Journal for Re Attach Therapy and Developmental Diversities
eISSN: 2589-7799
2023 August; 6 (10s): 317-335

Psychological Impact of Counselling Intervention Program of Sample of People Attending Primary Health Care Centers in Erbil City

Salah H, Ali[1], Haitham E, Al-Banaa[2]
1, 2 Community Medicine Department, college of Medicine, Hawler Medical University, Erbil,Kurdistan-Iraq
Salah; salah.ali@epu.edu.iq; Haitham: haitham.issa@hmu.edu..krd

Received: 25- June -2023
Revised: 26- July -2023
Accepted: 06- August -2023

Abstract

Background: Cardiovascular disease is one of the largest health issues threatening people's lives in the globe today. These illnesses are the primary cause of death in several states.

Objective: The goal of this study is to assess the impact of a counseling intervention program on cardiovascular disease incidence and mortality among the people of the Erbil Governorate.

Subjects and methods: In order to evaluate the efficacy of the counseling intervention program, pre-post intervention studies were carried out on a sample of participants who attended 29 primary health care centers in Erbil city affiliated to the Erbil Health Directorate, Kurdistan Region of Iraq. 100 participants who accepted to participate in the intervention program had their baseline data collected. Each group had 50 participants and was randomly allocated to either the intervention group or the control group. Data was gathered between October 2021 and July 2022. Before implementing the program, the validity of the counselling intervention program was approved by cardiologists and specialists in this field. Prior to data collection, the necessary ethics permissions were obtained.

Results: Most of the participants were either in the age range 56-65.9 years (48.0%) of the control group or 46-55.9 years (30.0%) of the intervention group. According to the findings, both groups had a significant prevalence of high blood pressure (74.0% in the control group and 68.0% in the intervention group), and 94.0% of the control group members had diabetes. As a result of the study's findings, the majority of participants in both groups were taking medication to treat high cholesterol. Participants in the intervention group lost more weight than those in the control group (83 vs. 79, p-value.114) and experienced higher changes in their cholesterol and HbA1c (6.4 vs. 6.8, p-value.003) after three months of follow-up. Both triglycerides (214 vs 229 mg/dL, p-value.172) and HDL (45.6 vs 45.2 mg/dL, p-value.841) were significantly different. LDL-C reductions in the intervention group were higher than in the control group (122 vs. 134 mg/dL, p-value = 0.047).

Conclusions: The findings show that cardiovascular disease patients can adopt and maintain a variety of lifestyle modifications during the follow-up and counseling periods that can lower and regulate blood pressure and HbA1c, help them lose weight, and raise their HDL-C levels.

Keywords: Cardiovascular diseases; Risk factor; Counselling intervention program; Primary health care centers

Introduction

Cardiovascular illnesses are one of the biggest health issues facing the globe today, and the growing threat they provide to human health. These illnesses constitute the primary cause of death in various countries (Roth, G.A., et al., 2020). Numerous studies have found that 40 to 45 percent of fatalities are caused by cardiovascular diseases. According to the third report from the World Health Organization, heart failure, strokes, and sudden cardiac death account for 12 million fatalities annually worldwide (Tsao, C.W., et al., 2022). By 2030, it is expected that more than 23.3 million people will die annually from CVD. Because they are more susceptible to risk factors like cigarettes, have less access to medical services, and have lower levels of health knowledge, low- and middle-income countries have a higher CVD mortality rate. Premature deaths from CVD were and continue

to be caused by risk factors such smoking, hypertension, dyslipidemia, diabetes, obesity, sedentary lifestyles, and nutritional variables (Amini, M., et al,2021).

The pathologies collectively referred to as cardiovascular disease (CVD) include coronary heart disease (CHD), cerebrovascular disease, peripheral arterial disease, rheumatic and congenital heart diseases, and venous thromboembolism. Of the 31% of CVD-related deaths worldwide, the majority are CHD and cerebrovascular accidents. Over 75% of premature CVD is preventable, according to the World Health Organization (WHO), and reducing risk factors can help ease the growing burden of CVD on both patients and healthcare professionals (Ralapanawa, U. and R. Sivakanesan,2021).

Particularly in low- and middle-income countries, cardiovascular illnesses kill 17.7 million people worldwide each year from non-communicable diseases. The greatest cause of cardiovascular mortality globally is coronary artery disease (CAD), accounting for more than 4.5 million deaths annually among non-communicable diseases (Saeed, K.M.I.,et al,2020)..

