



The Impacts of Economic Sanctions on Sustainable Development: Focusing on Labor

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Abstract. Health is crucial for sustainable development, both as an inalienable human right and an acceleration of the economic growth of countries. Health is also an appropriate measure of the progress of countries in achieving sustainable development. It contributes to development through productive employment. Therefore, it is necessary for each country to do detailed analysis of health situation in order to prevent declining health through preventive measures and proper policies, and to follow continuous improvement of the health situation in the country, contributing to the sustainable development. In this regard, this paper tries to consider the health effects of economic sanctions on Iranian people to show health situation in the country, and the need for paying more attention to the health in order to meet sustainable development. We have used a descriptive and analytical approach to study the impacts of economic sanctions on the health indicators, medicines and treatment, food security and pollution by macro-analysis. Results show that economic sanctions have had negative effects on people's health. In particular, the destructive consequences of sanctions are clear in the field of medicine and treatment, and air pollution and the environment. So, decision makers should be paying greater attention to these areas in order to improve the health of workers and achieve the goals of sustainable development.

Keywords: Economic Sanctions, Sustainable Development, Health, Iran

1. INTRODUCTION

Principle I of the Rio Declaration on Environment and Development states that “Human beings are at the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature”. So, the health of human resources and labor is a key element of sustainable development. By improving the health of workforce, the acceleration of economic growth increases. Today, health has become an important issue in development, contributing to achieve development agenda, and it is also a measure of sustainable development. Labor is a key factor in production that helps the process of production through physical and human capital.

Health of labor is an important precondition for an active role of labor in economic growth. Clearly, when people are susceptible to different diseases, and the health and nutrition of workforce are not at the standard levels, economic growth and development may be at risk. Therefore, paying attention to the physical and mental health of workforce and ensuring its realization in all situations, especially when a shock inflicts the economy, are essential for development. In this regard, we consider the impacts of sanctions on the health of Iranian peoples to explain how they affect the health of labors, and to draw a picture on health situation in Iran.

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The remainder of the paper is organized as follows. Section 2 presents a brief review of the literature. Section 3 is dedicated to describe the health effects of economic sanctions on Iranian people. Finally, conclusion of the paper is presented in Section 4.

2. LITERATURE REVIEW

2.1. Health and sustainable development

Health is crucial for sustainable development. By prioritizing sustainable development, countries commit to progress across four dimensions: economic development including the eradication of extreme poverty, social inclusion, environmental sustainability, and good governance. Each of these dimensions contributes to the others, and progress across all four is required for individual and societal wellbeing. Health is inherently important as a human right, but is also critical for achieving these four pillars. National aspirations for economic growth cannot be achieved without a healthy and productive population, and also economic growth contributes to improve health (SDSN, 2013). In other words, the goals of sustainable development cannot be achieved when there is a high prevalence of debilitating illnesses, and population health cannot be maintained in the absence of ecologically sustainable development (WHO, 2002).

By promoting good health at all ages, the benefits of development extend across generations. Investments in primary health care and improving performance of health systems by enhancing financial and human resources help to supply healthy and strong labor for productive activities in the countries. With appropriate use of technology, community empowerment and good governance, national economy will be strengthened through providing employment for these labors (Chuma et al, 2013). The importance of health as a critical catalyst for development led to health-related goals being centrally positioned in the MDGs. Child and maternal mortality became a measure of a nation's overall development, along with poverty eradication, the empowerment of women, and environmental sustainability (SDSN, 2014).

Evidence of the importance of health for sustainable development is increasing. For example, the growing numbers of reports highlight the need of investing in health sector by government (for more detail see WHO reports 2004, 2008, 2010, 2012 and SDSN reports 2013, 2014). These reports have examined the different effects of investment in health and the 'cost of neglect' from improving health systems.

2.2. Economic sanctions and health

"sanction is coercive economic measures, through which sanctionists can change the policies of a country or countries, or at least express their opinions over the policies of the target countries" (Carter, 1988). Economic sanctions, as a tool of coercive foreign policy, are planned by one or more governments for various political purposes to put pressure on the target country through restricting economic relations (Vakil and Tahsily, 2013).

Economic sanctions are often blamed for human suffering. There are many ways in which economic sanctions affect the population in the sanctioned countries. One of the most direct ways they affect health is through the lack of proper nutrition. Cuts in food imports lead to shortages in calories intake and to under nutrition which makes children and other vulnerable groups such as the chronically ill more susceptible to tuberculosis, measles, and other infectious diseases. Increases in prices of food lead to poor nutrition during pregnancy that can have a negative effect on the baby (Garfield, 1997). Sanctions can affect children also through water. Sanctioned countries experience shortages of materials and substances needed to clean the water which leads to less access to clean water. Dirty water causes outbreak of diseases among people, particularly children and the vulnerable group (Garfield and Santana, 1997).

In addition, reduction of raw materials and intermediate goods for the production of sanitary products increases the negative impact of sanctions on health (Petrescu, 2010). Lack of medicines

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is another problem caused by embargo in the embargoed countries. Imports of authorized medicines drop and imports of unauthorized and counterfeited drugs increase which lead decreases in efficiency of these drugs and severe side effects (Garfield, 1999). Lack of proper medicines leads the authorities to encourage the pharmacists to prepare old fashion remedies and the population to self-diagnose and to use traditional cures (Kandella, 1997). Although drugs and food are usually excluded from the sanctioned list, there is not adequate foreign currency for imports of these goods due to decrease of export in sanctioned countries. Even if there is sufficient foreign currency, the exchange is usually very difficult. As a result, drug shortages will be widespread in countries under sanctions. While it might be possible to produce some vital and rare drugs in sanctioned country, decrease in the import of raw materials needed for drug production is an obstacle to deal with the lack of drugs.

Furthermore, due to lack of foreign currency, the exchange rate is likely to rise, increasing prices of imported goods. Thus, foreign currency shortage, difficulty of currency exchange among foreign banks and the sanctioned country and increase in prices of raw materials needed for domestic production may increase prices in the sanctioned country. Hence, the purchasing power of people for buying goods (for example foods and medicines) and services (such as medical and health services) is reduced, and the health of people is negatively affected (Akbarpour and Abbasi, 2014).

Economic sanctions affect the quality of health care and may have huge negative implications on people's health. Insufficient vaccines in sanctioned countries can lead to outbreaks of diphtheria contagious diseases among children. Shortages of oil, gas, and electricity mean frequent power cuts and fuel shortages which affect emergency medical services, heating hospitals, and patient transportation to hospitals. These poor conditions in hospitals lead to increase in mortality (Proclamation no 9702). Hospitals also have fewer supplies and perform fewer tests (Garfield, 1999).

