

IRAN (ISLAMIC REPUBLIC OF)



HEALTH AND CLIMATE CHANGE **COUNTRY PROFILE 2022**

CONTENTS

1 HOW TO USE THIS PROFILE

NATIONAL CONTEXT

3 COUNTRY BACKGROUND

4 CURRENT AND FUTURE CLIMATE HAZARDS

6 HEALTH RISKS DUE TO CLIMATE CHANGE

6 HEAT STRESS

7 FOOD SAFETY AND SECURITY

8 WATER QUANTITY AND QUALITY

9 HEALTH RISKS DUE TO AIR POLLUTION

NATIONAL RESPONSE

10 HEALTH CO-BENEFITS FROM CLIMATE CHANGE MITIGATION

11 HEALTH IN THE NATIONALLY DETERMINED CONTRIBUTION (NDC)

12 NATIONAL HEALTH RESPONSE: HEALTH SYSTEM CAPACITY AND ADAPTATION

OPPORTUNITIES

15 OPPORTUNITIES FOR ACTION

16 WHO RESOURCES FOR ACTION

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HOW TO USE THIS PROFILE

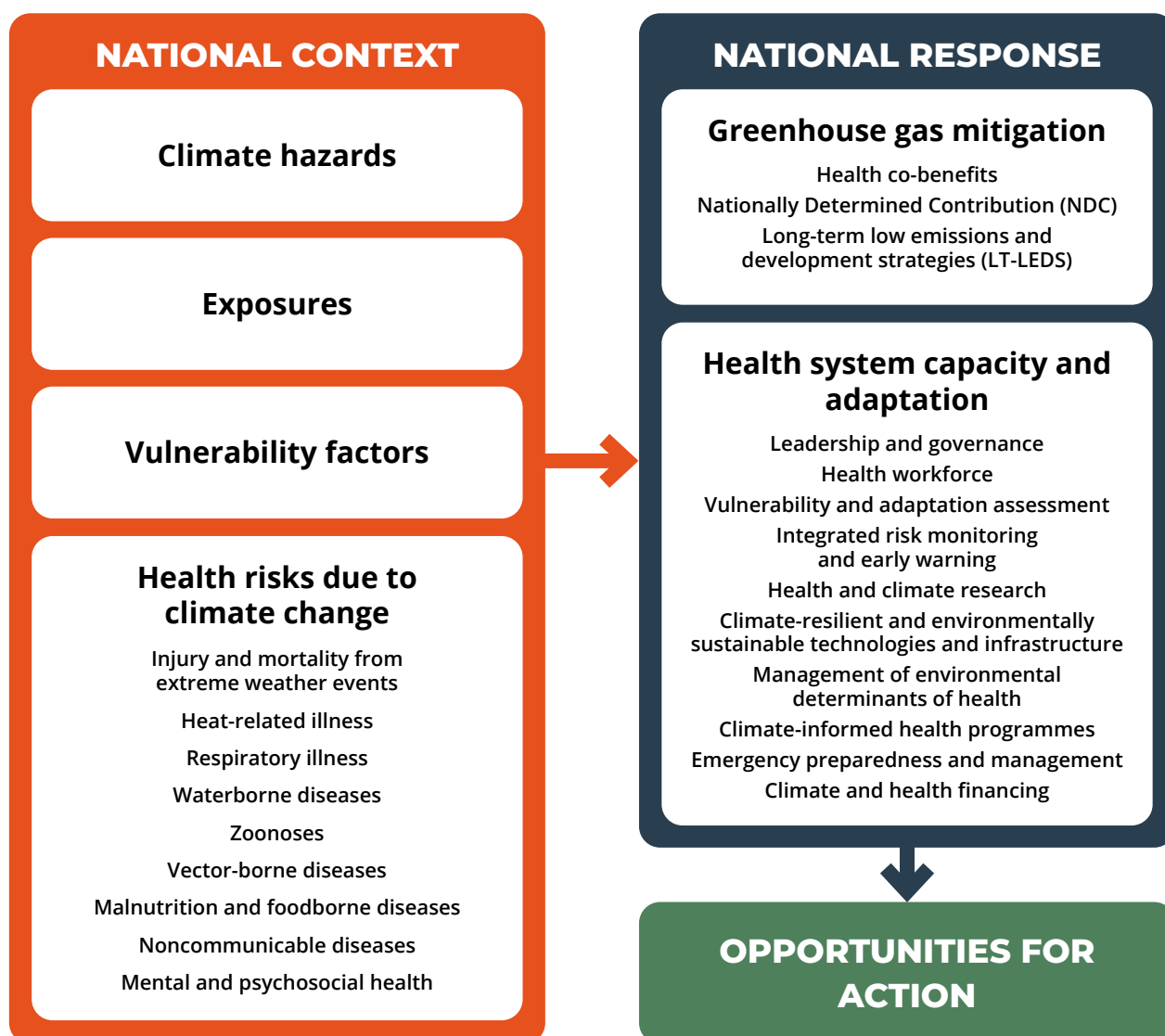
This health and climate change country profile presents a snapshot of country-specific climate hazards, climate-sensitive health risks and potential health benefits of climate change mitigation. The profile is also a key tool in monitoring national health sector response to the risk that climate variability and climate change pose to human health and health systems. By presenting this national evidence, the profile aims to:

- Raise awareness of the health threats of climate change within the health sector, other health-related sectors and among the general public;
- Monitor national health response;
- Support decision-makers to identify opportunities for action;
- Provide links to key WHO resources.

Tools to support the communication of the information presented in this country profile are available. For more information please contact: nevillet@who.int

The diagram below presents the linkages between climate change and health. This profile provides country-specific information following these pathways. **The profile does not necessarily include comprehensive information on all exposures, vulnerability factors or health risks** but rather provides examples based on available evidence and the highest priority climate-sensitive health risks for your country.