In Iraq, the leading cause of disease-related death is cardiovascular disease. These days, there are worrying signs of a rising rate of CAD at a young age in developing nations, including Iraq (Hussain, A.M. and R.K. Lafta,2019). Moreover, CAD affects the coronary tree with more aggressive lesions and tends to manifest earlier in patients with a clustering of cardiovascular risk factors (Mohammad, A.M., et al.,2021).

Rapid lifestyle changes have increased CVD severity, which is becoming a major health concern, particularly in poorer nations where non-communicable diseases are displacing the traditional foes of infectious diseases and hunger (Francula-Zaninovic, S. and I.A. Nola,2018).

Numerous risk factors, such as heredity, male gender, aging, smoking, high blood pressure, diabetes mellitus, obesity, inactivity, dyslipidemia, and homocysteine level, may contribute to the prediction of CVD. If a person has more risk factors, they are more prone to get cardiac problems (Bays, H.E.,2021).

The premise behind identifying risk factors and altering them is based on the notion that exposure to environmental factors raises the statistical likelihood of contracting a disease, and that altering these factors should delay or prevent the condition. Since the prevention of cardiovascular diseases was discovered to be more effective in this age group than in older patients, it is crucial to identify risk factors operating in early age (Pallazola, V.A., et al.,2019).

Cardiovascular disease (CVD) continues to be a leading cause of morbidity and mortality in low- and middle-income countries (LMICs). LMICs were home to 75% of the 17.9 million CVD-related fatalities reported globally in 2016 (Ali, S., et al.,2020). The increase in metabolic risk factors for cardiovascular illnesses, such as obesity, high blood pressure, and diabetes, can be attributed to changes in lifestyle, as shown by changes in physical activity, metabolism, drinking, and smoking habits (Cercato, C. and F. Fonseca,2019). More than half of the 671 million obese people worldwide are thought to reside in ten nations, eight of which are LMICs (Ng, M., et al.,2014). Furthermore, it is predicted that by 2030, there will be 228 million individuals living with diabetes worldwide, up from 84 million in 1995. Among LMICs, the prevalence of hypertension was reported to be 32.3% in 2015 by a comprehensive review (Sarki, A.M., et al.,2015), however among Africans aged 50 and older, the prevalence was reported to be 57.0% (Bosu, W.K., et al.,2019).

The overall burden of CVD can be decreased by giving up and avoiding certain lifestyle factors such inactivity, poor food, smoking, drinking, and metabolic risk factors like dyslipidemia, hypertension, and diabetes (Sharifi-Rad, J., et al.,2020). Community-based interventions can reduce the burden and risk of CVD in entire communities by influencing the population's views, knowledge, and risk-taking behaviors (Hassen, H.Y., et al.,2022). The majority of low- and middle-income nations lack the resources to execute treatment-oriented initiatives on a wide scale; hence population-level public health policies are likely to be more cost-effective (Feigin, V.L., et al.,2020).

The INTERHEART trial showed the influence of CVD risk factors such dyslipidemia, smoking, hypertension, diabetes, and abdominal obesity in addition to the health benefits of eating fruits and vegetables and getting regular exercise. These risk factors persisted across all demographic groups and socioeconomic levels investigated, suggesting the efficacy of international approaches to standardized fundamental CVD prevention (Alhabib, K.F., et al.,2020).

Subjects and Methods

Design of the study

The effectiveness and impact of a counseling intervention program were examined using a pre-post intervention design. The intervention's main goal was to raise participants' awareness of engaging in health-promoting behaviors in line with the framework of the health promotion paradigm. For intervention program participants, we held a face-to-face instructional session (30–40 minutes) on the day of the visit or interview. This was accompanied by an educational booklet (written information on quitting smoking, eating a healthy diet, managing your weight, and engaging in physical activity). Every two weeks after participants left the center, we would phone or text them to check on their progress and offer encouragement. Guidelines for structured courses and telephone courses were created. Cardiologists and other experts approved the counselling intervention program before the research.

The setting of the study

The current study was conducted in the health centers affiliated to the Erbil Health Directorate.

Population and sampling

Population

The main target population is all age from 18 to 65 years, who have one or more cardiovascular risk factor in Erbil city.

Sampling

Participants were chosen from primary healthcare facilities in Erbil, the capital of Iraq's Kurdistan Region.

Inclusion criteria: 1. They should fall within the age range of 18 and 65. **2**. At least one of the following coronary heart disease risk factors.

