Evaluation of The Skills of Community Health Workers in Providing Self-Care Program for Pre-Diabetic Individuals Based On The Precede-Proceed Model: A Descriptive Study

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Research Article

Keywords: Community Health Worker, Self-care, Pre-diabetes, Precede-Proceed Model

Posted Date: September 23rd, 2021

DOI: https://doi.org/10.21203/rs.3.rs-877857/v1

Abstract

Background

This study aimed to investigate the skills of community health workers in providing a self-care program for pre-diabetic individuals in Mazandaran Province, Iran, based on the Precede-Proceed model.

Methods

This descriptive-analytical study was performed on 400 community health workers in Mazandaran province using the cluster random sampling method. Data collection tools included demographic information and 54 questions based on the structures of the Precede-Proceed model, the validity and reliability of which were confirmed. Data were analyzed using SPSS 22 software and Pearson correlation coefficient and linear regression tests.

Results

The mean age of participants was 34.13 ± 8.94 years. The study results showed that awareness, attitude, and reinforcing factors variables were in the desired range, and knowledge, self-efficacy, enabling factors, and health workers' skills variables were in the moderate range. According to the regression test, self-efficacy (R^2 = 0.503) and enabling factors (R^2 = 0.422) were the most important predictors of health workers' skills in presenting a self-care program for pre-diabetic people.

Conclusion

According to the results obtained in the study of community health workers' skills, it is suggested that educational interventions to improve community health workers' skills in providing self-care programs for pre-diabetics with emphasis on predisposing factors (with more focus on knowledge and self-efficacy) and enabling factors to be designed and implemented.

Background

Concerns about non-communicable diseases are serious global problems that will cause many problems not only in these years but also in the future (1). Insulin-dependent diabetes (type 2) is one of the four major non-communicable diseases along with cardiovascular disease, cancer, and chronic respiratory diseases, which together account for 63% of non-communicable disease deaths worldwide (2). The results of the first phase of the Tehran Lipid and Glucose Study indicate a worrying and very high prevalence of risk factors, including hypertension (24%), overweight and obesity (63%), hyperlipidemia (54%), diabetes (14%) and cigarettes smoking (14%) was present in Tehran citizens and also showed that more than 70% of hospitalizations and deaths were due to non-communicable diseases (3). According to the latest reports from the International Diabetes Federation, there are 425 million diabetics in the world, which will increase to 629 million by 2045; Also, according to this report, the number of patients with diabetes in Iran is 5 million, which will increase by nearly 10 million by 2045 (4). The results of the studies of the WHO stepwise approach to surveillance of non-communicable diseases (STEPS) in 2016 in Iran showed that the prevalence of diabetes in Mazandaran province based on FPG ≥ 126 is 12.93% in total

(9.34 to 11.1% in men and more than 14.85% in women) and also the prevalence of diabetes based on HbA1c ≥ 6.4 is 12.38 to 14.38% in total (9.44 to 10.9% in men and more than 16.77% in women). The reports obtained from this study showed that Mazandaran province is one of the three most prevalent provinces in the country regarding the prevalence of diabetes (5).

Some predictors of pre-diabetes, e.g., age and family history of diabetes, are not preventable, but other factors that are effective and preventable in the development of pre-diabetes should be considered by officials, policymakers, and planners. Bodyweight in both sexes, waist size in women, fasting blood sugar level and two hours after a meal, and triglyceride and HDL cholesterol levels can be controlled with extensive public education programs for healthy eating and increased physical activity. Quitting smoking and increasing literacy levels are other important factors in reducing the incidence of pre-diabetes (6, 7). There is ample evidence that lifestyle modification, e.g., physical activity and healthy eating, can manage pre-diabetes and prevent or delay diabetes so that behavioral changes alone can greatly decrease the risk of developing diabetes. Therefore, identifying educational needs for preventive interventions seems to be essential (8–10).

