



Assessing the Iran Health System in Making Progress towards Sustainable Development Goals (SDGs): A Comparative Panel Data Analysis

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Abstract

Background: Sustainable development goals' (SDGs) analysis can be caused a better understanding of factors contributing to access to health services and help shape policies to attain health goals. This review aimed to measure and compare the SDGs between Iran and selected categories.

Methods: This study was a comparative cross-sectional study. We identified indicators of health status based on the SDGs report 2019. The status of SDGs indicators was compared in Iran to four categories, including selected countries with similar social, economic, and health status, six regions of the WHO, the average of each income level group. SPSS 20 and Excel 2019 software were used for descriptive data analysis.

Results: The average life expectancy and healthy life expectancy were 75.7 years and 65.4 respectively in Iran. Iran's mortality rate in indicators named road traffic (32.1 per 100000 population), suicide (4.1 per 100000 population), and unintentional poisoning (1.2 per 100000 population) were higher than most of the categories. Iran's status in morbidity indicators had an approximately lower rate than all categories. Iran had full coverage in three immunization indicators like DTP3 immunization, MCV2 immunization, and PCV3 immunization, which was higher than all categories. Coverage of UHC in Iran (65%) was near to the global average (64%) and higher than the eastern Mediterranean Region (53%). Moreover, the prevalence of tobacco smoking (10.95%) and alcohol consumption (1%) were lower than global (6.4%) and the WHO regions (1.8%) average.

Conclusion: Health status measurement is a trend that requires the collection, processing, analysis, and dissemination of data by a set of indicators. There are several weaknesses in reported data in the SDGs for some indicators, the data collection process should be noticed seriously by policymakers.

Keywords: Sustainable development goals; Indicator; Comparative analysis



Introduction

The WHO defines the concept of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Clearly, the WHO definition emphasizes that health is not the exclusive responsibility of the health sector, but rather, it is a responsibility shared by other sectors (1). Therefore, health measurement and improvement require reviewing comprehensive indicators in the related sectors (2). Health measurement with appropriate indicators can be helped to plan for eliminating preventable disease, disability, and premature death, achieve health equity, eliminate disparities, improve the health of all groups, and benchmark with other countries (3). The publication of a comprehensive road map of targets and indicators underpinning the sustainable development goals (SDGs) was great for aligning developing countries and developed ones (4).

The U.N. General Assembly adopted the SDGs in September 2015. They set the global direction for 17 development goals that health is a core dimension of the SDGs; 3 aims to "ensure healthy lives and promote well-being for all at all ages"(5). Health-related indicators were directly about health services, health outcomes, and environmental, occupational, behavioral, or metabolic risks in ten of the other 16 goals. Across these 11 goals, there are 28 health-related targets with a total of 47 health-related indicators. In sum, the SDGs have been set to follow and expand the MDGs, which transforms the world by ensuring, simultaneously, human well-being, economic prosperity, and environmental protection (6, 7).

SDGs analyses can be helpful for measures of population health and possible disparities between countries and guiding health policy toward the weaknesses points. Nevertheless, on the other hand, it can be led to inform national governments of their health status and help decision-makers better target resource allocation and service delivery.

Accordingly, we aimed to review the SDGs of the health indicators in different countries and population groups to demonstrate trends, discrepan-

cies, and gaps. By doing so, we highlight the weaknesses points and also targeted and transformational action to overcome them.

Materials and Methods

The methodology employed for this study was a comparative cross-sectional study comparing Iran's health status to achieving SDGs to other countries by using secondary data.

SDGs indicators inclusion, categorization, and measurement

We selected the critical health-related SDGs indicators from SDGs report 2019. Our review's general inclusion criteria were 1: clear target value defined by the SDGs report 2: availability of reliable data in the considered categories. Overall, 47 indicators related to health were identified in the SDGs report 2019, that 37 indicators were included in this review. After the initial assessment, we excluded ten indicators because of insufficient data availability among categories across years. The countries with reliable and valid reported data in the SDGs report 2019 were categorized into three levels for better comparison. Finally, the status of SDG indicators was compared in Iran to other countries and as follows:

- 1. Comparison of Iran with selected countries:** First, six countries were similar to Iran in terms of social and economic, and health indicators through an expert panel. These countries were: Turkey, Chile, Cuba, Egypt, Morocco, and Poland.
- 2. Comparison of Iran with the average of the six regions of the WHO:** in this section, the SDGs status in Iran compared with the average of the WHO 'regions, including Europe, Southeast Asia, Africa, the Eastern Mediterranean, the United States, and the western Pacific.
- 3. Comparison of Iran with the average of each income level group:** all countries reported in the SDGs report 2019 were classified in one of the income groups (Low income,

Lower-middle income, Upper-middle income, High income) according to the World Bank country classifications by their income level 2019. Then, the geometric mean of each indicator was calculated separately for income groups and compared with Iran.