Exclusion criteria

Participants who find it difficult to engage in moderate-intensity physical activity due to psychiatric conditions or terminal illnesses (such as cancer and heart failure) or difficult to communicate with patient. They were divided into two groups, intervention and control groups, then non-probability method of convenience sampling was practiced.

Sample size

According to the requirements of the current research, the researcher took samples from health center visitors who had at least one risk factor for developing heart disease with a number of 100 participants, then two groups (intervention and control) were selected, and each group consisted of 50 participants.

Data collection

The questionnaire was performed in July 2021to September 2021, In October 2021 we collected data until June 2022, and from July 2022 until December 2022 we cleaned, coded and analyzed the data. At the time of study enrollment, baseline participant information was gathered, and individuals were then randomly assigned to the

intervention group or the control group based on the study's objectives and methods. The researcher collected basic and follow-up data at 3 months and 6 months, depending on himself knowledge of the group allocation.

Statistical methods

All data analyzes were performed by SPSS (version 25), and all participants' data were analyzed at baseline for 3 months. Data were described using the mean, standard deviation, and median (or number and percentage), and the t-test, Chi-square test, and Fisher's exact test were used to investigate any differences between groups at baseline, as well as to investigate the effect of the counselling intervention program on cardiovascular risk, and efficiency. endogenous, and health-promoting behaviors, a generalized regression model was used. The modified generalized estimation equation model considered any variable with a p-value less than 0.1 in baseline comparisons between groups to be a covariate. The two-tailed significance level was set at 0.05.

Results

Data were collected from October 2021 to June 2022 in Erbil. One hundred people (50 interventional and 50 control participants) participated in the study. The mean age was 43.4 (SD 11.6) and 52.0 (SD 13.6) for the intervention group and control group. The intervention group had 60.0% (n = 30) male participants while the control group had only 42.0% (n = 21) male participants.

As show in Table 1 the majority of them were either in the age group 56-65.9 years comprises (48.0%) control group or 46- 55.9 years (30.0%) of the interventional group. This proportion represents the large groups in the study.in contrast, the age group of 18- 29.9 comprises (10.0%) of control group and (6.0%) of interventional group.

Data in table 1 shows the relationships between sociodemographic characteristics among intervention and control group. Chi-square, fisher exact, and likelihood ratio test were practiced to defect an association between both groups. The results revealed that, there are no statistically significant relationships between both groups. Chi-square test for patients age in both groups was investigated and the probability p value 0.000 shows statistical significances relationships between them, and gender shows p value=0.109, marital status (p value =0.836), level of education (p value= 0.000). Fishers' exact tests were used to examine the relationships between interventional and control groups regarding residency and the outcome was highly statistically significant relationships between both groups (p value=0.000). Regarding income in both groups was tested and they also prove no statistically significant association between both groups (p value= 0.427).

Table 1: Association between Control and Intervention for socio-demographic variables

Variable		Control(n=50)		Intervention(n=50)		P-Value
		Freq.	%	Freq.	%	
Gender	Male	21	42	30	60	0.109 (NS) ǂ
	Female	29	58	20	40	
Age (Group)	18 - 25.9	5	10	3	6	0.000 (HS) ǂ
	26 - 35.9	1	2	12	24	
	36 - 45.9	2	4	11	22	
	46 - 55.9	18	36	15	30	
	56 - 65.9	24	48	9	18	

Variable		Control(n=50)		Intervention(n=50)		P-Value
		Freq.	%	Freq.	%	
Level of Education	Illiterate	26	52	4	8	0.000 (HS) †
	Read &write	1	2	2	4	
	Primary	11	22	8	16	
	Secondary	8	16	19	38	
	Institute	1	2	10	20	
	College	3	6	7	14	
Place of Residence	Urban	35	70	50	100	0.000 (HS) ‡
	Rural	15	30	0	0	
Marital Status	Single	5	10	3	6	0.836 (NS) §
	Married	43	86	44	88	
	Divorced	1	2	1	2	
	Widowed	1	2	2	4	
Income	Enough	38	76	41	82	0.427 (NS) §
	Not enough	11	22	9	18	
	Exceeds for daily	1	2	0	0	
Occupation	House wife/unemployed	30	60	13	26	0.000 (HS) §
	Unskilled worker	6	12	6	12	
	Skilled manual worker	3	6	25	50	
	Non manual	4	8	0	0	
	High rank occupation	1	2	6	12	
	Retired	6	12	0	0	
No. of people living in your household (crowding index)	1 person	1	2	0	0	0.005 (HS) §
	2-3	9	18	19	38	
	4-5	14	28	19	38	
	6-7	22	44	7	14	
	8-9	1	2	4	8	
	>=10	3	6	1	2	

The results in table 2 show that there is not significance deference between control and intervention by walking with (p value 0.211), On the contrary to the exercise there is high significance between control and intervention with (p value 0.000).