CLIMATE CHANGE AND HEALTH



COUNTRY BACKGROUND

Located in the southwest of Asia, Iran (Islamic Republic of) is the sixteenth largest country in the world with an area of over 1.6 million km² (1). The economy of Iran (Islamic Republic of) predominantly depends on petroleum and natural gas exports and is amongst the 20 largest economies in the world (2). Iranians are mostly concentrated in urban areas, with an urban population of over 70% due to migration from rural areas to cities (1).

The climate is mainly arid and semi-arid; however, it varies throughout the national territory encompassing mountainous, dry, semi-dry and Caspian climates. Iran is amongst the most vulnerable countries to climate change due to its geographic, economic and climatic characteristics (3). For instance, a large area of the country is susceptible to floods, while changing trends in precipitation have also led to droughts and forest fires (1). Iran (Islamic Republic of) is also vulnerable to sand and dust storms, due to its arid and semi-arid climate, a phenomenon that causes adverse impacts on human health as a result of poor air quality (4).

The Nationally Determined Contribution (NDC) of Iran (Islamic Republic of) seeks to mitigate its greenhouse gas emissions by 4% in 2030 through increasing the share of renewable energies, including by participating in national and international market-based mechanisms, and employing low-carbon fuels. The adaptation actions of Iran (Islamic Republic of) are subjected to international funding and technology transfer (3). The government of Iran (Islamic Republic of) has also published its National Health and Climate Change Strategy, which aims to improve health system resilience to climate change. Specific targets in this strategy include: conducting a vulnerability assessment against climate change effects in the health sector; building capacity and planning adaptation development in the health sector; promoting knowledge and awareness of climate-related health issues; climate and health research and development; and maximizing the benefits from regional and international cooperation (5).



CURRENT AND FUTURE CLIMATE HAZARDS

CLIMATE HAZARD PROJECTIONS FOR IRAN (ISLAMIC REPUBLIC OF)

Country-specific projections are outlined up to the year 2100 for climate hazards under a 'business as usual' (BAU) high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions (see Figures 1–5).

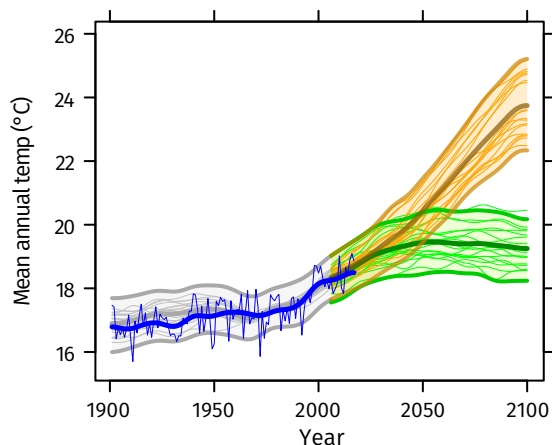
The climate model projections given below present climate hazards under a high emissions scenario, Representative Concentration Pathway 8.5 (RCP8.5 – in orange) and a low emissions scenario (RCP2.6 – in green).^a The text describes the projected changes averaged across about 20 global climate models (thick line). The figures^b also show each model individually as well as the 90% model range (shaded) as a measure of uncertainty and the annual and smoothed observed record (in blue).^c In the following text the present-day baseline refers to the 30-year average for 1981–2010 and the end-of-century refers to the 30-year average for 2071–2100.

Modelling uncertainties associated with the relatively coarse spatial scale of the models compared with that of geographically small countries are not explicitly represented. There are also issues associated with the availability and representativeness of observed data for some locations.



Rising temperature

FIGURE 1: Mean annual temperature, 1900–2100

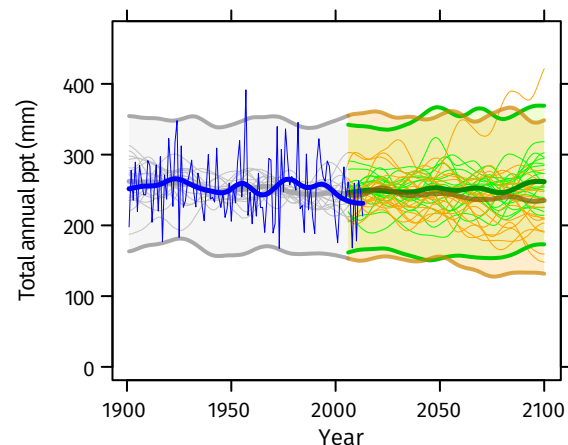


Under a high emissions scenario, the mean annual temperature is projected to rise by about 5.2°C on average by the end-of-century (i.e. 2071–2100 compared with 1981–2010). If emissions decrease rapidly, the temperature rise is limited to about 1.5°C.



Little change in total precipitation

FIGURE 2: Total annual precipitation, 1900–2100



Total annual precipitation is projected to remain almost unchanged on average under a high emissions scenario, although the uncertainty range is large (-24% to +21%). If emissions decrease rapidly, there is a projected change of -5% to +15%.

NOTES

^a Model projections are from CMIP5 for RCP8.5 (high emissions) and RCP2.6 (low emissions). Model anomalies are added to the historical mean and smoothed.

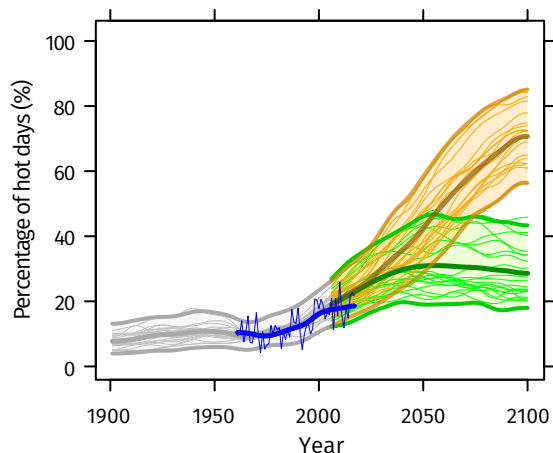
^b Observed historical record of mean temperature and total precipitation is from CRU-TSv3.26. Observed historical records of extremes are from JRA55 for temperature and from GPCC-FDD for precipitation.

