Financing of NCD Prevention in LMICs: Iran Case Study

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Objectives

This case study is part of a series of 10 case studies from low-and-middle-income countries that were carried out to describe the enablers, dynamics, and challenges of financing prevention programs to counter non-communicable diseases, and to identify promising practices and common threads and trends in these countries. Prevention programs are increasingly seen as critical for tackling the rising burden of non-communicable diseases (NCDs), but tend to be under-prioritized and under-funded, particularly in low and middle-income countries. The objective of this study is to critically assess the NCD prevention efforts made by the Iranian government over the years with a particular focus on cardiovascular diseases, cancers, chronic pulmonary diseases, diabetes, and psychiatric disorders.

Methods

The available literature on NCD prevention, funding, policy formulation, and recommendations was reviewed and selected publications were thematically organized into categories of analysis that were refined based on the emerging evidence. Later, a specific search was undertaken for broader literature, including policy frameworks on NCDs in Iran. An in-depth interview was carried out with an official from the health ministry to gain insights into the government's perspective and approach.

Results

Iran's NCD prevention efforts are guided by a National Action Plan developed by the Iranian Non-Communicable Diseases Committee, which was set up by the high-powered Supreme Council for Health and Food Security (SCHFS). Under the 6th National Development Plan (2016-2021), Iran announced a US$ 480 million increase in its NCDs budget for the next five years. The health ministry determines the financing requirement for every program and campaign that is to run on the ground and the government issues the required funds. The cost of NCD prevention programs is minimal in most cases since they are integrated into an already existing public healthcare system. Iran's NCD efforts operate without any external development assistance for health, and the government's plans are further restricted due to international trade sanctions.

Conclusion

In spite of trade sanctions, COVID-19 triggered economic meltdown, and zero international assistance for health, Iran has made considerable progress in preventing and containing the spread of NCDs. International support, easing of trade sanctions, and improvements in the current PHC can reduce the economic burden of the NCDs, as well as support the government's ability to improve the condition of the existing health care systems and networks.

1. INTRODUCTION

This case study shows the financing of NCD prevention in Iran and is part of a series of 10 case studies from LMIC describing the enablers, challenges, and dynamics of financing non-communicable disease (NCD) prevention programs, aimed at providing promising practices and determining common threads and trends. This case study also profiles areas in need of further study to best advance domestic financing and adoption of the country's NCD programs.

This study will investigate the dynamics of NCD prevention financing in Iran to identify the key lessons, challenges, and barriers from Iran's experience with financing and implementing NCD prevention. It will do so by first examining the socio-economic and institutional context of NCDs in Iran and the region, outlining the key policy responses and interventions of the government to the NCD crisis, and understanding how financing for NCD prevention is raised and spent, and what kind of economic, social, political and institutional barriers stand in its way. The key lessons and challenges emerging from the Iran experience will then be discussed and summarized, and a set of actionable outcomes and recommendations will be presented.

2. METHODOLOGY

The methodology for this assessment consisted of two parts: a review of academic and grey literature and interviews with key informants. The investigators used Google Scholar databases to identify peer-reviewed articles, besides scanning the first 20 pages of Google searches to identify articles from the grey literature. The main search terms were 'NCD', 'prevention', 'financing', and 'Iran'. Additional search terms related to the topic were: 'health promotion', 'non-communicable disease', and 'budget'. Additional search terms related to the policy were: tax, legislation, ban, intervention, labeling, law, and standards. Based on the information in the abstracts, those studies were selected for review that: a) examined NCD prevention, health promotion, and its financing; and b) dated from the 21st century onward, when concerted policy efforts to counter NCDs began in the region.

The selected studies were reviewed and organized into categories of analysis that were refined based on the evidence emerging from the literature. Later, a specific search was undertaken for broader literature, including policy frameworks on NCDs in Iran.

The World Bank definition of prevention was employed, as those preventative and "public health services … designed to enhance the health status of the population as distinct from the curative services which repair health dysfunction."

The investigators then reached out to the governments and relevant departments/bodies to procure reports, budget plans, policy guidelines, and similar material. This was analyzed thematically, to further refine research questions and thoroughly revise interview guides. At the end of the second tier, the investigators shortlisted potential participants to be recruited for in-depth interviews. An official from the Ministry of Health was recruited for an interview to gain insights from government quarters.

3.   THE SOCIO-ECONOMIC CONTEXT OF NCDs IN IRAN

The World Bank (2020) estimated Iran's GDP at US$440 billion for 2019-20 with a population of around 82.8 million. Hydrocarbons, the service sector, and agriculture form the backbone of the economy, while manufacturing and financial sectors also play an important role. Iran has the second-biggest natural gas reserves and fourth-largest crude oil reserves in the world. Iran has a diverse economic base but government revenues and economic activity rely heavily on oil revenues and thus have been volatile.

According to a World Bank Report, the country has been trying to maintain a resilient economy despite US-led sanctions that punish states and commercial entities for entering into trade with Iran, and for even supplying raw materials required to produce NCD-related medications.[1] While the impact of sanctions was felt more strongly after the US unilaterally distanced itself from the nuclear deal and re-introduced harsher measures in 2016 [2], the Iranian government introduced market-based reforms in their 20-year economic vision document and sixth, the 5-year development plan for 2016/17 to 2021/22. The plan is based on a resilient economy, improvement in science and technology, and cultural growth. [2]

However, as the global economy was rattled by the spread of COVID-19 during 2020 and strong economies also taking a toll, Iran's already fragile economy, particularly sectors related to the oil sector, faced a serious blow.

The World Bank presents a dire economic situation in the aftermath of the virus which caused a decrease in employment rates and labor force participation. Because of the pandemic, employment has fallen to 1.5 million, after increasing 1.8% to reach 24.3 million in 2019/20. During the pandemic, the labor force shrunk by a glaring 1.3 million during Q1-2020/21 while gender gaps also worsened with only 14% of working-age women working in 2019/20 which was a reduction of 0.6 points from the previous year.

With oil revenues falling to 2.2% of GDP, the government came under the weight of current expenditures, including a higher wage bill and transfers, and resorted to issuing bonds and selling assets to compensate for smaller oil revenues and a lower tax base.

Due to trade restrictions, exports fell by 26.9%. US secondary sanctions on banking transactions with Iran and rationing of foreign exchange reserves led to massive import contractions (38.1%). Inflation was high because of depreciation of the rial and it increased by 10 points to 41.2% due to higher trade cost. Low-income deciles were severely impacted by the consequent increase in food and household rent.

Poverty was more prevalent in rural areas (27%) when compared to urban areas (6%) when measured against the World Bank's upper-middle-income threshold of US$5.5 per day whereas inequality increased to 40.8 points in 2017 from 37.4 points.

COVID-19, high inflation, increase in gasoline prices, sanctions, and economic slowdown have raised concerns about household welfare, with a looming threat of an increase in poverty by 7-percentage. High inflation also mitigated the real value of government cash transfers which were instrumental to reducing poverty from 2009 to 2013.

The World Bank report highlights the possibility of Iran's limited ability to respond to the economic crisis while recommending increased dependence on cash transfer programs with better targeting to offset the fiscal pressures, which are projected to increase because of the higher issuance of bonds and the

increasing cost of COVID-19 in 2020/21. However, the report also projects a delayed moderate recovery and improvement following a period of a trough in 2020/21, nonetheless cautions against high inflationary pressures due to economic uncertainty and economic recovery pressures.

Demographic factors: According to the 2016 population census [3], the population of Iran was 79.9 million. 75.9% of the total population is urban. The average life expectancy in Iran is higher in comparison to other MENA countries and global life expectancy. (Iran's 76 years against MENA's 74 years and global 69 years).

Shia Muslims form 95% of the total Muslim population of 99.4%. Zoroastrians, Christians, and Jews are the main religious minorities in the country. Major ethnic groups are Persian, Azeri, Kurd, Lur, Baloch, Arab, Turkmen, and Turkic tribes, while primary languages spoken in the country are Persian Farsi (official), Azeri, and other Turkic dialects, Kurdish, Gilaki and Mazandarani, Luri, Balochi, and Arabic.

An estimated 48.94% of the Iranian population falls in the 25 to 54 years age bracket. Approximately 64% of the population is over 25 years of age and is at the direct risk of contracting NCDs. In 2050, the proportion of children and adolescents, and youth in the population is projected to be below 25 percent in Iran.

