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Original Article

Identification and Ranking of Cardiovascular Diseases Risk Factors with MICMAC Managerial Approach

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Abstract

Introduction: Cardiovascular diseases are one of the most important causes of mortality worldwide, and their prevention needs recognition of the factors affecting its occurrence and prospective planning. The aim of this study was to identify and rank the risk factors of cardiovascular diseases using MICMAC managerial approach.

Methods: The present study was conducted in two phases. In the first phase, a comprehensive overview of cardiovascular disease risk factors was performed. In the second phase, the identified factors were ranked using MICMAC managerial approach.

Results: In the literature review, 16 cardiovascular diseases risk factors including stress, anxiety and depression, nutrition and an unhealthy diet, low physical activity, smoking and drug consumption, hypertension, high blood lipids, overweight and obesity, age, gender, diabetes, family history, alcohol consumption, air and noise pollution, socioeconomic status, ethnicity and race and genetic factors were identified. According to the MICMAC approach and direct effects, three factors including unhealthy diet, obesity, and socioeconomic status were ranked first to third, as the most influential risk factors of cardiovascular diseases, respectively.

Conclusion: According to the findings and focusing on the three factors of unhealthy diet, obesity and economic and social status, appropriate educational interventions, notification, and awareness raising among the community using the mass media are suggested.

Keywords: Risk Factors, Disease, Cardiovascular.

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Introduction

It is generally accepted that non-communicable diseases account for 70% of global mortality (1). In this regard, cardiovascular diseases are important causes of mortality worldwide. However, the mortality from cardiovascular diseases is higher in developing countries (2). It is estimated that the number of people who die from these diseases will have reached 23.3 million by the year 2030 (3). The pathology of cardiovascular diseases varies from cardiac contractility to inflammation and damage to blood vessels. Factors such as hypertension, atherosclerosis, endothelial and myocardial disorders, diabetes, obesity, metabolic syndrome, and lifestyle (including exercise and nutrition) play a role in these diseases (4). On the other hand, cardiovascular diseases impose a heavy economic burden and also cause physical, psychological and social problems (4, 5). Since the two previous decades, the World Health Organization (WHO) has warned that non-communicable diseases including cardiovascular diseases should be among health priorities of developing countries (2).

One of the basic measures in managing the risk factors of any disease (including cardiovascular diseases) is to identify, evaluate and prioritize these factors. Without knowledge of the risk factors of the disease, prevention, control and management of these factors will be almost impossible and will cause the health systems confront with a systematic chaos in the face of disease. Therefore, identifying and ranking the risk factors for cardiovascular disease is an appropriate and logical approach in managing the risk factors. On the other hand, accurate knowledge of risk factors is essential for planning, monitoring and evaluating the national and regional control programs for this disease.

The present study aimed to identify and rank the risk factors for cardiovascular diseases by a MICMAC managerial approach in 2018.

Methods

This mixed-method research was conducted in two phases. First, the risk factors of cardiovascular diseases were extracted by conducting a comprehensive review of English-language databases, namely Web of Science (ISI), PubMed, Scopus and Cochrane, using keywords such as cardiovascular diseases, risk factor(s) and prevention.

All studies were evaluated by two researchers. In the first stage (title review), repeated and unrelated studies and studies on animals were excluded. In the next stage (abstract review), studies that were not relevant to the subject and purpose of the study were excluded. Finally, the quality of the remaining articles was evaluated using the STROBE tool. This tool includes 22 sections: title and abstract, background/rationale, objectives, study design, setting (study place and time), participants (in two parts: methods and results), variables, data sources/ measurement, bias, study size, quantitative variables, statistical methods, descriptive data, outcome data, main results, other analyzes, key results, limitations, interpretation, generalizability, and funding.

The inclusion criteria in the first stage were English-language articles on the risk factors associated with cardiovascular diseases (results related to risk factors) and on humans. In the second stage, the inclusion criteria included access to the full text of the studies. Finally in the third stage, studies which had a good quality according to the STROBE checklist assessment criteria (7≤score) were selected.

In the second phase, the most important risk factors for cardiovascular diseases were ranked, using MICMAC methodology approach. This phase of the study was carried out in four steps.

Step 1: Cross Impact of Cardiovascular Diseases Risk Factors

The Cross Impact Analysis was used after determining the risk factors of cardiovascular diseases in order to study the cross impact of these factors. To this end, the Cross Impact matrix consisting of the risk factors of cardiovascular diseases was distributed among some experts to determine the cross impact of the factors.

The experts consisted of 15 cardiovascular disease specialists who were selected by purposive sampling based on the research objective. The expertise in cardiovascular diseases and the work experience of at least 5 years in research centers related to cardiovascular diseases were the inclusion criteria. The contributing experts included faculty members of Shiraz University of Medical Sciences with work experience in the Cardiovascular Research Center of this university.

