Investigation and Analysis of the Impact of KHADEM National Program (Disaster Preparedness Program Serving Families and Communities) on the Household Disaster Preparedness Index in Khorasan Razavi Province

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Original Article

Abstract

INTRODUCTION: Iran is one of the 10 most disaster-prone countries in the world and out of the 42 known types of disasters, at least 31 of them have occurred in this country. Recent disaster experiences have taught us that warnings must be taken seriously and preparedness is necessary. Family readiness is considered as one of the most important pillars of public readiness and community readiness. Achievement of this goal requires a thorough program and various packages to build the culture of preparedness and education is one of its most important parts.

METHODS: The present cross-sectional descriptive study was performed on 18100 families who participated in all the stages of training of the KHADEM National Program (Disaster Preparedness Program Serving Families and Communities) in Khorasan Razavi province. These families were selected based on the regional divisions of the implementation of the project and in the first stage, 18100 families were trained throughout the province. The participating families completed the Household Disaster Preparedness Index questionnaire before and after face-to-face training.

FINDINGS: Assessment of the level of family readiness after the training showed an increase in this score. However, it was clear is that the distribution of the scores is not normal, and needs analysis and interpretation.

CONCLUSION: The analysis of data and statistical model revealed that the training program was more effective in cities with a population of fewer than 50,000 people compared to cities with a population of more than 50,000 people.

Keywords: Family Readiness; Family Preparedness for Disasters; Khorasan Razavi; Red Crescent Society.

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Introduction

Iran is a country with climate diversity and various environments which is the target of many known natural disasters. In other words, Iran is one of the most disaster-prone countries in the world (1) since out of the 42 known types of disasters, at least 31 of them have occurred in this country (2). Despite the fact that the types and causes of disasters are different, their effects, such as damage to lives, properties, and infrastructures, are often similar and more and more people are affected by them every year (3).

Naturally, the first human reaction to a natural disaster is to try to save people and reduce its effects, which require quick action. An appropriate response includes accurate identification, correct

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evaluation, quick decision-making with minimum difficulty, and timely implementation of emergency measures. Therefore, it is very important to be familiar with the types of disasters and be prepared for them (4). Moreover, to reduce the impact of disasters, it is necessary to be prepared since it leads to the reduction of vulnerability and improvement of resilience (6, 5). Preparedness refers to activities that are performed regarding threats (8, 7); it is one of the most important stages of the disaster management cycle that is very helpful. Preparedness is a set of activities that enable governments, organizations, and communities to respond quickly and effectively to adverse conditions that occur following a disaster. According to previous research, the role of people as the largest and most important beneficiary groups has often been neglected in the programs that are developed regarding disaster preparedness and confrontation (9).

In other words, in order to confront disasters and reduce their damages and unpleasant effects, it is necessary to effectively improve the knowledge and perception of people regarding the types of disasters that threaten their living and working environments and increase their preparedness. One of the most important steps is to educate the public and help them prepare for such situations. The milestone in disaster management was the designation of the 1990s as the International Decade for Natural Disaster Reduction. This declaration identifies important physical and social factors and, in fact, by describing the services that can be provided, claims the possibility of reducing the vulnerability of communities with the use of these programs (10).

United Nations Office for Disaster Risk Reduction defines public education as: "Public awareness is the enhancement of public knowledge about the dangers of disasters, the factors that cause disasters, and actions that can be performed individually and collectively to reduce exposure and vulnerability in face of risks." (11)

Furthermore, according to the statute of the Red Crescent Society "Plans and actions regarding preparation for disasters and public education, as well as training the required relief staff and workforce". As can be seen, according to the statute of the Red Crescent Society, public education of disaster preparedness is among the duties, missions, and activities of the Red Crescent Society that should be considered and planned (12).

The family as the smallest social unit has a major role in the development of society as well as its economic, social, and cultural performance. Ministry of Health and Medical Education, which is the governmental organization in charge of health, has also considered family as the core of health-related education regarding disasters since the family preparedness during a disaster can lead to the preparedness of the society as a whole. In this regard, the present study aimed to investigate this important issue.