Moreover, the health status of Iran was compared with descriptive statistics at the international level, including global average, the best situation in the world, and the worst rate in the world.

Data collection

We collected quantitative data from several sources of the diversity of the required data in this study. One of the essential criteria for selecting the data source was valid and reliable data to make accurate and real-based comparisons at the international level. We identified four databases for extracting data named Global Health Observatory (WHO), World Bank (W.B.), CIA factbook 2019, SDGs annual report 2019. First, we extracted data by a researcher-made checklist from different data sources. After that, data cleaning was done. During this process, ten indicators that had much missing and 25 countries that did not register many data were excluded from the study. Finally, 37 indicators for 169 countries were examined (Supplementary Files 1 and 2). Meanwhile, to ensure data quality of the SDGs 2019 results, we compared the SDGs report 2019 data with other national sources of data in Iran. In cases of considerable inconsistencies, we consulted our technical team for consensus on using the most reliable data.

Data analysis

SPSS 20 (IBM Corp., Armonk, NY, USA) and Excel 2019 software were used for descriptive data analysis. During this analysis, statistics of mean, lowest, highest, standard deviation, and classification of countries were used. Finally, the health status of Iran to achieving SDGs indicators was assessed; the challenges and the proposed solutions were analyzed in the discussion and conclusion.

Ethics consideration

This study was conducted with the approval of the ethics committee affiliated with Tehran University of medical sciences.

Results

We classified each indicator under a category and interpreted them to demonstrate Iran's situation compared with using four categories in SDGs (Table 1).

Life expectancy at birth (LEAB) and healthy life expectancy (HALE)

Our reviewing was shown the highest and lowest LEAB belong on Europe (77.5 yr) and African (61.2 yr) regions among the WHO regions, respectively. Moreover, the mentioned difference was observed between low-income (61.4year) and high-income (79.4 yr) countries. The average of LEAB (75.7 yr) and HALE (65.4) in Iran were higher than the global average (72 yr), Egypt and Morocco among selected countries, and also Southeast Asia, the Eastern Mediterranean Africa from the WHO regions.

Mortality indicators

Totally 13 indicators related to mortality were identified. Based on our assessment, the upward trend was observed with moving toward low-income categories except in mortality due to suicide and homicide that was higher in high-income countries. The suicide rate was the highest in the European, South-East Asia, and the western Pacific regions. Iran's mortality indicators, except road traffic mortality rate (32.1 per 100000 population) was lower than the global average. However, compared to the eastern Mediterranean Region, Iran had a higher mortality rate in suicide (4.1 per 100000 population) and road traffic mortality indicators (32.1 per 100000 population). Iran's situation compared to selected countries in the mortality rate related to unintentional poisoning (1.2 per 100000 population) had a higher rate than Turkey, Poland, and Chile. Although in some indicators like deaths from significant conflicts, dying from any CVD, can-

cer, diabetes, CRD was observed lower than most categories.