^c Analysis by the Climatic Research Unit, University of East Anglia, 2018.



More high temperature extremes

FIGURE 3: Percentage of hot days ('heat stress'), 1900–2100



The percentage of hot days^d is projected to increase substantially from about 15% of all days on average in 1981–2010 (10% in 1961–1990). Under a high emissions scenario, about 65% of days on average are defined as 'hot' by the end-of-century. If emissions decrease rapidly, about 30% of days on average are 'hot'. Similar increases are seen in hot nights^d (not shown).



Drought frequency and intensity

FIGURE 5: Standardized Precipitation Index ('drought'), 1900–2100

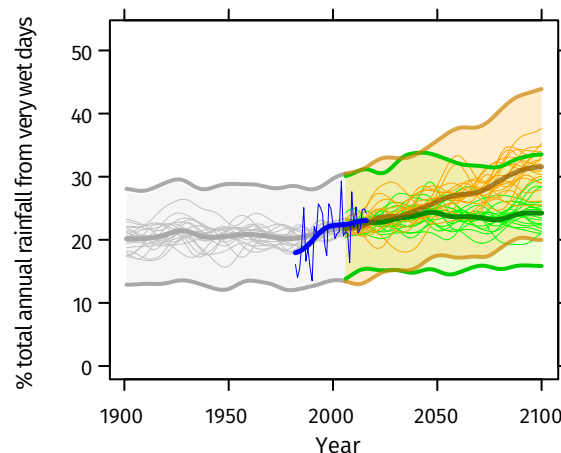
The Standardized Precipitation Index (SPI) is a widely used drought index which expresses rainfall deficits/excesses over timescales ranging from 1 to 36 months (here 12 months, i.e. SPI12).^f It shows how at the same time extremely dry and extremely wet conditions, relative to the average local conditions, change in frequency and/or intensity.

SPI12 values show little projected change from about zero on average, though year-to-year variability remains large. A few models indicate larger decreases (more frequent/intense drought events) or increases (more frequent/intense wet events).^f

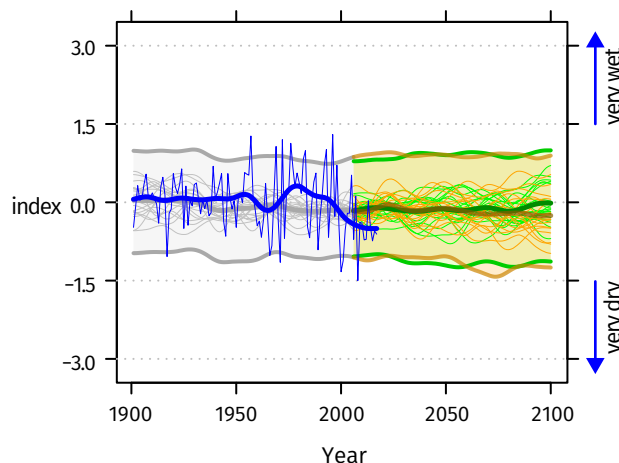


Increase in extreme rainfall

FIGURE 4: Contribution of very wet days ('extreme rainfall' and 'flood risk') to total annual rainfall, 1900–2100



Under a high emissions scenario, the proportion of total annual rainfall from very wet days^e (about 20% for 1981–2010) could increase by the end-of-century (to about 30% on average with an uncertainty range of about 20% to 40%), with less change if emissions decrease rapidly. These projected changes are accompanied by little change in total annual rainfall (see Figure 2).



^d A 'hot day' ('hot night') is a day when maximum (minimum) temperature exceeds the 90th percentile threshold for that time of the year.

^e The proportion (%) of annual rainfall totals that falls during very wet days, defined as days that are at least as wet as the historically 5% wettest of all days.

^f SPI is unitless but can be used to categorize different severities of drought (wet): +0.5 to -0.5 near normal conditions; -0.5 to -1.0 slight drought; -1.0 to -1.5 moderate drought; -1.5 to -2.0 severe drought; below -2.0 extreme drought.

HEALTH RISKS DUE TO CLIMATE CHANGE

HEAT STRESS

CLIMATE HAZARDS^a

 Up to 5.2°C mean annual temperature rise by the end-of-century.

 About 65% of days could be 'hot days' by the end-of-century.

EXPOSURES

Population exposure to heat stress is likely to rise in the future, due to increased urbanization (and the associated urban heat island effect) and climate change increasing the likelihood of severe heat waves (periods of prolonged heat).

EXAMPLE VULNERABILITY FACTORS^b



Age (e.g. the elderly and children)



Biological factors and health status



Geographical factors (e.g. urbanization)

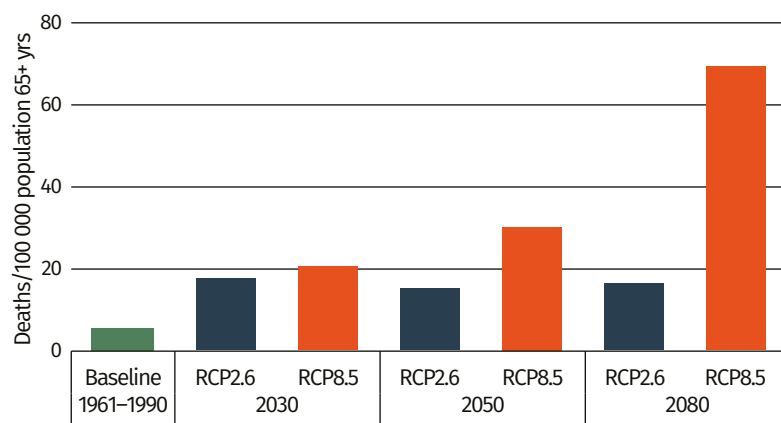


Socioeconomic factors (e.g. occupation and poverty)

HEALTH RISKS^c

FIGURE 6: Heat-related death among elderly people (65+ years), by high and low emission scenarios^d

Source: Honda et al. (2015) (6)



The health risks of heat stress include heat-related illnesses such as dehydration, rash, cramps, heatstroke, heat exhaustion and death.