In the present study, 16 risk factors for cardiovascular diseases were placed in the Cross Impact Analysis matrix (square matrix with a factor in each row and its corresponding column). In this matrix, the experts answered the following questions: "Does this factor of row affect the occurrence of other factors in the columns? If so, how much is its impact?" In each cell, if the factor in the row has no impact on the occurrence of the factor in the column, the zero number meaning "no impact" is placed; otherwise, number 1 (weak impact), 2 (moderate impact), and finally 3 (high impact) are considered based on the severity of this impact. After filling out this matrix questionnaire, we used the MICMAC software to analyze the data..

Step 2: System Stability-Instability

The status of the system was studied in terms of stability-instability after completing and entering the cross impact matrix in MICMAC software since it affects the method of analyzing the effective factors. To this end, a scatter plot (dispersion map) was used. This plot was individually drawn based on direct impact and also on the basis of indirect impact by MICMAC software (Figure 1).

Step 3: Determining the Role of Each Factor and Evaluating Their Mutual Effectiveness

The role of all factors was analyzed in this step. Based on MICMAC methodological approach, each factor can have "dual", "effective" "impressible" and "independent" roles. Dual variables are effective and impressible at the same time. Effective variables are more effective and less impressible; thus, the systems

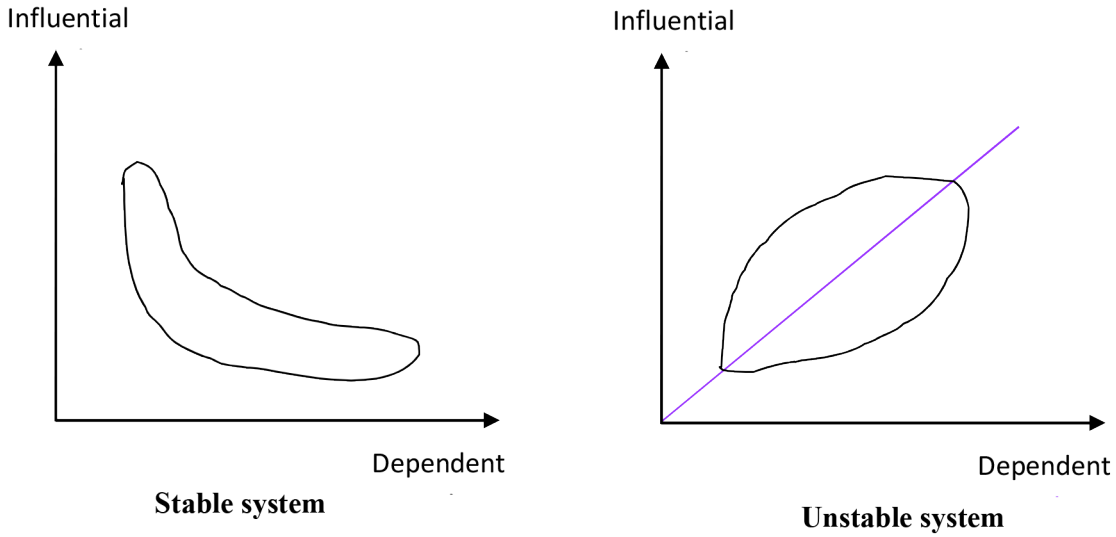

Figure 1: System Stability-Instability

largely depend on these variables. Impressible variables have low effectiveness and high impressibility; thus, they are very sensitive to evolution of dual and impressible variables. Independent or exclusive variables have low effectiveness and impressibility, and they seem unconnected to the system because they neither stop an original variable, nor cause its evolution and progress in the system.

Step 4: Ranking and Selecting the Most Important Risk Factors for Cardiovascular Diseases

After determining the role of these factors, the results of ranking effective and impressible factors were presented based on their direct and indirect effects, using the MICMAC software.

Results

First Phase Findings

3681 papers were found based on the search strategy, and ultimately 68 of them were used to extract the risk factors for cardiovascular diseases after removing repetitive and unrelated subjects to a desired purpose as well as screening based on their titles and abstract.

The findings of a comprehensive review in this phase resulted in extraction of 16 risk factors for cardiovascular diseases as follows:

1. Stress, anxiety and depression (6-12)
2. Nutrition and an unhealthy diet (13-17)
3. Low physical activity (18-20)
4. Smoking and drug consumption (9, 21-24)
5. Hypertension (9, 20, 25-29)
6. High blood lipids (30-32)
7. Overweight and obesity (9, 20, 33-39)
8. Age (40-43)
9. Gender (44-48)
10. Diabetes (blood glucose) (9, 49-51)
11. Family history of cardiovascular diseases (50, 52-54)
12. Alcohol consumption (9, 55-62)
13. Air and noise pollution (63)
14. Socioeconomic status (awareness, education and income levels) (64-68)
15. Ethnicity and race (69-71)
16. Genetics (genes associated with cardiovascular diseases) (72, 73)

Second phase findings: In the second phase, the identified risk factors for cardiovascular diseases in the first phase were analyzed and investigated.