Table 1: Health-related SDG indicators used in the study

Category	Health-related SDG indicator	Iran status	Global Ave	upper	lower	S.D.	Turkey	Chile	Cuba	Egypt	Morocco	Poland	the Eastern Mediterranean	the United States	Europe	Africa	Southeast Asia	the western Pacific	High	Upper-middle	Lower-middle	Low
Life expectancy	Life expectancy at birth (years)	75.5	72.0	84.2	53	7.4	76.4	79.5	79	70.5	76	77.8	69.1	76.8	77.5	61.2	69.5	76.9	79.4	73.8	68.1	61.4
	Healthy life expectancy (years)	65.4	63.3	76.2	44.9	6.8	66.0	69.7	69.9	61.1	65.3	68.5	59.7	67.5	68.4	53.8	60.4	68.9	70.1	65.1	59.8	53.8
Mortality	Maternal mortality (per 100000 live births)	25	216	882.0	3.0	207.6	16.0	22.0	39.0	33.0	121.0	3.0	166	52	16	542	164	41	15.5	60.9	236.4	497.0
	Under-5 mortality rate (per 1000 live births)	15.1	40.8	127.3	2.1	28.9	12.7	8.3	5.5	22.8	27.1	4.7	51.7	14.2	9.6	76.5	38.9	12.9	6.3	18.6	44.6	77.6
	Neonatal mortality rate (per 1000 live births)	9.6	18.6	45.6	0.6	10.4	6.5	5.4	2.4	12.8	17.8	2.8	27.7	7.5	5.1	27.2	22.6	6.5	3.5	10.1	20.1	27.2
	dying of CVD, cancer, diabetes, CRD (percent)	14.8	18.3	30.6	7.8	5.6	16.1	12.4	16.4	27.7	12.4	18.7	22.0	15.1	16.7	20.6	23.1	16.2	13.7	19.5	21.3	21.5
	Suicide mortality (per 100000 population)	4.1	10.6	31.9	0.8	6.0	7.3	10.6	13.9	4.0	2.9	16.2	3.9	9.8	15.4	7.4	13.2	10.2	12.1	9.0	8.0	6.8
	Road traffic mortality (per 100000 population)	32.1	17.4	36.2	0.0	9.0	8.9	12.4	7.5	12.8	20.8	10.3	19.9	15.9	9.3	26.6	17.0	17.3	7.9	16.9	20.9	27.7
	mortality on air pollution (per 100000 population)	50.9	114.1	324.1	7.0	71.9	46.6	25.3	49.5	108.9	49.1	37.9	125	29.7	36.3	180.9	165.8	102.8	28.1	63.0	133.1	197.2
	Mortality in unsafe WASH (per 100000 population)	1	11.7	101.0	0.1	21.0	0.3	0.2	1.0	2.0	1.9	<0.1	10.6	1.1	0.3	45.8	15.4	1.0	0.4	2.6	16.9	47.1
	Mortality in unintentional poisoning (per 100000 population)	1.2	1.4	4.2	0.0	1.1	0.3	0.2	0.3	0.2	0.6	0.2	1.5	0.6	0.7	2.7	1.8	1.1	0.3	0.7	1.5	2.8
	Average death rate due to natural disasters (per 100000 population)	0.1	0.1	7.0	0.0	0.8	<0.1	0.1	0.3	0.0	<0.1	<0.1	0.2	0.1	<0.1	<0.1	0.2	0.2	0.2	0.2	0.3	0.7
Mortality	4.5	6.4	55.5	0.0	9.2	2.7	4.4	5.5	4.8	1.4	0.9	6.7	17.0	3.3	10.0	4.1	1.9	4.0	9.0	9.3	8.1	

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	rate due to homicide (per 100 000 population) deaths from major conflicts (per 100000 population)	<0.1	2.5	32.4	0.0	3.6	1.1	<0.1	<0.1	0.6	0.0	<0.1	24.1	0.4	0.4	1.7	0.1	0.1	0.0	0.0	1.1	3.0
	Completeness of cause-of-death data (percent)	88	49	100.0	10.0	18.3	89.0	97.0	100.0	94.0	29.0	100.0	33	93	98	6	10	64	94.4	89.5	66.2	87.0
Morbidity	New HIV infections (per 1000 uninfected population)	0.06	0.26	5.6	0.0	1.0	N/A	0.3	0.3	0.0	0.0	N/A	0.06	0.16	0.25	1.24	0.08	0.05	0.01	0.06	0.6	0.8
	Tuberculosis incidence (per 100000 population)	14	140	781.0	0.0	143.4	18.0	16.0	6.9	14.0	103.0	18.0	114	27	32	254	240	95	25.5	90.8	207.0	197.5
	Malaria incidence (per 1000 population at risk)	0.2	90.8	459.7	0.0	134.5	0.0	N/A	N/A	N/A	N/A	N/A	20.5	11.3	0.0	239.6	16.5	4.2	0.04	16.6	77.4	245.1
	HB prevalence in U5 (percent)	0.02	1.30	8.5	0.0	1.7	0.3	0.3	0.1	0.8	0.5	0.0	1.6	0.2	0.4	3.0	0.7	0.9	0.04	0.06	1.9	4.0
	NTDs (Number reported)	0	۵۰۱۴۶	۹۹۸۲۵۶	0.0	۱۵۳۰	1497	44.0	43.687	1.826	25.0	64.0	85.715	49.500	2.821	591.698	671.797	98.201	52.8	42.4	8.3	#DIV/0!
Coverage	Family planning satisfied with modern methods (percent)	68.6	77.4	89.8	15.6	20.5	59.7	N/A	88.4	80.0	74.8	N/A	63.6	83.0	75.1	52.2	75.1	89.7	62.5	63.5	56.7	43.3
	DTP3 immunization (percent)	99	86	99.0	19.0	12.3	98.0	95.0	99.0	95.0	99.0	98.0	80	91	92	74	88	97	95.1	91.6	86.4	77.1
	MCV2 immunization (percent)	98	64	99.0	22.0	17.8	85.0	87.0	99.0	96.0	99.0	94.0	69	54	88	24	75	93	90.2	88.0	73.6	59.1
	PCV3 immunization (percent)	98	42	99.0	10.0	19.1	98.0	90.0	N/A	N/A	98.0	N/A	48	84	62	65	9	14	89.0	81.6	80.9	74.3
Access	UHC service coverage index (percent)	65	64	79.0	29.0	14.2	71.0	70.0	78.0	68.0	65.0	75.0	53	78	73	44	55	75	73.2	67.4	53.7	39.7
	Safely managed drinking-water (percent)	91	71	100.0	6.0	25.0	N/A	98.0	N/A	N/A	69.0	94.0	56	82	91	26	N/A	N/A	96.0	78.0	53.3	22.0
	Safely managed sanitation (percent)	N/A	39	100.0	9.0	27.8	44.0	85.0	31.0	61.0	38.0	77.0	N/A	43	67	N/A	N/A	57	84.6	42.0	43.0	9.0
	Primary reliance on clean fuels (percent)	>95	59	>95	6.0	30.8	N/A	92.0	79.0	>95	>95	>95	71	92	>95	17	41	63	81.1	73.6	36.1	26.0
	Fine particulate matter (PM2.5) in urban areas (percent)	34.4	39.6	99.5	5.8	16.4	41.2	23.1	21.6	79.6	31.1	21.5	54.0	13.4	17.6	35.5	57.3	42.9	17.7	21.9	31.6	37.5

