Drug addiction rate and the state roles in decreasing addiction rate in Iran society; System dynamics approach

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Abstract

This paper mainly discusses the addiction and management of this social disorder in Iran. Multitude factors emerge this socio-economical problem; however, we have concentrated on the demand prevention factors which are the major causes of addiction. We have studied UNODC[1] policies about drug addiction and UNODC's preventive programs instead of punishment (UNODC, 2010). Also we reviewed the programs of Iranian drug control headquarters. Therefore, we considered some important organizations and estimate their effect on addiction prevention. Our preventive tools are to increase the public awareness about drug abuse as well as diminish the engagement with drug consumers. Therefore, we have built a system dynamic model to investigate the interconnected structure of these preventive tools. We aim to indicate the ongoing status of addiction and then analyze the behavior of the system by assuming the state roles in long-term horizon.

Keywords

Drug Addiction, Drug Abuse, System Dynamics

Introduction

Iran is located near Afghanistan, which is the main producer of various kinds of drugs and also Iran is one of the appropriate ways of drug trafficking. According to the *UNODC* statistics, Afghanistan, eastern neighbor of Iran is the largest illicit opium and cannabis producer. Also Russia, Europe, and North America are the main markets for these venturesome substances. So drug business from Afghanistan to Russia, Europe, and North America pass through the east borders of Iran to the northwestern side. This could potentially affect Iran society and could distribute opium in entire of Iran. Although Iran is near this major resource (Afghanistan), inappropriate policies against drug addiction, not only hinders the addiction rate, but also caused increase in real circumstances (Madani, 2011).

[1] United Nations Office of Drug and Crime

After Islamic revolution in Iran, the newly established system only pursued the prevention of drug supply in order to eliminate the addicts and the addiction as a result (Madani, 2011). But during the time, Iranian government reformed the perspective against drug addiction and drug abuse, because of different reasons. First of all, supply prevention policy was failed. The second one is that applications of novel communication tools such as internet and international television channels caused civil society strengthening. Consequently, people's awareness increased in such social disorders (addiction). Also people involved social activities and tried to lessen the addiction rate by establishing addiction treatment centers or launching campaigns against addiction. It is worth noting that these activities not just occur in the developed provinces; however, deprived provinces have been covered by these voluntary groups (Madani, 2011).

Although above-mentioned subjects are positive factors, the central state must provide infrastructures to prevent susceptible individuals especially among juveniles. Lack of public facilities such as cultural complexes and entertainment centers as well as educational infrastructures is a potential stimulator factor for drug consumption. For example, illegal artistic activities including music bands, theaters groups, etc are not under control and these groups are potentially risky in narcotic and drug abuse cases. Marijuana and new industrial drugs are the prevalent substances among these groups (first author's witnesses).

According to WHO[2] documents, addiction is one of the social determinants (Hovmand, 2012). A model of social determinants needs to identify the very social relations creating the social determinants in the first place (Harding, 1991). Also it needs to adjust for the way that social relations distort perceptions of what is occurring within a community. System dynamics has underlying potential to emerge contribution to the understanding of social determinants and social relations. Furthermore, it could represent the social determinants' effects on criminal and health outcomes in a particular community (Hovmand, 2012; Dianati and Happach, 2012).

In system dynamics, the modelers could constitute the interactions between social relations as well as other factors such as economical factors. This could best be implemented through interdisciplinary team works. Therefore, in this paper, we have collected several experts' thought and build a system dynamics model. This model incorporates feedback loops that we consider as significant in reinforcing addiction rates and eventually balancing it out through governmental agencies.

In the following sections, at first, we will mention a short literature review and define the problem of drug addiction in Iran. Then, we will introduce the causal loops of the presented model which we have built to elaborate the dynamicity of the counter addiction system. Next section is about model analysis. Section five will propose some practical policies and conclusion of the paper. Lastly, the acknowledgement is provided.