In the MENA region, Iran stands on the lowest rung in the provision of health services with countries such as Djibouti, Egypt, and Morocco, where according to the WHO by 2030, the health service provider density will be lower than the minimum WHO standard.
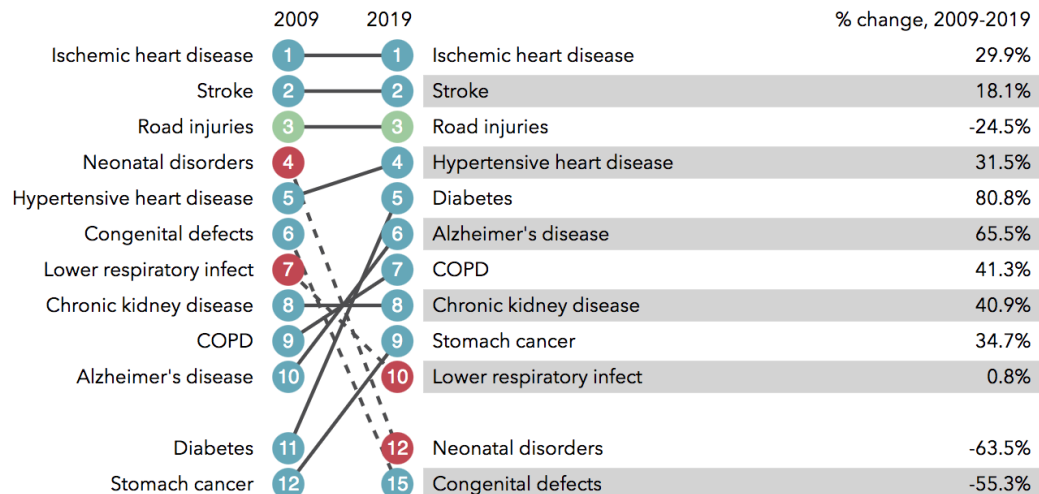

4.   THE NCD CHALLENGE IN IRAN

Being a leading cause of death worldwide, NCDs have taken their toll on public health in Iran as well. NCDs claimed 287,000 lives and 6.5 million years of life loss (YLLs), while 8.2 million years of disability (YLDs) were attributed to Iran in 2016 alone.[4]

The urban population of the Islamic Republic of Iran has tripled since the 1960s, and life expectancies were recorded to have increased from 64 to 76 years in a period between 1990 and 2013 [5]**.** These gains were indicative of great improvements in the health status of Iranians, especially in the field of communicable diseases.

Thus NCDs remain a great health problem, as an increase was seen in people's exposure to unhealthy diets, tobacco, and physical inactivity. Four risk factors -- cardiovascular diseases, chronic pulmonary disease, cancers, and diabetes [6] -- account for 82.2% of NCDs-related deaths in Iran and are listed as the highest-ranked causes of death in the country. [7]

What causes the most deaths?

- 🔴 Communicable, maternal, neonatal, and nutritional diseases
- 🔵 Non-communicable diseases
- 🟢 Injuries

2009		2019	% change, 2009-2019
Ischemic heart disease	1 → 1	Ischemic heart disease	29.9%
Stroke	2 → 2	Stroke	18.1%
Road injuries	3 → 3	Road injuries	-24.5%
Neonatal disorders	4 → 4	Hypertensive heart disease	31.5%
Hypertensive heart disease	5 → 5	Diabetes	80.8%
Congenital defects	6 → 6	Alzheimer's disease	65.5%
Lower respiratory infect	7 → 7	COPD	41.3%
Chronic kidney disease	8 → 8	Chronic kidney disease	40.9%
COPD	9 → 9	Stomach cancer	34.7%
Alzheimer's disease	10 → 10	Lower respiratory infect	0.8%
Diabetes	11 → 12	Neonatal disorders	-63.5%
Stomach cancer	12 → 15	Congenital defects	-55.3%

Top 10 causes of total number of deaths in 2019 and percent change 2009–2019, all ages combined

Table I[1]

In 2018, the UN General Assembly met for the third high-level meeting on NCDs and adopted a 5x5 response model in place of the erstwhile 4x4 model (disease "x" risk factors) by introducing mental health as a major NCD category, and air pollution as the fifth major risk factor.[8] In this paper, we have used this 5x5 model in our review of NCDs and their risk factors.

A more recent study noted improvements in life expectancy and human development index after reform implementation while attributing 74.6% of deaths to NCDs. Compared to the MENA region, Iran has a lower maternal mortality ratio, neonatal, infant, and under-5 mortality rates, and a higher life expectancy. The researchers believe that even though Iran has made a lot of progress, there is a need to develop a roadmap to accelerate achieving global health goals and SDGs targets. [9]

All NCDs appeared to be more prevalent in urban than rural areas, except gastroesophageal reflux disease. Ahmadi recruited 10,075 participants in Chaharmahal and Bakhtiari province in Iran, and concluded that NCDs were more prevalent at baseline, for example, 10.7% for type-2 diabetes mellitus, 20.2% for hypertension, 14.6% for non-alcoholic fatty liver, 11.4% for thyroid disease, and 5.7%, 0.9% and 1.3% for ischemic heart disease, stroke, and myocardial infarction respectively.[10]

The United Nations and WHO have adopted the slogan "25 by 25" and have called for a 25% reduction in mortality from NCDs among people between 30 and 70 years in comparison with mortality in 2010 by 2025. [11] Universal health coverage has been made an integral part of sustainable development and its

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[1] Iran [Internet]. Healthdata.org. 2015 [cited 2021 Mar 20]. Available from: http://www.healthdata.org/iran

availability, accessibility, acceptability, and quality are propagated to reduce poverty and social inequities. By considering these rights and responding to the significant burden of NCDs, the World Health Organization (WHO) developed the global action plan for the prevention and control of NCDs (2013–2020) which contain 9 targets by considering four main risk factors; including tobacco use, an unhealthy diet, lack of physical activity and harmful alcohol use. These behavioral risk factors are associated with four main disease clusters mentioned above.

The WHO has signaled that countries need to shift from political commitment to effective action by prioritizing affordable interventions, and underscored the need to set national NCDs targets and be responsible to achieve them.[12]

Iran's initiatives to reduce the devastating impacts of NCDs, led by the government's highest levels and backed by WHO, are progressing rapidly. The country has also reportedly put in place strong governance and collaboration across all sectors of society to support its strategy. During the recent decades, socio-economic development and the Primary Health Care (PHC) system brought forth improvements in health, decreasing child and maternal mortality. [13]

How well is this country or territory providing effective, essential health services?
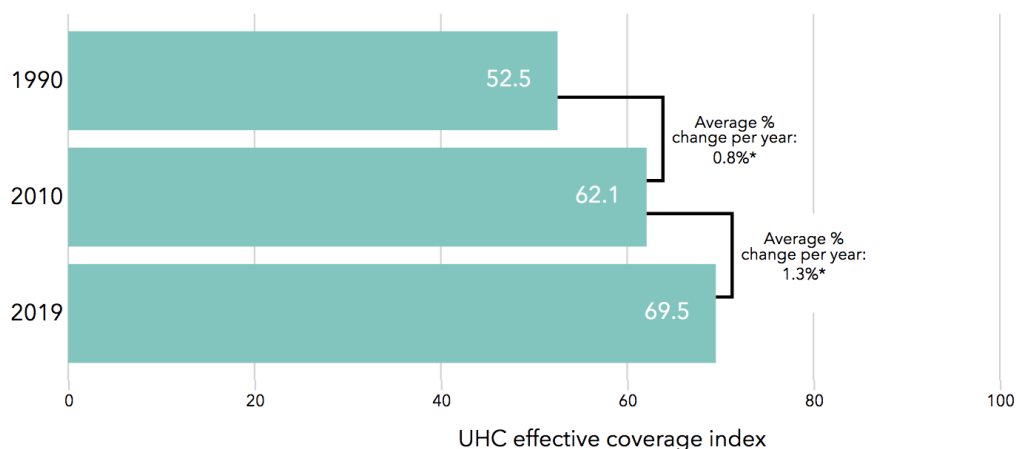
*The average rate of change was statistically significant for that time period.

The Universal Health Coverage (UHC) effective coverage index aims to represent service coverage across population health needs and how much these services could contribute to improved health.

Table II: [2]

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[2] Iran [Internet]. Healthdata.org. 2015 [cited 2021 Mar 20]. Available from: http://www.healthdata.org/iran

4.1   The epidemiological burden of NCDs in Iran

In 2013, 236,000 deaths in Iran were attributed to NCDs, while a 14.5% increase of NCDs' deaths was seen during the past two decades while at the same time, substance abuse, mental disorders, and traffic accidents were the cause of 15,821 deaths [14]**.** Furthermore, the chance of premature death (between 30 to 70 years) from NCDs in Iran is 15% and while the prevalence of tobacco smoking has shown a decline; obesity (particularly among females) is on the rise.

