" goals in epidemics with "<0.5%." In addition, indicators for undefined targets were not predicted[11]. The target status of each indicator is shown in Table 1.

Based on the results of the GBD 2017[11] and the weight of populations in BRI countries, we estimated the national average of each indicator for 2017. Simultaneously, based on the 2030 target, we determined the annual rate of change required for BRI countries to achieve their goals from 2017 to 2030, and compared with the average annual rate of change from 1990 to 2017 to predict progress in achieving each goal. However, we used average scores of indicators to reduce the heterogeneity in drivers of growth across BRI countries. In addition, forecasts were based on past rates of change; therefore, changes in several factors between the present date and 2030, including health financing, global health priorities, and climate change, could not be determined accurately. Census coverage was not estimated because of its binary

Table 1. Non-Communicable Disease-Related Sustainable Development Goals, Sub-goals, Indicators, and Targets for 2030

	NCD-Related Indicators	Definition	2030 SDG Target
Goal 2: End Hunger, Achieve Food Security and Adequate Nutrition, and Promote Sustainable Agriculture			
Target 2.2: By 2030, end all forms of malnutrition; by 2025, achieve internationally-agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons	Stunting (2.2.1)	Prevalence of stunting in children under 5 years of age, %	Eliminate
Target 2.2 (as above)	Wasting (2.2.2a)	Prevalence of wasting in children under 5 years of age, %	Eliminate
Target 2.2 (as above)	Overweight (2.2.2b)	Prevalence of overweight in children aged 2–4 years, %	Eliminate
Goal 3: Ensure a Healthy Lifestyle and Promote the Well-being for All Ages			
Target 3.1: By 2030, reduce the global MM rate to less than 70 deaths per 100 000 live births	MM ratio (3.1.1)	Maternal deaths per 100 000 live births	<70/100 000
Target 3.1 (as above)	Skilled birth attendance (3.1.2)	Proportion of births attended by skilled health personnel (physicians, nurses, midwives, or country-specific medical staff [eg, clinical officers]), %	100%
Target 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births	Under-5 mortality (3.2.1)	Probability of dying before age 5 years per 1000 live births	Decreased ≥25‰
Target 3.2 (as above)	Neonatal mortality (3.2.2)	Probability of dying during the first 28 days of life per 1000 live births	Decreased ≥12‰
Target 3.4: Reduce premature mortality from NCDs by one-third through prevention and treatment, and promote mental health and wellbeing by 2030	NCDs (3.4.1)	Age-standardized death rate due to cardiovascular disease, cancer, diabetes, and chronic respiratory disease in populations aged 30–70 years per 100 000 population	Reduce by 1/3
Target 3.4 (as above)	Suicide (3.4.2)	Age-standardized death rate due to self-harm per 100 000 population	Reduce by 1/3
Target 3.5: Strengthen the prevention and treatment of substance abuse, including narcotic drugs and alcohol	Alcohol (3.5.2)	Risk-weighted prevalence of alcohol abuse measured by the SEV for alcohol abuse, %	Undefined
Target 3.7: By 2030, ensure universal access to sexual and reproductive healthcare services for FP and education, and the integration of reproductive health into national strategies and programmes	Meet the need for FP and contraception (3.7.1)	Proportion of women of reproductive age (15–49 years) whose need for FP is satisfied with modern methods, % women aged 15–49 years	100%
Target 3.7 (as above)	Adolescent birth rate (3.7.2)	Birth rates among women aged 10–14 years and 15–19 years, number of live births per 1000 women aged 10–14 years and 15–19 years	Undefined
Target 3.8: Achieve universal health coverage, including financial risk protection, access to essential high-quality healthcare services, and access to safe, effective, high-quality, and affordable essential medicines and vaccines for all people	Universal health coverage tracer (3.8.1)	Coverage of universal health, coverage tracer interventions for prevention and treatment services, %	Fully accessible (100%)
Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals, and reduce air, water, and soil pollution and contamination	Air pollution mortality (3.9.1)	Age-standardized death rate attributable to air pollution, per 100 000 population	Undefined
Target 3.9 (as above)	WASH mortality (3.9.2)	Age-standardized death rate attributable to unsafe WASH per 100 000 population	Undefined