Baseline (1961–1990) heat-related deaths among the elderly (65+ years) are less than 6 deaths per 100 000 population. Under a high emissions scenario (RCP8.5), heat-related deaths among the elderly (65+ years) are projected to rise to about 69 per 100 000 by 2080. A rapid reduction in emissions (RCP2.6) could significantly reduce deaths among the elderly in 2080 to around 16 per 100 000 population (6).

^a For details see "Current and future climate hazards".

^b These vulnerability factors are not comprehensive but rather examples of relevant vulnerability factors. Please see the WHO Quality Criteria for Health National Adaptation Plans for more details: <https://www.who.int/publications/i/item/quality-criteria-health-national-adaptation-plans>.

^c See "National health response: health system capacity and adaptation" for the national response to heat stress.

^d Country-level analysis, completed by Honda et al. (2015), was based on health models outlined in the Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014. The mean of impact estimates for three global climate models are presented. Models assume continued socioeconomic trends (SSP2 or comparable).

FOOD SAFETY AND SECURITY

CLIMATE HAZARDS^a



Up to 5.2°C mean annual temperature rise by the end-of-century.



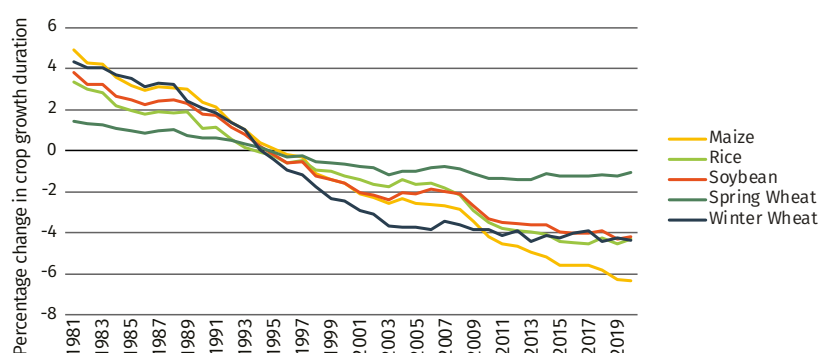
About 65% of days could be 'hot days' by the end-of-century.



Large year-to-year variability in drought conditions.

EXPOSURES

FIGURE 7: Percentage change in crop growth duration in Iran (Islamic Republic of) in 1981–2020, relative to the 1981–2010 average, expressed as the running mean over 11 years (5 years before and 5 years after) (7,8)



Reliable food resources are essential to good health. Climate change significantly increases exposure to changes in the safety and sustainability of food systems, directly through its effects on agriculture and indirectly by contributing to underlying risk factors such as water insecurity, dependency on imported foods, urbanization and migration, and health service disruption.

EXAMPLE VULNERABILITY FACTORS^b



Age (e.g. the elderly and children)



Biological factors and health status (e.g. pregnant women)



Environmental factors (e.g. loss of biodiversity)



Gender and equity



Socioeconomic factors

HEALTH RISKS^c

Food safety and security problems can result in: malnutrition and foodborne diseases, zoonoses, noncommunicable diseases (NCDs), and mortality. As food security decreases due to climate change, metabolic and lifestyle risk factors for diet-related NCDs are likely to be exacerbated. Increasing temperatures can lead to increases in foodborne illnesses through spoiled food from refrigeration failure in transport/storage or changes in patterns of salmonella growth. Food security in Iran (Islamic Republic of) is expected to be negatively affected by climate change. In particular, decreasing water availability, rising temperatures, and more frequent and severe sand and dust storms are anticipated to reduce agricultural productivity (3). Iran (Islamic Republic of) already faces challenges in the agricultural sector from a range of factors, including limited food security and self-sufficiency in major staple crops; inadequate access to food for all; and low productivity among smallholding farmers (9). Climate change will exacerbate these existing challenges, putting future food and nutrition security at risk in Iran (Islamic Republic of).

^a For details see "Current and future climate hazards".

^b These vulnerability factors are not comprehensive but rather examples of relevant vulnerability factors. Please see the WHO Quality Criteria for Health National Adaptation Plans for more details: <https://www.who.int/publications/i/item/quality-criteria-health-national-adaptation-plans>.

^c See "National health response: health system capacity and adaptation" for the national response to food safety and security.

WATER QUANTITY AND QUALITY

CLIMATE HAZARDS^a

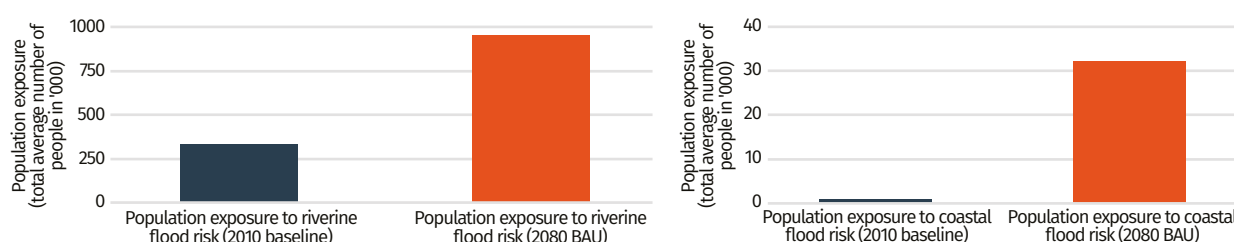
 Up to 5.2°C mean annual temperature rise by the end-of-century.