Dietary risks, metabolic risk factors, followed by low physical activity, air pollution, tobacco smoke, and alcohol and drug use are the next related risk factors, respectively. In 2013, NCDs led to 7 million years lived with disability (YLD) in Iran. [15]

A study projects that the age-standardized mortality rate for cancers, CVDs, and Asthma, and COPD will continue to decrease in both sexes in Iran till 2030 except for the trend in diabetes. The data were gathered from the Iranian death registration system and trends of 4 major categories of NCDs (cancer, cardiovascular diseases, asthma and COPD, and diabetes) were projected.[16]

Another study found a critical role of NCDs in the mortality rate of COVID-19 infected persons in Iran. It revealed that prevalence of comorbidities in confirmed COVID-19 in hypertension (21%), diabetes mellitus (11%), cardiovascular disease (5.8%), chronic kidney disease (3.6%), malignancy (2.7%), cerebrovascular disease (2.4%), chronic pulmonary disease (2.0%) were considerable.[17]

In an earlier study, researchers had concluded that there was sufficiently published evidence in NCDs' scientometry for cancer, diabetes, and cardiovascular diseases but more effort was needed in chronic respiratory diseases research, and increased collaboration with regional countries was required. Through this study, the researchers aimed to quantify the trend of four main NCDs' scientific publications in a 17-year period and reflect on international collaboration. The most collaborative country was the USA in the four areas, while research collaboration with regional countries was not found in the top ten levels. The frequently used terms in NCDs' articles in order were diabetes, cardiovascular diseases, and breast cancer. [18]

Cardiovascular Diseases (CVDs)

Being the leading cause of death among all NCDs, Cardiovascular Diseases have received a reasonable degree of academic attention. Local scholarship, as well as academics based overseas, have contributed to studying the connection between CVDs and the various underlying risk factors, and ensuing comorbidities.

Some researchers have highlighted various factors behind increasing CVD cases, including socioeconomic, physical inactivity, cultural and dietary changes, industrialization and urbanization, metabolic and physical risks, increased life expectancy, limited access to and poor affordability for primary care and treatment, and low compliance due to economic and psychological problems. They argue that strategies to limit CVD risk factors, including measures for early detection and treatment of CVDs are necessary to lessen the burden of CVDs in Iran.[19]

Others have found correlations between rising numbers of cardiovascular diseases and urbanization, air pollution [20-22], climate change [23], dietary habits[24], obesity [25,26], diabetes [27] and mental health [28,29].

Of all the factors, urbanization and problems associated with urban lifestyle are the biggest underlying factor for NCD deaths in Iran. Deaths due to CVDs are higher in urban areas when compared to rural areas, with the death rate also being higher among men because of an unhealthy diet, lack of exercise, sedentary lifestyle due to technological advancements, and environmental pollution. [30, 31]

Furthermore, an increase in temperature and the number of hot days will increase CVD mortality in the future decades in Iran. [32]

Cultural factors play a very important role in patient education regarding cardiovascular diseases and according to medical workers, they may act as risk factors and in some cases, also intensify CVDs. Factors such as lifestyle, opinion on treatment, disease, and diagnosis, as well as the effectiveness of communication should be considered for the success of education programs. [33]

Dyslipidemia is a major risk factor for CVD and prevention programs designed after careful assessment of the nationwide prevalence of the same have been recommended by experts, who have also pointed out that lipid component abnormalities were more prevalent in urban residents. [34]

Age, metabolic syndrome, HDL cholesterol, duration of diabetes, hypertension, renal insufficiency, and uric acid ratio are significant interdependent predictors of CVDs and specifically, the high prevalence of CVD in Iranian patients with type 2 diabetes underlines the importance of treatment of metabolic risk factors of CVDs in these patients. [35]

Research has found a higher prevalence of CAD and angina among women in the urban population while the overall prevalence increases in both sexes with age. The researchers pointed out that low education, lower income, and unemployment are important risk factors that determine the spread of CADs in the Iranian population.[36]

Another study found connections between cardiovascular diseases and mental health by indicating the greater frequency of depression among CVD patients. The study also noted that the risk of depression was higher among women and the combination of CVDs and depression had a terrible impact on the quality of life. Early diagnosis and treatment not only improves recovery but also reduces the cost and duration of treatment.[37] According to another study, timely diagnosis, coupled with lifestyle and dietary modification to prevent CVDs can result in substantial financial savings. [38]

A cross-sectional research study demonstrated that substance abuse, especially of cigarettes, opium, and alcohol was found to be high among CVD patients in Iran. The researchers also noted that cultural attitude towards drug type determined their usage. [39]

Some researchers predict that the burden of cardiovascular diseases will increase steeply in Iran over 2005-2025 because of the aging population. The researchers believed that the policy makers should introduce reform to deal with the impact of CVD in the upcoming decades in the country.[40]

Due to misclassification of death from unclear diagnosis, the prevalence of NCDs is underreported. Correct diagnosis and classification of deaths in the Iranian death registration system would result in an increase in

the proportion of deaths from ischaemic heart disease and cerebrovascular diseases by 32%, diabetes mellitus by 68%, and chronic lower respiratory diseases by 73%.[41]

Researchers have also called for policymakers to, in addition to maintaining and expanding the current system, work on more rehabilitation centers for patients suffering from NCDs such as stroke, ischemic heart disease, and respiratory diseases to mitigate their disabilities. They have also pointed out that increases in morbidity and mortality of diabetes call for extensive preventive and control measures. They have also outlined how the expansion in death-averting treatments for NCDs might cause a shift toward a greater share of years lived with disability (YLDs) compared to years of life lost (YLLs) in the disability-adjusted life years of NCDs.[42]

Cancers

Cancer is the third main cause of death in Iran. Researchers have also attributed the spread of cancer to the aging population and the exposure of people to various new risk factors due to the change in lifestyle.[43]

A study demonstrates that there is an incremental relationship between incidence and mortality of most cancers in Iran [44]and the need for screening, early diagnosis of high-risk population, and treatment is of utmost importance. [45]

The types of cancer with the highest mortality rate among women were breast, stomach, esophagus, colorectal, and lung, and in men, it was stomach, lung, esophagus, colorectal, and prostate cancer, with skin, breast, stomach, colorectal, bladder, and prostate cancers being the most common among both sexes. [46] Research also shows that certain cancers had become more frequent over time, with higher incidence and mortality in men than in women. [47]
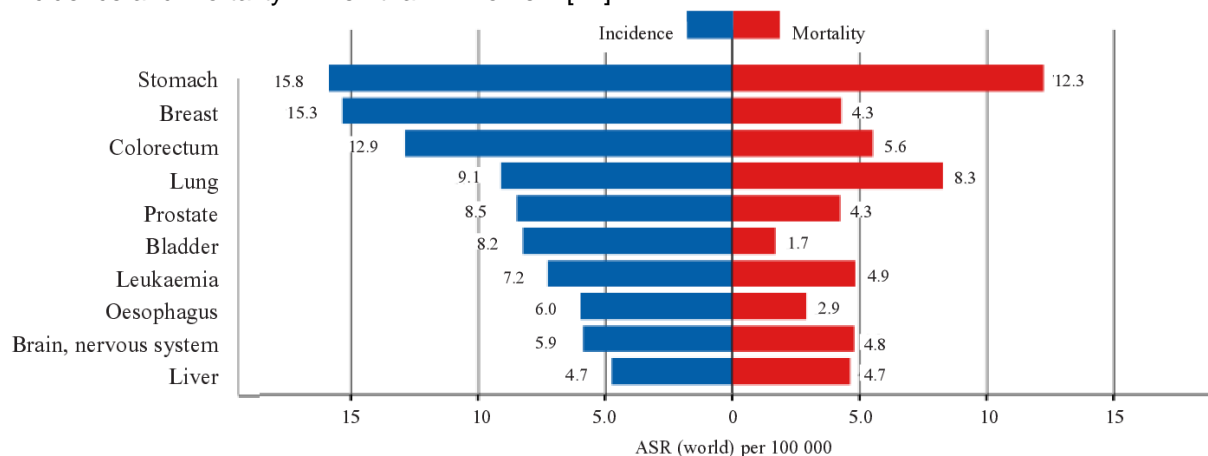
Age-Standardized Mortality Rates (ASMR) per 100,000 for Top 10 Cancer Sites in I.R. Iran by Sex (2019) [48]

The cases have been on the rise, with incidence and mortality being higher in men than in women with skin and breast cancers being the most common among men and women respectively. [49]