Table 1. Continued

	NCD-Related Indicators	Definition	2030 SDG Target
Target 3.a: Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate	Smoking (3.a.1)	Age-standardized prevalence of daily smoking in populations aged 10 years and older, % population aged 10 years and older	Undefined
Target 3.c: Substantially increase health financing and the recruitment, development, training, and retention of the health workforce in developing countries, especially in low- and middle-income countries and small island developing states	Health worker density (3.c.1)	Health worker density per 1000 population, by cadre and summed across cadres	Undefined
Goal 6: Ensure the Availability and Sustainable Management of Water and Sanitation for All			
Target 6.1: By 2030, provide universal and equitable access to safe and affordable drinking water for all people	Water (6.1.1)	Risk-weighted prevalence of populations using unsafe or unimproved water sources, as measured by the SEV for unsafe water, %	Eliminate
Target 6.2: By 2030, provide equitable access to adequate sanitation and hygiene for all people and end open defecation, paying special attention to the needs of women and girls and individuals in vulnerable situations	Sanitation (6.2.1a)	Risk-weighted prevalence of populations using unsafe or unimproved sanitation, as measured by the SEV for unsafe sanitation, %	Eliminate
Target 6.2 (as above)	Hygiene (6.2.1b)	Risk-weighted prevalence of populations with poor hygiene (no hand washing with soap), as measured by the SEV for unsafe hygiene, %	Eliminate
Goal 7: Ensure Access to Affordable, Reliable, and Sustainable Energy for All People			
Target 7.1: By 2030, ensure universal access to affordable, reliable, and modern energy services	Household air pollution (7.1.2)	Risk-weighted prevalence of ambient air pollution, as measured by the SEV for ambient air pollution, %	Eliminate
Goal 8: Promote Lasting, Inclusive, and Sustainable Economic Growth, Promote Full Productive Employment and Decent Work for All People			
Target 8.8: Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular female migrants, and workers in precarious employment	Occupational risk burden (8.8.1)	Age-standardized all-cause disability-adjusted life year (DALY) rate attributed to occupational risk (per 100 000)	Undefined
Goal 11: Make Cities and Human Settlements Inclusive, Safe, Resilient, and Sustainable			
Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, paying special attention to air quality and waste management	Mean $PM_{2.5}$ (11.6.2)	Population weighted mean level of $PM_{2.5}$ ($\mu g/m^3$)	Undefined
Goal 17: Establish and improve Global Partnerships for Sustainable Development			
Target 17.19: By 2030, improve existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity building in developing countries	Population census (17.19.2a)	Population and housing census status over the past 10 years	Census in the past 10 years
Target 17.19 (as above)	Death certificates (17.19.2c)	Number of deaths certificates in a vital registration system relative to a country's total deaths (%)	80% of total deaths

Abbreviations: NCD, Non-communicable disease; SDG, Sustainable Development Goal; MM, Maternal mortality; WASH, Water, sanitation, and hygiene; SEV, summary exposure value; FP, family planning.

nature and the lack of documentation about planned censuses across all countries. In addition, indicators were not estimated by sex or region.

Results

NCD-Related SDGs in BRI Countries From 1990 to 2017

The scores of 24 NCD-related SDGs in BRI countries are shown in Figure 1. In 2017, the median overall score of NCD-related SDG index for all 66 BRI countries was 60 points, ranging from 29 points in Afghanistan to 84 points in Israel. China scored 73 points and was ranked No. 17. There was a difference of more than 50 points between Afghanistan and Israel. However, more than 80% of countries achieved the 2030 target for MM rate (<70 deaths per 100 000 live births), and more than 59% achieved skilled birth attendance rate >99% (the target was 100%). Furthermore, of 24 NCD-related SDGs, none of the evaluated countries achieved the goals for children's overweight (2.2.2b), modern methods of contraception (3.7.1), and universal health coverage (3.8.1).

Israel had the highest sc ore (84) among all countries, and the scores for nine NCD-related SDGs were >99, including stunting (99.3), malnutrition (99.6), MM (99.5), safe delivery (99.2), under-five mortality rate (U5MR) (99.1), water, sanitation, and hygiene (WASH) mortality (99.9), drinking water (99.8), individual health (99.3), and household air pollution (99.6) (Figure 1).

With regard to adverse health outcomes and risks, the goal was eliminating stunting, malnutrition, and overweight (Table 2). In this study, the highest scores for stunting were 99.9 in Cyprus, and 99 in Greece and Israel, and the lowest score was 22.8 in Afghanistan. The average total score was 99.3. For malnutrition, the three highest scores were 99.9 in Cyprus, 99.7 in Turkey, and 99.6 in Greece and Israel. The lowest score was 27.9 in India. For overweight, the top three scores were 96.3 in Bangladesh, 94.5 in Nepal, and 94.2 in Cambodia. The lowest score was 8.2 points in Kuwait (Figure 1).

The highest score for MM was 99.8 in Estonia, and the scores were higher than 90 points in Poland (99.6), Israel (99.9), and Czech Republic and Singapore (99.5 each). The lowest score was 51.6 in Pakistan. The highest U5MR scores were 100 in Singapore, 99.8 in Slovakia, 99.5 in Czech Republic, 99.4 in Cyprus, and 99.4 in Estonia, whereas the lowest score was 68.8 in Pakistan. The highest scores for the infant mortality rate (IMR) were 100 in Cambodia, 99.3 in Indonesia, 99.2 in Laos, and 99.2 in Malaysia, whereas the lowest score was 44 in Pakistan. Association of Southeast Asian Nations (ASEAN) and Central and Eastern European countries had outstanding performance in healthy lifestyles, ranking high among the BRI countries. Pakistan had poor performance, ranking the last for these three indicators.

For NCD mortality, six of the top 10 countries were located in West Asia. Singapore had the best performance, with a score of 100, attributed to the lowest age-standardized mortality rate for cardiovascular disease, cancer, diabetes, and chronic respiratory diseases among residents aged 30 to 70 years from 1990 to 2017. Apart from Singapore, the 10 countries with the highest scores were Israel (98.6), Kuwait (97.5), Cyprus (94.9), Maldives (94.1), Slovenia (93.8), Qatar

(93.6), Bahrain (92.2), Thailand (91.5), and Jordan (91.2). Conversely, the 10 countries with the lowest scores were Afghanistan (25.1), Mongolia (48.3), Turkmenistan (54.1), Pakistan (55.0), Uzbekistan (55.8), Ukraine (56.6), Sinai Peninsula (58.3), Yemen (58.8), Azerbaijan (60.3), and Laos (62.2). China scored 83.0 and was ranked No. 23.