Also, sanctions can indirectly affect health through air pollution. Because of restrictions on the entry of new technologies, and the use of obsolete machinery in sanctioned countries, air pollution may rise, and therefore the health of population- especially vulnerable population- may be at risk. Sometimes countries under sanctions produce some essential goods to compensate their shortages. But usually due to lack of access to updated technology and knowledge for producing these goods, the produced goods may have low quality, and this may affect the health of citizens (Akbarpour and Abbasi, 2014). These are only some of the channels through which sanctions affect the health and mortality of people- particularly children. Indeed, sanctions that have been imposed to force the government of target country to respect human rights may violate human rights themselves.

2.3. Health impacts of economic sanctions in Iran

We have used descriptive and analytical approach to determine the impacts of sanctions on the health of Iranian peoples. We considered health effects of sanctions in four aspects: the impact of sanction on health indices, food security, medicines and treatment, and air pollution. Macro analysis is applied to show the effects of sanction. In this regard, we have used data from Central Bank of the Islamic Republic of Iran, Statistical Center of Iran, National Iranian Oil Refining and Distribution Company, Air Quality Control Company of Tehran, World Bank, United Nations International Children's Emergency Fund (UNICEF), World Health Organization's (WHO), Foods and Agriculture Organizations (FAO) and the United States Census Bureau.

2.4. The effects of sanctions on health indices

Iran has shown a relatively good performance of Infant, child and maternal health indices among developing countries, and has continued to improve them. For example, neonatal mortality rate¹ in Iran was 10.8 per 1000 live births in 2012. Also, infant and under-5 mortality rate in 2012 have been reported 15.1 and 17.6 per 1000 live births, respectively. Despite the pressures of sanctions and a big drop in available calories, we can see a continuous improvement in these indicators during the considered period (Figure 1). One reason for the reduction of infant mortality is the improved medical care during pregnancy, childbirth and after birth. According to the UNICEF data, the percentage of births which occur in health institutions increased from 89.6% in 2000 to 97.3% in 2005; and it shows the decrease of childbirth risk and infant mortality. In recent years, this measure began to decrease, so that it reached to 96.4% in 2011. In addition, UNICEF has reported that the maternal mortality ratio was about 23 per 100,000 births in Iran in 2013 (Figure 4).

Using World Bank data, figure 2 shows the death rate per 1,000 people during 1960-2012 in Iran. As it shown in the figure, death rate per 1,000 people decreased from 22 deaths in 1960 to 5.2 in 2012; it is worth noting that this index increased temporarily during revolution and war. Also, according to World Bank data, life expectancy in Iran was approximately 73.76 years in 2012 (Figure 3).

With regard to WHO database, per capita expenditure on health in terms of PPP index has grown increasingly, and it reached to 1562.2 \$ in 2012 (Figure4). Government was responsible for about 40.37% of total health expenditure in 2012. As it shown in figure 5, the share of private health expenditure of total health expenditure has been more than the share of public health expenditure during considered period. More than 15% of total government expenditure was allocated to health in 2012, and it has increased compared with 13.6% in 2011 (Figure 6). With this performance, and despite the pressures of sanctions, most of health indices in Iran have continued to improve.

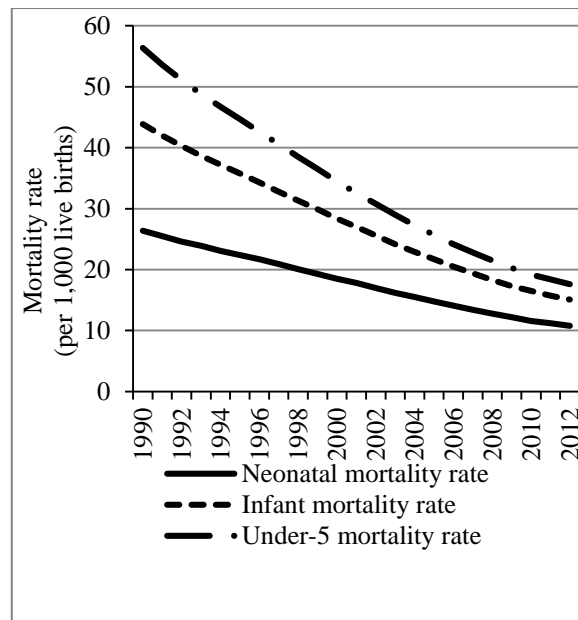


Figure 1. Children and infant mortality rate in Iran.

¹ Neonatal mortality rate is the number of neonates dying before reaching 28 days of age.

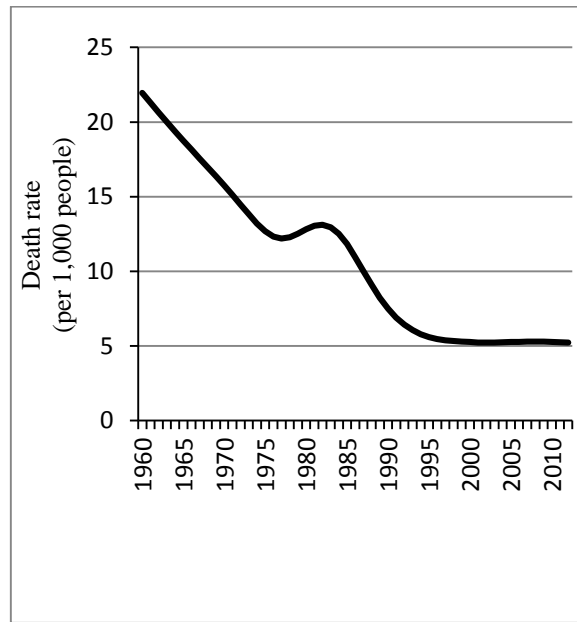


Figure 2. Death rate in Iran .

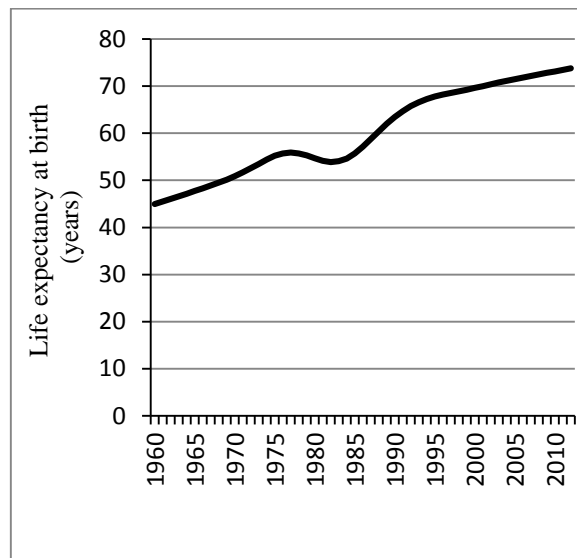


Figure 3. Life expectancy in Iran.