Various risk factors such as infectious agents, exposure to certain environments, lifestyle choices, and constitutional factors can be attributed to an increase in the prevalence of these cancers and the development of the Comprehensive National Cancer Control Program should be the top priority of the policymakers [50] because cancers have a huge burden on Iran's health care system. [51]

A study warned of a rapid increase in the number of cancer cases in the coming years, as risk factors were highly prevalent in Iran. The authors argued that a lack of national screening programs for various types of cancers, and the low cancer incidence rate would aggravate over the coming years because of incomplete diagnosis of cancer patients, an anticipated increase in life expectancy, and a "westernized lifestyle." [52]

Chronic Pulmonary Diseases

Of all the NCDs, chronic pulmonary diseases (CPDs) hold a lot of significance because comorbidities are extremely common in CPD patients [53], whose number and severity increases with age.[54]

Some common comorbidities that occur with CPD are CVDs, diabetes, anxiety/depression, metabolic syndrome, and osteoporosis. [55-58]

Following the worldwide trend, the occurrence of comorbidities with CPD is very high in Iran as well, as shown by a research study, in which 94.5% of the 6,961 patients had at least one comorbidity, with dyslipidemia, hypertension, metabolic syndrome, and diabetes mellitus being the most common. [59]

Researchers have noted that an increase in CPD is directly associated with the concentration of particulate matter in the air, and steps such as international policies on reducing particles in source in neighboring countries, reducing emission from industries, switching to green energy, and proper environment monitoring can help improve the air quality. [60]

Other leading causes of the prevalence of non-communicable CPDs in Iran include ozone pollution [61], hookah smoking [62], and fossil fuel burning that leads to an increase in nitrogen dioxide concentration in the air. [63] Carbon monoxide was found to have the strongest effect on respiratory mortality rates. [64]

CPDs were found to be more prevalent among women handling indoor household chores, such as bread baking, carpet weaving, and burning biomass fuels, as the concentration of particulate matter indoors was two- to four-folds higher than the outdoors. [65] Another study also endorses this view by finding that CPD prevalence was higher in rural communities, and occupational and environmental smoke exposure was the leading cause of increasing CPD cases. The study also concluded that CPD cases in both rural and urban populations were "equally underdiagnosed and undertreated." [66]

Diabetes

Just as the rest of the world, Iran is faced with the crisis of manifold increase in the number of reported cases of diabetes among its population. Researchers have warned about the drastic increase in the prevalence of diabetes among Iranian adults and conclude that the cases have seen more than a 1.8-fold increase in 8 years only, calling for "urgent measures" to address this looming disaster. [67]

Leading causes of diabetes in Iran include sedentary lifestyle, urbanization, rapid economic transition, obesity, and intake of high-calorie food.[68]

Diabetes, though not always deadly itself, can lead to serious health complications because it is a risk factor for many other diseases. Patients suffering from diabetes suffer from comorbidities such as chronic vascular complications, CVDs, hypertension, and obesity, with the prevalence being higher in women than men.[69]

There is a direct connection between diabetes prevalence and marital status, unemployment, insurance, age, education, and positive family history and the prevalence of prediabetes was 25.8% in population size of 9,965 individuals.[70]

A screening program carried out in different locations in Iran showed that nearly 50% of the patients suffering from diabetes were unaware of their condition. [71]

While diabetes cases have an upward trend across Iran, a survey showed unsatisfactory knowledge and self-care practices among patients, to the extent that the sample population was not fully aware of diabetic symptoms and complications. Of 100, 30 patients were of the opinion that diabetes meant high sugar intake, 16 thought it was the failure to produce insulin and the remaining did not have any idea. The participants' knowledge of lifestyle modification to control diabetes was also limited. The study pointed out that there was a dearth of effective educational programs on diabetes in hospitals, while patients were dependent on drugs to control the disease, with little or no modification in lifestyle. [72]

A qualitative study carried out in a polyclinic in Isfahan interviewed diabetic patients along with nurses, physicians, clinic staff, and directors. The study found key system- and patient-centered challenges that directly impact the efforts to control the prevalence of diabetes. The findings are listed under "weak care delivery system" and "defective diabetes self-care" and are meant as a "warning" for policymakers to reform the diabetes management system. Shortcomings in the system include "no need-based organization chart, lack of patients' follow-up system, defective records registration, not using evidence-based instructions, lack of continuous supervision on evidence-based instruction performance" while those on the patient's side were listed as, "not committed to visiting the physician regularly, to the diet, physical exercise, to medical treatment, and to group training courses." [73]

It is important that patients suffering from diabetes are provided with proper healthcare facilities to improve their quality of life and to reduce the disease burden. Except for eye examinations, all the required healthcare facilities for diabetes patients are missing in Iran. [74]

Mental Health

Iran ranks 118 out of 153 countries on the UN's 2020 World Happiness Index (WHI), thus slightly above the lowest quintile—the least happy. [75]

Researchers have argued that mental health and NCDs often occur together and policymakers are faced with the challenge to strike a balance between offering mental health care and NCD care together at the primary care level to support public health. They also stressed that unless "chronic medical conditions care and support mental health care" are not integrated into a "collaborative care model", early intervention in both these areas will not help improve the situation.[76]

A study demonstrates that even though 7 million people in Iran suffer from one or more types of psychiatric disorders, overall, the prevalence of mental health concerns is relatively lower in Iran than in the West. [77] In 2005, the burden of mental and behavioral disorders was estimated to be 41% of the total disease burden. [78]

Anxiety disorders were the most common type of psychological disorders in Iran and there was a higher prevalence among females, unemployed individuals, and people living in urban areas with a low household income. [79]

Depression and psychiatric disorders are also prevalent among adolescents, with girls (34.1%) showing a higher tendency of being ill than boys (23.7%), underlining the need for regular surveys and visits to schools for timely diagnosis and treatment.[80] The prevalence of mental disorders in medical students is also high (46%), with gender, marital status, and economic condition playing a major role in the mental well-being of the students. [81]

In Tehran, housewives and unemployed men exhibit the greatest tendency to develop psychiatric disorders, with over 2 million people requiring some sort of mental health intervention in the capital city alone. However, there are not enough basic mental health facilities and psychiatrists, and authors recommend life skill workshops for the urban population to help develop resilience.[82]

Because of better social participation, the elderly in Iran have shown better mental health and resilience, when compared to the rest of the population.[83]

4.2. NCD risk factors in Iran

In Iran, dietary risks are the first line of NCDs' risk factors and metabolic risk factors stand at second position. Tobacco smoke, air pollution, low physical activity, and alcohol and drug use are the next related risk factors, respectively.

Dietary Risks

Iran has formulated an NCDs roadmap based on Best Buys recommendations and required policies for reducing sugar, fat and salt are in place. However, some policies are aspirational commitments rather than concrete measures. More steps, especially structural interventions, are required to address food reformulation, taxation, and marketing. [84]

Researchers found a correlation between cancers and NCDs risk factors, arguing that most cancers could be prevented by improving dietary habits, maintaining proper weight, and increasing physical activity. Programs introduced to control and prevent NCDs could also reduce the prevalence of cancer and cancer-related deaths.[85]

A study assessed salt content in traditional Iranian breads to estimate the daily salt intake through bread consumption. Carried out in five major cities, it found 49.2% of the traditional bread samples in Tehran and 47.2% of the traditional bread samples in other cities exceeding the standard limit.[86] Others have analyzed the maximum permitted levels of salt and trans and saturated fats and compared the old and the new standards. Policies on salt included a reduction in the maximum permitted percentage in bread, cheese, and doogh (a fermented drink) to 1%, 3%, and 0.8%, respectively. For trans and saturated fats, maximum permitted percentages were set as 2–5% and 30–65% of edible oils and fats, respectively. Nutritional traffic light labeling, which indicates the content of salt, sugar, fat, and trans fat in foods, has been mandatory for all foods since 2016. [87]

Some researchers have also expressed skepticism over the long-term success of reforms carried out under the National Food Policies to decrease the prevalence of NCDs in Iran[88]. Others have highlighted the need for better coordination between various sectors of food systems (primary production, food

processing, distribution, marketing, retail, catering, and food service) in order to help governments successfully implement NCD prevention policies. [89]

Physical Inactivity

Among Iranian adults, 40% were reported to have low levels of physical activity while 15% engaged in no physical activity at all [90]. The average time spent daily on different types of physical activity in Iranian society is 51 minutes and for sedentary activities 240 minutes [91]. Women exhibit a more sedentary lifestyle and are prone to physical inactivity (48.6%), which is higher than that of men (31.6%). However, WHO recommends that adults need to undergo 150 minutes of aerobic exercise of moderate to severe intensity, or 75 minutes of high-intensity aerobic exercise, which should be increased to 300 and 150 minutes, respectively. [92]

Researchers have compared the prevalence of NCDs in rural and urban areas and concluded that rural participants, who were significantly more physically active than their urban counterparts, displayed lower overweight, obesity, and mean systolic and diastolic blood pressure levels. The prevalence of self-reported diabetes was also higher in urban areas. According to the researchers, physical inactivity, obesity, and elevated blood pressure were the most common risk factors associated with self-reported diabetes. The researchers concluded that the prevalence of diabetes and its associated risk factors in the urban population was on the rise in Iran, and there was an urgent need to improve care more than ever before. [93]

A study involving 10,016 participants, revealed that the main factors associated with physical inactivity were female gender, urban area, low socioeconomic status, obesity, diabetes, and older age. [94] The prevalence of low physical activity in the population was found to be at 48%. Women were three times more likely to be physically inactive than men, and the wealthiest people were 25% less likely to be physically active than the poorest people. The researchers proposed that public health policies should be designed to address the groups that are at the highest risk of low physical activity.