Table 2: Association between Control and Intervention regarding life-style

Variable		Control(n=50)		Intervention(n=50)		P- value
		Freq.	%	Freq.	%	
Do you smoke any tobacco product?	Yes	10	20	16	32	0.254 (NS) ⸸
	No	40	80	34	68	
Have you made an effort to quit smoking in the last 12 months?	Yes	9	18	9	18	0.099 (NS) ⸸
	No	1	2	7	14	
Did someone smoke in your home over the last 30 days?	Yes	5	10	10	20	0.689 (NS) ⸸
	No	5	10	6	12	
Do you walk or do other moderate activity for at least 30 minutes on most days, or at least 150 minutes per week?	Yes	37	74	43	86	0.211 (NS) ⸸
	No	13	26	7	14	
Exercise	Sedentary/ less than once week	46	92	33	66	0.000 (HS) §
	Moderate/ average once per week	2	4	17	34	
	Moderate/ average 2-3 times per week	1	2	0	0	
	Average 5 or more times per week	1	2	0	0	

As for the relationship between the interventional and the control regarding the medical condition of the participants (Table 3), the results of the study showed that there are no significant differences regarding patients with high blood pressure (p value 0.660), and regarding patients with diabetes there are high significance difference (p value 0.000). Regarding the measure of sugar there are significant difference between both groups (p value 0.012). Furthermore, there are high significant differences between both group regarding measure of HbA1c (p value 0.000). Regarding the use of any medication for high cholesterol level the association between both groups was not significance (p value0.841).

Table 3: Association between (Control and Intervention) for medical condition associated with cardiovascular diseases

Variable		Control(n=50)		Intervention(n=50)		P-value
		Freq.	%	Freq.	%	
Have you ever had your blood pressure checked by a medical professional?	Yes	33	66	40	80	0.176 (NS) ǂ
	No	17	34	10	20	
Do you have HTN?	Yes	37	74	34	68	0.660 (NS) ǂ
	No	13	26	16	32	
Duration of HTN? (Group)	1 – 5	17	34	8	16	0.087 (NS) §
	6 – 10	13	26	21	42	
	11 – 15	6	12	5	10	
	16 – 20	1	2	0	0	
Are you taken any herbal or traditional remedy to raised BP?	Yes	3	6	0	0	0.242 (NS) ǂ
	No	47	94	50	100	
Do you have regular follow up?	Yes	33	66	41	82	0.110 (NS) ǂ
	No	17	34	9	18	
Have your blood sugar levels ever been checked?	Yes	47	94	26	52	0.000 (HS) ǂ
	No	3	6	24	48	
Do you have diabetes?	Yes	47	94	20	40	0.000 (HS) ǂ
	No	3	6	30	60	
Duration of diabetes? (Group)	1 – 5	7	14	3	6	0.001 (HS) §
	6 – 10	15	30	16	32	
	11 – 15	13	26	1	2	
	16 – 20	7	14	0	0	
	21+	5	10	0	0	
Rx regimen	Oral hypoglycemic drug	8	16	8	16	0.053 (NS) §
	Insulin	23	46	11	22	
	Both	14	28	1	2	
	Diet only	1	2	0	0	