The countries with the highest scores for alcohol consumption were Iran and Pakistan (99.9), Palestine (99.3), and Bangladesh (99), whereas the country with the lowest score was Ukraine (0.00). This finding indicates that alcohol abuse should be prevented in Ukraine. The government should strengthen regulations on alcohol abuse and educate the population on the negative consequences of excessive drinking. The performance in WASH mortality was high in most BRI countries, with 34 countries reaching a score of 100 and 15 countries reaching a score of 99. It is estimated that the mortality from unsafe water drinking and poor sanitation and habits will decrease significantly by 2030. With regard to health-worker density, only Slovakia and Palestine had a score >70 (74), and the other 64 countries had low scores for this indicator. Therefore, these goals should be strengthened in low- and middle-income countries.

The highest score for healthy Lif index was 87.3 in Bhutan, and the scores were higher than 80 points in Bangladesh (83.0), and Iran (80.3). The lowest score was 28.0 in Montenegro. For the healthy P-I index, 49 out of 66 countries scored more than 90 points, with the highest and lowest score of 99.9 in Singapore and 57.3 in Pakistan. For the healthy G&D index, there are totally 27 countries and 14 countries scored over 90 points and 80 points, respectively. The highest and lowest score of G&D were 100.0 points in Cyprus and 28.5 in Yemen, respectively. The median score of the healthy Env index was 83.5 points in Syria and 84.2 points in Armenia, respectively. A total of 19 countries scored over 90 points, with the highest and lowest score in Brunei (98.5) and Afghanistan (28.7), respectively (Supplementary file 1, Figure S1).

Association Between Socio-demographic Index and Sustainable Development Goals

The NCD-related SDG index was positively associated with SDI quintiles ($R^2 = 0.70$), indicating that the higher was the SDI, the best was the health of the population (Figure 2).

Most low-SDI countries had low SDG indexes. SDI values are shown in Table S2 (Supplementary file 1). However, among the 10 countries with the highest NCD-related SDG indexes, Palestine presented the lowest SDI, whereas the other nine countries had higher SDIs. Among the 10 countries with the lowest SDG indexes, Indonesia presented the highest SDI.

NCD scores were positively associated with SDI quintiles. High-SDI countries had high NCD scores and low mortality (Figure 2). Overweight scores were negatively related to SDI quintiles. The scores for substance abuse were negatively associated with SDI quintiles, ie, the higher was the SDI, the higher were the rate of smoking and alcohol abuse.

Progress in Achieving the Targets for NCD-Related SDGs

On the basis of past trends, most countries were projected to have higher NCD scores in 2030 than in 2017. The probability