The World Health Organization identifies community health workers (CHWs) as those responsible for providing health care and has received less training than other health care workers; Also, because they have to meet the community's needs, they are selected from people in the same community. They are typically trained for specific tasks such as prenatal care or vaccination (11). Community health workers have successfully provided essential health services to the public, such as reducing maternal and infant mortality rates, encouraging people to get vaccinated, promoting breastfeeding, and educating about infectious diseases. They have recently played a useful role in preventing AIDS through control, educating communities, and performing tasks such as testing, counseling, etc. (12–14). Even in areas with limited physicians, the responsibilities of community health workers have increased, which can be seen all over the world. This transition has led community health workers to use non-communicable diseases as well, as community health workers have played an increasing role in preventing and controlling non-communicable diseases over the past ten years, and the available evidence shows promising results. 15). In the Iranian health care system, community health workers are the first category of human resources in the provision and training of health care (16) that the use of appropriate and efficient methods and models will enable them to play their educational and executive role (17).

Pre-diabetics not only need knowledge and information to deal with diabetes-related issues and problems but also the skills, abilities, and motivations to engage in self-care behaviors; community health workers and therapy teams play an important role in educating these issues (18). By observation of pre-diabetic care by community health workers in health centers, interviews with diabetes experts and health education experts in Mazandaran province and Nowshahr city, study of epidemiological indicators that indicate the high prevalence of diabetes in Mazandaran province (5) and also, the results of educational needs assessment of community health workers, it was found that they do not have the desired ability in terms of non-communicable diseases and educational skills (19); Therefore, providing a self-care program is essential to improve the skills of community health workers.

Health education experts have proposed a range of different models to describe the factors affecting behavior, of which the Precede-Proceed model is a framework and a design model for identifying needs in health education and health promotion. This model is a process for changing behavior and explains the possible outcomes of a training program. According to the results of different researches, the Precede-Proceed model provides a framework according to which predisposing factors (knowledge, attitude, perceptions, beliefs, etc.), reinforcing factors (influence of others, family, peers, health workers, and etc.), and enabling factors (availability of resources, skills,

etc.) are determined as factors affecting behavior in educational diagnosis. In fact, the most useful application of this model is to explain the factors related to behavior (20–23).

Due to the increasing prevalence of diabetes and the importance of self-care in controlling the progression of diabetes in pre-diabetic people, and that the studies on diabetes self-care programs in which pre-diabetic people have received less attention and the need for special attention to this group in order to prevent or delay diabetes and concerning the effective and undeniable role of community health workers and concerning the Sustainable Development Goals (SDGs), the third goal of which is entitled "Ensuring a life with health and welfare promotion for all at all ages", this study was conducted to evaluate the skills of community health workers in providing self-care program for pre-diabetic people in Mazandaran province based on the Precede-Proceed model.

Methods

The present study is a cross-sectional descriptive-analytical study to evaluate the skills of community health workers in providing self-care programs for pre-diabetic people in Mazandaran province based on the Precede-Proceed model. The study population in this study was community health workers in Mazandaran province who were active in the health care system in 2020. After obtaining a license from Tarbiat Modares University and Mazandaran University of Medical Sciences and receiving the code of ethics (IR.NIMAD.REC.1398.244) from Tarbiat Modares University, the subjects were selected through cluster random sampling method appropriate to the volume and entered the study. Inclusion criteria in this study were having at least three years of work experience and satisfaction in participating in the study, and exclusion criteria were having more than 20 years of experience and unwillingness to participate in the study. Due to the prevalence of coronavirus and travel restrictions, the study questionnaire was designed online and sent to selected community health workers through the WhatsApp application.

Sampling

The sampling method was that each of the health networks of Mazandaran province was selected as a cluster, and the subjects were randomly selected from each class and in proportion to the number of community health workers in each city. After determining the proportion of each city, the people were selected using a random number table based on the list of names in the city health network. After determining the desired community health workers, in coordination with the connector of each city, a questionnaire was sent to the participants in the study. Also, to thank the participants for participating in the study and completing the questionnaire, they were given a gift of 50,000 Rials as a Mobile phone charge.

Sample size

The following formula was used to estimate the sample size:

$$n = \frac{(z_{1-\alpha/2})^2 p(1-p)}{d^2} = \frac{4 \times p(1-p)}{d^2}$$

Considering p = 0.5, α = 0.05 and error value 0.05, confidence interval 95% and previous similar studies in Iranian society (25, 24) and considering 10% drop, the number of samples 400 people were considered.