 Large year-to-year variability in drought conditions.

 Annual rainfall from very wet days could increase by the end-of-century.

EXPOSURES

FIGURE 8: Change in population exposure to riverine and coastal flooding in Iran (Islamic Republic of) from 2010 (baseline) to 2080 (under a BAU scenario)^b (10)



Climate change increases the intensity and frequency of extreme weather events including drought and floods. Rising sea levels can lead to storm surges, coastal erosion, saltwater intrusion of groundwater aquifers, and ecosystem disruption. These events can lead to population displacement and affect water and sanitation infrastructure and services, contaminate water with faecal bacteria (e.g. *E. coli*, salmonella) from runoff or sewer overflow. Increasing temperatures and precipitation can also lead to water contaminated with *Vibrio* bacteria or algae blooms.

6.6 million
rural inhabitants living in rainfed areas with high drought frequency OR irrigated areas with high water stress (11)

11.9 million
urban inhabitants living in rainfed areas with high drought frequency OR irrigated areas with high water stress (11)

EXAMPLE VULNERABILITY FACTORS^c



Access to clean and safe water and sanitation services



People living near flood and drought zones



Socioeconomic factors



Gender and equity

HEALTH RISKS^d

Water resources are expected to be less reliable in the future in Iran (Islamic Republic of), with an observed 50% decrease in surface runoff (and consequential reductions in water availability) and flood occurrence potentially increasing by around 52%. Climate change will worsen such trends; by 2030, there is a projected further 25% decrease in surface water runoff in Iran (Islamic Republic of) (3).

^a For details see "Current and future climate hazards".

^b This analysis, conducted by Aqueduct, shows projections for changing population exposure to riverine and coastal flood risk under a BAU scenario, which reflects RCP8.5 and SSP2. SSP2 is the socioeconomic pathway representing "middle of the road", whereby global social, economic and technological trends do not shift significantly from historical patterns.

^c These vulnerability factors are not comprehensive but rather examples of relevant vulnerability factors. Please see the WHO Quality Criteria for Health National Adaptation Plans for more details: <https://www.who.int/publications/i/item/quality-criteria-health-national-adaptation-plans>.

^d See "National health response: health system capacity and adaptation" for the national response to water quantity and quality.

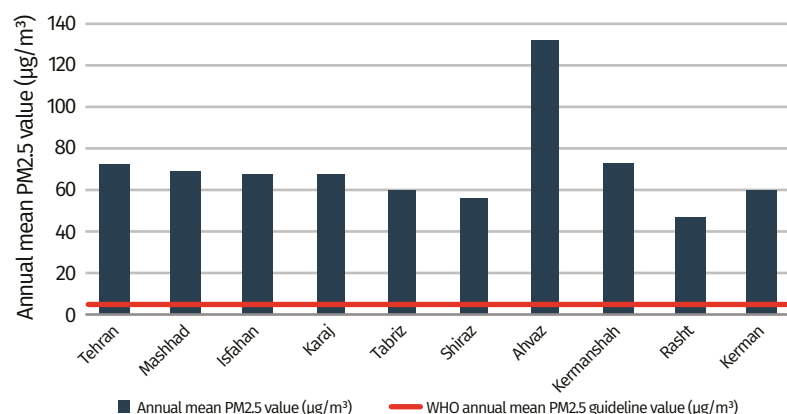
HEALTH RISKS DUE TO AIR POLLUTION

Many of the drivers of climate change, such as inefficient and polluting forms of energy and transport systems, also contribute to air pollution. Air pollution is now one of the largest global health risks, causing approximately seven million deaths every year. There is an important opportunity to promote policies that both protect the climate at a global level, and also have large and immediate health benefits at a local level.

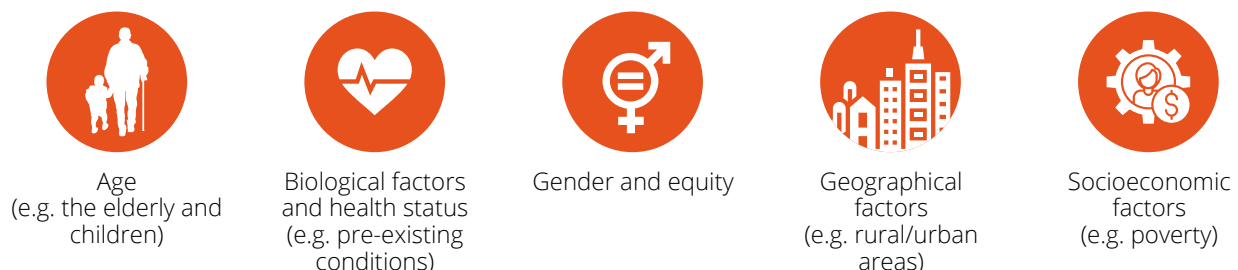
EXPOSURES

Recent data indicates that all of the top ten most populated Iranian cities, for which data has been reported, had annual mean $PM_{2.5}^a$ levels above the WHO guideline value of $5 \mu g/m^3$ (see Figure 9) (12).