Country	Total	Stunting	Wasting	Overweight	Maternal	Skilled	Under-5	Neonatal	NCD	Suicide	Alcohol	FP	Adole	UHC	Air	WaSH	Smoking	Health worker	Water	Sanitation	Hygiene	Household	Occupational	PM2.5	Certified
1 Israel	84	85	100	55	99	99	99	98	99	93	79	85	95	94	98	100	58	34	100	99	99	100	93	84	83
2 Brunei	83	85	88	58	93	99	96	94	75	92	92	72	94	75	98	100	69	38	98	99	96	100	78	100	79
3 Iran	82	87	83	53	97	99	93	88	88	94	100	87	85	75	90	99	81	39	84	92	85	100	94	65	76
4 Slovakia	81	92	93	41	99	100	98	97	82	85	34	77	87	85	94	100	45	74	97	99	100	98	92	88	94
5 Malaysia	79	74	58	46	91	99	97	95	81	89	85	78	95	70	88	99	57	52	87	98	94	98	89	89	52
6 Bahrain	78	93	93	55	97	99	97	96	92	96	91	66	93	82	84	99	84	49	85	93	84	100	86	32	60
7 Palestine	78	89	94	66	98	99	94	91	83	98	99	63	53	68	88	99	56	74	58	91	68	99	87	71	63
8 Kuwait	77	99	95	8	99	99	97	94	98	100	99	73	98	87	93	100	65	34	90	97	87	100	92	42	85
9 Oman	77	79	67	32	98	99	95	92	85	99	95	38	95	79	87	99	93	32	80	98	82	99	93	63	58
10 Singapore	76	99	89	60	99	100	100	100	100	90	68	75	92	98	98	100	80	5	98	99	96	100	91	86	100
11 Sri Lanka	76	80	50	70	96	100	96	93	88	64	71	63	90	76	92	98	84	45	63	69	81	69	89	95	73
12 Slovenia	76	92	94	33	99	100	100	99	94	75	71	70	99	96	99	100	40	17	98	98	100	96	81	89	92
13 Syria	75	61	49	45	98	95	90	93	76	99	96	55	81	65	85	100	68	45	84	90	82	100	87	60	62
14 Jordan	74	88	94	71	97	100	93	88	91	98	96	53	86	76	92	100	43	14	90	94	80	100	100	71	73
15 Turkey	74	85	100	40	97	97	93	89	87	98	86	60	85	77	90	100	43	31	75	91	81	99	76	60	79
16 Armenia	74	83	87	32	97	100	96	93	76	88	68	36	86	74	85	100	50	34	97	76	87	88	75	72	95
17 China	73	87	95	68	98	99	94	94	83	90	66	100	96	81	83	100	49	29	80	74	85	83	78	51	77
18 Estonia	73	92	95	46	100	100	99	99	85	78	17	76	94	88	100	100	48	23	95	93	96	93	94	99	97
19 Kazakhstan	73	87	92	47	98	100	93	90	65	57	40	80	83	70	89	100	51	40	89	59	90	89	77	92	86
20 Moldova	73	91	94	84	97	100	93	85	69	76	34	58	87	69	89	100	60	40	75	39	83	91	94	89	88
21 RF	73	86	89	51	98	100	97	95	65	53	32	61	86	82	92	100	37	43	91	78	95	100	81	89	91
22 Latvia	72	90	94	58	98	100	98	97	72	69	25	72	91	83	94	100	25	37	94	88	96	95	89	92	97
23 Maldives	71	74	61	74	88	99	97	94	94	98	89	52	91	78	99	99	50	21	37	83	71	90	88	98	68
24 Iraq	71	69	74	53	97	92	87	82	90	96	94	56	63	67	91	99	63	27	76	78	91	100	88	41	57
25 Georgia	69	84	95	30	94	99	95	91	64	89	51	50	71	67	82	100	46	38	89	63	90	73	81	83	65
26 Kyrgyzstan	69	77	95	68	94	100	90	81	70	84	58	64	77	64	83	99	62	23	83	19	86	75	82	82	95
27 United Arab Emirates	69	83	62	36	98	100	97	95	63	94	65	71	94	64	80	99	67	9	87	99	85	100	85	63	72
28 Serbia	68	91	89	55	98	100	98	96	74	79	27	31	92	81	85	100	26	45	94	95	99	78	82	80	73
29 Macedonia	68	93	93	47	99	99	96	91	76	91	77	11	91	77	88	100	16	32	94	93	99	84	91	75	85
30 Croatia	68	91	93	39	99	100	99	97	86	82	43	44	96	91	95	100	15	18	95	98	100	93	85	87	95
31 Albania	68	68	70	34	99	99	94	90	89	94	60	14	88	81	92	100	33	36	80	86	96	75	73	87	76
32 Cyprus	68	100	100	52	99	100	99	99	95	95	44	88	100	100	97	100	30	5	100	100	99	100	85	88	70
33 Bosnia and Herzegovina	68	90	95	39	99	100	98	93	79	91	43	18	95	75	86	100	19	45	92	94	98	76	87	77	78
34 Hungary	68	91	93	44	98	99	98	97	74	75	30	62	88	86	93	100	31	12	97	94	100	89	86	89	96
35 Tajikistan	68	54	54	71	96	93	75	68	65	93	84	49	65	52	74	93	93	53	74	31	70	70	79	58	59
36 Belarus	68	97	96	59	98	100	97	96	70	65	8	73	90	85	89	100	19	62	94	83	96	99	92	86	90
37 Turkmenistan	68	84	90	38	99	99	85	76	54	87	63	76	90	63	84	99	61	10	79	52	83	100	84	83	81
38 Poland	67	92	93	53	100	100	99	97	81	76	36	47	94	87	94	100	35	9	96	98	100	95	82	84	78
39 Greece	67	99	100	43	99	100	99	97	91	98	32	59	96	96	97	100	14	12	100	99	99	99	90	89	80
40 Thailand	67	81	72	62	94	99	96	95	91	83	60	93	79	75	94	97	62	12	41	98	68	88	73	79	65
41 Saudi Arabia	66	87	93	15	96	98	97	95	87	99	96	38	96	77	84	99	89	16	90	97	82	100	97	14	53
42 Czech Republic	66	98	91	43	99	100	99	99	88	83	27	76	95	93	96	100	31	6	97	100	100	99	80	89	90
43 Uzbekistan	65	72	82	45	96	100	88	82	56	85	65	85	81	62	72	99	89	5	87	37	84	87	81	76	84
44 Romania	65	85	88	45	98	100	96	95	73	86	15	50	79	80	92	100	39	16	91	82	97	89	76	91	89
45 Bulgaria	64	89	91	40	97	100	97	95	67	85	39	57	76	77	89	100	14	13	94	99	99	89	89	86	78
46 Azerbaijan	62	78	83	31	96	97	82	69	60	97	59	25	73	64	80	99	53	6	89	59	91	86	81	85	84
47 Philippines	62	51	73	86	87	74	86	82	64	92	72	55	66	48	68	94	51	13	45	88	72	61	78	87	78
48 Egypt	62	72	78	36	91	94	90	90	58	94	96	86	62	59	68	97	62	12	90	74	86	100	91	15	52
49 Lithuania	61	92	94	61	99	100	98	98	74	46	11	70	91	82	95	100	36	4	94	88	96	99	89	94	98
50 Montenegro	60	88	92	27	99	99	99	97	76	85	32	40	95	81	89	100	13	7	86	97	99	79	93	84	84
51 Qatar	59	87	92	14	98	100	97	95	94	95	84	69	96	85	84	100	74	4	89	96	86	100	81	10	51
52 Ukraine	56	79	83	70	95	100	96	94	57	51	0	66	85	73	85	100	36	35	85	67	90	96	89	85	89
53 Bhutan	55	51	86	77	74	73	85	72	83	93	91	81	79	57	83	89	100	43	75	57	79	75	57	66	0
54 Vietnam	54	67	77	82	98	96	94	90	76	90	41	75	86	68	85	98	59	46	62	71	54	73	75	75	0
55 Mongolia	54	79	98	53	94	99	87	79	48	73	61	68	85	59	78	99	43	2	66	26	64	71	84	64	71
56 Lebanon	50	84	87	52	97	88	97	95	82	95	84	60	64	82	89	99	29	6	70	98	81	100	95	74	0
57 Myanmar	48	52	71	84	67	74	76	67	68	94	88	78	86	49	67	89	58	50	34	48	49	49	68	69	0
58 Indonesia	46	47	43	72	74	88	87	80	68	99	97	79	84	54	83	81	29	8	60	78	69	71	63	89	0
59 Cambodia	45	40	62	94	83	94	84	75	75	96	53	57	73	54	67	90	61	19	55	53	60	32	57	79	0
60 India	44	39	28	81	75	84	78	64	69	72	77	71	85	46	63	62	88	41	43	62	45	67	72	10	1
61 Yemen	43	29	28	86	68	50	76	68	59	92	99	39	53	46	73	90	70	21	40	52	36	73	76	53	0
62 Laos	42	30	75	90	72	59	69	60	62	87	73	63	60	41	64	84	51	27	40	31	53	56	64	80	0
63 Pakistan	38	31	45	94	52	64	69	44	55	96	100	43	73	39	65	79	81	7	20	62	46	62	74	45	0
64 Bangladesh	38	39	44	96	74	47	83	68	73	92	99	78	54	51	69	85	59	34	14	29	7	47	56	42	0
65 Nepal	31	49	70	95	67	65	84	70	73	88	90	58	61	50	63	71	58	7	25	51	48	57	38	1	0
66 Afghanistan	29	23	80	92	53	59	71	65	25	86	96	37	40	31	42	92	90	4	8	21	27	28	52	46	0