Data collection tool

The data collection tool was a researcher-made questionnaire whose questions were based on the structures of the Precede-Proceed model. To design the questionnaire items, valid and specialized sources, including scientific articles and books (26–29) and interviews with experts and specialists in diabetes and health education, were used. After reviewing the expressions extracted by the research team, expressions with overlapping concepts were integrated, and the initial questionnaire was designed in the form of 54 expressions. This questionnaire had three sections:

1. Demographic information;
2. Assessing the level of knowledge and knowledge of community health workers; and
3. Assessing behavioral and environmental factors (predisposing, enabling, and strengthening) community health workers' skills in providing self-care training programs for pre-diabetics.

Two qualitative and quantitative methods were used to determine the content validity of the designed questionnaire. The questionnaire was given to 10 specialists (5 specialists in health education and health promotion, three provincial experts in diabetes, and two general practitioners) in the qualitative method. At this stage, they were asked to check the questionnaire based on appropriate words, placement of items in the appropriate place, and observance of grammar. In the content validity study, two values of Content Validity Ratio (CVR) and Content Validity Index (CVI) were calculated quantitatively. To determine the CVR, experts will be consulted about the necessity of each item, and CVR values higher than 0.62 were accepted based on the Lawshe table. The criteria of relevance, clarity, and simplicity of each item were examined to determine the CVI, and values higher than 0.79 were accepted. After determining the CVR, three questions were removed from the reinforcing structure, while in determining the CVI, no questions were removed. In the next step, to determine the clarity of the items, a questionnaire was given to 15 community health workers, and a survey was conducted on the level of difficulty in understanding the concepts, the degree of appropriateness and communication, and the amount of ambiguity and misconceptions. Based on the comments and suggestions received from the participants, the necessary changes were made in order to clarify the items. The quantitative effect of the item was also used to determine the importance of the items and remove inappropriate items. An impact score above 1.5 was considered acceptable (30, 31). In the study of face validity, eight questions were removed from the knowledge section, and finally, the number of questions in the questionnaire reached 43 questions; the predisposing structure with 27 questions (awareness with 5 questions, knowledge with 13 questions, attitude with 4 questions, self-efficacy with 5 questions), resources (enabling structure) with 4 questions and support from others (reinforcing structure) with 7 questions and community health workers’ skills with 5 questions. The questions of the awareness section were designed as correct/incorrect, the questions of the knowledge section were designed as multiple choice, and the questions related to the attitude, self-efficacy, resources, and support of others were designed in 5-options Likert scale from 1 (strongly disagree) to 5 (strongly agree). The reliability of the questionnaire was assessed by calculating Cronbach's alpha and the reliability of the test-retest on a group of 30 community health workers. Cronbach's alpha was considered equal to or greater than 0.7 (32), which in the questionnaire variables ranged from 0.87 to 0.88. Reliability of test-retest of questionnaire structures was obtained from 0.78 to 0.84.

Data analysis method

The collected data were analyzed by SPSS 22 statistical software and descriptive-analytical statistical tests, correlation, and regression.

Results

The mean age of participants was 34.13 ± 8.94 years, and 37.5% (150 people) were male, and 62.5% (250 people) were female. Other findings of the study in the demographic information section are listed in Table 1.

Table 1
Demographic characteristics of the participants

Variable		Number	Percent
Sex	Man	150	37.5
	Female	250	62.5
Education	Primary School	34	8.5
	Diploma	194	48.5
	Associate Degree	81	20.2
	Bachelor's degree and higher	91	22.8
Marriage	Single	101	25.2
	Married	285	71.2
	Divorced	11	2.8
	Widow	3	0.8
Work experience	Less than 5 years	154	38.5
	5 to 10 years	69	17.2
	10 to 15 years	81	20.2
	15 to 20 years	96	24.1
Type of employment	Official	191	47.8
	Second handed	33	8.2
	Contractual	176	44
Second job	Yes	36	9
	No	364	91

The mean total score of community health workers' skills was 21.23 ± 3.41. The mean and standard deviation of the score of the factors of the educational and ecological diagnosis stage of Precede-Proceed are given in Table 2. The variables studied in this study were divided into three ranges of poor (less than 50%), moderate (50 to 85%), and favorable (more than 85%) based on the average percentage obtained.