Some researchers [95] are skeptical about the success of government initiatives to promote physical activity. They say that actions taken about physical activity are not systematic and all-encompassing, and most have been individual cases and people practically have not been made aware of the necessity and importance of physical activity effectively. The experts also concluded that cultural barriers are the biggest hurdles in promoting physical activity, for example, considering comfort as a value in the Iranian culture and the misconception that sports require buying special equipment. Women specifically do not have free access to sports facilities. There is also a gap in the policy of the previous government and the current government. The latest national statistics indicate an undesirable state of physical activity in Iran. On the other hand, given the growing trend of chronic diseases in the country and the role of physical activity in preventing it, any action to increase physical activity of all the social strata is vital.

Tobacco Smoke

Prevalence of smoking is high in Iran, as one-fifth of Iranian male adults smoke and if steps are not taken, the diseases caused by it will increase [96]. Encouragingly, tobacco use has not gone up in Iran in the last two decades, however, the disease burden is very high and efforts have to be made to reduce it even further.[97]

Waterpipe smoking has also become very common among Iranians, with a typical session lasting 45 minutes and carboxyhemoglobin concentration being a lot higher than cigarette smokers. It increases the risk of lung cancer, CVD, periodontal disease, chronic respiratory disease, and causes low birth weight. It was also noted that high levels of education, age, and unemployment were connected to waterpipe smoking and interventions need to be made to protect the vulnerable group.[98]

Some researchers have highlighted the need for more investment and "serious prioritization" of mass-awareness campaigns to discourage smoking and exposure to second-hand smoke while promoting healthy dietary habits. In a mixed-method study, they found out that only 12 out of 105 actions and interventions recommended by WHO, were not on the national agenda in Iran. [99]

Alcohol & Drug Use

Recent research [100] shows that one in eight people in Iran has consumed alcohol whereas according to Lankarani, alcohol consumption for drinkers older than 15 years is estimated to be 25 liters per person per year which is much higher than many European countries. [101]

According to another research, 5 to 7% of the adult population, with a higher prevalence among men, young adults, single adults, and residents of urban areas, had consumed alcohol meanwhile alcohol poisoning was also frequent resulting in hospitalization and deaths. In late 2018, over the course of 4 weeks, 768 individuals were hospitalized because of methanol poisoning in eight provinces; 170 had dialysis, 16 were blinded, and 96 died. [102]

Compared to other Middle East countries, alcohol consumption in Iran is moderate, however, it has been associated with suicide, mental disorders, violence, and injuries. Alcohol consumption is higher in urban areas. [103]

The prevalence of opium use disorders is very high and men have a greater tendency to develop these disorders than women. There was also an unmet need for treatment and addicts rely on self-help groups and pharmacies for treatment. [104]

Stressful circumstances such as divorce and living away from family, as well as curiosity, have been attributed to the high rate of drug abuse among university students, and increasing the occurrence and frequency of training programs and workshops can help improve the situation[105]. Some other factors observed in another sample were the mother's literacy level, economic status, and relationship of parents. [106]

The highest mortality rate due to alcohol and illicit drug abuse was observed in men aged 30 to 39 who fell into low-income, low literacy groups.[107] Hallucinogens, tranquilizers, and sleeping pills are the most common drug choices in schools, and in order to control their use, it is essential to introduce age-appropriate preventive and control measures.[108]

Drug abuse is also very common among street children of Iran and the primary cause of this has been identified as the drug-abusing parents' tendency to use their children to acquire drugs. Street children admitted resorting to drugs to "cope with stress, and to reduce physical and psychological stressors and problems, such as fatigue, sadness, and pressure, resulting from frequent failures in life." Intervention programs for street children, therefore, need to involve their families and friends as well.[109]

Air Pollution

Iran is the world's third most polluted country which incurs an annual loss of $16 billion [110]. Karaj, Tehran, Mashhad, Isfahan, Tabriz, Arak, and Ahvaz are some of the most polluted cities. Air pollution caused 4,460 deaths in Iran in 2013 only [111] and it is also considered a major risk factor for NCDs [112].

Air pollution is a major problem in Iran and despite the threat that it causes, the progress to control it is slow because of low funding and weak coordination[113]. Some researchers have also pointed out the lack of legislation and inadequate policies as the leading cause of air pollution in Iran, and have expressed the need for regular monitoring of the air quality for better-informed policies. Researchers advise extensive media campaigns, increasing taxation on smoke-emitting vehicles, slapping fines on industries causing air pollution, and increasing the cost of fuel.[114]
In Tehran, a 10-year master plan to help control air pollution was started in 2000 but unfortunately, there were a lot of gaps between the plan and its implementation.[115]

5.   HEALTH FINANCING IN IRAN

The government is the major source of health financing in Iran, funding 42% of the total health expenditure with up to 7.8% of the GDP allocated for health, one of the biggest in the Mediterranean region [116]. The government also introduced a comprehensive insurance plan in 2009 and insurers played a key role in leveraging NCDs in the service package. By 2006, 73% of the population was being covered by government and para-government insurance schemes [117]. Under the 6th National Development Plan (2016-2021), Iran announced a US$ 480 million increase in its NCDs budget for the next five years.

Iran has a centralized system of government, with the provision of implementing health policies into its comprehensive PHC system. According to a government official interviewed for this case study, any new proposals or programs, upon approval, can be seamlessly integrated into the existing PHC structure. Furthermore, the government allocates funds for new programs at the time of approval, while the integration of most programs does not require any additional funding since the PHC has the required infrastructure and systems in place. However, US-led sanctions are an impediment to finding funding or the required materials for health programs.

> "We have a strong PHC. If you want to integrate one program into our PHC, we have to present a proposal to our health network center. When they accept that to integrate into our PHC, they provide the funds that we need for that program. So in terms of services, we first try to integrate it into our PHC, so we don't need extra funds. Our infrastructure in PHC is very capable to implement other services but when we have some challenges to provide equipment and drugs that we need to implement these services. So we are not worried about the extra funds for NCD because it was integrated into our PHC. But for other measures that we are taking, for example, for the blood pressure measurement campaign, we needed extra funds. We have difficulties due to sanctions these days. It is difficult to find the money that we need.

> "We also face difficulty in scal[ing] up. We plan to scale up our NCD services into PHC faster but we can't. So in terms of the services that we have integrated into PHC, we don't have much of a problem but for other measures, especially national campaigns, we have many problems right now."