Value   100   75   50   25   0

Figure 1. Scores of 24 Non-communicable disease-Related Sustainable Development Goal Indicators in 66 Countries From Belt and Road Initiative Countries in 2017. Abbreviations: NCD, Non-communicable disease; FP, family planning; WASH, Water, sanitation, and hygiene; UHC, universal health coverage.

Table 2. Predicting the Achievement of NCD-Related SDG Indicators in 2030 on the Basis of Annual Change From 1990 to 2017 Across Countries

Countries	Total Score of SDG Indicators in 2017	Annual Rates of Change From 1990 to 2017[a]	Predicted Total Score of SDG Indicators in 2030	Target Year for Achieving the Indicator
Total 66 countries from the BRI	68.0	1.33	80.4	2046
Afghanistan	46.0	2.16	60.7	2053
Albania	80.3	0.91	90.3	2041
Arab	69.0	0.57	74.3	2081
Armenia	75.9	0.80	84.1	2051
Azerbaijan	68.7	1.11	79.3	2050
Bahrain	81.5	1.04	93.2	2036
Bangladesh	59.8	2.18	79.1	2041
Belarus	83.6	0.72	91.7	2041
Bhutan	64.1	2.11	84.0	2038
Bosnia and Herzegovina	76.6	0.64	83.2	2058
Brunei	76.5	0.47	81.4	2072
Bulgaria	77.7	0.37	81.5	2084
Burma	58.4	1.46	70.5	2053
Cambodia	61.9	2.27	82.9	2038
China	80.4	1.53	98.0	2031
Croatia	87.2	0.51	93.2	2042
Cyprus	93.6	0.71	102.6[b]	2026
Czech Republic	88.6	0.67	96.6	2034
Egypt	65.2	1.21	76.2	2052
Estonia	85.5	0.75	94.3	2037
Georgia	71.2	0.36	74.6	2109
Greece	90.9	0.40	95.7	2040
Hungary	84.2	0.66	91.7	2042
India	56.8	1.55	69.4	2053
Indonesia	61.8	1.23	72.4	2056
Iran	76.7	0.85	85.6	2048
Iraq	71.1	0.94	80.2	2053
Islam	89.6	0.52	95.9	2037
Jordan	77.3	1.01	88.1	2042
Kazakhstan	73.1	0.60	79.0	2068
Kuwait	84.8	0.75	93.5	2038
Kyrgyzstan	68.6	0.79	76.0	2064
Laos	53.0	2.75	75.4	2040
Latvia	81.9	0.54	87.8	2053
Lebanon	81.2	1.04	92.9	2036
Lithuania	81.2	0.43	85.9	2064
Macedonia	77.7	0.62	84.2	2057
Malaysia	72.9	0.99	82.8	2049
Maldives	78.2	1.50	94.9	2033
Moldova	72.6	0.43	76.8	2089
Mongolia	65.7	1.10	75.7	2055
Montenegro	80.7	0.39	84.9	2070
Nepal	59.0	2.53	81.7	2038
Oman	79.3	0.87	88.7	2043
Pakistan	51.6	1.53	62.8	2060
Palestine	71.8	0.70	78.6	2063
Poland	84.5	0.80	93.8	2037
Qatar	83.6	1.12	96.7	2033
Romania	79.6	0.74	87.6	2047
Russia	81.1	0.67	88.5	2047