[2] World Health Organization

Motivation and Problem Definition

Among the addiction researchers who have examined addiction systematically, Leischow (2008) puts an emphasis on the importance of systems thinking when dealing with various subjects including public health and depicts that the effectiveness of public health approaches depends on the range of knowledge that the study includes. White (2007) believes that in order to succeed in alcohol and other drug (AOD) recovery, an effort must be made to find the origin of addiction through the complex network of events in society. White focuses on the intrapersonal modalities of AOD recovery and that society and cultural and environmental infrastructures in accelerating the process of AOD recovery. Siegelmann (2011) discusses the multi-factorial feature of addiction and believes considering system dynamics can be helpful. In another article, health care system and drug addiction is modeled by system dynamics (Tretter, 2002). This paper proposes a model for heroin addicts and implies that addiction is caused by several numbers of reasons and compares the proposed models.

Generally, in previous articles, authors rarely applied a holistic and dynamic standpoint. Mostly researchers utilize statistical analysis such as linear regressions analysis. Only a few researchers concluded closed-loop causal and possible non-linear relationships from crude data analysis. We do believe that system dynamics approach is an appropriate approach for solving socio-economical problems. Because most of socio-economical problems are not caused by several straightforward linear cause- effect relationships, but they are as a result of a complex chain of closed-loop feedbacks of several cause-effect relationships. System dynamics modeling investigates reinforcing elements of drug addiction rate and simulates to balance it through governmental interference.

From two decades ago, Iranian drug control headquarters reformed and six committees emerged. Generally half of these committees are related to supply control and others are prevention and demand reduction committees. This changing from a mere criminal view to a demand reduction perspective caused great permutation in this organization and attracted not only national but also international attentions. Consequently, some important government agencies such as the Ministry of Education, the Ministry of Culture, and the Ministry of Health involved in these committees. Also Tehran branch of the United Nations Office of Drug and Crime (UNODC) established in those days in Iran. In addition, some countries participated in counter addiction projects and supported Iranian state financially (Madani, 2011).

But over time, the productivity of these committees reduced? due to disagreement between the agencies. For example, the Ministry of Education didn’t accept that addiction is prevalent amongst students; however, there were 23,000 imprisoned juvenile related to addiction in 1994 and according to Iranian Constitution all of juveniles (under 18 years old) must be educated (Madani, 2011).

Despite investments in demand prevention and exorbitant costs for dealing with drug supply, this systematic inconsistency confronts Iran society with more addicts and imprisoned addicts. So that there is an obvious gap for a holistic perspective that estimates the outcomes of consistency among different organizations; consistency and coordination that could emerge a dynamic system against this destructive event.

Methodology

As mentioned before, drug addiction in the Iran society is not just affected by the environmental causes and narcotic supply in black markets. However it is mostly affected by our own community and an undeniable demand for drugs. Thus, governmental agencies could implement preventing tools such as education, advertising, and information systems integrated to each other and foster the people to avoid drug abuse and narcotic consumption. In this regard, we have designed a causal loop diagram in order to apply a systematic approach among organizations linked to drug addiction. Also our models are built and analyzed in Vensim PLE software.