-- Health Ministry official

The Iranian government, instead of earmarking funds for specific objectives, releases need-based amounts to implement the decisions made by the Iranian Non-Communicable Diseases Committee.
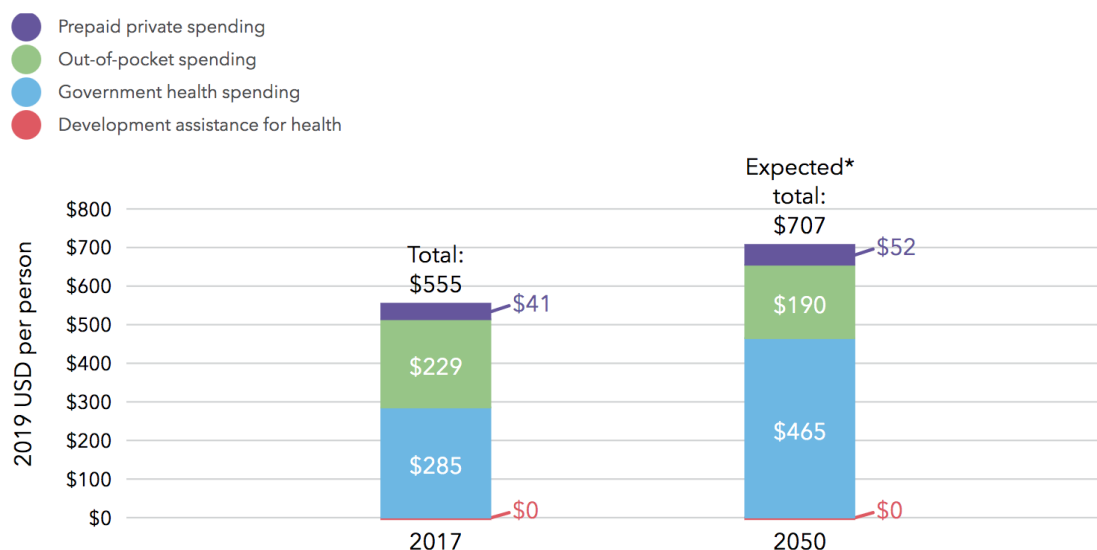
> "There are no earmarked funds. If INCDC makes any decision in terms of any activity, we request the minister of health to provide the funds and if he approves, the deputy minister for development provides the funds that we need."

> -- Health Ministry official

Despite being the primary cause of death (cardiovascular diseases (41.9%), neoplasms (14.9%), and road traffic injuries (7.4%), research investment in NCDs continues to remain limited.[118]

LMICs need special assistance and funds to deal with the global challenge of rising cases of NCDs. Iran has been unfortunate in this regard and the direct assistance for health that it has received has been next to none. It is difficult for a country like Iran to meet the needs of its population from its local economy alone and US-led sanctions have only made things difficult for the people of Iran.

How much is spent on health – now, and in the future – and from which sources?

● Prepaid private spending
● Out-of-pocket spending
● Government health spending
● Development assistance for health

Source: Financing Global Health Database 2019

3

6. NCD PREVENTION EFFORTS IN IRAN

Iran has developed an intervention framework based on cross-sectoral collaboration to achieve global NCD targets. In this regard, the country upscaled its commitment to counter NCDs by taking it to the highest level. Led by the Iranian president, the Supreme Council of Health and Food Security, ensures and facilitates

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[3] Financing Global Health Database 2019

multisectoral collaboration through its "health in all" approach that centers all policy matters, be it agriculture, trade or urban planning, around health. [119]

Iran set up a multi-sectoral INCDC, which later developed the National Action Plan through inter and intra-sectoral collaboration. [15] This approach was approved by the Supreme Council for Health and Food Security (SCHFS) and led to the formulation of interventions that were oriented, priority-based, and centered around the idea of an equitable health system. The following goals were set for the committee: (i) promotion of mental health (ii) reduction in indoor and outdoor air pollution, (iii) efficient utilization of monetary resources (iv) adaptation of innovative financing models, and (v) highlighting the importance of NCDs management in emergencies as new political commitments. These goals as well as the financial and capacity-building recommendations were made a part of Iran's multi-sectoral NCDs national plan. [120]
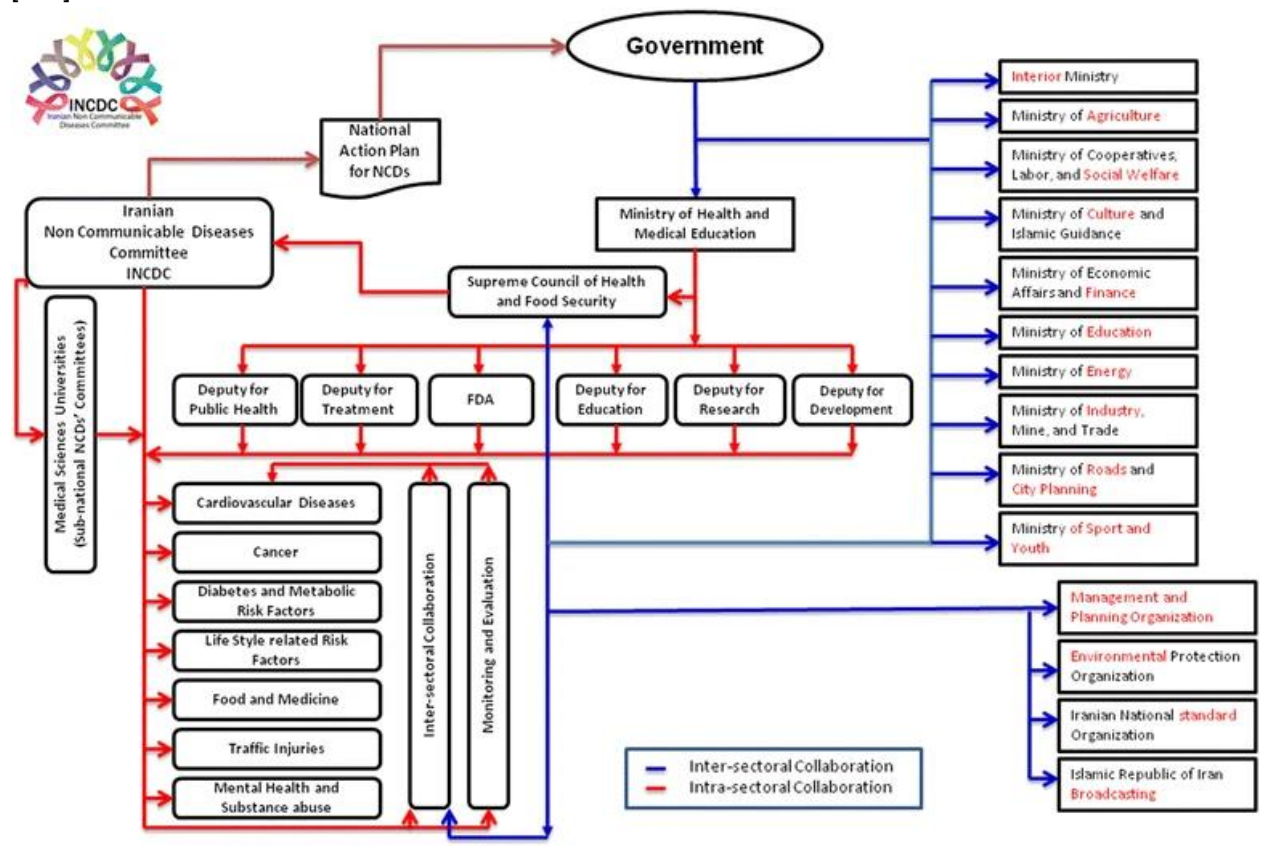
Organogram of Iran's NCD prevention program [15]

Iran's response to curb NCDs has been acknowledged as an example for other LMICs, and its political commitment and government's action lauded for its progress in improving the health of its citizens.[4] Iran's health care system has been ranked ahead of the United States and Brazil. [121]

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[4] Dr Oleg Chestnov, WHO's assistant director-general for NCDs and mental health

Development of INCDC

The Ministry of Health and Medical Education has set up a national NCD committee that facilitates the implementation of National Action Plan, whereas health authorities have also signed agreements with other ministries, such as sport and education, for increased collaboration on fighting NCDs. [119]

The Iranian non-communicable diseases committee (INCDC) set up by the Ministry of Health and Medical Education (MOHME) played an integral role in formulating a comprehensive policy that was meticulously planned and monitored to achieve results that made Iran stand up the first rank in Eastern Mediterranean region. [119]

> "INCDC was established in 2015 in response to the global action plan recommendations. The Minister of Health is leading the INCDC. At that time, the vice minister for education was appointed as a special representative of the minister to lead INCDC. All deputy ministers are members of the INCDC and there were subcommittees. The main objective of the INCDC was to create a multidisciplinary, multi sectoral mechanism for NCD activities. The first step was to develop a national action plan. It was developed after a few months of establishment of INCDC. There were 13 objectives in the national action plan, nine of which were more or less similar to the global action plan but four objectives specific to Iran, for example for traffic injuries, substance abuse and others. So there are 13 objectives we are following in the Ministry of Health in collaboration with other sectors.