FIGURE 9: Annual mean $PM_{2.5}$ in the ten most populated cities of Iran (Islamic Republic of), compared with the WHO guideline value of $PM_{2.5}$ of $5 \mu g/m^3$. Source: Ambient Air Pollution Database, WHO, 2018. A standard conversion has been used, see source for further details (12)



EXAMPLE VULNERABILITY FACTORS^b



HEALTH RISKS^c

Ambient air pollution can have direct and sometimes severe consequences for health. Fine particles, which penetrate deep into the respiratory tract, subsequently increase mortality from respiratory infections, lung cancer and cardiovascular disease. Sand and dust storms have severe impacts on human health, by increasing particulate matter and carrying harmful substances and pathogens, all of which contribute to air pollution and associated respiratory problems. Furthermore, sand and dust storms increase desertification, drought and soil salinity, as well as decreasing water resources. This has severe implications for people's livelihoods as well as their health, with agricultural land being particularly badly affected. There has been an observed increase in the frequency and severity of sand and dust storms globally. This is expected to worsen with climate change and be further exacerbated by drought, land degradation, and unsustainable land and water management (15).

^a $PM_{2.5}$ is atmospheric particulate matter (PM) with a diameter of $<2.5 \mu m$.

^b These vulnerability factors are not comprehensive but rather examples of relevant vulnerability factors. Please see the WHO Quality Criteria for Health National Adaptation Plans for more details: <https://www.who.int/publications/i/item/quality-criteria-health-national-adaptation-plans>.

^c See "National health response: health system capacity and adaptation" for the national response to air pollution.

^d Some ambient and household air pollution deaths may overlap.