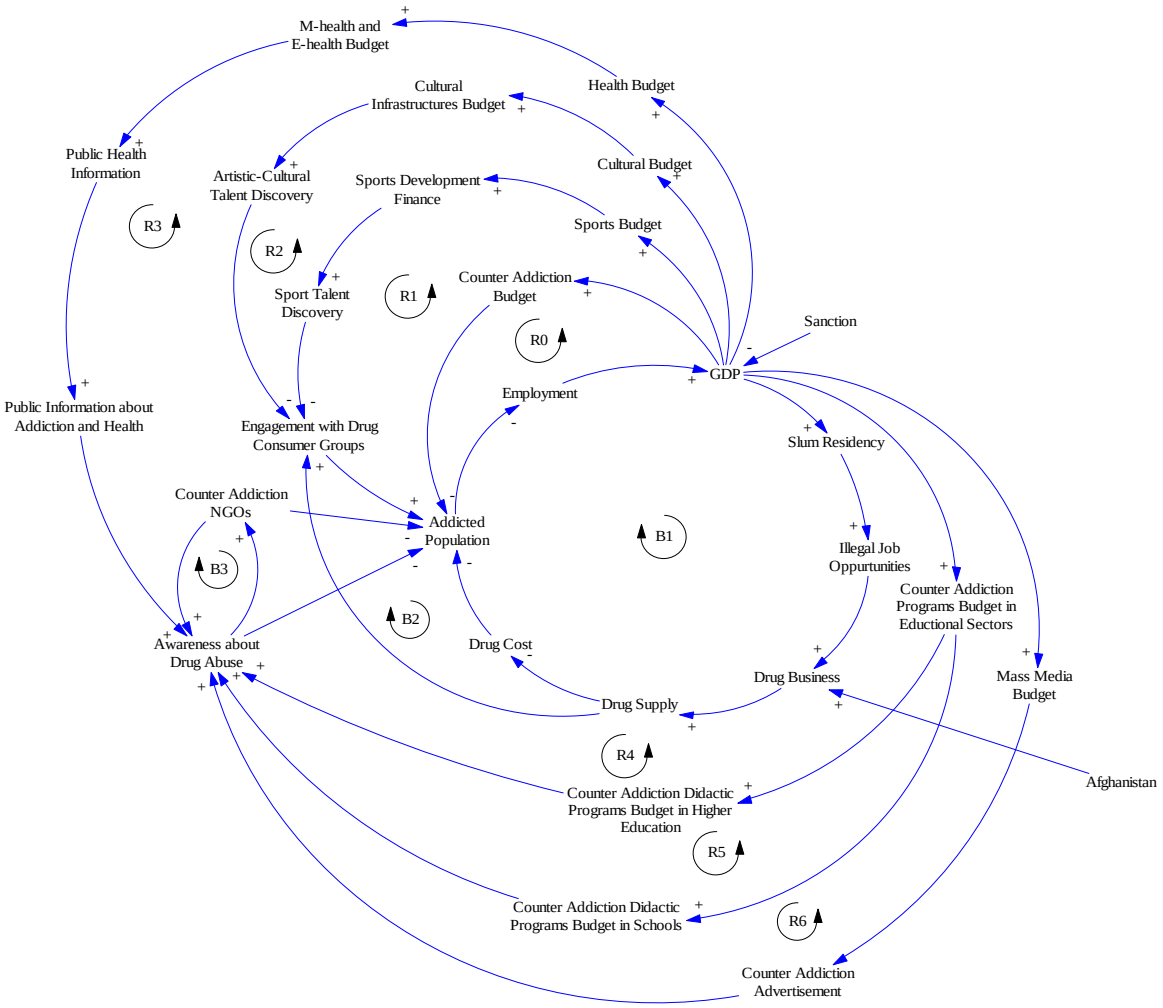

Figure 1 Causal loop

As it is shown in loops B1 and B2, addicted population is located in the center of the model and they have a close interaction with economical factors. In our model, “addicted population” affects employment rate through unemployment of addicts or rejection by employers. This employment factor has direct impact on gross domestic product (GDP). Rate of GDP causes development in the country. But due to unbalanced development of Iran and concentration of production units in the capital (Tehran) and some limited areas for example in the south of Iran (petroleum industries), emigration would be increased form deprived areas to developing parts. As an obvious result, slum residency would be emerged and undesired illegal jobs follows slum residency. This is the start point of the drug business and drug distribution in the society. Of course, drug trafficking groups provoke these marginalized people. Thereupon, according to the supply law, increasing total drug supply decreases the drug price smoothly, as well as increases “engagement with consumer groups”. Consequently, both of these factors affect addiction population and cause amplification in addicted population.