Cross Impact Analysis

Table 1 presents the results of the initial analysis of the matrix data and their cross impact. According to the results of the preliminary analysis, the matrix filling rate was equal to 50.07, indicating that the selected factors had moderate and dispersed impact on each other and in fact the system had a relatively stable status.

From a total of 256 (16*16) evaluable relations in this matrix, 129 were zero, showing that the factors

Table 1: The findings of Matrix data initial analysis and the factors' mutual effects

Criteria	Amount
Matrix dimensions	16
Frequency Interaction	2
The frequency of number 0	129
The frequency of number 1	70
The frequency of number2	48
The frequency of number 3	9
The assumption of Matrix fillings	127
Matrix filling degree (%)	50.39

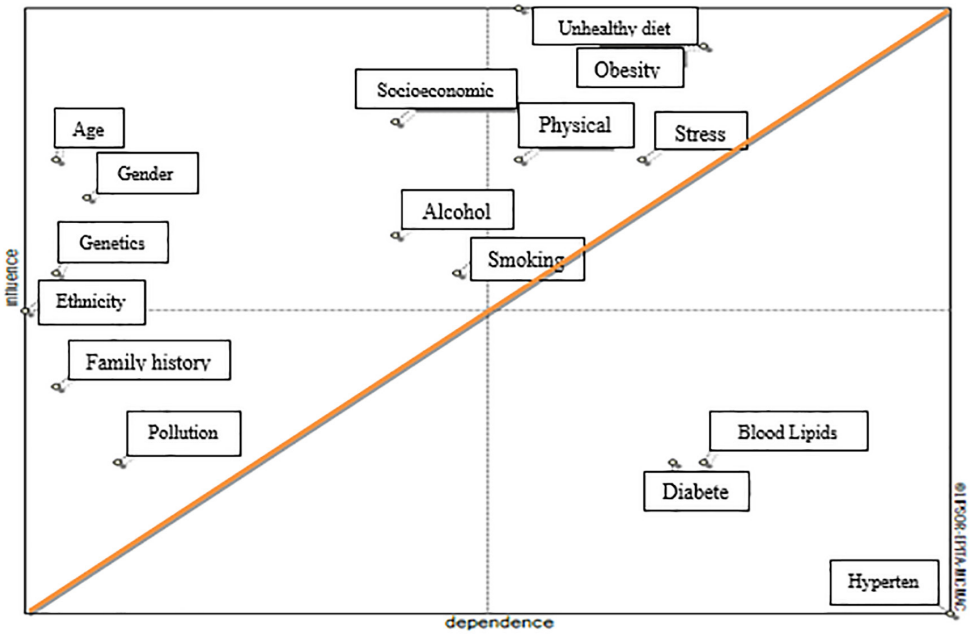

Figure 2: The distribution of cardiovascular diseases risk factors in the impressibility-effectiveness diagram (based on direct effects of variables)

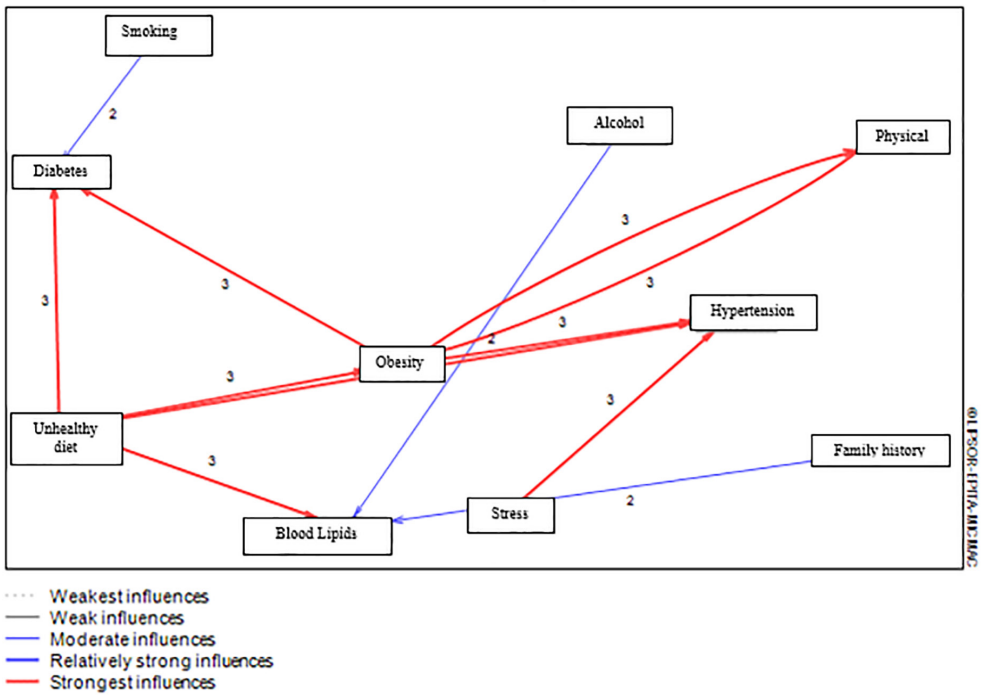

Figure 3: The direct relationship between the variables (very weak to very strong effects)

did not have any cross impact. This value accounted for nearly 50.39% of the total volume of the matrix (Table 1).