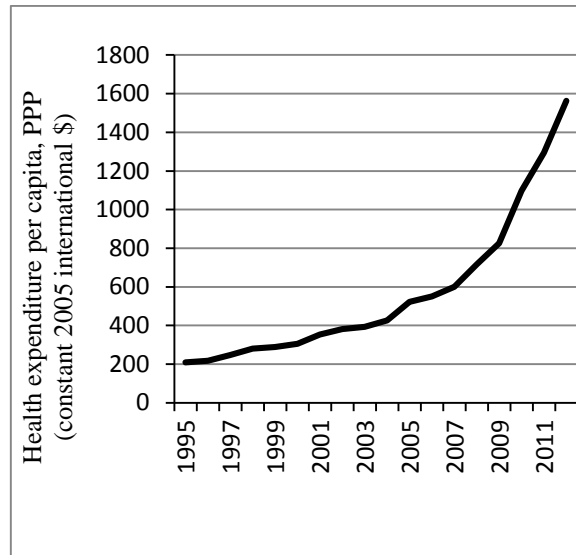


Figure 4. Health expenditure per capita in Iran.

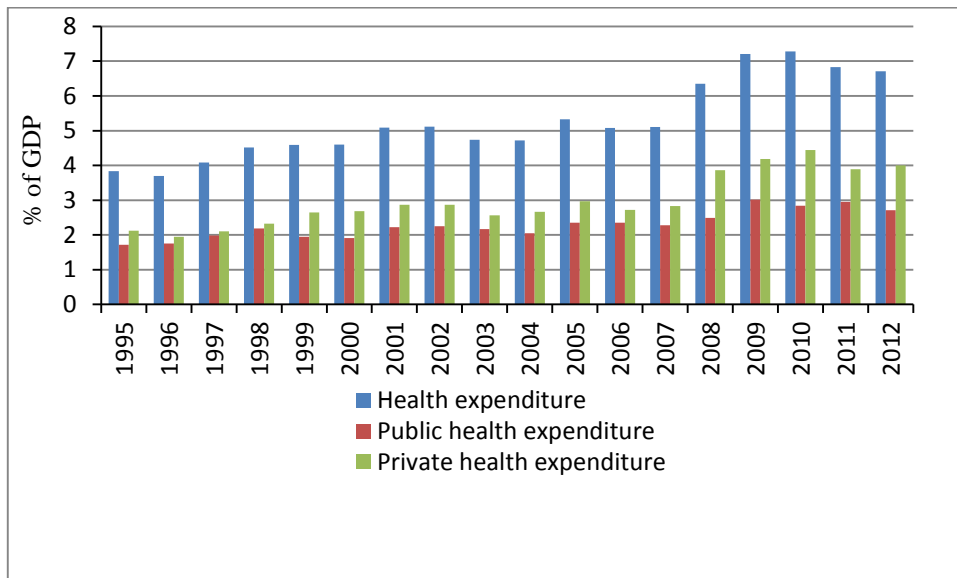


Figure 5. Health expenditure by private and public in Iran.

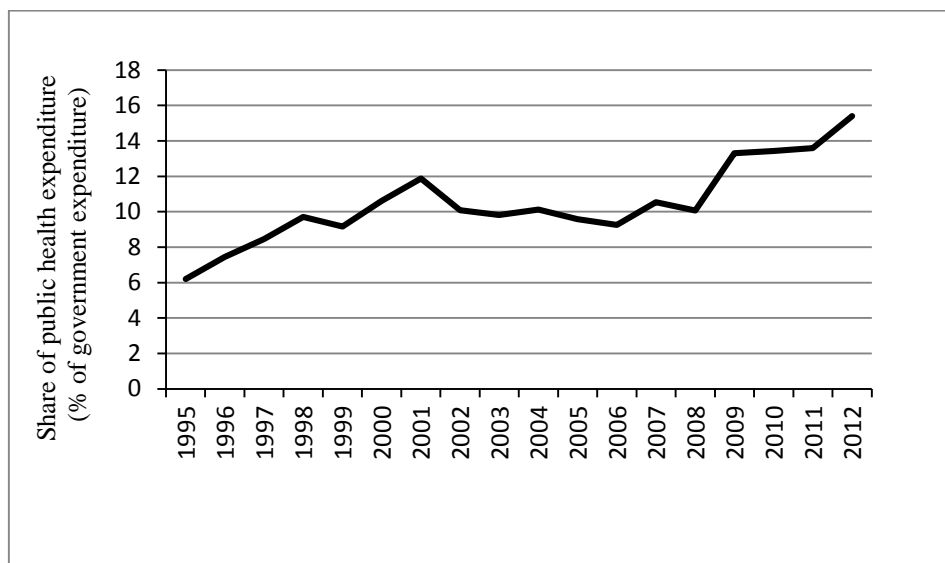


Figure 6. Share of public health expenditure as a percentage of government expenditure.

2.5. The effects of sanctions on food security

Although UN regulations technically exempt food and medicine from sanctions in order to minimize the impact on civilians, secondary effects of the sanctions on banking, shipping and insurance influence the imports of food and medicine. The increasing implementation of financial sanctions has discouraged exporters from shipping to Iran, because they face problems of getting paid, due to barring of money transaction and additional banning of insuring shipments to Iran. Furthermore, providing license requirements for exporting to Iran is time-consuming and complicated. Figure 7 shows the seasonal food imports of Iran during 2001-2011. According to Statistical Center of Iran's data, food imports decreased from 17978200.2 million Rials in the summer of 2010 to 13761798.2 million Rials in the summer of 2011. It should be noticed that sanctions have influenced food production in Iran by limiting the imports of raw materials and devices needed for producing some products. Figure 8 represents the trend of food production index in Iran during 1961-2012. This index which is provided by FAO covers food crops that are considered edible and that contain nutrients. In general, food production index in Iran has had an ascendant trend during mentioned period. So, in spite of various sanctions against Iran, food production has increased in the country; because many manufacturers in the food industry manage sanctions using anti- sanctions measures, and sometimes they circumvent the sanctions by dealing through third countries. However, sanctions have imposed heavy costs to the producers.

Figure 9 shows the supply of food (including vegetal and animal products) during 1961-2011. Based on FAO data, after reaching 3096 kilo calories per day in 1993, per capita food supply in Iran began to decrease slowly, and reached 3058 kilo calories per day in 2011. A similar trend is observed in per capita supply of vegetable crops, but per capita supply of animal products has had a smoothly incremental trend. However, food supply variability as an indicator of instability of food supply is more important. Figure 10 represents per capita food supply variability in Iran during 1995-2010. The variability is obtained as the standard deviation over 5 years of the deviation from the trend of per capita food supply observed during the period. With regard to recent figure, per capita food supply variability was at minimum level in 2004 (12 kcal per day). After that it began to increase, reaching 44 kcal per day in 2009. To some extent, this increase can be attributed to the sanctions. This index was 40 kcal per day in 2010.