> "There is a Supreme Council for Health and Food Security led by the President. We are implementing our inter-sectoral activities through that council, for example the ministries of Agriculture, Education, Foreign Affairs. All ministers are members of the Supreme Council and the INCDC provides issues for approval in this council."
>
> -- Health Ministry official

Involvement of Medical Universities

The INCDC collaborated with health system sectors, ministries, and universities to develop a national document based on the framework recommended by the WHO. The policy was centered around four areas of governance, prevention, and reduction of risk factors, health care, and surveillance, monitoring and evaluation. The time-bounded National Action Plan set clear targets with well-defined strategies for stakeholders with proper resource allocation. It utilized the cover of 61 medical science universities all over the country in collaboration with the Department of Health under the Ministry of Health and Medical Education to create a synergy to achieve its targets. [119]

> "Each medical university is responsible for providing health services for a defined population as well as medical education in that area. There is a defined population for each medical university and the chancellor of the medical university is responsible for providing health services as well for the population. In a province, at least one medical university exists. In some provinces, more than one. So we are monitoring the function of each medical university by incorporating key elements of our services into that electronic system in our PHC."
>
> -- A MOHME Official

Inter-sectoral Coordination & Collaboration

Since most of the NCD risk factors and diseases have high comorbidity, it is not possible to devise a strategy to curb disease spread without involving various stakeholders in the decision-making process. In this regard, the Iranian government took a well-planned initiative to involve various ministries, departments, coordinating bodies, and officials to make its NCD prevention and control plan robust and holistic.

The focal person for Non-Communicable Diseases leads a separate department in the Ministry of Health and Medical Education (MOHME) with national managers appointed for Tobacco Control, CVD, Diabetes, Musculoskeletal, Oral Health, and Neonatal Hypothyroidism Screening Program. [122] MOHME has a technical role and NCDs-related initiatives are coordinated through the National Health Policy Unit.

A 'health in all' approach was adopted, in which ministries - be it agriculture, water and sanitation, education, or youth and sports - were advised to keep health as the main theme around which their respective policies and initiatives were planned.

> "The first and most important achievement was the agreement on the importance of NCDs and the importance of having a multi-sectoral action plan to address NCDs and its risk factors and outcomes.

> "An important achievement was signing some memorandums of understanding by other ministries for example ministry of education, agriculture, youth and sports to do activities in terms of NCDs. This is a brief description of what we are doing, but the COVID pandemic has diverted all the attention to another emergency."

-- A state official

The government carried out a national campaign in 2019 and conducted around 30 million blood pressure measurements, according to an official interviewed for the present study. The campaign involved "wide inter-sectoral collaboration" with military forces, the Red Crescent, the Ministry of Higher Education etc.

However, a rapid evaluation study found in a sample of 1,526 Iranian adults that only 24.6% of participants had heard about the campaign, while only 167 individuals actually knew about the campaign's aims. Factors associated with lack of knowledge were old age, unmarried status, low education, and no family history of high blood pressure. [123]

Package of Essential Non-communicable Diseases Intervention

A study on the challenges of implementing the Package of Essential Noncommunicable Disease Intervention (PEN) in Iran's Healthcare system concluded that effective management, healthcare system restructuring, intersectoral cooperation, and training could improve coordination and the implementation of PEN initiatives in the country. The obstacles were categorized into nine main themes, namely, management challenges, organizational challenges, functional challenges, intelligence challenges, political challenges, demographic challenges, economic challenges, cultural challenges, and educational challenges. [124]

A document analysis of programs to control the prevalence of diabetes has shown that political, economic, financial, and cultural factors have all played their role in the failure of program implementation to control diabetes in Iran. The program also experienced a lack of sufficient funding for implementation of the program and in some instances, unavailability of insulin and quality syringes, lack of diagnostic facilities, and the unaffordability of glucometer hampered the successful implementation of the control program. Socially, lack of access to a healthy lifestyle was one of the main reasons that delayed the implementation of the program.[125]

Some academics are of the view that in order to implement any integrated prevention and control plan for NCDs in Iran, policymakers will have to involve and engage with the country's health program, seek approval from the Supreme Council of Health and Food Security, as well as work on a comprehensive provincial health plan that includes the recommendations given in their proposal. [126] Major

recommendations included formulation of three main strategies for the prevention and control of NCDs including promotion of health literacy, utilization of primary care services, and stabilization of intersectoral cooperation to reduce risk factors related to nutrition, tobacco, alcohol, and physical activity.

> "We have adapted the WHO package of essential NCDs (WHO PEN) to our specific context called IRAPEN. IREPEN is a package of essential NCDs that we are trying to implement in our health system. Iran has a relatively strong PHC and since 2015 we have planned to implement this package into our PHC. IRAPEN has three main components. The first one is addressing cardiovascular risk stratification. We are using the WHO risk score for cardiovascular risk scoring and implement interventions based on the risk for people aged 30 years and older. The second component of IRAPEN is cancer. Early detection for three important cancers: colorectal cancer, breast cancer, and cervical cancer. The third component is chronic respiratory diseases. These components are under different stages of implementation. Another achievement that we had is in terms of surveillance. We were able to implement a population-based cancer registry. 98-99% of the population is covered by the system. We have developed three reports so far. The quality of the registry and the coverage is very global.

> "Steps survey[5] has also been conducted in 2015 for surveillance of NCD risk factors. We were planning to do another round of steps survey but because of COVID this was affected."

-- Health Ministry Official

Monitoring & Evaluation

According to government officials interviewed, the INCDC has a sub-committee for monitoring and evaluation. The NCD Research Center at Tehran University of Medical Sciences conducts the monitoring and evaluation of the National Action Plan, while the Deputy Minister for Research and Technology is responsible for providing the funds needed for monitoring and evaluation, and for doing research.

> "We provided funds for the steps survey, which was an important source of information on NCD risk factors. We planned some surveys with the National Institute for Health Research (NIHR) on tobacco surveillance. We have two surveys. One is for adults: GATS -- the Global Adults Tobacco Survey -- and the other is for youth, Global Youth Tobacco Survey. We have another survey for NCDs risk factors among children and adolescents. It is based on the Global School Health Survey…. The National Institute for Health Research is responsible for conducting these surveys. We are planning to conduct a demographic and health survey (DHS).

> "We have developed an integrated electronic system and are incorporating all the key elements of our NCD services into that. These indicators will enable us to monitor our activities in PHC on a sub-national level. And there are some indicators in that, for example, how many diabetic patients are registered, how many of them are receiving care etc. Same for hypertension, cancers etc."

-- Health Ministry Official

Interventions on Risk Factors

The Food and Drug Administration has asked manufacturers to reformulate products and make healthier foods accessible and available. In 2016, a "traffic light" food labeling scheme was introduced to increase salt, sugar, and fat regulation while restrictions were also placed on imports of palm oil. [127] This led to an immediate decrease in salt in cheese, from 4% to 2%, levels of trans fats have also reduced, and sugar in carbonated drinks and juices has also gone below 10%.

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[5] The WHO STEPS Instrument covers three different levels of "steps" of risk factor assessment. These steps are: Questionnaire; Physical measurements; Biochemical measurements.

"We are working on food quality and food security in collaboration with the Ministry of Agriculture. We are working with the Food and Drug Organization to reduce free fatty acids in industrial food. We are raising the issue of smoking prevention control programs, for example, taxation for cigarettes. We are working with the parliament to raise tax which is very low. We managed to increase it by 50% last year but we are not happy with this amount of taxation and we are negotiating with the parliament to increase it further.

"We have developed a national document in terms of physical activity with the Ministry of Youth and Sport, and we are trying to implement it in the country. We are also working on a national campaign for physical activity. Around 55% of our population are not active enough according to the last steps survey so we are aiming to tackle this through a multi-sectoral approach.

"In terms of alcohol, it is forbidden to sell and consume but we are trying to monitor alcohol consumption through the STEPS survey. There are some outbreaks of poisoning through alcohol. We are trying to conduct some awareness campaigns with regard to this.

"Another measure taken last year was a national campaign on blood pressure measurements. Around 30 million blood pressure measurements were done in the country and it was a very wide inter-sectoral collaboration, for example, military forces, red crescent organization, ministry of higher education."

-- Health Ministry Official

In a long-term community-based Lifestyle Promotion Project (LPP), researchers [128] have demonstrated that prevention and control of NCDs is not possible without introducing healthy lifestyle promotion interventions. Overall, 3,000 participants aged 15–65 yr were enrolled to evaluate the impact of healthy lifestyle interventions in phase II of the project.

Research on Tabraiz has shown that increased accessibility and visits to public parks have a correlation with improvements in mental health and increased contentment with life while helping to reduce the expenditure on mental health. [129]

7. Discussion

The government of Iran has been successfully able to set up a robust and comprehensive system to control the prevalence of NCDs, resulting in the country being placed at the first position in NCD control in the Mediterranean region. Because of the cross-sectoral collaboration under the INCDC, management, monitoring and evaluation of the program by the Supreme Council for Health and Security led by the president himself, robust public health care system, and clear target setting, Iran's example can be used by other LMICs for successful implementation of NCD control programs.