System Analysis: Stability-instability Status

Figure 2 shows the scatter plot of the risk factors for cardiovascular disease in the impressibility-effectiveness diagram (based on direct effects of variables).

The system had a relatively stable status according to the distribution graph of the risk factors for cardiovascular diseases. This confirms the dispersion of variables in the first and third quarters. Similarly, seven variables existed in the second quarter. These variables had high effectiveness and low impressibility. Three variables existed in the fourth quarter and had effectiveness and low impressibility. Some of these variables were also dispersed around the diagonal axis, indicating that these variables have the same level of effectiveness and impressibility.

Figure 3 corresponds to the matrix questionnaire of research based on direct effects of the factors. It contains 10 factors which at least have a direct impact on another factor.

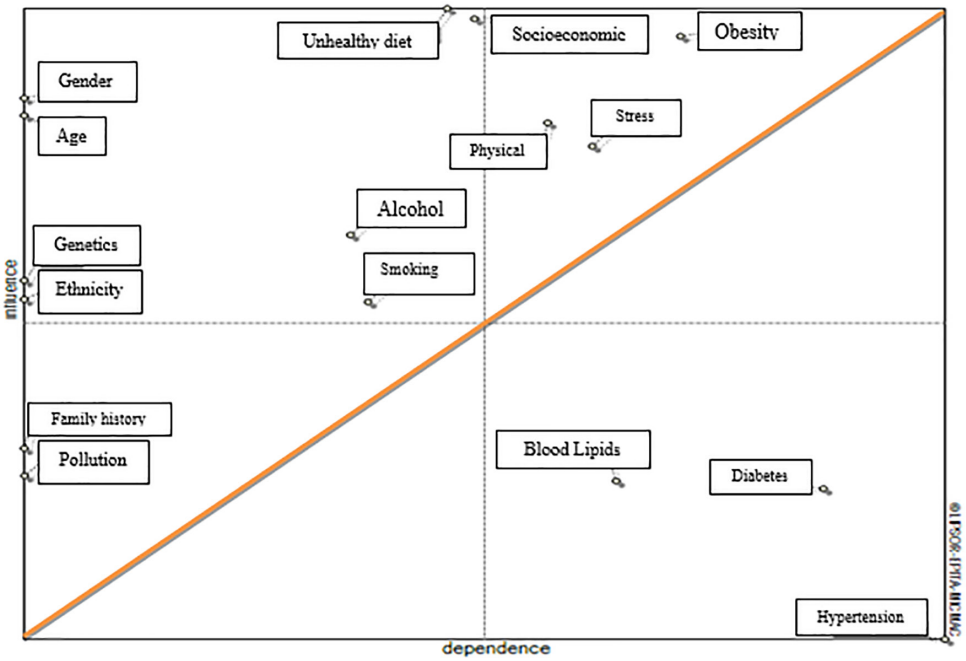

Figure 4: The distribution of cardiovascular diseases risk factors in the impressibility-effectiveness diagram (based on indirect effects of variables)