Table 2. Continued

Countries	Total Score of SDG Indicators in 2017	Annual Rates of Change From 1990 to 2017[a]	Predicted Total Score of SDG Indicators in 2030	Target Year for Achieving the Indicator
Saudi Arabia	77.8	0.89	87.3	2045
Serbia	80.5	0.84	89.8	2042
Singapore	92.4	0.68	101.0[b]	2029
Slovakia	83.2	0.55	89.3	2049
Slovenia	90.7	0.61	98.2	2032
Sri Lanka	77.1	0.88	86.3	2046
Syria	69.9	1.02	79.8	2052
Tajikistan	60.6	0.35	63.4	2160
Thailand	76.4	0.92	86.0	2046
The Philippines	57.9	0.42	61.2	2145
Turkey	77.8	1.36	92.6	2035
Turkmenistan	68.2	0.63	74.0	2077
Ukraine	75.3	0.21	77.4	2149
Uzbekistan	67.8	0.47	72.1	2097
Vietnam	71.7	1.26	84.4	2043
Yemen	56.2	1.40	67.4	2058

Abbreviations: NCD, Non-communicable disease; SDG, Sustainable Development Goal.
The global average from 2017 for 24 health-related indicators with defined targets. [a] Based on the mean percentiles for defined targets. [b] The score higher than 100 indicated achieving the SDG target before 2030.

of achieving NCD targets varied substantially. The average annual rate of change from 1990 to 2017 was 1.33% (Table 2). The predicted average NCD index for 2030 was 80.4% and did not meet the SDG target (>99%). The results showed that 19 countries would have an SDG index of more than 90% by 2030, but only two countries—Cyprus and Singapore—would fully meet the target (Table 2).

China and Slovenia are expected to reach their targets in 2031 and 2032, respectively. The average annual rate of change in Laos (2.75%), Nepal (2.53%), Cambodia (2.27%),

Bangladesh (2.18%), Afghanistan (2.16%), and Bhutan (2.11%) was lower than that of other countries in the period 1990–2017. Among these countries, Afghanistan is expected to achieve the SDG target in 2053, and the other countries are expected to achieve the targets by 2041. Furthermore, several countries had difficulty in reaching the SDG 2030 targets. Ukraine (2149), Tajikistan (2160), and the Philippines (2145) would require more than 100 years to reach the target, and Georgia (2109) would require 92 years. Generally, BRI countries required additional 29 years to reach the SDG 2030
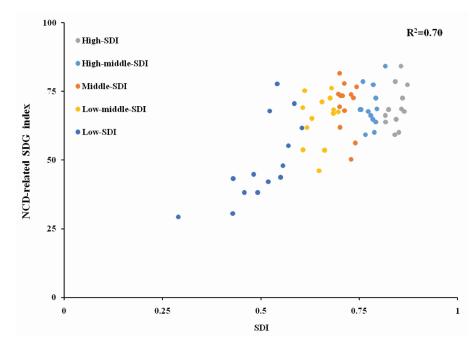

Figure 2. Association Between the Values of Non-communicable Disease-Related Sustainable Development Goal Indicators and Socio-demographic Index Scores. Abbreviations: NCD, Non-communicable disease; SDG, Sustainable Development Goal; SDI, Socio-demographic Index.

target.

The annual rates of change required for several indicators were met or exceeded by many countries that were not in the top decile of performance from 1990 to 2017. However, only countries in the top decile of performance in this period met or surpassed the rate of change required to meet the MM rate target for 2030, and a few countries recorded the rates of change required at the global level to meet the target in 2030. U5MR and IMR were 25.8‰ and 13.7‰ in 2017, respectively, which differed from the SDG target by -0.8‰ and -1.7‰, respectively (Table 3). The annual rate of change for U5MR and IMR in the period 1990-2017 was -4.0% and -3.1%, respectively (Table 3).

Therefore, it was very likely that the targets for these two indicators would be achieved by 2030. Moreover, the annual rate of change for MM (93.4 deaths per 100 000 in 2017) necessary to reach the 2030 target was -2.2%, whereas the average annual rate of change in the period 1990-2017 was -3.6%. The annual rate of change for safe delivery (89.2% in 2017) necessary to reach the 2030 target was 0.8%, whereas the average annual rate of change in the period 1990-2017 was 1.9%.

For water and sanitation, the annual rate of change for safe drinking water (34.8% in 2017), environmental sanitation (28.2% in 2017), and personal hygiene (27.8% in 2017) necessary to reach the 2030 target was -23.9%, -22.7%, and -22.6%, respectively, whereas the annual rate of change in the period 1990-2017 was -1.5%, -3.4%, -1.5%, respectively. For nutritional needs, the annual rate of change for stunting (24.9% in 2017), malnutrition (8.2% in 2017), and overweight (15.7% in 2017) necessary to reach the 2030 target was -25.9%, -19.3%, and -23.3%, respectively, whereas the annual rate of change in the period 1990-2017 was -1.8%, -1.3%, and 1.9%, respectively. These results show that achieving the 2030 target for the above indicators is challenging.

NCD-related SDGs Across Different Geographical Locations

Mongolia presented the lowest SDG score in East Asia. The scores of four SDGs were higher than 90: malnutrition (97.7), MM (93.6), safe delivery (99.0), and WASH mortality (99.1), whereas the score for health worker density was the lowest (1.7).

The median score considering 10 ASEAN countries of relevance to this study—Singapore, Malaysia, Indonesia, Myanmar, Thailand, Laos, Cambodia, Vietnam, Brunei, and Philippines—was 57.8. The scores of five of these countries were higher than the median, including Brunei (83.0), Malaysia (78.6), Singapore (76.4), Thailand (67.1), and the Philippines (61.9).