	Wasting in children U5 (percent)	4	7.5	21.5	0.0	4.5	1.7	0.3	N/A	9.5	2.3	N/A	9.1	0.9	N/A	7.0	15.2	2.3	3.0	3.7	7.8	7.6
	Stunting in children U5(percent)	6.8	22.2	50.2	1.8	13.2	9.5	1.8	N/A	22.3	14.9	N/A	24.6	6.3	N/A	33.6	33.0	6.9	9.9	13.4	28.6	35.5
	Over-weight in children U5(percent)	N/A	5.6	19.9	0.0	4.2	10.9	9.3	N/A	15.7	10.7	N/A	6.8	7.2	N/A	3.7	3.4	5.3	7.0	8.7	5.7	3.6
Birth	Births attended by skilled (percent)	99	N/A	100.0	20.0	18.8	97.0	100.0	100.0	92.0	74.0	100.0	N/A	N/A	N/A	N/A	N/A	N/A	99.3	96.5	78.0	58.1
	Adolescent birth rate (per 1000 women aged 15-19 yr)	23	43.9	229.0	0.7	47.2	26.9	44.7	50.0	56.0	32.0	12.3	44.5	48.6	16.6	99.1	33.0	14.2	17.0	41.4	71.0	126.2
Others	Fine particulate matter (PM2.5) in urban areas	34.4	39.6	99.5	5.8	16.4	41.2	23.1	21.6	79.6	31.1	21.5	54.0	13.4	17.6	35.5	57.3	42.9	17.7	21.9	31.6	37.5
	Development assistance to medical research	0.03	N/A	60.0	0.0	9.0	0.4	0.0	0.1	0.2	1.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.5	5.4	4.3	6.8
	tobacco smoking (percent)	1	6.4	15.2	0.0	4.1	2.0	9.3	6.1	0.4	0.6	11.6	1.8	14.2	9.7	5.3	3.4	5.2	9.1	6.3	3.7	4.6

Morbidity indicators

Among five identified indicators, Iran's status in all indicators had an approximately lower rate than all categories. The incidence rate in Hepatitis B, Malaria, and Tuberculosis was incremental for low-income countries. However, we faced incomplete reported data for some indicators named HIV, hepatitis, and especially NTDs.

Birth indicators

Iran was placed in the same situation compared to the global and the Eastern Mediterranean region average. However, the percentage of married or in-union women of reproductive in Iran (68.6%) was lower than the global average, and the selected countries expect Turkish.

Coverage indicators

In this category, most of the assessed categories had up to full coverage (Ave). Similarly, Iran had full coverage in three immunization indicators like DTP3 immunization, MCV2 immunization, and PCV3 immunization, which was higher than all categories. While coverage of family planning

satisfied with modern methods indicator in Iran was lower than the global average and even all the WHO region except the eastern Mediterranean and African regions.