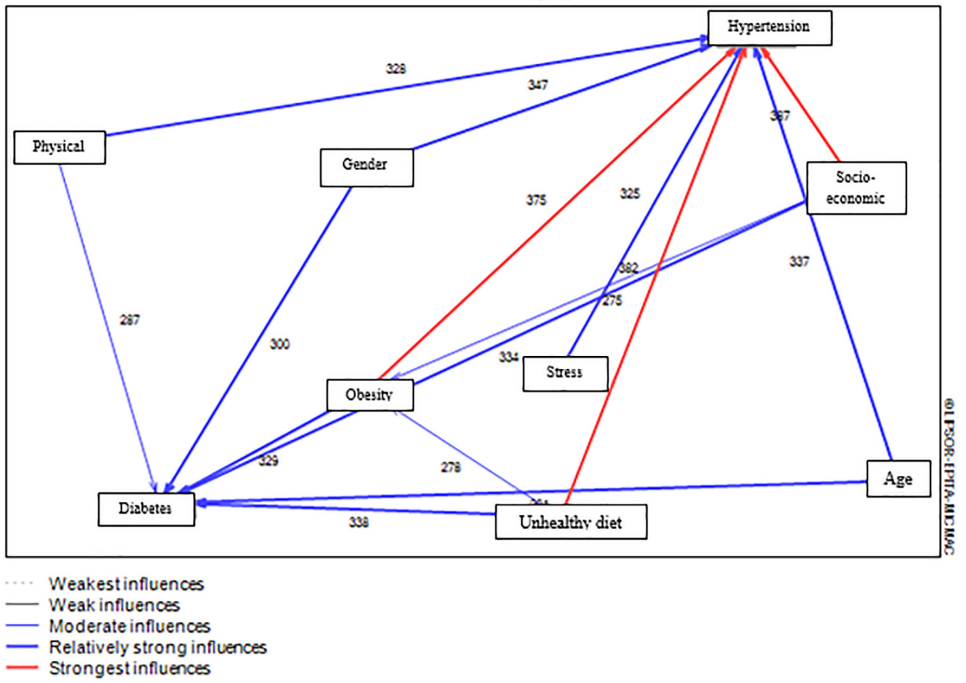

Figure 5: The indirect relationship between the variables (very weak to very strong effects)

As shown in Figure 4, the system has a relatively stable status based on indirect effects of the variables.

Based on Figure 5, which corresponds to the matrix questionnaire of research and based on indirect effects of factors on each other, the matrix has 9 factors. This is the number of factors that affect at least another factor.

Assessment of Cross Impact of factors

In the Cross Impact matrix, the sum of the numbers of each row refers to the effectiveness of that factor, and the sum of column numbers of each factor also indicates its impressibility. Table 2 presents the sum of row and column scores for each factor.

Based on analytical results of this matrix, the most effective factors are unhealthy nutrition and diet, overweight and obesity, and socioeconomic status. The most impressible factors are the hypertension, high blood lipids, overweight and obesity. The output of MICMAC Software in Figures 6 and 7 of the list of variables shows the direct effects of the above findings.

Table 2: The features of Cross Impact matrix of cardiovascular diseases risk factors

Rank	Cardiovascular disease risk factors	Sum of the numbers of each column (Range 0 to 48) impressibility	Sum of the numbers of each row (Range 0 to 48) effectiveness
1	Nutrition and an unhealthy diet	16	19
2	Low physical activity	16	15
3	Smoking and drug consumption	12	14
4	Hypertension	30	3
5	High blood lipids	22	7
6	Overweight and obesity	22	18
7	Age	0	15
8	Gender	0	14
9	Diabetes (blood glucose)	21	7
10	Family history of cardiovascular diseases	1	9
11	Alcohol consumption	12	13
12	Air and noise pollution	3	7
13	Socioeconomic status	12	16
14	Ethnicity and race	0	11
15	Genetics	1	12
16	Stress, anxiety and depression	20	15

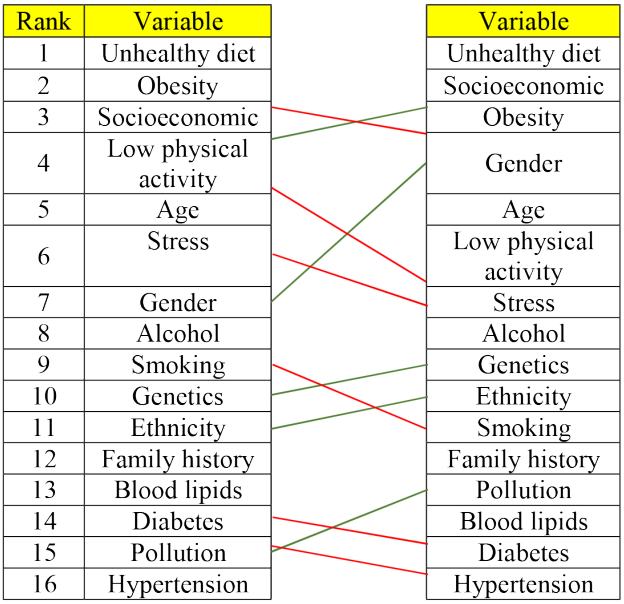

Figure 6: The results of MICMAC: lists of variables according to their direct effectiveness

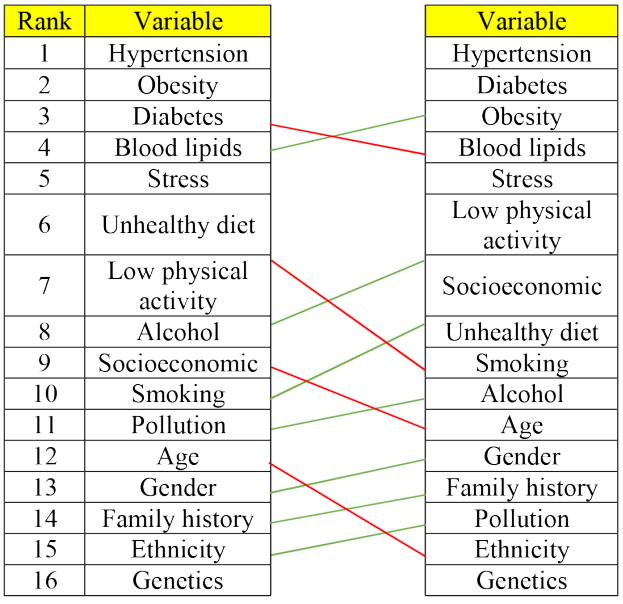

Figure 7: The results of MICMAC: lists of variables according to their direct impressibility

System Analysis: Determining role of each factor

The role of each factor can be examined in the system based on its location in the scatter map of cross impact graph. Table 3 presents the classification of variables based on the roles.