	Diet and drugs	1	2	0	0	
Do you have regular follow up DM?	Yes	47	94	24	48	0.000 (HS) ǂ
	No	3	6	26	52	
How often you measure your sugar?	Daily	39	78	14	28	0.012 (S) §
	Weekly	8	16	7	14	
	Monthly	0	0	3	6	
How often you measure your HbA1c?	Every 3 Months	45	90	11	22	0.000 (HS) §
	Every 6 Months	2	4	11	22	
	Every Year	0	0	2	4	
Are you taken any herbal or traditional remedy to raised sugar?	Yes	2	4	0	0	0.495 (NS) ǂ
	No	48	96	50	100	
Have you any health problem due to your diabetes?	Yes	40	80	14	28	0.000 (HS) ǂ
	No	10	20	36	72	
Do you have ever had your cholesterol measured by a doctor or health worker?	Yes	28	56	31	62	0.685 (NS) ǂ
	No	22	44	19	38	
Have you taken any medication to raise your cholesterol level?	Yes	26	52	28	56	0.841 (NS) ǂ
	No	24	48	22	44	
Are you taken any herbal or traditional remedy to raise your cholesterol?	Yes	2	4	0	0	0.495 (NS) ǂ
	No	48	96	50	100	
BMI G1 (test 1) before Intervention	18.5- 24.9 normal	8	16	10	20	0.448 (NS)†
	25- 29.5 over weight	19	38	13	26	
	30- 35.9 obese class 1	14	28	20	40	
	>36 obese class 2	9	18	7	14	
BMI G2 (test 2) after intervention	18.5- 24.9 normal	8	16	11	22	0.245 (NS)†
	25- 29.5 over weight	20	40	12	24	
	30- 35.9 obese class 1	14	28	21	42	
	>36 obese class 2	8	16	6	12	

The table 4 showed that the mean age for both the control and intervention groups was 52.0 and 43.0%, respectively. The table also shows the arithmetic mean of the weight of the intervention group at the beginning of the behavioral application and after three months of application, and the results were as follows: 84 at the

beginning of the application and 83 after 3 months, as well as the mean of the waist circumference was 89 and became 88 after three months of applying the program, as well as for the body mass index (BMI) it was 30.38. It became 30.2, and for the mean cholesterol, triglycerides, LDL, HDL, and HbA1c were as follows, respectively (184-168), (232- 214), (137- 122), (43- 45.6). These results indicate the effectiveness of applying the program through adherence to the instructions.

Table 4: Mean for Socio demographics characteristic by (control and intervention)

Mean	**Control(n=50)**	**Intervention(n=50)**
Age	52.0	43.4
First test		
Weight	80	84
Height	1.62	1.67
Waist	89	89
Systolic	133	131
Diastolic	85	82
HbA1c	7.09	6.95
BMI 1	30.47	30.38
Cholesterol	198	184
Triglyceride	234	232
LDL	137	137
HDL	43	43
Second test (after three months)		
Weight 2	79	83
Height 2	1.62	1.67
Waist 2	89	88
Systolic 2	133	124
Diastolic 2	85	81
HbA1c2	6.8	6.4
BMI 2	30.2	30.2
Cholesterol 2	191	168
Triglyceride2	229	214
LDL 2	134	122

Mean	Control(n=50)	Intervention(n=50)
HDL 2	45.2	45.6

Table 5; After three months of follow-up , participants in the intervention program had greater weight loss than those in the control group (83 vs. 79, p value < .114) and greater improvements in HbA1c (6.4 vs. 6.8, p value < .003), systolic blood pressure (124 vs. −133 mmHg, p value < .000), diastolic blood pressure (81 vs. −85 mmHg, p < .000), HDL cholesterol (45.6 vs. 45.2 mg/dL, p value < .841), and triglycerides (214 vs −229 mg/dL, p value < .172)). Reductions in LDL-C were greater in the intervention group than in the control group (122 vs −134 mg/dl, p value = .047). A lifestyle intervention program can result in significant weight loss and maintenance and improve physical fitness in individuals with cardiovascular disease and risk factors. Over a three-month follow-up, people participating in the intervention program had better overall levels of glycemic control, blood pressure, HDL-C, and triglycerides, and thus would spend more time with a lower risk of cardiovascular disease.

Table 5: Differences in mean (95% CI) between the intervention and control group by the scale variable