This section aims to look at some of the NCD risk factors and the role they have played in hampering the government's effort to curb NCDs. These aspects include rapid urbanization, comorbidities, cultural factors, food, and mental health, and substance abuse.

Urbanization

An increase in urbanization has seen an increase in people's exposure to tobacco, unhealthy diet, and lifestyle. Most of the Iranians live in urban centers and rapid urbanization is the leading cause of NCDs in Iran. A study recruiting 439,406 people found out that only 35% of them were fully healthy [129], while the rest were suffering from one NCD or another. These figures, apart from being alarming, are expected to go

up in the future if the harmful effects of urbanization are not taken into account while designing future policies on NCD control.

Urbanization is an aggregated risk factor linked to many other risk factors, such as pollution, sedentary and technology-centered lifestyles, lack of exercise, and drug and substance abuse because of economic pressures. People living in rural areas are at a lower risk of NCDs such as obesity, CVDs, and diabetes. Furthermore, only 50% of Iranians are aware of what it means to live a healthy lifestyle.[130] Iran is faced with the challenge to introduce reforms and measures to reverse the adverse effects of urbanization.

In this regard, the Iranian government introduced the 'Healthy City Program' under the Community Based Initiatives in 1991 which showed positive changes in the urban centers. Green areas in the cities were increased, access to sports facilities was improved, and many new NGOs started playing an active role in improving the public's awareness regarding healthy living.[131]

Parallel programs titled 'Basic Development Need' and 'Healthy Village Program' were also launched with the Healthy City Program and it was observed that by improving facilities and employment opportunities in the villages, rapid urbanization and migration to cities had decreased.

The key takeaway from this program is that a holistic, intersectoral, and multidimensional approach needs to be taken in order to address the major causes behind the risk factors of NCDs. These require deeper insights, dedicated, continuous efforts on the part of the government and health authorities, and the need for carefully tailored programs to address city-specific challenges, and efforts to reverse harmful trends.

Comorbidities

Any program meant to control the prevalence of CPD should also focus on common comorbidities, which arise due to the simultaneous existence of one or more NCDs. With Chronic Pulmonary Disease, for example, there is a high chance (94.5%) of the patient developing at least one comorbidity such as dyslipidemia, hypertension, or diabetes.[132] Factors such as urbanization, physical inactivity, smoking, and air pollution increase the chances of developing comorbidities.

Therefore, while planning any strategy to control the prevalence of a single NCD, the common comorbidities have to be considered and resources have to be allocated for control, prevention, and management of its risk factors as well. The strategies have to address the connection between NCD and their comorbidities by promoting a healthy lifestyle that also increases the public's awareness regarding the risk factors they can modify or eliminate from their lives.

Cultural Factors

For any intervention to be successful, it is important that it considers various cultural aspects, and develops a response around those realities. Beliefs, practices, lifestyles, food consumption, cultural perception of health and disease, healing practices, and their patterns of change are all crucial aspects that can significantly determine the success or failure of an NCD-related program.

Researchers believe that communication, opinion regarding the instructor disseminating information on NCDs, the lifestyle of the patients, their opinion about disease and treatment, and their sensitivity regarding disease diagnosis should be kept into consideration while determining the success of any disease education program. [32]

Dietary habits are another area that needs attention. Although the Iranian authorities have made inroads to reduce sodium intake by introducing standard limits for salt in breads and cheese. Nonetheless, cultural tastes and enforcement limitations are some of the impediments identified in this regard. Research shows that nearly half of traditional bread samples exceeded standard limits for salt.[85] It is predicted that reforms under national food policies would show a significant reduction in the prevalence of NCDs in the coming years.[86]

Mental Health & Substance abuse

In Tehran, housewives and unemployed men exhibit the greatest tendency to develop psychiatric disorders, with over 2 million people requiring some sort of mental health intervention in the capital city alone. However, there are not enough basic mental health facilities and psychiatrists, and researchers recommend life skill workshops for the urban population to help develop resilience.[133]

Researchers have argued that mental health and NCDs often occur together and the policymakers are faced with the challenge to strike a balance between offering mental health care and NCD care together at the primary care level to support public health. They recommend a "collaborative care model" that integrates care for chronic medical conditions and mental health support while arguing that early intervention alone would not help improve the situation. [75]

A cross-section study was carried out in the educational hospitals of Alborz University which successfully demonstrated that programs can be carried out to prevent, control, and screen mental disorders among healthcare workers during a pandemic and may serve as an example for other situations and vulnerable groups.[134]

Sanctions and Economy

Taxation is one of the most efficient means available to the state machinery to implement its NCD prevention and control policies. However, Iran is stuck between the devil and the deep sea, as harsh taxation policies to support NCD-prevention efforts are not viable in an economic context shaped by US sanctions. The government is faced with a tough choice to raise taxes or to keep the local economy afloat.

> "Because of US sanctions, we are in a difficult economic situation and it is not very easy to impose taxes on sweet beverages, to ban some advertisements on the food industry and others….
>
> "[T]he main challenge at the moment is the COVID pandemic. All attention has moved to COVID and it is difficult to raise awareness in terms of NCDs. But we are trying to say that those living with NCDs are at a greater risk for severe COVID, and trying to make sure that the continuity of our services is maintained."
>
> -- Health Ministry Official

The country also faces a critical drug shortage due to US sanctions. While the rate of chronic NCDs keeps going up, even before the onset of COVID-19, the country was faced with the challenge of providing lifesaving drugs to its population. Sanctions have directly impacted many areas of health delivery service, including, but not limited to, essential testing equipment, hospital equipment, availability of drugs, disease control and prevention, scientific research, maternal and infant healthcare, as well as the NCDs. [135]

Scaling Up & Health Governance

In order to scale up the NCD prevention efforts, the Iranian government needs to ensure that various sectors apart from health and education continue to collaborate to make the policies comprehensive and holistic. The lesson learned from policies and plans which have been successfully implemented can only be benefitted from on a larger scale if monitoring and evaluation and accountability of the governing bodies are carried out alongside NCD control efforts.

Scaling up also requires a dedicated financial commitment from the government and donor agencies but unfortunately, the Irani government does not have the funds available to inject into the healthcare system.

> "But for other measures that we are taking, for example, the blood pressure measurement campaign, we needed extra funds to implement it. We have difficulties in terms of sanctions these days. It is difficult to find the money that we need. We face difficulty in scal[ing] up. We plan to scale up our NCD services into PHC faster, but we couldn't do it because of US sanctions. So, in conclusion, in terms of the services that we have integrated into PHC, we don't have much problem, but for other measures, especially national campaigns, we have many problems right now."

> -- Health Ministry Official

However, upscaling the current healthcare and NCD prevention and control systems does not come without its own set of challenges. The PHC services currently in a place catered to the needs of the population in the 1970s and 1980s but the need posed by the current disease burden requires a more comprehensive and updated public healthcare system. According to researchers, PHC system weaknesses fall into two categories i.e. i) weaknesses related to health system that exist within the PHC and ii) shortcomings in the PHC system itself. Only by keeping these shortcomings in mind can the current model of healthcare be upscaled to respond to the emerging needs of NCD prevention and control.[136]

In a review article, a group of researchers hailed the Iranian model of NCD prevention and control and proposed that the Iranian Non-communicable Diseases Committee (INCDC) was an "ideal model" that could be replicated in other regions as well. They also point out that the multi-sectoral approach taken by the Iranian government is what led to the success of this model.[17]

The researchers also proposed that clear vision and mission, stability in country politics and support from the local authorities, monitoring and evaluation, resource management, and supportive supervision will ensure successful implementation whereas poor leadership, change management, financial constraints, poor health infrastructure, inadequate qualified human resources, poor information and communication, poor coordination and resistance of some organizations might be lead to implementation collapse. [123, 124]

Conclusion

The case of Iran offers many valuable lessons from an LMIC context, such as economic constraints, international sanctions, lack of development assistance for health (DAH), and a health spending model based on government contributions and out-of-pocket expenses. The financing framework is complemented by an organizational framework led by the highest office of the state. Key features of the Iranian response to NCD prevention include a multi-sectoral mechanism, involvement of medical universities in research and M&E. The cost of NCD prevention programs is minimal in most cases since they are integrated into an already existing public healthcare system.

In spite of trade sanctions, COVID-19 triggered economic meltdown, and zero international assistance for health, Iran has made considerable progress in preventing and containing the spread of NCDs. International support, easing of trade sanctions, and improvements in the current PHC can reduce the economic burden of the NCDs, as well as support the government's ability to improve the condition of the existing health care systems and networks.

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