Table 2
Mean and standard deviation of study variables in providing self-care educational programs for pre-diabetic people based on the Precede-Proceed model

Variable		Mean	SD	Average of gained points (%)	Minimum & Maximum	Status
Predisposing factors	Awareness	8.75	0.64	87.5	5–10	Favorable
	Knowledge	20.84	2.69	80.15	13–26	Moderate
	Attitude	17.31	2.63	86.55	4–20	Favorable
	Efficacy	20.86	3.55	83.44	5–25	Moderate
Enabling factors		16.41	2.8	82.05	4–20	Moderate
Reinforcing factors		30.10	3.76	86	7–35	Favorable
Skill		21.23	3.41	84.92	5–25	Moderate

According to the regression test, self-efficacy (from predisposing factors; $R^2 = 0.503$) and available resources (from enabling factors; $R^2 = 0.442$) are the most important predictors of this study that the self-efficacy ($\beta = 0.7$) compared to resources ($\beta = 0.64$) play a greater role in predicting the skills of community health workers in providing self-care training programs for pre-diabetics (Table 3). Also, the Pearson correlation coefficient test showed a positive and significant correlation between the score of community health workers' skills and the scores of predisposing factors (awareness, knowledge, attitude, and self-efficacy), enabling factors, and reinforcing factors. Self-efficacy, enabling factors, and reinforcing factors were most correlated with the skills of community health workers (Table 4).

Table 3
Predictors of health care skills in providing self-care training programs for pre-diabetic people based on the Precede-Proceed model

Dependent variable	R^2	F	P	t	Non-standard β coefficients	Standard β coefficients	Predictor	
Health Care Skills	0.052	21.956	0.000	11.573	0.305	0.229	Awareness	Predisposing factors
	0.044	18.359	0.000	25.729	0.173	0.210	Knowledge	
	0.272	148.793	0.000	12.198	0.540	0.522	Attitude	
	0.503	402.795	0.000	20.07	0.682	0.709	Efficacy	
	0.422	290.352	0.000	17.04	0.633	0.649	Enabling factors	
	0.291	163.043	0.000	12.769	0.685	0.539	Reinforcing factors	

Table 4
Correlation of study variables in providing self-care educational programs for pre-diabetics based on the Precede-Proceed model

Variable	Awareness	Knowledge	Attitude	Efficacy	Enabling	Reinforcing	Skill
Awareness	1						
Knowledge	0.259**	1					
Attitude	0.293**	0.490**	1				
Efficacy	0.250**	0.253**	0.546**	1			
Enabling	0.191**	0.083**	0.340**	0.577**	1		
Reinforcing	0.132**	0.040**	0.290**	0.349**	0.473**	1	
Skill	0.229**	0.210**	0.522**	0.709**	0.649**	0.539**	1
**. Correlation is significant at the 0.01 level.							

Discussion

Given the importance of diabetes and the role of self-care education in its prevention and control, assessing the skills of community health workers is very important. This study aimed to evaluate the skills of community health workers to prioritize interventions to increase their skills in providing self-care programs using the third phase of the Precede-Proceed model or "educational-ecological evaluation". In this study, predisposing factors (awareness, knowledge, attitude, and self-efficacy), enabling factors, and reinforcing factors and skills of community health workers were evaluated.

Predisposing factors

Community health workers had acceptable knowledge and awareness. Since community health workers are at the first level of the health care system and are in close contact with people with pre-diabetes and have the duty to provide the necessary training to these people, they need to have a high level of knowledge and awareness. In other words, the high skill of community health workers in providing self-care programs depends on the high level of knowledge and awareness of these people. In this study, it was observed that community health workers have a good level of awareness and average knowledge, which is in line with the results of some studies (33, 34); therefore, it is suggested that this issue be considered in the design of interventions.