Parameter	Mean (95% CI)		Mean Difference (95% CI)	P-Value
	Intervention (n=50)	Control (n=50)		
Age	43.4 (40 to 46.7)	52 (48.2 to 55.9)	8.67 (3.64 to 13.69)	0.000
before initiating the intervention program				
Weight	84 (80 to 88)	80 (76 to 85)	-4.01 (-9.84 to 1.82)	0.097
Height	1.67 (1.64 to 1.7)	1.62 (1.61 to 1.63)	-0.05 (-0.08 to -0.02)	0.015
Waist	89 (88 to 90)	89 (88 to 90)	0 (-1.64 to 1.64)	1.000
Systolic	131 (126 to 136)	133 (130 to 136)	2.14 (-3.31 to 7.59)	0.203
Diastolic	82 (79 to 85)	85 (84 to 86)	2.98 (0.07 to 5.89)	0.004
HbA1c	6.95 (6.4 to 7.49)	7.09 (6.61 to 7.58)	0.15 (-0.57 to 0.87)	0.108
BMI	30.38 (28.84 to 31.92)	30.47 (28.97 to 31.97)	0.09 (-2.04 to 2.21)	0.936
Cholesterol	184 (172 to 196)	198 (187 to 209)	14.37 (-1.88 to 30.63)	0.075
Triglyceride	232 (195 to 268)	234 (198 to 269)	2.34 (-47.57 to 52.24)	0.945
LDL	137 (129 to 146)	137 (129 to 146)	0 (-11.64 to 11.64)	1.000
HDL	43 (40 to 46)	43 (40 to 46)	0 (-4.23 to 4.23)	1.000
after completion of the intervention program				
Weight 2	83 (79 to 87)	79 (75 to 83)	-3.74 (-9.33 to 1.85)	0.114
Height 2	1.67 (1.64 to 1.69)	1.62 (1.61 to 1.63)	-0.04 (-0.07 to -0.01)	0.037

Waist 2	88 (87 to 89)	89 (88 to 90)	1.12 (-0.43 to 2.67)	0.154
Systolic 2	124 (120 to 129)	133 (131 to 136)	9 (3.92 to 14.08)	0.000
Diastolic 2	81 (79 to 83)	85 (84 to 87)	4.66 (2.24 to 7.08)	0.000
HbA1c2	6.4 (6 to 6.8)	6.8 (6.4 to 7.2)	0.36 (-0.17 to 0.89)	0.003
BMI 2	30.2 (28.6 to 31.8)	30.2 (28.8 to 31.6)	-0.01 (-2.08 to 2.06)	0.991
Cholesterol 2	168 (157 to 178)	191 (179 to 203)	23.37 (7.5 to 39.24)	0.004
Triglyceride2	214 (182 to 245)	229 (199 to 259)	15.36 (-27.45 to 58.17)	0.172
LDL 2	122 (112 to 131)	134 (126 to 143)	12.88 (0.4 to 25.37)	0.047
HDL 2	45.6 (42.8 to 48.3)	45.2 (42.5 to 47.9)	-0.38 (-4.16 to 3.39)	0.841

The results of the study (Table 6) revealed the relationship between the two groups regarding the medical history of incidents of cardiovascular diseases and found that there were no significant differences for all the seven items studied and mentioned in table 11.

Table 6: Association between (Control and Intervention) regarding previous history of cardiovascular accidents

Variable		**Control(n=50)**		**Intervention(n=50)**		**P-value**
		Freq.	**%**	**Freq.**	**%**	
Have you heart attacks (angina, or MI)	Yes	8	16	4	8	0.357
	No	42	84	46	92	(NS) ⸸
Have you ever been hospitalized in cardiology department?	Yes	7	14	6	12	1.000
	No	43	86	44	88	(NS) ⸸
Have you made a coronarography?	Yes	4	8	3	6	1.000
	No	46	92	47	94	(NS) ⸸
Have you made CABG?	Yes	2	4	0	0	0.495
	No	48	96	50	100	(NS) ⸸
Are you on aspirin?	Yes	34	68	37	74	0.660
	No	16	32	13	26	(NS) ⸸
Are you on Beta blocker?	Yes	31	62	25	50	0.314
	No	19	38	25	50	(NS) ⸸
Are you on statin?	Yes	26	52	34	68	0.153
	No	24	48	16	32	(NS) ⸸

As for the food pattern applied by the participants in both groups, the study (Table 7) found highly significant differences in all items except for the number of cups of coffee drunk by both groups, which confirmed that there were no significant differences between them (0.791).