Thus, we have considered several major reinforcing feedback loops that have counteracted drug demand and contributed to the downturn of addiction rates are. Hence, in this presented model, we suppose that the addicted population in the society of Iran could be diminished through two ways, the "awareness" about drugs and the reduction of "engagement with drug consumers". The awareness about drugs is a preventive tool, but it would not make a direct effect on addicted people. Instead, it aims family and close relevant of susceptible persons to inform them about the subsequences of addiction (Madani, 2011). Since the awareness could best be influenced by education which is a long-term lever regarding addiction or any other contravention (Dianati and Happach, 2012), in our model, awareness is mostly affected by educational loops as well as mass media advertisements. Now let us illustrate the reinforcing causal loops of the model as shown in Fig. 1.

The R3 loop: As GDP increases, allocated budget for health sector would increase and results more investments for public health information systems. New remote health information systems such as e-health[3] and m-health[4] empower healthcare systems to provide public health information for most of the citizens. Especially, new telecommunication systems including cell phones, smart phones, and all internet connected devices could get addiction-health advices.

The R4 and R5 loops: Increasing allocated budget for counter addiction programs in educational sectors increases more the number of workshops about addiction in the schools and also in the higher education centers. These two educational centers have an underlying effect on awareness about drug addiction. Because students enter peer groups that are potentially prepared as prime recruiting groups for drug addiction. Overall these two loops reinforce the social awareness about drug addiction and consequently increasing awareness, decreases addicted population.

Moreover, the engagement with consumers also affects the number of addicted population in a direct way.

The R1 loop: This loop is the sign of causal relation between the sports budget and the engagement with consumer groups, which is a positive relation. That is, the addendum of the sports infrastructures increases the talented discovery. As a result, discovered athletes might not engage with consumer groups. It is worth noting that reduction of oil dependency in western countries, decreases risks of global economy due to oil dependency via decreasing average dependency of oil.

The R2 loop: The next causal loop introduces the relationship between the cultural budget and engagement with consumer groups. The relation of this loop is positive. Like the R1, increasing cultural centers, causes rise in talented artists' discovery. These cultural centers could encompass cinema, music, theater, and library sections.

[3] Electronic health
[4] Mobile health

Also we have supposed an independent loop (R1 loop) for direct counter addiction activities. This loop, introduces the relationship between the counter addiction budget and the addicted population that is a positive relation. This budget is allocated for the Iranian drug control headquarters. As it is discussed, this organization is responsible for dealing with drug supply, as well as drug demand prevention.

To have a comprehensive perspective, let us investigate these loops together. Growing of the total budget due to the GDP, would increase the investments of the social services. Thus, these social services would increase awareness about addiction as a social disorder. Also social services could lessen the engagements of the consumer groups with peer groups and lead them to the prosperity in particular field. Ultimately, the government and the civil society could contribute to decrease the drug demand and addiction cure (UNODC, 2010).

In addition, Iran usually faces different kinds of sanctions. Some of them are international sanctions, adjusted by the UN and the others are adjusted by a number of countries. Apparently, according to the ongoing political status, these sanctions are going to be tightened. Thus, in the case of an extreme sanction, which leads to uncontrollable economic crisis, the GDP and the total budget will decrease. Unfortunately, sanctions waste the national capitals and decrease the total budget. This results a reduction of investments in above-mentioned sectors and indirect rise in addicted population.

Simulation and model analysis

We have developed the stock-flow diagram according to the presented causal loop diagram. The stock variables are “addicted population”, “awareness”, “engagement with consumers”, and “drug supply”. Then we formulate the model based on the above-mentioned relations between the variables in causal loop diagram. In the following part, we want to represent model simulation and summarize how different policies impress the stock variables. Also we intend to point out the state role to compensate for the negative effects of addiction and illustrate what could be done by the government to sustain stabilization of addiction rate. Unfortunately, we did not access to authentic information regarding some of the variables of the model and we forced to use estimated information. For example, the population of addicts in Iran is not accurate and we should consider estimated statistics.

In our model, we could implement the state role by adjusting considered budget for five governmental agencies. These governmental agencies include Ministry of Sports, Ministry of Culture, Ministry of Education, Ministry of Health, and mass media organizations. Ministries of Sports and Culture, could implement talent discovery programs and develop infrastructures by establish sport centers and cultural centers. This could reduce the engagement with consumers and cause decline in addicted population. Also the last three agencies could apply information tools to increase people’s awareness. Awareness about drug addiction has indirect effect on addicted population in long term.