Based on the findings shown in Table 3, the first group consists of effective variables which are located near the vertical axis in the second quarter and contain socioeconomic status, age, gender, alcohol consumption, ethnicity and race, and smoking as variables influencing the prevention of cardiovascular diseases (variables that affect other risk factors).

The second group is two-sided variables which are in the first quarter, namely the unhealthy nutrition and diet, obesity and overweight, stress and anxiety, inactivity and low physical activity with dual roles (effectiveness and impressibility).

The third group consists of impressible or output variables that are in the fourth quarter. This Group has 3 factors, namely the high blood lipids, diabetes (blood sugar) and hypertension.

The fourth group also consists of independent variables located in the third quarter containing air and noise pollution and the family history of cardiovascular diseases.

Ranking and Selecting the Most Important Risk Factors of Cardiovascular Diseases

The shift of variable ranks is not tangible according

Table 3: The role of the cardiovascular disease risk factors by MICMAC methodological approach

The feature of variable locations in the scatter map		Cardiovascular disease risk factors	The variable role based on MICMAC
Sum of the numbers of each column (Range 0 to 48) impressibility	Sum of the numbers of each row (Range 0 to 48) effectiveness		
12	16	Socioeconomic status (awareness, education and income levels)	Effective variables
0	15	Age	
0	14	Gender	
12	13	Alcohol consumption	
1	12	Genetics (genes associated with cardiovascular diseases)	
0	11	Ethnicity and race	
12	14	Smoking and drug consumption	
16	19	Nutrition and unhealthy diet	Dual variables
22	18	Overweight and obesity	
20	15	Stress, anxiety and depression	
16	15	Low physical activity	
22	7	High blood lipids	Impressible variables
21	7	Diabetes (blood glucose)	
30	3	Hypertension	
1	9	Family history of cardiovascular diseases	Independent variables
3	7	Air and noise pollution	

to the compared results of ranking variables based on the analysis of direct and indirect effects. Therefore, factor ranking was not significantly different based on direct and indirect effects in identifying the most effective factors. Tables 4 and 5 present the results of ranking effective and impressible variables based on direct effects of the factors on each other and their indirect effects.

According to Table 5 and based on direct effects, "unhealthy nutrition and diet", "overweight and obesity" and "socioeconomic status" are ranked first to third respectively in terms of their impact. On the basis of indirect effects, "socioeconomic status" factor is put in the second rank and the "overweight and obesity" is ranked third in terms of their impact.

Discussion and Conclusion

The present study aimed to identify and rank the risk factors for cardiovascular diseases by MICMA managerial approach. Based on the results, three factors, namely the "unhealthy diet and nutrition", "overweight and obesity" and "socioeconomic status", were the most important factors in the prevention of cardiovascular diseases and they should be seriously taken into account.

Healthy diet is an important preventive factor in the incidence of cardiovascular diseases and has a particular importance in today's societies because dietary habits and types of diet affect the health and function of the cardiovascular system. Researchers recognized the definite association between the diet and cardiovascular health in the 1950s and found that the fat in the diet was a key source of body cholesterol (74).

A great number of studies have investigated the relationship between diet and cardiovascular disease (6-12). There is also considerable evidence that cardiovascular diseases have nutritional roots (13, 74, 75). According to the results of studies by Haghighatdoust et al. and Hu et al., the unhealthy diet model was positively associated with the risk factors for cardiovascular diseases (76, 77).

In a case-control research, Salimzadeh et al. studied the nutritional risk factors and their relationships with cardiovascular diseases, indicating that cardiovascular diseases were directly associated with consumption of fat, solid and hydrogenated oils, but inverse association with consumption of fruit and vegetables. Furthermore, nutritional risk factors in the patient group included the low consumption of fish and the overuse of fried foods (78).

Maleki et al. reported that low intake of fruits and vegetables and fish, and high consumption of hydrogenated oils containing undesired fatty acids were the major nutritional risk factors for cardiovascular diseases. Furthermore, the excessive consumption of foods including red meat and mayonnaise was the other risk factor with direct association with cardiovascular diseases (79). The obtained information from a cohort study in Sudan

Table 4: The ranking of effective and impressible variables based on their direct and indirect effects