Table 7: Association between (Control and Intervention) regarding food pattern

Variable		Control(n=50)		Intervention(n=50)		P-value
		Freq.	%	Freq.	%	
How frequently do you typically consume fried food?	Less than once a week	46	92	26	52	0.000 (HS) §
	1-2 times a week	4	8	18	36	
	3-6 times a week	0	0	6	12	
How many servings of starchy foods—bread, pasta, rice, potatoes are there in a day?	None	2	4	11	22	0.000 (HS)†
	2 serves a day	47	94	25	50	
	3serves a day	1	2	14	28	
How many portions of sweet foods, such as cake, cookies, and chocolate do you eat each day?	None	38	76	29	58	0.056 (NS) §
	1-2 serves	11	22	21	42	
	More than 2 serves	1	2	0	0	
How much sugar do you put in your hot drinks each day?	None	36	72	20	40	0.004 (HS) §
	1-3	13	26	29	58	
	4-6	1	2	1	2	
How frequently do you typically eat fish?	Rarely	48	96	30	60	0.000 (HS) §
	1-2 times a week	1	2	20	40	
	3-6 times a week	1	2	0	0	
How many servings of fruit do you typically consume each day?	None	1	2	12	24	0.000 (HS)†
	1-3 pieces	23	46	31	62	
	4 or more pieces daily	26	52	7	14	
How much coffee do you consume each day?	None	33	66	30	60	0.791 (NS) §
	1-2 cups daily	15	30	17	34	
	3-4 cups	2	4	3	6	
How much water do you drink?	500 ml	0	0	11	22	0.000 (HS)†
	501-1.25 liter	18	36	33	66	
	More than 1.25 liters	32	64	6	12	

How many vegetables servings?	None	0	0	4	8	0.001 (HS) §
	1-2 serves	21	42	33	66	
	3-4 serves	29	58	13	26	

Data in table 8 shows the effectiveness of the program and comparison mean on eight items that include BMI, Cholesterol, Triglyceride, LDL, HDL, systolic, diastolic, and HbA1c. in BMI the mean of the all 50 participants before intervention program was 30.38 with standard deviation 5.42 compared with after 3 months that the mean was 30.19 with p value 0.442. in cholesterol the mean before intervention program was 183.76, standard deviation 42.77 (CI 6.09 to 26.11), compared with 3 months after the was 167.66, Std was 37.71 with p value 0.002. in triglyceride the mean before intervention program was 231.54, Std 127.03, compared with 3 months after was 213.53, Std 110.68, with (CI 1.43 to 34.55) p value 0.000. in LDL the mean before intervention program was 137.32, Std 29.32, compared with 3 months after was 121.61, Std 33.54 with (CI 7.71 to 23.72) p value 0.000. in HDL the mean before intervention program was 43.39, Std 10.65, compared with 3 months after intervention the mean was45.56, Std 9.57 with (CI -3.73 to -0.62) p value 0.007.in systolic blood pressure the mean before intervention was 130.98, Std 16.78, compared with the mean after three months was 124.16, Std 15.80, with (CI 4.33 to 9.31) p value 0.000. in diastolic blood pressure the mean before intervention program was 82.14, Std 9.66, compare with three months after intervention that mean was 80.84, Std 7.83 with (CI -0.07 to 2.67) p value 0.052. in HbA1c the mean before intervention was 6.95, Std 1.91, compared with the mean of after three months of intervention was 6.44, Std 1.43, with (CI 0.27 to 0.75) p value 0.000. The decrease in the ratios of values and the existence of a clear difference between the results of the participants in the intervention program before and after 3 months of the intervention and conducting sessions and meetings shows the effectiveness of the program in improving the medical conditions and problems that the participants were suffering from.

Table 8: Average comparison between before and after applying the intervention program for the intervention group

Intervention	Time	N	Mean	Std. Deviation	95% Confidence Interval of the Difference	P-Value (test)
BMI	Before	50	30.38	5.42	(-0.31 to 0.7)	0.442 t-test
	After	50	30.19	5.52		
Cholesterol	Before	50	183.76	42.77	(6.09 to 26.11)	0.002 t-test
	After	50	167.66	37.71		
Triglyceride	Before	50	231.53	127.03	(1.43 to 34.55)	0.000 Wilcoxon
	After	50	213.54	110.68		
LDL	Before	50	137.32	29.32	(7.71 to 23.72)	0.000 t-test
	After	50	121.61	33.54		
HDL	Before	50	43.39	10.65	(-3.73 to -0.62)	0.007 t-test
	After	50	45.56	9.57		

Systolic	Before	50	130.98	16.78	(4.33 to 9.31)	0.000 Wilcoxon
	After	50	124.16	15.80		
Diastolic	Before	50	82.14	9.66	(-0.07 to 2.67)	0.052 Wilcoxon
	After	50	80.84	7.83		
HbA1c	Before	50	6.95	1.91	(0.27 to 0.75)	0.000 Wilcoxon
	After	50	6.44	1.43		

Although the sessions and meetings were not conducted and adequate counseling was not provided to the participants of control group in the intervention program except for conducting medical examinations, answering some inquiries and giving some advice, the results (Table 9) of the medical examinations before and after three months of applying the abandonment program were good and positive, and there was a noticeable and joyful change, and this indicates the validity the accuracy of the examinations and the scientific advice given to the participants, as well as an indication of the health awareness of the participants to maintain their health.