Prevalence of undernourishment, an index by FAO, is used to explain the impacts of sanctions on undernourishment. It is defined as the proportion of the population in the country with a level of Dietary Energy Consumption (DEC) lower than the Dietary Energy Requirements (DER). This indicator is used to monitor evolution of hunger over time. Figure 11 shows the trend of this index in Iran during 1991-2012. As it is clear in the figure, 5% of population suffered from undernourishment during 1991-2002. After that, the index began to increase, reaching 6% in 2006, and then it decreased and fixed at 5% again. Another index for studying food security is prevalence of food inadequacy. It indicates the risk that individuals will be living on a diet that prevents them from effectively discharging an economic activity requiring significant physical effort. Compared with the prevalence of undernourishment, the prevalence of food inadequacy also includes individuals with a food energy deficit who would not be considered undernourished under normal conditions, but who may be undernourished when carrying out the intense physical work they engage in owing to a lack of alternatives. Trends for this indicator are similar to those for the prevalence of undernourishment, but the indicator's level offers insights into the inadequacy of food supply. Figure 12 shows the trend of prevalence of food inadequacy in Iran during 1991-2012. It had an increasing trend during 1993-2006; so that it increased from 5.2% in 1993 to 11% in 2006. Then, prevalence of food inadequacy began to decrease, reaching 8.7% in 2012. In addition, figure 13 represents the depth of the food deficit provided by WHO. It indicates how many calories would be needed to lift the undernourished from their status, everything else being constant. As it shown in the figure, trends for this indicator are consistent with those for the prevalence of food inadequacy. Food deficit increased from 15 kilocalories per person per day in 1994 to 29 kilocalories per person per day in 2008. After that, it decreased to 29 kilocalories per person per day in 2013. Despite the ups and downs of the indicators related to food security, prevalence of anemia among children and pregnant women (Figure 14) shows a permanent reduction of anemia.

Sanctions affect not only food productions, but also availability of food needed for a standard living through prices. Increasing number of sanctions against Iran has been one of the reasons of currency depreciation in recent years. Therefore, even if importing could be facilitated despite financial sanctions, many of producers and importers cannot afford to import products or devices, because foreign goods are relatively expensive. Currency depreciation, and so, increase of prices of imported intermediate and final goods has led to inflation. Figure 15 illustrates the trend of general consumer price index and food price index. Clearly, we can see a sudden increase in the general price level in recent years; so that general consumer price index increased from 361.7 in 2012 to 487.3 in 2013. Furthermore, increase in food price index has been much more than general consumer price index; with a growth rate of 41.7%, it increased from 462.6% in 2011 to 655.5% in 2012. As a result, purchasing power of consumers for provision of food needed for a standard living has reduced substantially in recent years, and sanctions against Iran have been one of the major factors involved in this matter.

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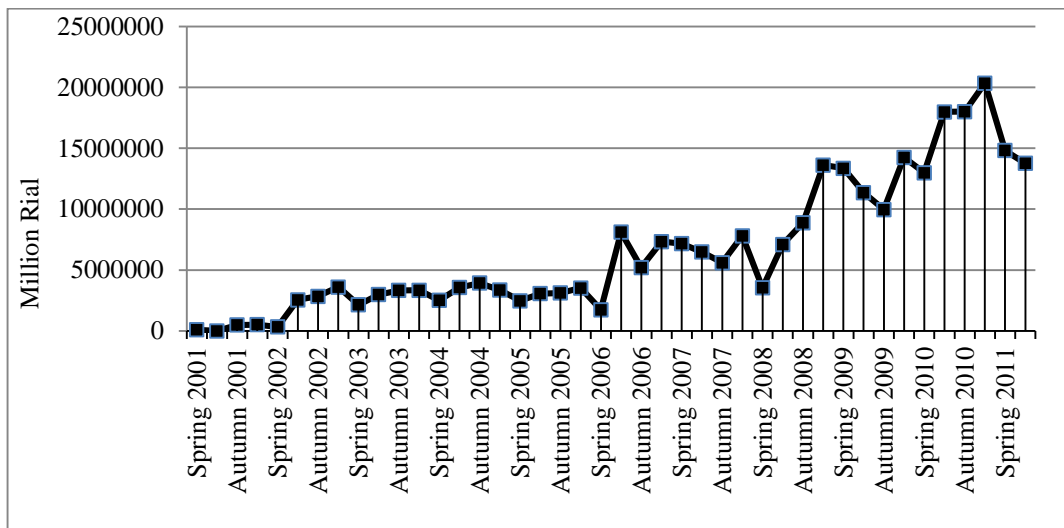


Figure 7. Food import in Iran.

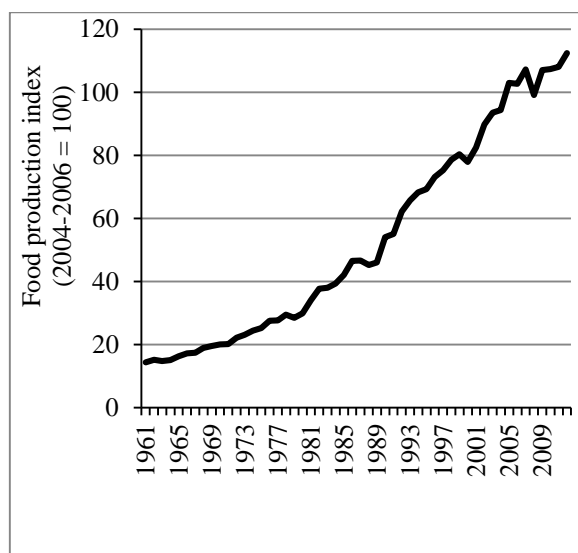


Figure 8. Food production index in Iran.

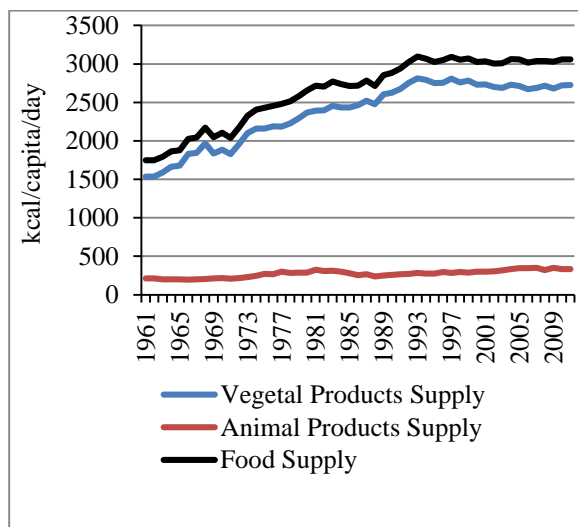


Figure 9. Food supply by vegetal and animal products in Iran.