The median SDG score in West Asia was 72.3 and was higher than that in East, South, and Central Asia, ASEAN countries, the Commonwealth of Independent States (CIS), and Central and Eastern Europe. The scores of seven countries—Israel, Iran, Bahrain, Palestine, Kuwait, Oman, Syria, Jordan, and Turkey—were higher than the median. The median SDG score among eight South Asian countries was 41.1, and the scores of four countries—Sri Lanka, Maldives, Bhutan, and India—were higher than the median.

In Central Asia, the median NCD-related SDG score among five countries was 67.9. In the CIS, the scores were 73.5 (Armenia), 72.6 (Moldova), 72.6 (Russia), and 69.5 (Georgia) and higher than the median score in the CIS (69.5). The median score among the 16 countries from Central and Eastern Europe was 68.2.

In China, the score for modern contraceptive methods was 100, which was the highest among BRI countries. In addition, 95.9% of women of childbearing age were satisfied with modern contraceptive methods in China, and the score for this indicator was close to the SDG target (100%), demonstrating China's excellent performance in providing universal sexual and reproductive healthcare. Furthermore, the scores for WASH mortality, malnutrition, MM, safe delivery, U5MR, IMR, self-mutilation, and adolescent fertility rate were100, 95, 98, 99, 94, 94, 90, and 96, respectively. Of the 16 indicators with clearly defined goals, MM, U5MR, IMR, and safe delivery rate reached the SDG target, indicating that Chinese residents had healthy lifestyles and adequate nutritional intake. In addition, the mean scores for $PM_{2.5}$, smoking, alcohol consumption, and health worker density were 51, 49, 66, and 29, respectively and did not meet the SDG targets to date.

Discussion

Although nearly all countries were projected to have higher NCD-related SDG index scores by 2030, the performance of each indicator varied by country and SDI quintile. For many indicators, the annual rate of change required to meet targets far exceeded the pace of progress achieved by any country in the recent past. However, even for SDGs with mean projected values below the 2030 target, attaining these goals by 2030 is possible by accelerating progress in the coming years. Most countries will fall short of the SDG targets if actions to prevent and treat NCDs are not implemented. These results highlight the need for the prompt and strategic implementation of programs and continued monitoring of inequalities in NCD-related SDGs within populations. In addition, countries with high NCD-related SDG indexes had higher scores for MM rate, safe delivery, U5MR, and IMR.

Countries with high SDG indexes usually presented lower scores for childhood overweight and alcohol abuse. Obtaining high scores for the number of death certificates was a challenge in countries with the lowest SDG indexes. As populations age, all countries need to strengthen health information systems to ensure that death registration keep space with the increasing mortality of older populations. Central and Eastern Europe and the ASEAN performed better on the NCD-related SDG index than South Asia. This finding agrees with the result that the SDG index was positively associated with SDI quintiles, indicating that the higher is the education level of the population and the national GDP, the higher are NCD-related SDG index scores.

The goals for childhood overweight were achieved in most countries except for low-SDI countries. Therefore, strengthening some interventions, including the children's dietary education and physical exercise, is crucial. Moreover, the threshold number of 23 physicians, nurses, or midwives

Table 3. Forecast for 66 Countries From the Belt and Road Initiative Based on the Average Annual Rate of Change From 1990 to 2017 for Reaching Sustainable Development Goal Targets by 2030

	SDG 2030 Target	Average Estimate of BRI Countries in 2017	Annual Rate of change Required to Reach the SDG 2030 Target	1990-2017 Average Annual Rate of Change
Goal 2: End hunger, achieve food security and adequate nutrition, and promote sustainable agriculture				
Indicator 2.2.1: Prevalence of stunting in children under 5 years	≤0.5%	24.90%	-25.90%	-1.80%
Indicator 2.2.2a: Prevalence of wasting in children under 5 years	≤0.5%	8.20%	-19.30%	-1.30%
Indicator 2.2.2b: Prevalence of overweight in children aged 2-4 years	≤0.5%	15.70%	-23.30%	1.90%
Goal 3: Ensure healthy lives and promote well-being for people of all ages				
Indicator 3.1.1: Maternal deaths per 100 000 live births	<70/100 000	93.4/100 000	-2.20%	-3.60%
Indicator 3.1.2: Proportion of births attended by skilled health personnel	≥99%	89.20%	0.80%	1.90%
Indicator 3.2.1: Under-5 mortality	At least fell to 25‰	25.8‰	-0.20%	-4.00%
Indicator 3.2.2: Neonatal mortality	Decreased ≥12‰	13.7‰	-1.00%	-3.10%
Indicator 3.4.1: Age-standardized mortality rates for cardiovascular disease, cancer, diabetes, and chronic respiratory diseases in people aged 30-70 years	Reduce by 1/3	442.5/100 000	-9.10%	-1.00%
Indicator 3.4.2: Self-injury age-standardized mortality	Reduce by 1/3	9.8/100 000	-8.00%	-1.80%
Indicator 3.7.1: Satisfaction rate of women of childbearing age who require modern methods of contraception for FP	≥99%	76.50%	2.00%	0.7
Indicator 3.8.1: Basic health service coverage as defined by the Health Coverage Index	≥99%	68.00%	2.90%	1.30%
Goal 6: Ensure availability and sustainable management of water and sanitation for all people				
Indicator 6.1.1: Risk-weighted prevalence of unsafe or unimproved water use by the population, unsafe water by SEV	≤1%	34.80%	-23.90%	-1.50%
Indicator 6.2.1a: Risk-weighted prevalence of population use without improved environmental sanitation, unsafe environmental health measured by SEV	≤1%	28.20%	-22.70%	-3.40%
6.2.1b: Risk-weighted prevalence of unhealthy habits measured by SEV	≤1%	27.80%	-22.60%	-1.50%
Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all people				
7.1.2: Risk-weighted prevalence of ambient air pollution measured by SEV	≤1%	17.10%	-19.60%	-3.30%
17.19.2c: Number of death certificates in the vital registration system relative to a country's total deaths	≥80%	37.90%	5.90%	0.60%