Family preparedness index

Types and causes of disasters are different; however, their effects, such as bodily injury, property damage, and harm to the infrastructures, are often similar. Therefore, the purpose of family preparedness is to develop a comprehensive family preparedness plan (13) and also satisfy the basic needs of the families after the disasters since in that condition survival is the priority (14).

Bradley has proposed a model that includes eight basic needs that must be met for survivors during or after disasters. This model also includes six secondary needs that are directly or indirectly related to survival. In his model, the basic needs are food, water, shelter, light, heating/cooling systems, air, sleep, and health/improvement of the environment. Moreover, the secondary needs include medicine, first aid, communication, electricity, money (financial aid), and protection. Bradley believes that all of these 14 items should be part of a comprehensive family preparation program (14).

The American Red Cross and Federal Emergency Management Agency (FEMA) have provided a three-step model for family preparedness and guide families for the implication of this comprehensive program. This model has three stages, including "knowledge acquirement", "preparation of a package" and "plan development" (15). These three steps are briefly described below.

1. Knowledge acquirement: The FEMA recommends that community members and family members become aware of the disasters that may

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Table 1. Public Readiness Index

Column	Items
1	Does your local government have a plan for emergencies or disasters?
2	Do you know how to find the emergency information channel on your radio?
3	In the last 30 days, have you seen or heard a message in your community encouraging people to be prepared for emergencies?
4	Have you prepared an emergency kit, which contains necessary items, such as water, food, and medicine, and put it in a special place at home?
5	Have you prepared a small kit for your house, car, or workplace with the necessary tools and equipment in it, so that you can take it with you when you have to leave immediately?
6	Do you have a plan for communication with your family members if you lose each other during an emergency?
7	Have you already identified a place to gather if family members are unable to return home after a disaster?
8	Have you practiced at home what you should do in case of a disaster?
9	Have you volunteered to help prepare people for disasters?
10	Have you participated in first aid training courses in the last five years?

affect their community and learn about the potential hazards by becoming aware of their signs. They should be familiar with local danger alerts and warnings and know what to do in such situations (16). They should also receive training on what to do during a disaster, first aid, and cardiopulmonary resuscitation.

2. Plan development: Family members may be in different places at the time of a disaster; therefore, they need a plan to determine how to go to a safe place, how to contact each other, how to get back together, and what to do in different situations (17).

3. Preparation of a package: The FEMA emphasizes that families may need to rely on themselves for survival for at least the first 72 h after a disaster. The reason is that rescue workers who arrive on the scene are not able to have immediate access to all the victims (18).

Based on the concept and steps it mentions for preparedness, FEMA uses a tool to measure the preparedness of families (as well as individuals and communities) called the Public Readiness Index (PRI). The PRI has 10 items that measure the readiness of individuals and families and score them. In fact, it is claimed that this tool can reveal the shortcomings as well as the progress of preparedness. In total, 3 of its components measure the level of awareness about readiness while the other 7 components measure the readiness-related behaviors. Each item is scored 1 or 0 based on the answers "yes" or "no" (19); therefore, the range of the total readiness score in this index is 0-10. This index is shown in Table 1.

Methods

As can be seen, the PRI is prepared for all types of disasters and does not emphasize a specific one; however, there are other measuring tools that focus on readiness for a particular calamity. The Iranian Ministry of Health and Medical Education has also introduced a tool called the Household Disaster Preparedness Index (HDPI), which has 15 items that are summarized in Table 2 (20).

This index, which has been defined and used in the country's health system, is currently used in the national program of KHADEM, which is implemented nationwide by the Red Crescent Society, to assess the readiness and training of families. According to these indexes, two national programs have been defined in organizations that are in charge of health during disasters. Initially, the national program of Disaster Assessment of Readiness and Training was proposed by the Ministry of Health and Medical Education which is implemented by health centers in cities and villages. This program aims to evaluate the level of knowledge of people regarding disasters and prepare them by training.