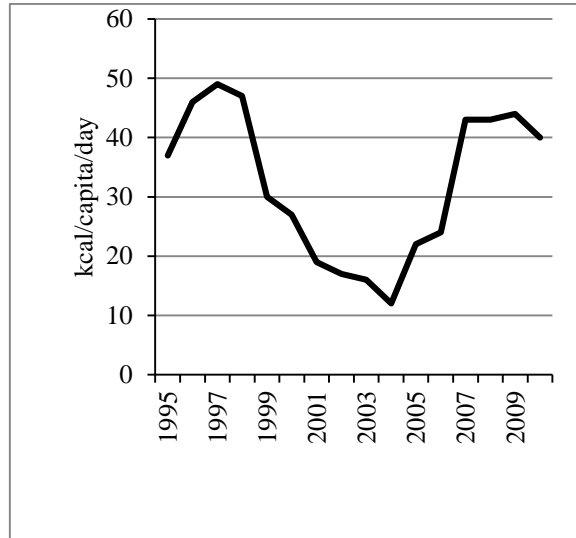


Figure 10. Per capita food supply variability in Iran.

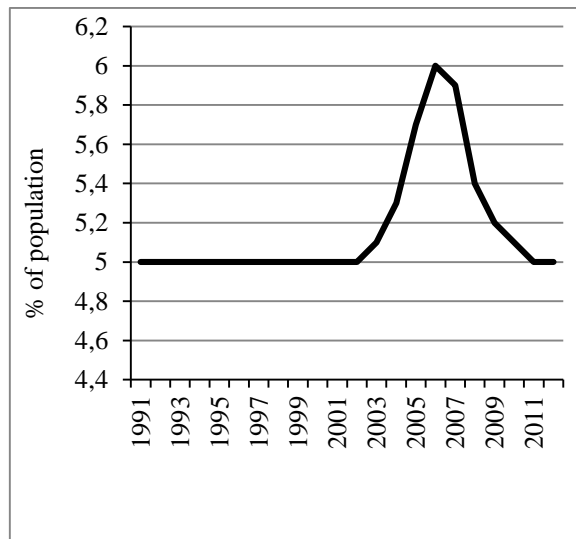


Figure 11. Prevalence of undernourishment in Iran.

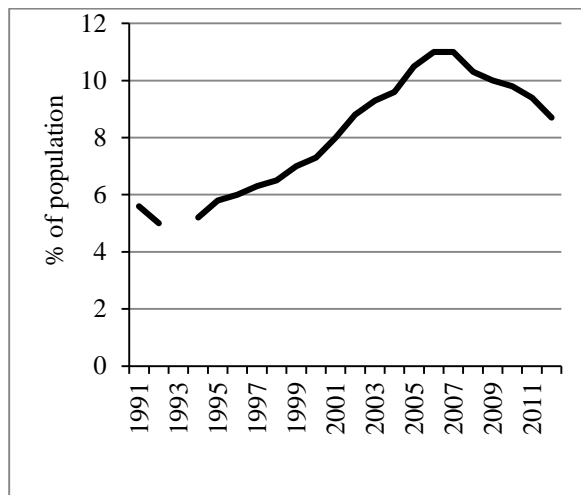


Figure 12. Prevalence of food inadequacy in Iran.

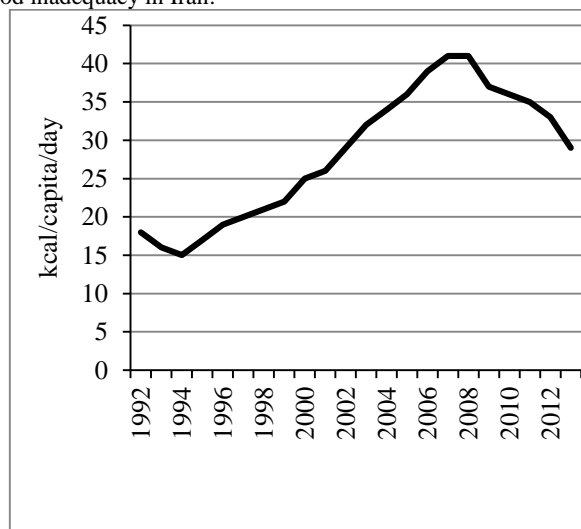


Figure 13. Depth of the food deficit in Iran.

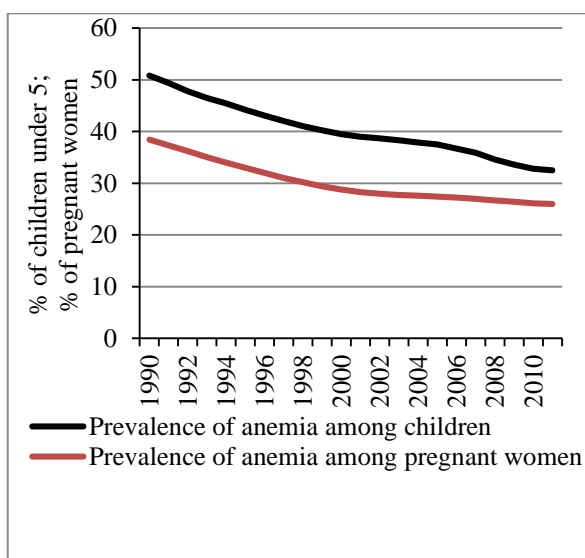


Figure 14. Prevalence of anemia among children and pregnant women in Iran

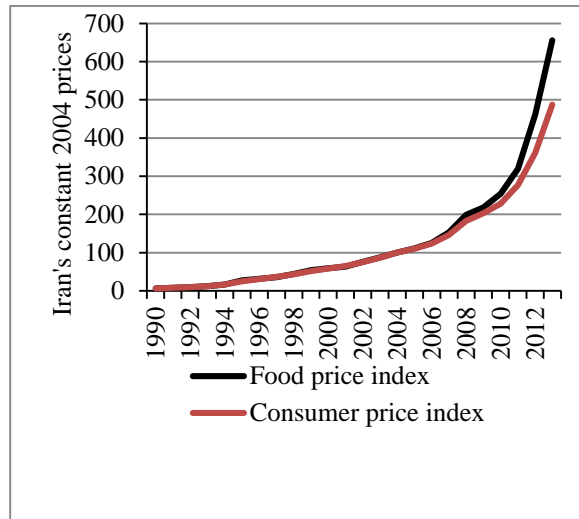


Figure 15. General consumer price index and food price index

2.6. The effects of sanctions on medicines and treatment

While UN, EU, and the US sanctions do not directly include importation of humanitarian goods, these sanctions have acutely decreased Iranian people's access to commodities and major services, including medicine and treatment. Sanctions on petroleum industry, cargo shipment, shipping insurance, followed by sanctions on banking system has damaged the economic situation in Iran, having destructive effects on providing commodities and services (International Institute for Peace, Justice and Human Rights, 2013). In this field, economic sanctions have affected the availability of health services, the quality of health care, and its cost. The secondary effects of sanctions have led to a decrease of medicinal and pharmaceutical imports in Iran. For example, table 1 summarizes the values of US exports to Iran of medical and pharmaceutical products from 2004 to 2013 as provided by the US Census Bureau. According to the data, exports of these products to Iran decreased from 72766 thousand dollar in 2011 to 40412 thousand dollar in 2013. In figure 16 the decreasing trend of medical and pharmaceutical exports to Iran in recent years has been shown. A bulk of this decrease is because of the reduced import of pharmaceutical preparations and medicinal equipment.