Access indicators

Among five indicators in this category, coverage of UHC in Iran (65%) was near to the global average (64%) and higher than the eastern Mediterranean Region (53%). Although compared to all of the selected countries and most of the WHO regions had lower accessibility. Meanwhile, there was not any reported data for safely managed sanitation indicators. The best-reported data among selected countries belong to Chile.

Other indicators

The prevalence of tobacco smoking (10.95%) and alcohol consumption (1%) was lower than the global and the WHO regions average and selected countries. There is a weakness in reporting total net official development assistance to medical research and fundamental health indicators.

Discussion

The SDGs indicators provide a comprehensive framework to assess health status that can be addressed inequality between counties wherever it exists. In this study, we compare 37 of the 47 health-related SDG_s indicators across 169 countries. Our findings show the need to design a set of interventions for some health-related indicators like road traffic mortality, suicide, unintentional poisoning, and alcohol consumption indicators.

The LEAB and HALE average in Iran was a few lower compared to most of the investigated categories. However, there is a huge disparity in life expectancy among the best and the worst average in the world (approximately 18 years). LEAB and HALE indicators have been affected by many factors such as socioeconomic status, disease control approaches, lifestyle, and health service status in each country. Salomon et al. found that life expectancy and healthy life expectancy trends increased faster for countries with UHC (8). The global average of UHC was 65%, while lower coverage belongs to the low-income countries and the Africa region. Specific programs to achieve UHC should be considered for countries that have not seen sufficient gains in life expectancy as part of the broader push to achieve the SDG_s(9).

Our reviewing was shown the rate of mortality in Iran in three indicators named road traffic, suicide, and unintentional poisoning were higher than the WHO regions and most of the selected countries. Traffic accidents are the most important cause of death due to injuries and loss of life in Iran (10). Based on the GBD (2013)(11), road traffic accidents alone account for an estimated five million injuries worldwide (12). Also, previous studies (13) were reported a high road traffic mortality rate per 100 000 population in china (10.8 deaths), Japan (4.2 deaths), and Australia (5.4 deaths). Then serious attention is needed in this regard. Most accidents are preventable due to culture and related to human error named excess speed and violation of traffic signals (14)

and infrastructure. Then to overcome this problem, there is an urgent need to develop a comprehensive injury control policy and strategy. Unintentional poisoning and suicide were other indicators that need more consideration in Iran. Based on the U.S. poison centers in 2018 (15), 76.7% of poison exposures reported were unintentional. Mahmudi et al. reported poisoning with pesticides, mainly Rice tablets and opium, devoted the highest causes of poisoning and mortality than the other drugs and toxins in Iran (16). Iran and European Region had the highest rate of suicide. Across all WHO regions, close to 800 000 people died by suicide in 2016(17). Besides, governments, especially upper-middle-income and high-income countries, should be adopted a national suicide prevention strategy.

Morbidity indicators in Iran had a lower rate than most of the categories. On the other hand, even the lowest-income regions had progressed in combating HIV/AIDS, tuberculosis, and malaria as communicable diseases. Apart from SDG_s like illness related to (air, water, and soil) pollution and hepatitis B incidence, NCDs and HIV in most countries require concentrating on producing timely, good-quality data (18). On the other hand, the mentioned indicators need multi-sectoral action from agriculture, food processing, finance, excise, women and child development, youth affairs and sport, urban development and planning, environment, human resource development, road transport, and highways, and others(19).

The rate of alcohol consumption per capita was near to average in the Eastern Mediterranean region. Moreover, excessive alcohol consumption is one of the most significant challenges for public health in Europe (20). Mackenbach reported alcohol-related health problems have also become an essential driver of socioeconomic inequality in mortality in many regions, particularly in Eastern Europe and in the Nordic countries (20). Based on the WHO report, it can be related to domestic and illegal alcohol consumption in some countries like South Asia, North Africa, and the Middle East Mediterranean Because of forbidden alcohol consumption (21).

Our study faced a few challenges in this regard with incomplete or outdated information on several health-related indicators. Moreover, the data sets have weaknesses in the mental indicators despite the importance of those indicators.

Conclusion

Health status measurement is a trend that requires the collection, processing, analysis, and dissemination of data by a set of indicators. In this research, Iran's health status is measured based on SDGs. Based on the results, Iran's status in most of the health-related indicators in SDGs was more than the eastern Mediterranean Region and global averages. However, in some indicators named road traffic mortality, suicide, and unintentional poisoning, alcohol consumption indicators need to design the preventive actions. Therefore, in addition to some weakness in reported data in the SDGs for some indicators, the data collection process should be noticed seriously by policymakers.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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