In addition, the KHADEM National Program was designed in the Iranian Red Crescent Society and is being implemented. In this program, trained

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Table 2. Household Disaster Preparedness Index

Column	Item
1	Have you held a disaster planning session in the family over the past year?
2	Have you drawn a danger map in the family?
3	Have you had an expert assess the earthquake resistance of your house during the past year?
4	Have you tried to strengthen the building of the house, if it is not resistant?
5	Have you assessed the earthquake resistance of non-structural factors of the house during the past year?
6	Have you attempted to reduce the vulnerability of non-structural factors of the house over the past year?
7	Do you have an emergency and disaster kit in the house?
8	Do you have a family communication plan for emergencies and disasters?
9	Do you have a family evacuation plan for emergencies and disasters?
10	Do you have a plan to help vulnerable groups in the family for emergencies and disasters?
11	Is your family familiar with the initial warnings of important threats to your living area, such as floods, and storms?
12	Do you have ready fire extinguishers at home?
13	Have any of your family members had first aid training in the past year?
14	Has your family participated in neighborhood disaster management programs?
15	Have you practiced emergencies and disasters in the family over the past year?

volunteers visited families door to door to evaluate their knowledge and train them.

Necessary training was given to the learners in different stages, with intervals, and face to face to facilitate learning through repetition.

The KHADEM program is a collective effort to train Iranian families for preparedness for the disasters that threaten them. This plan aims to prepare families, which is presented as "ready family, ready society" and its slogan is "We bring service to people" (21).

Public readiness for disasters has benefits, such as:

1. It reduces fear and anxiety as well as bodily harms and property damages caused by disasters.

2. People can take action to reduce the extent of the damage caused by disasters.

The national KHADEM program soon became the largest public education program of the Iranian Red Crescent Society. The main body of the KHADEM program consists of volunteers who strive for the health of the community. In this program, the volunteers, who have first received the necessary training, provide door-to-door training for people.

The main target community in KHADEM national program is families; however, according to some theories, behavior change in the family requires a change of attitudes, mental norms, and control beliefs which means that the level of intervention should be extended beyond families. Therefore, in addition to families -who are the main target group- educational interventions should be provided for the following target groups as well to achieve the success and sustainability of the effects of this program.

The general motto of the program is "ready family, ready society" and the motto of the volunteers of this project is "We bring service to people". According to theories and models of training preparedness for disasters, the following should be considered:

1) Change of the audience's beliefs about the benefits of preparedness

2) Education of different social groups to create social pressure/value

3) Change of the audience's control beliefs by paying attention to facilitators and barriers to readiness

4) Education of the audience for the different stages of behavior change and the need to use methods and tools appropriate to these stages to promote the audience to higher levels

5) Continuity of training to prevent people from returning to previous stages

6) Consideration of the threat/self-efficacy profile of individuals in the design and implementation of the training

In general, it should be noted that the above-mentioned goals were considered in the design and implementation of the KHADEM in the Red Crescent Society. In this program, the volunteers

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Table 3. Family training in KHADEM National Program

Column	Items
1	How to hold a family disaster planning session
2	How to draw a danger map of the risk of major disasters by the family and how to use it
3	How to seek the help of an expert to assess the earthquake resistance of the house
4	How to strengthen the house
5	How to assess the vulnerability of non-structural factors to earthquake
6	How to reduce the vulnerability of non-structural factors of the house
7	How to prepare a family emergency and disaster kit
8	How to establish a family communication plan for emergencies and disasters
9	How to establish a family evacuation plan for emergencies and disasters
10	How to establish a program to assist vulnerable groups in the family for emergencies and disasters
11	Teach the family the initial warnings of important disasters in the area, such as floods, and hurricanes.
12	Justification of the need for fire safety equipment at home and ways to use it
13	Provision of first aid training for at least one family member
14	How to plan for family participation in the neighborhood disaster management
15	How to practice emergency and disaster plan in the family

evaluate families based on the items of the index in the first visit and the necessary training is performed based on Table 3 in the next visits.

After fulfillment of the various stages of training shown in Table 3, the participants were re-evaluated based on the readiness index.