27 178

deaths from ambient air pollution in Iran (Islamic Republic of) in 2016 (13)^d

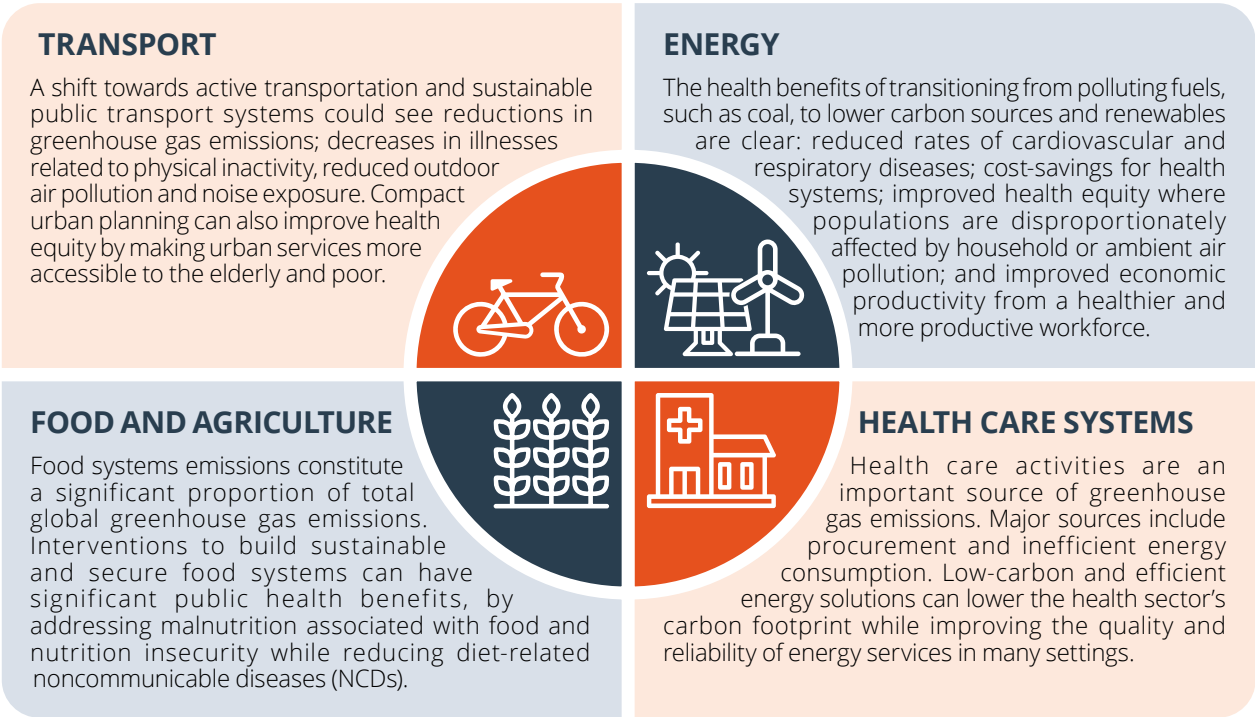
1147

deaths from household air pollution in Iran (Islamic Republic of) in 2016 (14)^d

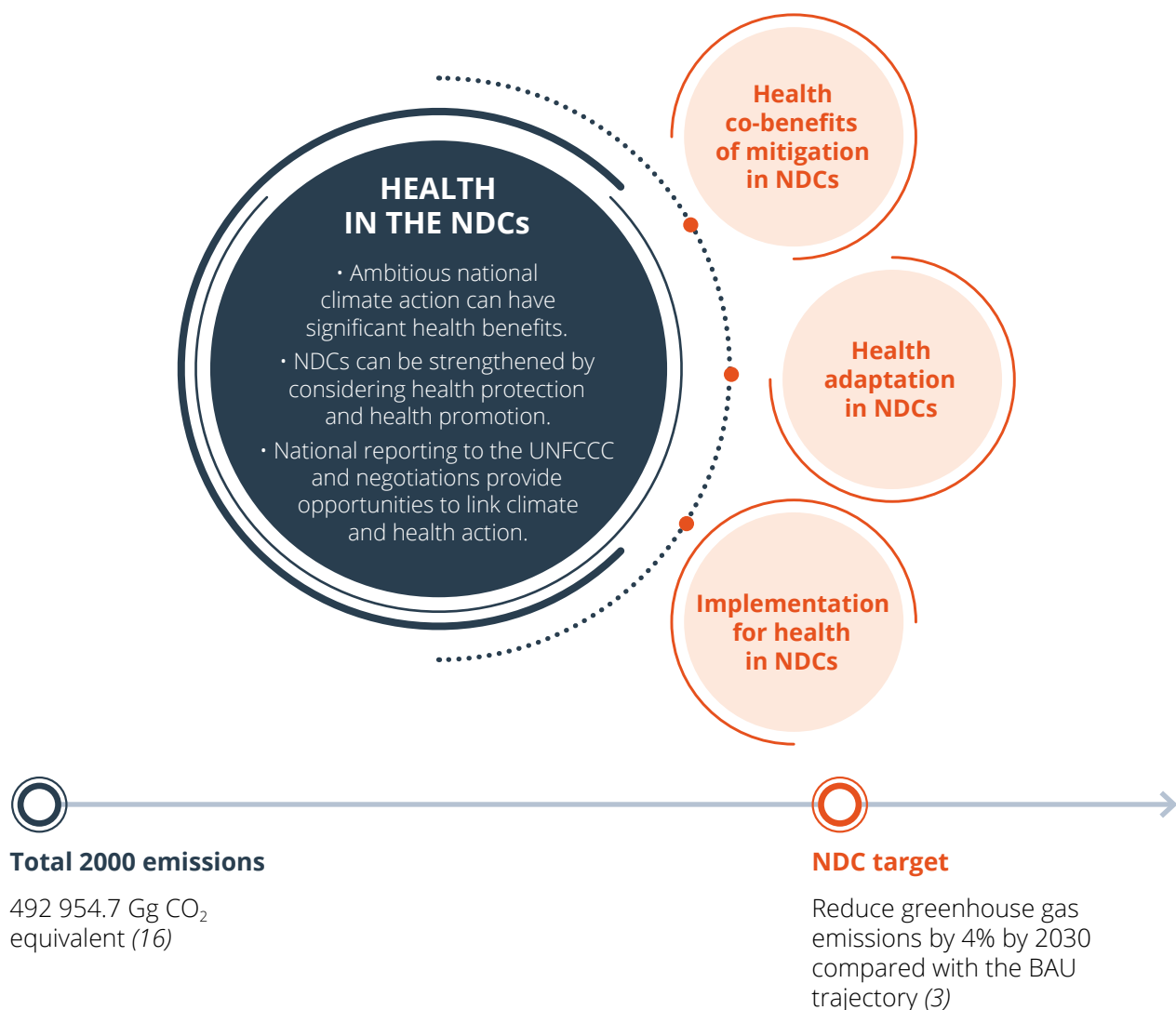
HEALTH CO-BENEFITS FROM CLIMATE CHANGE MITIGATION

Health co-benefits are local, national and international measures with the potential to simultaneously yield large, immediate public health benefits and reduce greenhouse gas emissions.

GLOBAL EXAMPLES



HEALTH IN THE NATIONALLY DETERMINED CONTRIBUTION (NDC)



The NDC of Iran (Islamic Republic of) does not explicitly outline health plans, but health co-benefits exist in the priorities identified (3).

NATIONAL HEALTH RESPONSE: HEALTH SYSTEM CAPACITY AND ADAPTATION

The following section measures progress in the health sector in responding to climate threats based on country reported data collected in the WHO Health and Climate Change Global Survey (17).

GOVERNANCE AND LEADERSHIP

National planning for health and climate change

Has a national health and climate change strategy or plan been developed?^a	Under development
Title: N/A	
Year: N/A	
Content	
Are health adaptation priorities identified in the strategy/plan?	☐
Are the health co-benefits of mitigation action considered in the strategy/plan?	☐
Have performance indicators been identified?	☐
Level of implementation of the strategy/plan	☐
Portion of estimated costs to implement the strategy/plan covered in the health budget	☐

☒ yes
 ☐ no
 ☐ unknown / not applicable

Intersectoral collaboration to address climate change

Is there an agreement in place between the ministry of health and this sector which defines specific roles and responsibilities in relation to links between health and climate change policy?

Sector^b	Agreement in place
 Transportation	☐
 Electricity generation	☐
 Household energy	☐
 Agriculture	☐
 Social services	☐
 Water, sanitation and waste-water management	☐

☒ yes
 ☐ no
 ☐ unknown / not applicable

^a In this context, a national strategy or plan is a broad term that includes national health and climate strategies as well as the health component of national adaptation plans (HNAPs).

^b Specific roles and responsibilities between the national health authority and the sector indicated are defined in the agreement.

EVIDENCE AND IMPLEMENTATION

Vulnerability and adaptation assessment for health

Has an assessment of health vulnerability and impacts of climate change been conducted at the national level?



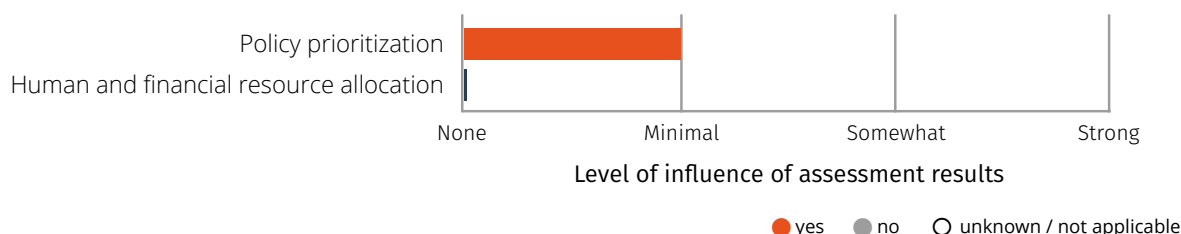
Title: Technical Support to Climate Change Health Vulnerability Assessment and Identifying Strategic Directions for Action for I.R. of Iran

Year: 2020

Title: National Adaptation Strategy and Plan of Action (NASPA) or Climate Change and Health for Islamic Republic of Iran

Year: 2013

Have the results of the assessment been used for policy prioritization or the allocation of human and financial resources to address the health risks of climate change?