Table 1. US food, medicinal and pharmaceutical exports to Iran from 2004 to 2013 (in thousand dollars).

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Laboratory Testing Instruments	130	83	249	122	385	768	1858	842	394	635
Medicinal equipment	4782	5444	7470	9757	13497	16021	17370	21955	24326	19674
Pharmaceutical Preparations	11726	18463	27690	35091	34142	63173	49076	49969	23219	20103
Total US Medicinal and Pharmaceutical Exports to Iran	16638	23990	35409	44970	48024	79962	68304	72766	47939	40412

Source: Bureau of the Census, United States, Foreign Trade Statistics (www.census.gov).

Figure 17 represents the trend of the prices of health and treatment during 1990-2013. Clearly, the prices of health and treatment have substantially increased in recent years. Based on the data from Central Bank of the Islamic Republic of Iran, the growth of health and treatment prices was 38.4 % in 2013; 17.2 % in 2011; and 24.7% in 2012.

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After sanctions on banking system, the medicines without Iranian equivalents became rare. Sanctions made it difficult to import key materials to produce some medicine, and this caused some serious problem in manufacturing pharmaceuticals. Reduction of medicine supply and high costs of medicine have worsened the situation for people with chronic diseases. So, patients with chronic diseases are the most affected people from sanctions. Most of these patients cannot postpone the process of their treatments, and delays in taking medicine and treatment threaten their lives; so, this issue needs a great attention.

In addition, according to data from the World Health Organization, death by non-communicable diseases (including cancer, diabetes mellitus, cardiovascular diseases, digestive diseases, skin diseases, musculoskeletal diseases, and congenital anomalies) in Iran has increased due to the lack of access to medicines and medical equipment needed for diagnosis and treatment of chronic diseases. Death by non-communicable diseases as a share of total deaths increased from 69.7% percent in 2000 to 76.4 percent in 2012. It should be noted that proportion of death by communicable diseases and maternal, prenatal and nutrition conditions decreased from 13.9 percent in 2000 to 9.7 percent in 2012. The following highlights the effects of sanctions on medicine and treatment.

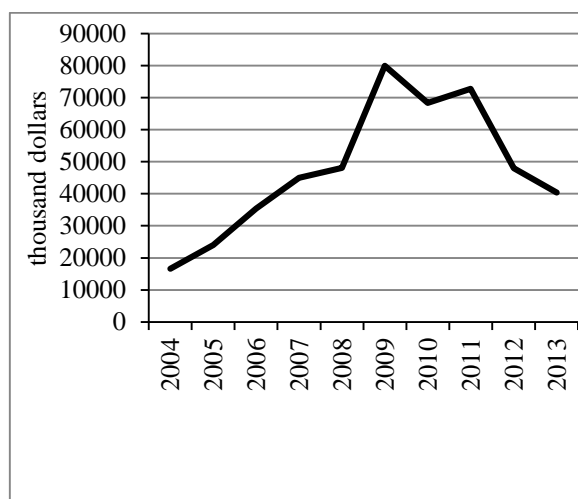


Figure 16. Total US Medicinal and Pharmaceutical Exports to Iran.

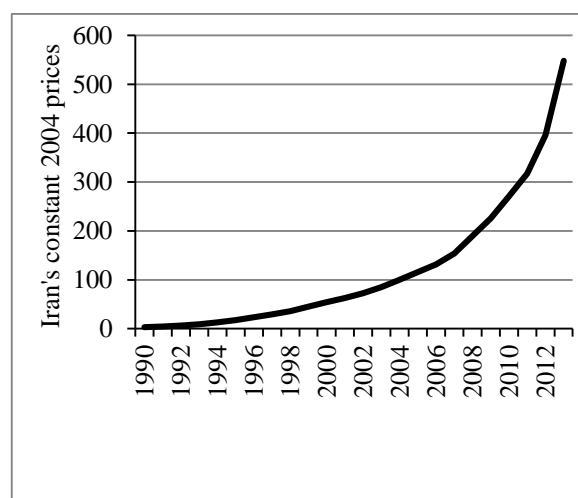


Figure 17. Health and treatment prices in Iran

Treatment: We used a 2013 report by International Institute for Peace, Justice and Human Rights to describe how sanctions affect the treatment of patients. In this report, four diseases were selected as representatives of different group of chronic diseases: Cancer treatment as representative of high mortality diseases; Asthma as a prevalent disease, decreasing quality of life; MS as a prevalent disease in Iran, disturbing daily life; and surgery for Dystonia and Parkinson’s disease as a high-tech surgery. Then, the condition of patients with these diseases was studied after sanctions.

Based on the findings of this report, sanctions have had destructive effects on the treatment of people with considered diseases, and they have brought about severe problems in the process of treatment, especially through increasing costs of treatment. Also, they have led to problems of treatment access for patients. For example, the necessary facilities for cancer surgeries and also, the related medicines (except the nuclear medicines for cancer diagnoses) are not under sanctions currently. But the usage overlaps of radiotherapy pieces and some military devices (like radars) has made the sanctions focused on these pieces (International Institute for Peace, Justice and Human Rights, 2013).

Medicine: Although none of the sanctions imposed against the Iranian government directly ban export of humanitarian goods such as pharmaceuticals to this country, their indirect devastating effect on the healthcare, welfare and access of ordinary people to these services is notable. The impacts of sanctions on medicine section include access to medicine, medicine quality, and medicine costs. Financial sanctions against Iran have made it difficult to import permissive goods, like medicine. By banning and sanctioning main roots of import or at least making it extensively difficult, the foreign companies or entities reasonably lose their interest to deal with Iran. As a result, the import of medicine from foreign companies to Iran has reduced, and medicine for patients with chronic disease (such as cancers, thalassemia, MS, cardiovascular diseases, and respiratory diseases) has became rare. Figure 18 shows the seasonal imports of medicinal products in Iran during 2001-2011. As it shown, the imports of medicinal products started to decrease in 2011; so that, it reduced from 5081056.2 million Rials in the summer of 2010 to 3198923.1 million Rials in the summer of 2011. Furthermore, sanctions have had an effect on the domestic production of drugs -as it requires importing key materials, equipment, and pieces. Overall, both of these -reduction of the imports of foreign medicine and the production of domestic medicine- have limited patient's access to medicine.