According to the plan, this project should be implemented in marginal and less developed areas since their training can greatly increase public preparedness for disasters. This preparation is especially for the first 72 h after the disaster and in the peak of the crisis, with the aim of surviving and reducing injuries. In other words, increasing preparedness in vulnerable areas reduces the rate of crisis and damage during emergencies.

The present study aimed to investigate the changes in the knowledge and performance of the families who were trained in the KHADEM National program in Khorasan Razavi Province during 2016-17. Therefore, after the introduction of this plan, the collected data were reviewed and statistically analyzed.

Findings

This study investigated the process of public education and its effects on vulnerable groups. In this regard, the obtained data from the HDPI in different cities of Khorasan Razavi province before and after the implementation of the KHADEM program were analyzed.

The training was provided for the families by volunteers who learned the required materials of this project and, in return, were committed to training other groups of the society. The volunteers were selected from those who were interested in cooperation; moreover, written and practical exams were taken from them. The results obtained from the implementation of this plan are summarized in Table 4.

As it is shown in table 4, in the first phase of the project, the mean score of the province was 3.16. According to the statistics, the latest available assessment in this regard is related to the national statistics of 2015, which shows the number 9.3%. In the scale of the program, this number represents 1.4 for the national mean value. This difference is due to various reasons, such as the errors of the interviewers of this project and the fact that Khorasan Razavi province is at a higher level regarding the urban indicators and preparedness, compared to the nation as a whole. However, it is not possible to compare the collected data of the present study with the previous data and this study requires more extensive data collection. Therefore, this section will not be analyzed further.

In its first step, the most obvious result of this plan was an increase in the readiness of the trained families by at least 30% which was one of the goals of the project. In other words, it should be noticed that given the cost and time allocated to this project, which was about five years, an increase of at least 30% in the knowledge of the families was expected. Therefore, the implementation of this program for public education is certainly justifiable. This issue and the difference in the collected data have been statistically examined in the following section.

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Table 4. Summary of the performance of the KHADEM national program in 2016

Performance of KHADEM national program in 2016						
Khorasan Razavi province			Assessment		2016	Number of families living in each area based on the 2016 census
Column	Name of the branch	Number of families	First assessment	Second assessment	Changes	
1	Bajestan	400	5.52	9.75	4.23	10000
2	Taybad	700	3.32	5.67	2.35	30000
3	Torbat-e-Jam	1100	1.69	3.37	1.68	71000
4	Torbat Heydariyeh	1200	3.08	4.93	1.85	68000
5	Joghatay	400	3.60	8.16	4.56	15000
6	Joveyn	600	4.17	6.53	2.36	16000
7	Chenaran	500	3.73	10.85	7.11	45000
8	Khaf	900	2.92	10.32	7.40	36000
9	Sabzevar	1500	3.67	7.69	4.02	95000
10	Sarakhs	800	4.03	10.02	6.00	26000
11	Fariman	700	3.25	9.02	5.77	28000
12	Firouzeh	300	0.00	6.31	6.31	11000
13	Ghouchan	1000	2.15	7.65	5.51	52000
14	Kashmar	700	2.60	8.55	5.95	52000
15	Kalat	300	2.24	11.49	9.24	10000
16	Gonabad	1000	4.20	10.53	6.33	27000
17	Mashhad	4000	3.62	8.22	4.60	1000000
18	Neyshabour	2000	3.46	11.48	8.02	142000
	Total	18100	3.164117647	8.18	5.182777778	1734000

Discussion and Conclusion

One of the methods used in health education is face-to-face education. Face-to-face training is an effective learning method in which the educational content is presented to the learner in person. It creates an opportunity for the verbal and non-verbal exchange of ideas and feelings between the trainer and the trainee (22).

In this method, the trainer provides the opportunity for active learning in real situations with desirable models that are suitable for the individual characteristics of the trainee. One of the important features of this method is the observation of the trainee's performance which means the trainer and the trainee communicate face to face and the trainee is allowed to speak, ask questions, and give comments (23).