Integrated risk monitoring and early warning^a

Climate-sensitive diseases and health outcomes	Health surveillance system exists ^b	Health surveillance system includes meteorological information ^c	Climate-informed health early warning system (EWS) in place
Thermal stress (e.g. heat waves)	●	●	○
Vector-borne diseases	○	○	○
Foodborne diseases	○	○	○
Waterborne diseases	○	○	○
Nutrition (e.g. malnutrition associated with extreme climatic events)	○	○	○
Injuries (e.g. physical injuries or drowning in extreme weather events)	●	●	○
Mental health and well-being	○	○	○
Airborne and respiratory diseases	●	●	○

● yes ● no ○ unknown / not applicable

^a Iran (Islamic Republic of) is currently developing a surveillance system, which will capture a range of climate-sensitive diseases and health outcomes, including airborne and respiratory illnesses and heat-related illness among others.

^b A positive response indicates that the surveillance system is in place, it will identify changing health risks or impacts AND it will trigger early action.

^c Meteorological information refers to either short-term weather information, seasonal climate information or long-term climate information.

Emergency preparedness

Climate hazard	Early warning system in place	Health sector response plan in place	Health sector response plan includes meteorological information
 Heat waves	☐	☐	☐
 Storms (e.g. hurricanes, monsoons, typhoons)	☒	☐	☐
 Flooding	☒	☐	☐
 Drought	☐	☐	☐
 Air quality (e.g. particulate matter, ozone levels)	☒	☒	☐
 Sand/dust storms	☒	☒	☐

☒ yes ☐ no ☐ unknown / not applicable

CAPACITY, INFRASTRUCTURE AND SUSTAINABILITY

Human resource capacity

	International Health Regulations (IHR) Monitoring Framework Human Resources Core Capacity (2018) (18)	80%
	Does your human resource capacity, as measured through the IHR, adequately consider the human resource requirements to respond to climate-related events?	☐
	Is there a national curriculum developed to train health personnel on the health impacts of climate change?	Under development

☒ yes ☐ no ☐ unknown / not applicable

Health care facilities, infrastructure and technology

	Has there been an assessment of the climate resilience of any public health care facilities?	☐
	Have measures been taken to increase the climate resilience of health infrastructure and technology?	☐
	Is there a national initiative/programme in place to promote the use of low-carbon, energy-efficient, sustainable technologies in the health sector?	☐

☒ yes ☐ no ☐ unknown / not applicable

OPPORTUNITIES FOR ACTION



1. STRENGTHEN IMPLEMENTATION OF THE NATIONAL HEALTH AND CLIMATE CHANGE PLAN/STRATEGY OF IRAN (ISLAMIC REPUBLIC OF)

Implementation of the health and climate change plan/strategy in Iran (Islamic Republic of) is reported to be in the planning phase. Assess barriers to implementation of the plan/strategy (e.g. governance, evidence, monitoring and evaluation, finance). Implementation can be supported by exploring additional opportunities to access funds for health and climate change priorities (e.g. GCF readiness proposal). See “WHO resources for action” for further details.



2. STRENGTHEN MULTISECTORAL COLLABORATION ON HEALTH AND CLIMATE CHANGE

There are some multisectoral agreements in place on climate change and health. Enhance collaboration between health and health-determining sectors with agreements on climate change and health action (e.g. with transport, energy, water and sanitation, national meteorological and hydrological services sectors, etc.). Promote climate mitigation and adaptation policies that protect and promote health and strengthen health systems.



3. ASSESS THE HEALTH CO-BENEFITS OF NATIONAL CLIMATE MITIGATION POLICIES

Health co-benefits of mitigation are currently not included in the Nationally Determined Contribution (NDC) of Iran (Islamic Republic of). Ensure that climate mitigation policies include the health risks posed from climate change, identify health adaptation priorities and measure and optimize the health co-benefits of climate mitigation action.



4. BUILD CLIMATE-RESILIENT AND ENVIRONMENTALLY SUSTAINABLE HEALTH CARE FACILITIES

Measures can be taken to prevent the potentially devastating impacts of climate change on health care facilities and health service provision while decreasing the climate and environmental footprint of health care facilities. A commitment towards climate-resilient, environmentally sustainable health care facilities can improve system stability, promote a healing environment and mitigate climate change impacts.

WHO RESOURCES FOR ACTION

-  **Operational framework for building climate-resilient health systems**
<https://www.who.int/publications/i/item/operational-framework-for-building-climate-resilient-health-systems>
-  **WHO guidance to protect health from climate change through health adaptation planning**
<https://www.who.int/publications/i/item/who-guidance-to-protect-health-from-climate-change-through-health-adaptation-planning>
-  **Quality Criteria for Health National Adaptation Plans**
<https://www.who.int/publications/i/item/quality-criteria-health-national-adaptation-plans>
-  **Protecting health from climate change: vulnerability and adaptation assessment**
<https://www.who.int/publications/i/item/protecting-health-from-climate-change-vulnerability-and-adaptation-assessment>
-  **Integrated risk surveillance and health early warning systems**
<https://www.who.int/activities/supporting-countries-to-protect-human-health-from-climate-change/surveillance-and-early-warning>
-  **WHO guidance for climate-resilient and environmentally sustainable health care facilities**
<https://www.who.int/publications/i/item/9789240012226>
-  **Heat early warning systems guidance**
<https://www.who.int/publications/i/item/heatwaves-and-health-guidance-on-warning-system-development>
-  **Climate services for health fundamentals and case studies**
<https://public.wmo.int/en/resources/library/climate-services-health-case-studies>
-  **Climate-resilient water safety plans**
<https://www.who.int/publications/i/item/9789241512794>

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