Based on the state roles, we have considered five scenarios that simulate the behavior of the system. The initial year is 2013 and the final year is 2027. The simulation results are shown in the following.

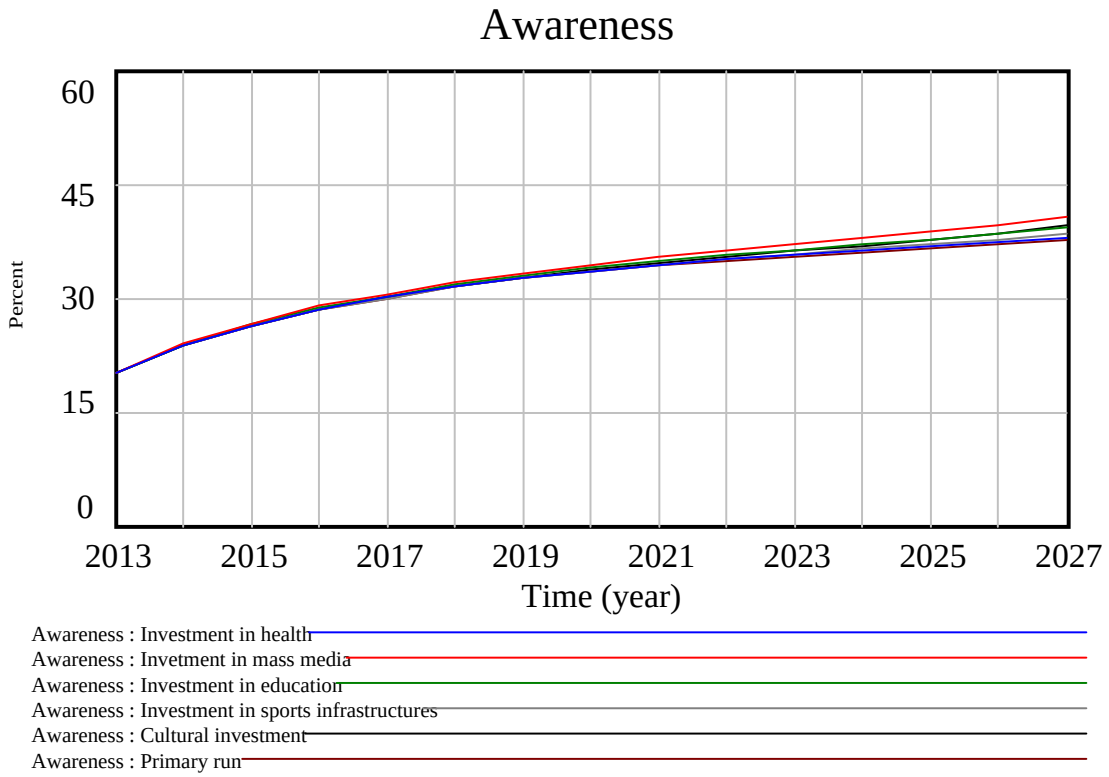

Figure 2 Awareness

The awareness is a qualitative variable and we have assumed it between 0 and 100. As shown in Fig. 2, the system indicates goal seeking behavior. So that awareness increases to achieve a particular goal which is approximately 37 percent in primary run. It is evident that five scenarios have different effects on the awareness. The red line shows the maximum changing in awareness caused by a 4 percent growth in the budget of mass media. Also 10 percent additional investment in cultural activities and 5 percent additional investment in education create an acceptable rise in awareness.

Moreover, investments in different organizations cause diminishing rate of addicted population. As the subsequent figure shows, like last stock variable, investment in mass media has the most impact on the addicted population. Then cultural investment and investment in education create the most considerable influence on addicted population. In addition, investment in sports and health information systems further less reduction in addicted population, respectively.