There are various opinions about face-to-face training. Figueiras in Spain (2005) stated that face-to-face training was more effective in the improvement of medication prescription, compared to group training (24). Johnson et al. also believe that face-to-face training is one of the most common methods of training in the health care system. In this method, due to two-person discussions and in-person communication, change of behavior is more likely to happen; however, it requires more time and is not feasible in crowded centers. Few studies have compared face-to-face and non-face-to-face education (25, 26).

Its most important educational advantage is being personal since you can have a conversation with the trainee and encourage them to improve their performance. Moreover, personal education gives the trainer a chance to ask about the interests of the trainee. However, it can be provided for a limited number of individuals and only those who have access to the trainer can receive this education. Given the listed advantages, the face-to-face method can be considered more effective on the trainee, compared to other methods. Nevertheless, in many situations due to limited resources, equipment, and staff, it is not possible to use face-to-face training for the above-mentioned disadvantages.

The right educational method for each situation depends on several factors, such as the subject of the training, the level of training, the level of the trainee, and the conditions and limitations of the trainer and the trainee. Moreover, regarding the training in the present study, some other factors should be taken into account, namely the threats to the area of the trainees, the level of awareness, previous experiences, the level of knowledge and mastery of the learners of the subject.

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Therefore, face-to-face training was used in the Iranian Red Crescent Society as a national plan for measuring the level of family preparedness and providing education to improve it.

Furthermore, the collected data were categorized and analyzed based on the population data of the cities. This categorization certainly helps to highlight the benefits of the program. It divides the cities of the province into three categories, namely cities with less than 10,000 households, 10,000-50,000 households, and more than 50,000 households. Moreover, the mean value of the increase of readiness index in these cities is presented and analyzed. These data are summarized in tables 5, 6, and 7.

The results indicate that in cities with a population of fewer than 50,000 households, the project efficiency was about 30% higher, compared to cities with a population of more than 50,000 households. However, as explained in the previous sections, the distribution of the data in some categories was not normal which can also be justified and accepted due to the variety of areas, and the number of volunteers and project executives. The important difference was observed in Neyshabour city and it was due to the fact that the program was implemented in this city more than the other studied areas. As can be seen, by the elimination of the data of this city, the difference between the categories becomes close to 50% which is very significant.

Table 5. The KHADEM program in cities with more than 50,000 households

City	Number of families	First assessment	Second assessment	level of change
Torbat-e-Jam	71000	1.69	3.37	1.68
Torbat Heydariyeh	68000	3.08	4.93	1.85
Sabzevar	95000	3.67	7.69	4.02
Mashhad	1000000	3.62	8.22	4.60
Neyshabour	142000	3.46	11.48	8.02
	Mean value of the increase			4.0

Table 6. The KHADEM program in cities with 30,000-50,000 households

City	Number of families	First assessment	Second assessment	level of change
Kashmar	50000	2.60	8.55	5.95
Ghouchan	50000	2.15	7.65	5.51
Chenaran	45000	3.73	10.85	7.11
Khaf	36000	2.92	10.32	7.40
Taybad	30000	3.32	5.67	2.35
	Mean value of the increase			5.6

Table 7. The KHADEM program in cities with less than 30,000 households

City	Number of families	First assessment	Second assessment	level of change
Fariman	28000	3.25	9.02	5.77
Gonabad	27000	4.20	10.53	6.33
Sarakhs	26000	4.03	10.02	6.00
Joghatay	16000	3.60	8.16	4.56
Joveyn	15000	4.17	6.53	2.36
Firouzeh	11000	0.00	6.31	6.31
Bajestan	10000	5.52	9.75	4.23
Kalat	10000	2.24	11.49	9.24
	Mean value of the increase			5.6

The Student's t-test was used to test the hypothesis and ascertain if the scores of households increased after training. Values of changes in the evaluation score were investigated using the normal probability plot which revealed their normality (Figure 1).

H_0: The level of knowledge (score) of households did increase after the training.

H_1: The level of knowledge (score) of households did not increase after the training.