Abbreviations: SDG, Sustainable Development Goal; BRI, Belt and Road Initiative; SEV, summary exposure value; FP, family planning.

per 10 000 population, which was set by the WHO in 2006, is the minimum required to providing essential maternal and child health services during the MDGs era. In our study, health worker density in most countries did not meet this target. Therefore, this short-term goal can be achieved by governments by strengthening health financing in low- and middle-income countries, decreasing health expenditure, and the training and employment of health workers to ensure high-quality medical services to the world population. In addition, governments should pay attention to the regions lacking water resources, then improving the quality of drinking water. Countries with severe air pollution should make efforts to reduce this problem, advocate energy saving and emission reduction, such as reducing coal consumption and CO_2 emissions. Countries with low scores for substance abuse should take effective measures to control unhealthy lifestyles.

For NCDs, Afghanistan had the lowest SDG score. Although NCDs have been adequately prevented and controlled in China, which was ranked No. 23 among the 66 countries, much work still needs to be done. The number of deaths from NCDs is expected to decrease to 338 per 100 000 by 2030 in China, which also reflects the progress in preventing and controlling chronic diseases in the past few years, and indicates that national strategies such as "Healthy China 2030" and other health policies are effective. However, the number of NCD patients in China has increased rapidly in recent years, with the acceleration of industrialization, urbanization, and ageing. The GBD 2017 results showed that deaths from NCD accounted for 89.48% of the total deaths, and the disability-adjusted life year rate was 82.63% in China (vs. 62.02% elsewhere).[11] It is well known that chronic diseases are long-term highly prevalent conditions that cause substantial economic losses, high rates of disability and death, and poverty.[34] Currently, exposure to NCD-related risks has been increasing, wherefore future actions against NCDs are crucial.

NCDs have a negative effect on individual health, family budget, and national employment. Furthermore, NCDs are closely associated with other SDGs. Low- and middle-income countries, and small-island countries face enormous challenges in the pursuit of sustainable development. The ongoing monitoring of the status of NCDs in BRI countries is essential to reaching SDG targets and promoting rapid public health development in these countries.

Until 2030, most BRI countries were projected to improve their NCD-related SDG index scores, although our results indicated gaps in potential progress at the national level in this study. This indication is urgently needed to inform strategies for achieving NCD-related SDG targets, and for many countries, they have to require a faster rate of progress than has been achieved recently. Currently, most countries have formulated national action plans, which can be used to meet the targets derived from the MDGs, however, the NCD-related SDGs have not been similarly implemented in national policies.[10,11] Therefore, it is vital that the government invests in and implements NCD-related SDG programs and continues to monitor the inequality in the population to truly fulfill the promise of not leaving no one behind, in the remaining years of achieving NCD-related SDG targets.

Conclusion
The health status of the population varies greatly by country. Therefore, establishing long-term cooperation mechanisms and health information platforms, and strengthening health policy communication are fundamental. In addition, improving counseling and coordination, and advice to policy-makers in bilateral health cooperation and multilateral health governance are vital. Other recommendations include (1) encouraging academic institutions and experts to share experiences on health policy research and activities; (2) strengthening the monitoring of the health condition of the population; and (3) establishing regional disease surveillance and early warning systems.

For many indicators, the annual rate of change required to meet established targets far exceeded the progress achieved by any country in the recent past. However, the projected scores for some indicators did not reach the 2030 target but could be improved, highlighting the potential to achieve SDGs if progress is accelerated in the coming years. Countries that do not make concerted efforts to prevent and treat NCDs will fall short of SDG targets. These results highlight the need for promptly and effectively implementing programs and continually monitoring inequalities in NCD-related SDGs within populations. In addition, governments should pay attention to regions lacking water resources, and then improving the quality of drinking water. Countries with severe air pollution should make efforts to mitigate this problem, advocate energy saving and emission reduction, and reduce CO_2 emission and coal consumption. Countries with low scores for substance abuse should take effective measures to control unhealthy lifestyles.

Authors' affiliations
[1]Ningbo No. 2 Hospital, Ningbo, China. [2]Ningbo Municipal Center for Disease Control and Prevention, Ningbo, China. [3]Department of Global Health, Ningbo Institute of Life and Health Industry, University of Chinese Academy of Sciences, Ningbo, China. [4]Panjin Municipal Center for Disease Control and Prevention, Panjin City, China. [5]Fenghua District Center for Disease Control and Prevention, Ningbo, China. [6]Department of Health Metrics Sciences/Institute for Health Metrics

and Evaluation, University of Washington, Seattle, WA, USA. [7]Division of Chronic Disease and Aging Health management, Chinese Center for Disease Control and Prevention, Beijing, China.

Supplementary files

Supplementary file 1 contains Tables S1-S2 and Figure S1.

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