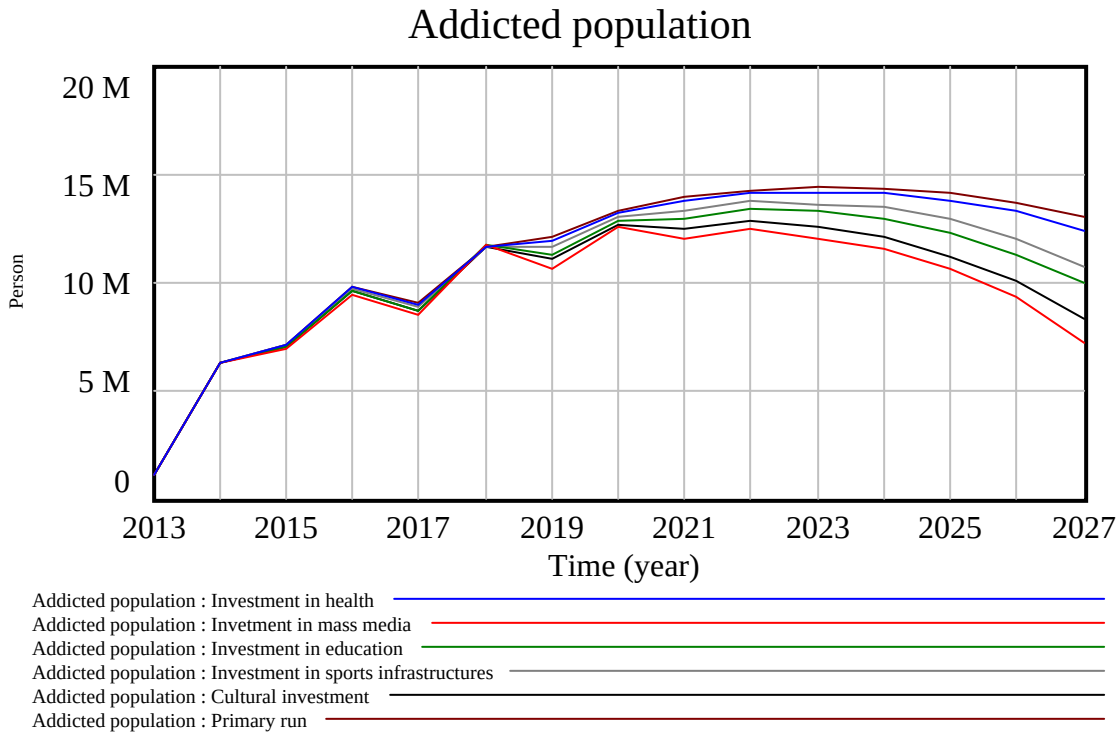

Figure 3 Addicted population

Meanwhile, our expert panel members analyzed the simulation results and they verified the behavior of the system.

Conclusion

According to the presented model and the influences of the state roles in addiction rate, prioritized policies that can be proposed are as follows:

- Investment in mass media to transmit counter addiction programs
- Investment in cultural and artistic sectors to create cultural centers
- Investment in education centers especially in the schools

The drug addiction is a national problem and this problem should be solved by linked organizations. Hence, the proposed policies may not become effective unless there is a national wide determination to execute them.

The above-mentioned policies can be divided into two main categories; short-run and long-run. As a short-run solution, the state may aware the people by mass media means. This might be implemented through counter addiction programs in mass media. This prepares the public opinion to establish the long-run policies. As discussed before, cultural and educational investments are our long-run policies. As a long-run policy, cultural investments can be utilized,

that is, building some cultural and artistic centers. Additionally, the government could hold training courses in educational centers.

As the state implements the above-mentioned policies, we could conduct the four major sociability factors to affect the addiction rate. These factors encompass family, education system, peer groups, and mass media. The role of mass media and education system is obviously presented. Additionally, the role of family and peer groups is conflicting. Yet the government should establish mass media tools and provide infrastructures for cultural and educational activities. These proceedings reinforce the social structures and reinforce the society in preventing social disorders such as drug addiction.

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