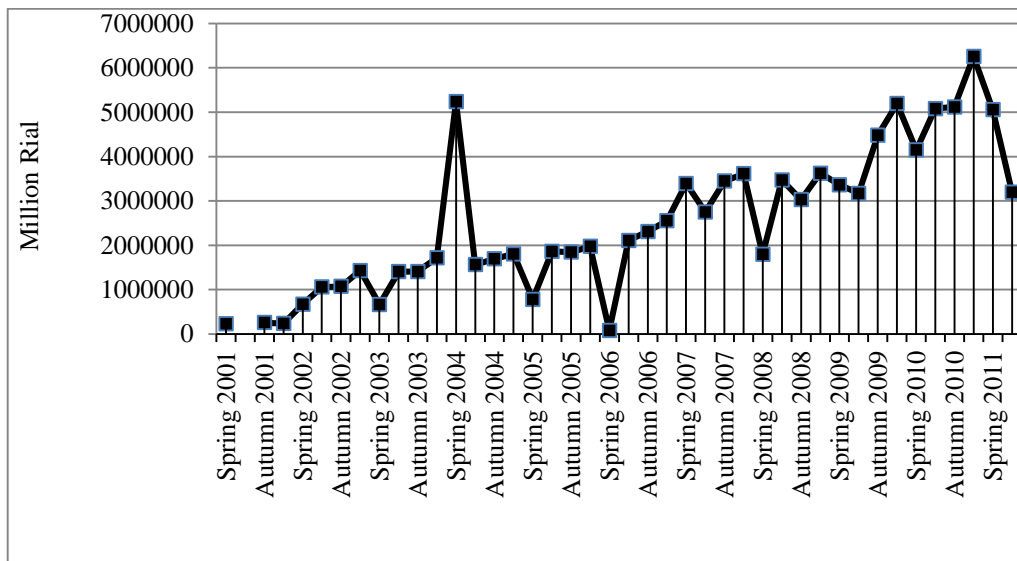


Figure 18. Seasonal imports of medicinal products in Iran.

According to the data from June 2012 until September 2012, there was an average monthly shortage of 83 drugs, but in October 2012 the number of drug shortages dramatically raised; so that the average drug shortages reached to 144 in June 2013. In a report, International Institute for Peace, Justice and Human Rights (2013) has considered medicine shortages using total number of calls made to the response center of Iran's Ministry of Health and Medical Education, 1490, in a period of four months, from 21 March to 23 July 2013. The results clearly show the decrease of drug's accessibility in the period. For example, Warfarin Sodium (anti-blood clot) is one of the drugs considered in the mentioned report. In the first month (21 Mar -20 Apr) the number of calls made to check warfarin's availability was zero; in the second month (21 Apr. -21 May) the number of calls was only 2 that were successfully guided to the nearest pharmacy. But in the third month (22 May-21 June) the number of calls dramatically increased to 790 calls, and it reached to 1701 calls in the fourth month (22 June-23 July). Irrespective of whether 1490 hotline was able to direct callers to a pharmacy, the increasing number of calls made to 1490 shows that patients couldn't simply find the drug needed in a regular pharmacy and they had to call 1490 for help. Data shows that 27% of the callers in the 3rd month and 30 percent of callers in the 4th month couldn't buy this drug.

The second area of sanctions effects on medicine is related to the quality of drugs. Whenever importation of a kind of bulk material was restricted from western sources, manufactures shifted to Indian or Chinese sources. Although this procedure was costly and time consuming due to paper work, legal issues and the need to repeat quality control tests and stability tests to determine the products' quality, it helped manufactures to partially retain their pre-sanctions production levels. Nevertheless, this was at the cost of decline in overall quality of medicine since alternative sources are generally less qualified and partially have unknown side effects. The low-quality materials require purification and processing devices which cannot be imported due to their dual usage in nuclear issues. These devices may be provided through smuggling, but then, there will be maintenance problems: if the device breaks down and needs to repair, there would be problems with the manufacturer company (International Institute for Peace, Justice and Human Rights, 2013).

The third canal which sanctions have affected medicine in Iran is medicine costs. Turmoil of Iran's exchange market and trade situation –due to sanctions- led to an increase of price levels. As a result, the prices of drugs increased, and patients faced a sudden raise of medicine costs. Based on the data from Central Bank of the Islamic Republic of Iran, the growth of medicine price index was 4 percent in 2011. Then, it began to increase rapidly; reaching 15.2 and 48.5 in 2012 and 2013, respectively. Therefore, a large number of patients cannot afford to pay the costs of medicine, even if they were able to find their drugs.

2.7. The effects of sanctions on air pollution

According to WHO's data, four of the top 10 air polluted cities are in Iran. Ahvaz is the most polluted city in the world, and it struggles with micro-dust blowing in from neighboring countries, as well as industrial and domestic pollution. Also, there is a high level of pollution in Tehran; so that, a number of days in Tehran are officially “unhealthy.” Although Tehran has always faced pollution problems because of its overcrowding, its pollution problems have increased considerably in recent years. Figure 19 shows the polluted days of Tehran by Air Quality Index (AQI)² during 2008-2013. This figure represents the number of days with AQI values greater than

² The AQI is an index for reporting daily air quality. It tells you how clean or polluted air is, and what associated health effects might be a concern for people. The six levels of health concern are: "Good" AQI is 0 – 50, "Moderate" AQI is 51 – 100, "Unhealthy for Sensitive Groups" AQI is 101 – 150, "Unhealthy" AQI is 151 – 200, "Very Unhealthy" AQI is 201 – 300, "Hazardous" AQI greater than 300.

100. Clearly, we can see an increase in the number of the polluted days of Tehran in recent years. Sanctions are responsible for a large part of this problem.

Sanctions have influenced air pollution in two ways: First, petroleum sanctions have forced Iran to use its own “sort of petrol” for everything. Figure 20 shows the trend of gasoline imports in Iran during 1991-2012. As shown in the figure, gasoline imports began to fall sharply in 2009. So, Iran had to use its own sort of petrol, and increase its production capacity in order to meet high level of petrol consumption in the country. Figure 21 represents the increasing trends of gasoline production in Iran during 1991-2012. According to the National Iranian Oil Refining and Distribution Company, the amount of daily gasoline production from Iran refineries reached to 60 million liters in 2013 (A daily gasoline production of 60 million liters, 2014). In addition, figure 22 shows that what percentage of the country's gasoline consumption is responded through the petrol produced by domestic refineries. The share of gasoline production in total gasoline consumption has increased; so that, about 79 percent of total gasoline consumption was provided by domestic production in 2012.

Since the gasoline produced by Iran's refineries lacks standard quality, the increase in the consumption of domestic produced petrol worsened the problem of pollution in Tehran and other major Iranian cities, and therefore, threatened the health of citizens. So, petroleum sanctions and the prevention of importing petroleum products to Iran have directly affected air quality of the country's cities. It is worth noting that some key steps have been taken to supply high quality gasoline to address the problem of pollution.