The variable ranking based on indirect effect						The variable ranking based on direct effect					
Rate of impressibility	Variable	Rank of impressibility	Rate of effectiveness	Variables	Rank of effectiveness	Rate of impressibility	Variable	Rank of impressibility	Rate of effectiveness	variables	Rank of effectiveness
1643	Hypertension	1	925	Nutrition and unhealthy diet	1	1554	Hypertension	1	984	Nutrition and unhealthy diet	1
1426	Diabetes	2	913	Socioeconomic status	2	1139	High blood lipids	2	932	Obesity	2
1171	Obesity	3	892	Obesity	3	1139	Obesity	3	829	Socioeconomic status	3
1056	High blood lipids	4	819	Age	4	1082	Diabetes	4	777	Low physical activity	4
1013	Stress	5	798	Low physical activity	5	1036	Stress	5	776	Age	5
934	Low physical activity	6	790	Stress	6	829	Nutrition and unhealthy diet	6	777	Stress	6
803	Socioeconomic status	7	762	Alcohol consumption	7	829	Low physical activity	7	725	Alcohol consumption	7
754	Nutrition and unhealthy diet	8	657	Smoking	8	725	Smoking	8	673	Smoking	8
613	Smoking	9	603	Gender	9	621	Alcohol consumption	9	621	Gender	9
582	Alcohol consumption	10	581	Ethnicity and race	10	621	Socioeconomic status	10	621	Genetics	10
0	Air and noise pollution	11	577	Genetic	11	155	Air and noise pollution	11	569	Ethnicity and race	11
0	Age	12	404	Family history	12	103	Gender	12	466	Family history	12
0	Gender	13	372	Air and noise pollution	13	51	Age	13	362	High blood lipids	13
0	Family history	14	366	High blood lipids	14	51	Family history	14	362	Diabetes	14
0	Ethnicity and race	15	357	Diabetes	15	51	Genetic	15	362	Air and noise pollution	15
0	Genetic	16	178	Hypertension	16	0	Ethnicity and race	16	155	Hypertension	16

Table 5: The most important cardiovascular diseases risk factors (based on direct and indirect effects)

The variable ranking based on their indirect effects		The variable ranking based on their direct effects	
Variable	**Rank of effectiveness**	**Variable**	**Rank of effectiveness**
Nutrition and unhealthy diet	1	Nutrition and unhealthy diet	1
Socioeconomic status	2	Obesity	2
Obesity	3	Socioeconomic status	3
Age	4	Low physical activity	4
Low physical activity	5	Age	5
Stress, anxiety and depression	6	Stress, anxiety and depression	6
Alcohol consumption	7	Alcohol consumption	7
Smoking	8	Smoking	8

indicated that an unhealthy diet was a risk factor for cardiovascular diseases, and, on the other hand, lifestyle modification and healthy nutrition could prevent cardiovascular diseases by 80% (80). Given the research results, a healthy diet plays a significant role in preventing cardiovascular diseases and requires a serious attention by health system policymakers and planners.

Furthermore, obesity and overweight have always been among the health problems, especially in developing countries. Obesity or increased body fat including visceral fat and subcutaneous fat are due to imbalances in the energy intake and consumption that can be genetic or occur due to various diseases. Various factors including the amount of food consumed, activity levels (such as hours of watching TV by children), different hormones, and education level play important roles in this regard (81).

Obese people are more susceptible to non-communicable diseases such as cardiovascular disorders (82).

According to reported statistics in district 13 of Tehran in 2001, the prevalence of obesity and overweight was 23% and 40% respectively in people over 20 years of age. On the other hand, 8.8% of men and 12.7% of women suffered from cardiovascular diseases in this region (83). The findings of a research by Azizi et al. indicated a significant relationship between obesity and cardiovascular risk factors such as hypertension and high fat levels (84). Results of Agheli et al.'s research on the prevalence of cardiovascular disease risk factors in people over the age of 30 years in Rasht and Qazvin indicated that obesity was more prevalent and had a positive and significant relationship with other risk factors of cardiovascular diseases (85).

The findings of a research by Daniel et al. indicated that hypertension was a risk factor for cardiovascular diseases in obese people, especially those with abdominal and upper body obesity (86).

McGill et al. reported that obesity was associated with variations in blood lipid metabolism. Side effects of obesity on lipids are the increased cholesterol concentrations, increased levels of LDL and Triglyceride and decreased HDL. Decreasing the HDL is a risk factor for cardiovascular diseases (87). According to previous studies, obesity and overweight are some reasons for the increase in the prevalence of cardiovascular diseases (88).

Regarding the socioeconomic status, it is suggested that the rate of development of each society on the quality of public health, equitable distribution of health among different social classes, and degree of protecting deprived people against the factors with the adverse effects on the public health should be investigated (13). On the other hand, the socioeconomic status, which is an important determinant of social classes, is directly related to health levels (13).

In fact, the socioeconomic status is a determinant of the human health. For most people, the health status is primarily related to the rate of socioeconomic progress including per capita income, educational levels, employment, housing, military rate, household size, and increase in population. Evidence suggests that the greatest burden of diseases and most of health inequalities arise from social factors in the world, and it is impossible to achieve health goals without achieving significant success in the poverty reduction, food security, education, women empowerment and lifestyle modification in poor and populated regions (89-91).