According to the present study results, strengthening the positive attitude of community health workers towards the need to control the disease and prevent its spread is a cost-effective way that can prevent the high costs of diabetes treatment and its complications, which inevitably burden patients and the health system. A study by Tseng *et al.* In the United States found that 96% of community health workers have a positive attitude toward identifying and providing self-care programs to pre-diabetics. This discrepancy can be seen in health policy-making and programming self-care services in pre-diabetic individuals (35). In the present study, community health workers had moderate self-efficacy in providing education to pre-diabetic individuals as well as material resources, which was consistent with the study by Bouchonville *et al.*; in that study, the self-efficacy of community health workers was not optimal, but after the implementation of a program called ECHO, it was significantly increased and confirmed that

the implementation of an appropriate program could increase the self-efficacy of community health workers (36). In the regression test, self-efficacy was the most important predictor of community health workers' skills, that the results of the present study were in line with the results of some studies (37–39).

Enabling factors

According to the present study results, community health workers were at a moderate level in terms of enabling factors. In this section, the lack of standard and high-quality equipment for measuring blood sugar, lack of access to the necessary resources to deal with environmental barriers, and weakness in using appropriate training strategies to implement self-care programs were prioritized. Enabling factors is one of the most important factors in increasing the skills of community health workers because without resources (standard tools) and without the use of appropriate strategies, it will be very difficult to provide self-care programs to people with pre-diabetes. In the regression study, enabling factors after self-efficacy were the most important predictors of community health workers' skills in providing self-care programs, consistent with many previous studies (23, 40–42).

Reinforcing factors

According to the studies conducted in this section, it is suggested that the support and encouragement of the authorities should be a priority because community health workers consider the support of the authorities to be effective in providing self-care programs to people with pre-diabetes. Given that the Precede model, in addition to evaluating predisposing factors and enabling factors, consider reinforcing factors in the educational-ecological evaluation phase, the behavior of others, especially authorities and their support, can improve the skills of community health workers in providing a self-care program for people with pre-diabetes. Various studies have shown an increase in support from those around them as well as authorities in improving the performance of patients and community health workers, and it seems that by creating a supportive environment, favorable changes can be made in the performance of the target group (20, 43, 44).

Conclusion

In this study, self-efficacy, enabling factors, reinforcing factors, and attitude were the predictors of community health workers' skills in providing self-care programs for pre-diabetic people, respectively. The status of reinforcing factors was at the desired level, but because the target group of this study were primary care providers, they did not have the knowledge, self-efficacy, and desirable reinforcing factors. Due to the unfavorableness of the mentioned variables and their direct and significant correlation with the skills of community health workers, it is suggested that educational interventions to improve the skills of community health workers in providing self-care programs for pre-diabetics be designed and implemented with emphasis on predisposing, enabling and reinforcing factors.

Limitations

Due to the limitations caused by the spread of Covid-19 disease, the questionnaire was completed by the participants online that the researchers were not aware of the conditions for completing the questionnaire, and this issue could affect the provided answers. Also, because this study was performed on community health workers, it cannot be generalized to other care groups such as nurses and physicians, and it is recommended that similar studies be performed on other community health workers.

Abbreviations

CHWs
community health workers
SDGs
Sustainable Development Goals
HDL
high-density lipoproteins
AIDS
Acquired immunodeficiency syndrome
SDGs
Sustainable Development Goals
CVR
Content Validity Ratio
CVI
Content Validity Index

Declarations

Acknowledgments

The authors of this article consider it necessary to appreciate and thank Tarbiat Modares University and the experts who helped us in various stages with their valuable opinions, community health workers, and Mazandaran University of Medical Sciences and Health Services, who had the necessary cooperation with researchers to carry out this project.

Authors' contributions

FG was responsible for the conception and design of the study. MG was responsible for the data acquisition. MG and HS were responsible for data analysis. MG drafted the manuscript; FG, FA, and HS revised and commented on the draft. All authors read and approved the final version of the manuscript.

Funding

This article in this publication was supported Elite Researcher Grant Committee under award number IR.NIMAD.REC.1398.244 from the National Institutes for Medical Research Development (NIMAD), Tehran, Iran.

Availability of data and materials

The data supporting our findings can be made available on request from the corresponding author.

Ethics approval and consent to participate

Ethical approval was granted by Tarbiat Modares University, Faculty of Medical Sciences, Ethics Committee (Approval ID: IR.MODARES.REC.1400.020). Online informed consent was sought from all the participants in the study. All authors confirm that all methods were performed in accordance with the relevant guidelines and regulations of Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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