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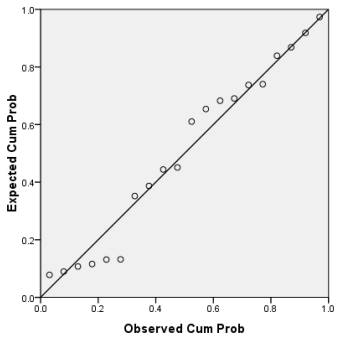


Figure 1. Student normality test to increase the score of household after training

Therefore, the following region of rejection can be considered for the above nonparametric test:

$$\frac{\bar{D}}{\frac{S_D}{\sqrt{n}}} > t_{1-\alpha,n-1} \Rightarrow H_o \text{ is rejected}$$

Value of the relevant test statistic was obtained at -9.7. Therefore, with α=0.05 and $t_{0.9519}$=1.73, the hypothesis of the increase in household scores cannot be rejected. On the other hand, p-value= $P(\frac{\bar{D}}{\frac{SD}{\sqrt{n}}}>-9.7)-P(T_{(19)}>-9.7) > 0.95$ shows that this hypothesis cannot be rejected even with different significance levels.

Group 1	Group 2	Group 3
Torbat-e-Jam	Dargaz	Rashtkhar
Torbat Heydariyeh	Taybad	Joveyn
Sabzevar	Bajestan	Joghatay
Mashhad	Fariman	Sarakhs
Kashmar	Gonabad	Firouzeh
Ghouchan	Chenaran	Khaf
Neyshabour		Kalat

The cities were divided into three groups based on their populations and a city from each group was selected to compare the impact of the program on different populations. To find the score distribution model of the households, the curve fitting of the normal comparison test was constructed which was acceptable in all three cities. (Graph A) Moreover, the Wilcoxon Significant Rank Test was used to test the following null hypotheses and evaluate the effect of education on raising awareness in each city. (Graph B)

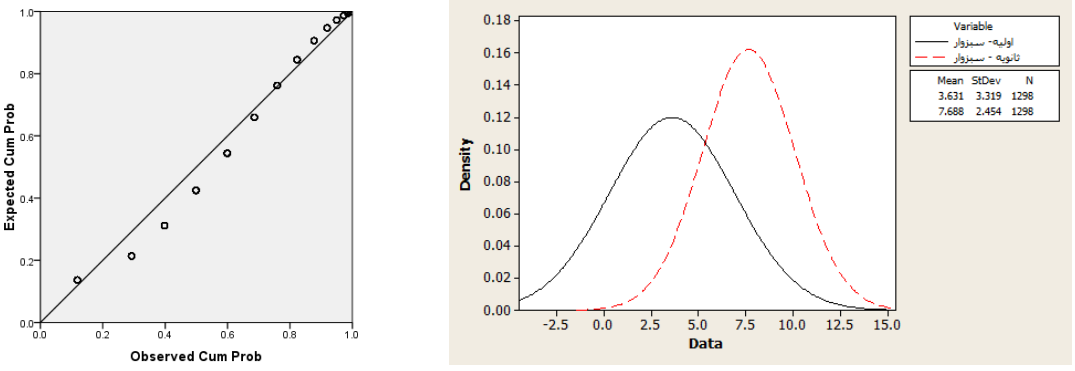
H_o: The KHADEM program did not increase the awareness of the households.

H_1: The KHADEM program did increase the awareness of the households.

Sabzevar from group 1: by using Wilcoxon test z=-30.814 < $-z_{0.95}$=-1.645 and with a p-value of less than 0.001, the hypothesis H_0 is rejected (Figure 2).

Sarakhs from group 2: by using Wilcoxon test z=-23.527 < $-z_{0.95}$ and with a p-value of less than 0.001, the hypothesis H_0 is rejected (Figure 3).