Therefore, health systems need to pay attention to health determinants, which are the main causes of health inequities, in order to achieve the goal of equity in health (92). In every social and political system and geographic location, there are differences in the health status of different social groups, even in different geographic regions within a country (93).

Haghighatdoust et al. reported that the prevalence of cardiovascular diseases is lower in lower classes of socioeconomic status (76). Pourreza et al. studied the relationship between socioeconomic factors and coronary artery disease (as one of cardiovascular diseases) in people below 45 years of age and indicated that socioeconomic factors were associated with the incidence of disease. The coronary artery disease was significantly higher in patients with lower education levels (under high school diploma and illiterate) (94). Albus also considered the risk of developing cardiovascular diseases associated with reduction of education level and pointed out that if we consider a parameter as a socioeconomic factor due to the lack of time or cost increase, the education level is the best indicator for good cardiovascular health (95).

Harderson found an inverse relationship between the education level and mortality from coronary artery disease. Therefore, a 14% reduction in mortality from coronary artery disease was reported in men with high school education compared to those with primary school education. This figure reached 17% for people with academic education (96).

In a 10-year cohort study on 25-65 year-old people in Russia, Malyutina concluded that more than half of people who died of cardiovascular diseases had the primary school education; and the relative risk rates of mortality from cardiovascular diseases were 1.025, 0.74 and 0.48 at the confidence level of 95% for primary, secondary, high school, and university education levels (97).

According to the results of the studies conducted by Asefzadeh et al. (98) and Marmut et al. (99), farmers were 9.1 times more vulnerable to death from cardiovascular diseases than the managers and lawyers. Pourreza et al. (94) reported that the type of jobs and positions was significantly correlated with coronary artery disease; and the risk of this disease was 2.7 for self-employed people, 7.8 for unemployed people and workers, and 2.1 for housewives compared to employees and retirees. In 2008, Rainier studied the impact of socioeconomic status on a sudden cardiac arrest and concluded that people in lower income deciles were more likely to die due to this disease than those at the highest levels (100).

It seems that its association with other causes

of this disease is a reason why the socioeconomic status is considered as an important risk factor for cardiovascular diseases.

Evidence suggests that such risk factors associated with cardiovascular diseases as the obesity, lack of fresh fruit and vegetables, and cigarette smoking are more common among people and regions with lower socioeconomic status. According to the results and findings of the above-mentioned studies on the socioeconomic status and its role as an effective factor in the risk of cardiovascular diseases, people with better educational status and higher income levels usually work in suitable places and have less disability and mortality. On the other hand, they have more job opportunities, and higher information and skills, all of which have a positive impact on improving the public health and reducing the risk of cardiovascular diseases.

Regarding the mentioned risk factors, prevention is recommended as the first priority of intervention in preventing the incidence of cardiovascular diseases and a managerial strategy to control the disease.

In this regard, it should be noted that prevention should be done primarily by educating, informing, and increasing the knowledge of people in the community about the risk factors for the disease and also reminding the protective factors against these diseases. Because lack of awareness and non-observance of proper health behaviors are inevitable in any society, individuals and communities need to be trained in proper health behaviors to know the correct ways of life and its use and to avoid the diseases (101).

Therefore, health education and, thus, promoting community health play a key role in preventing many diseases (101). In the present study, it is recommended that educational programs in the field of nutrition and a healthy lifestyle for the general public should be considered in order to prevent cardiovascular diseases. In the field of promoting nutritional knowledge and having a healthy lifestyle, another issue that should be addressed is the role of audio and video media at the national level, because as a communication mechanism they play an important role in the field of health and culture in this area.

It also seems necessary to try to study the preventable mechanisms and subsequently promote and support a healthy lifestyle among the groups with lower socio-economic status. In this regard, first, it is necessary to identify and then classify different individuals in the community and households based on indicators related to socio-economic status. It is suggested that the main basis of programs to improve socio-economic status (and reduce the risk of cardiovascular disease) include making efforts to reduce social strata (meaning reducing inequality in income and wealth), reducing exposure to harmful factors (which the deprived suffer from), reducing the vulnerability of the underprivileged groups in critical situations, and performing interventions using health care to reduce the unequal consequences of the disease among disadvantaged people who suffer from the disease. Also, development and implementation of screening and prevention programs for early detection of cardiovascular disease in deprived areas and among people with low socioeconomic status, who often live in small towns, suburbs, and areas out of reach of health teams, are suggested.

Finally, the Ministry of Health and Medical Education (MOHME) has suggested identification of the risk factors and symptoms of illness and timely referral for disease prevention or diagnosis through informing and raising the public awareness through the mass media. Furthermore, educational programs on lifestyle changes and healthy nutrition will also be helpful in this regard. On the other hand, the use of new diagnostic methods can be effective in accurate and early diagnosis of the diseases.

Ethical Considerations

Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy) were thoroughly observed by the authors.

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Conflict of Interest: None declared.

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