Financial sanctions are the second way which sanctions have affected air pollution. Financial sanctions mean that there is no money for “best available technology”, even if imports were allowed. So, sanctioned countries can't import new technologies which reduce the overall fuel consumption and greenhouse gas emissions, as they would like to. For example, sanctioned countries can't retrofit urban buses or think about hybrid electric taxis and motorbikes or equip factories with high technology devices to avoid increase of air pollution. In this regard, financial sanctions on Iran have had adverse effects on pollution through issues such as those mentioned above. Increased air pollution has affected the health of citizens, especially vulnerable groups; because increase in pollution will lead to an increase in cardiovascular and respiratory diseases, and some types of cancers.

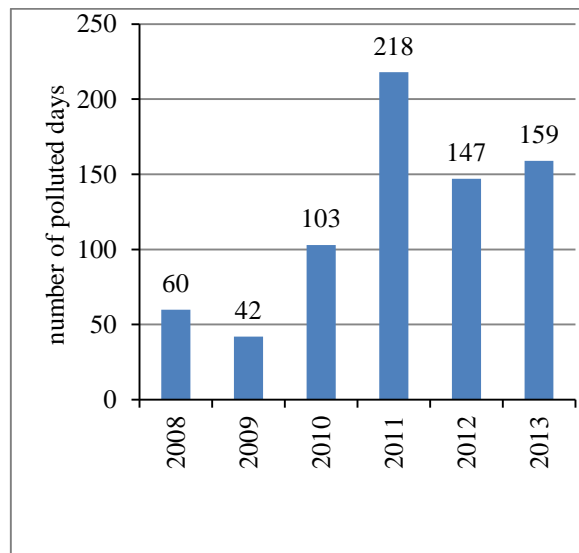


Figure 19. The number of Tehran's polluted days by Air Quality Index.

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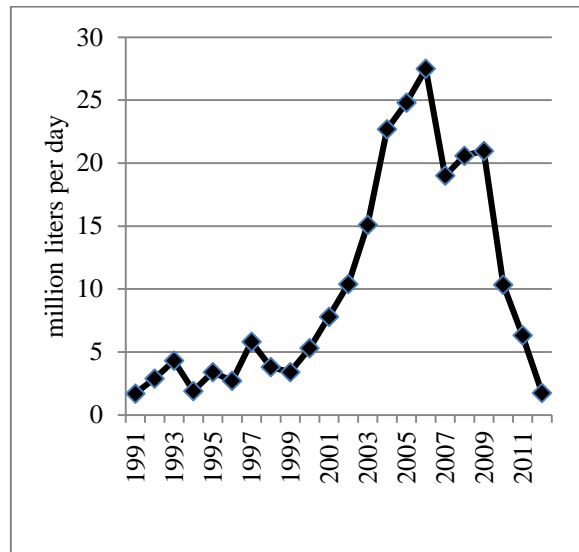


Figure 20. Gasoline imports in Iran.

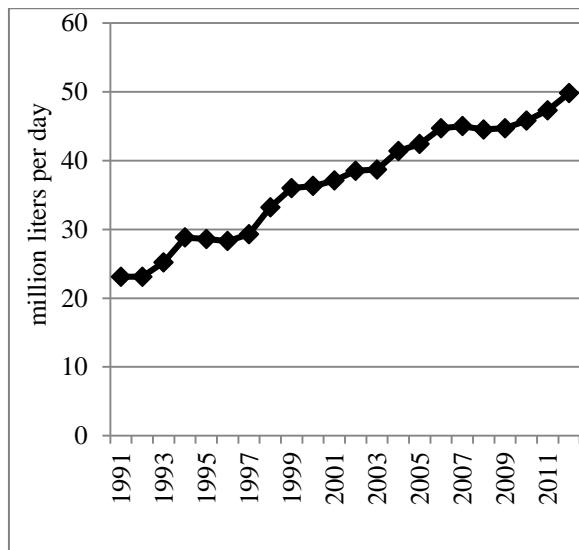


Figure 21. Gasoline production in Iran.

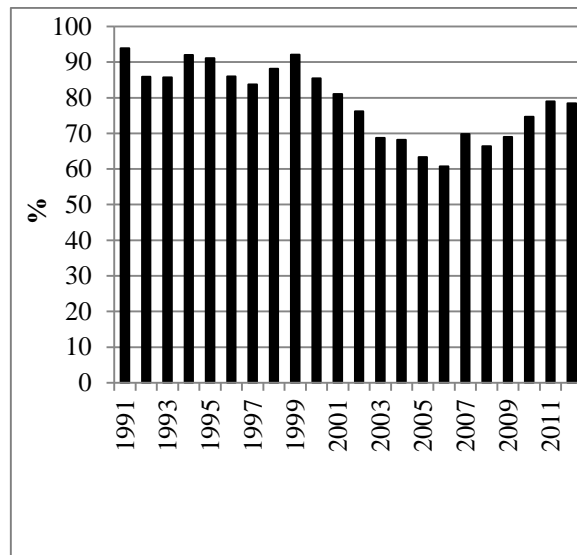


Figure 22. Share of gasoline production in total gasoline consumption.

The negative impacts of sanctions on environment are not limited to air pollution. Putting restrictions on the use of technology in factories damages the country's water resources, and causes overuse of nonrenewable resources. Therefore, sanctions impose irreversible damage to the environment.

It should be noted that environmental issues are important to the world and the problems caused by damaging environment will affect the rest of the world. So, undoubtedly negative environmental consequences of broad sanctions on Iran, will affect the environment of the region and the world. These concerns in the areas of air, water, land and biodiversity, have resulted in environmental and social NGOs criticism about the sanctions against Iran. The removal of sanctions will not only improve air quality and environmental conditions in Iran, but also will help to decrease environmental concerns in the region.

3. CONCLUSION

The health of human resources and labor is a key element of sustainable development. By improving the health of workforce, the acceleration of economic growth increases. So, it is necessary to consider the health of human resources to achieve sustainable development. Especially in the presence of a shock which can affect the health of the workforce, measures and policies must be devised to prevent the reduction of health-related quality of life. One of the most important shocks which have influenced Iran economy is sanctions. Sanctions can have destructive effects on people's health, and therefore sustainable development.

In this regard, we have studied the impacts of economic sanctions on the health of Iranian people (including labor) using a descriptive and analytical approach. We analyzed health effects of sanctions in four aspects: the impact of sanction on health indices, food security, medicines and treatment, and air pollution. The results of macro analysis show that medicines and treatment, air pollution and the environment are the most affected health area by sanctions. So, sanctions have a negative effect on the health. To achieve sustainable development and increase the health level, it is necessary for government to make efficient and timely decisions on the use of very scarce resources after facing economic sanctions. To show a proper reaction, health impacts of sanctions and their magnitudes should be realized carefully. Then, government must give priority to the most affected area of health to reduce the reverse impacts of sanctions. Finally, it seems that negotiations on nuclear energy can help Iran to remove many problems caused by sanctions.

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