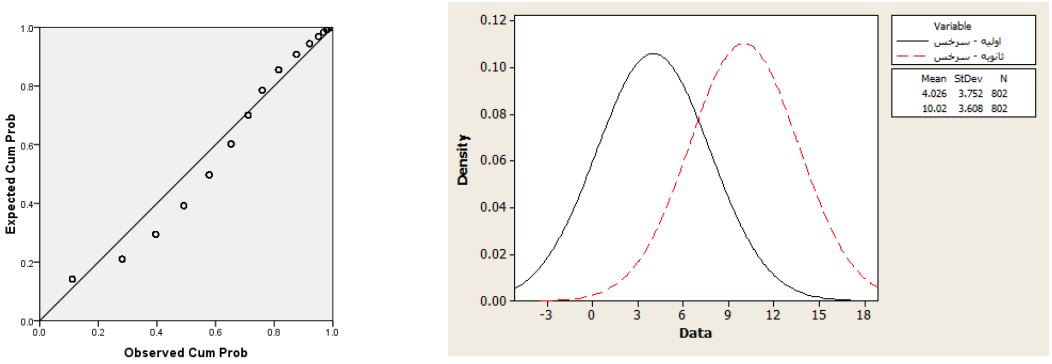
Bajestan from group 3: by using Wilcoxon test z=-15.867 < $-z_{0.95}$ and with a p-value of less than 0.001, the hypothesis H_0 is rejected (Figure 4). The KHADEM program is a large-scale and wide-ranging project which needs more study and analysis to be able to continue its implementation process and be pursued more effectively. This study aimed to investigate the strengths and weaknesses of this plan in order to improve its performance.



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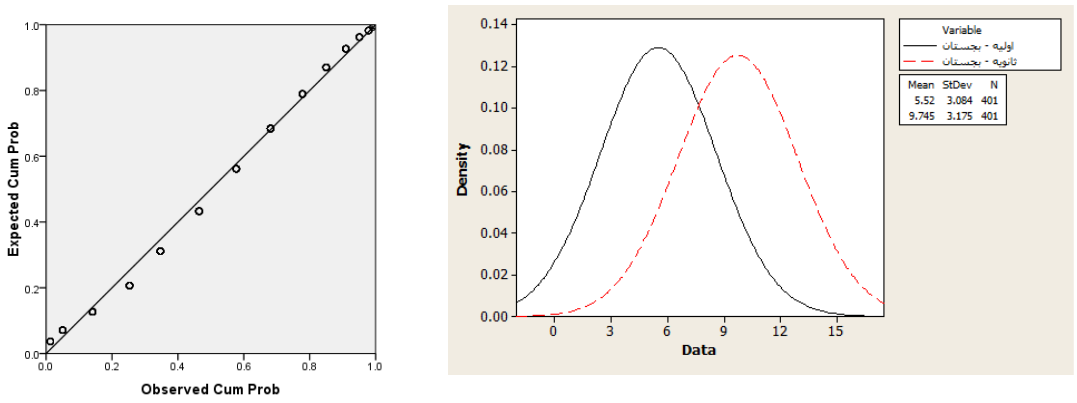
Figure 2. A) Data normality test of Sabzevar using the Wilcoxon test
B) Data of Sabzevar using the Wilcoxon test

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Figure 3. A) Data normality test of Sarakhs using the Wilcoxon test
B) Data of Sarakhs using the Wilcoxon test



A B

Figure 4. A) Data normality test of Bajestan using the Wilcoxon test
B) Data of Bajestan using the Wilcoxon test

In this project, based on the developed index in the Ministry of Health of the Islamic Republic of Iran, first, the families are evaluated and then provided with simple and face-to-face training. Finally, the secondary evaluation of this study was performed after 12 stages of door-to-door visits and training. The present study was performed based on this review and evaluation method and it was found that the goals set for the project can be fully achieved if it receives the required support.

Moreover, it was found that face-to-face training was less effective in the more developed regions. This means that the rate of participation and acceptance of this project had a negative relationship with the population of the city. As a result, the impact of education in cities with less than 50,000 households was almost 50% more than the cities with more than 50,000 households.

It can be concluded that the Iranian Red Crescent Society, as the head of the committee of search and rescue and public education, should improve the prepared training package and implement the KHADEM plan in less developed areas. Moreover, other plans should be developed for attracting public participation in more developed areas. Insistence on the nationwide implementation of the present program is accompanied by a decrease in its productivity and loss of material and spiritual capital of the Red Crescent Society.

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culture of public readiness in the society.

Conflict of Interests

There is no conflict of interest regarding the publication of the study.

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