Table 9: Average comparison between before and after applying the intervention program for the control group

Control	Time	N	Mean	Std. Deviation	95% Confidence Interval of the Difference	P-Value (test)
BMI	Before	50	30.47	5.27	(-0.04 to 0.62)	0.082 t-test
	After	50	30.18	4.91		
Cholesterol	Before	50	198.13	39.07	(1.28 to 12.94)	0.018 t-test
	After	50	191.02	42.15		
Triglyceride	Before	50	233.86	124.44	(-10.09 to 20.01)	0.269 Wilcoxon
	After	50	228.90	105.00		
LDL	Before	50	137.32	29.32	(-1.91 to 7.57)	0.236 t-test
	After	50	134.49	29.25		
HDL	Before	50	43.39	10.65	(-3.38 to -0.2)	0.028 t-test
	After	50	45.18	9.46		
Systolic	Before	50	133.12	9.74	(-0.53 to 0.45)	0.661 Wilcoxon
	After	50	133.16	8.82		
Diastolic	Before	50	85.12	3.74	(-0.87 to 0.11)	0.111 Wilcoxon
	After	50	85.50	3.64		
HbA1c	Before	50	7.09	1.72	(2.1 to 0.49)	0.001 Wilcoxon
	After	50	6.80	1.24		

Discussion

According to the WHO, smoking, saturated fats, self-reported high blood pressure and diabetes, obesity, diet, physical activity, excessive alcohol consumption, and psychosocial factors like stress are nine major risk factors for cardiovascular disease that, when combined, account for 90.4% of the population's attributable risk of suffering an acute myocardial infarction (Alsford, D.P.,2020). The current study selected 100 people who attended primary health care centers in the Erbil city, and were included in the counselling intervention program. The mean age for both the control and intervention groups was 52.0 and 43.0%, respectively, and there are no significance difference (p value 0.109) between intervention and control group regarding the gender , and the percentage of participants from the group (56-65) years was the largest in number and the oldest among the other groups, by (48%) in control group while there were (30%) from the group(46-55.9) for intervention group with high significance difference. The current study showed that the participants who do not read or write represent the largest percentage among education levels with a percentage of (48%) for control group, followed by high school graduates with a percentage of (38%) for intervention group with high significance difference, as well as primary school graduates with a percentage of (18.6%), and that these results are higher than to the results of a study conducted in the Kingdom of Saudi Arabia, (Ghamri, R.A., et al.,2019).

The current investigation demonstrated that the place of residence of the majority of the participants was urban (100% and 70%) in the intervention and control group, respectively, and this percentage was higher than that of the study conducted by Mukhopadhai in India, and it was. (62.1%) (Mukhopadhay, S., et al., 2021). The present study revealed that the married participants represented the majority (88%), (86%) of the intervention group and the control group were married respectively and these findings concur with those of Rajati's study, which was carried out in Iran. (Rajati., F., et al., 2019). The study concluded that nearly half of the participants do not work or are housewives in the control group, and (50%) of the participants in the intervention group are employees or workers, and these results are identical to the results achieved by Al-Ghamri et al. , the study, which showed that nearly (67.8%) are not employed or housewives (Ghamri, R.A., et al., 2019). As for the monthly income of the participants, the majority of the participants in the two groups confirmed that their monthly income is sufficient.

Regarding the lifestyle of the participants, the current study showed that the percentage (32%) and (20%) of the participants in the intervention group and the control group, respectively, used tobacco and smoke, and most of the participants (78.4%) had never had. smoked tobacco, and the highest percentage of those who started smoking between the ages of 20-29 years among other groups (48.6%), in contrast to Al-Ghamri's study (6.8%), and Loukili study, in which the percentage of smokers was 7.58%, and 75% of the sample started smoking in Age 19 or younger (Al-Ghamri, R.A., et al., 2019; Loukili, H., et al., 2020). The participants in this study had a mean waist circumference of 89 6.7 cm in both groups. This is concerning since people who are large are at a greater risk of having cardiovascular disease, particularly if they also have a number of other risk factors. In a study by Sheikh Ali (Alsheikh-Ali, A.A., et al., 2014), the average waist circumference was (68%); the current study's finding was higher. These results can point to patients' poor eating habits or a lack of exercise possibilities, negative lifestyles, such as bad eating habits, inactivity, smoking, and being overweight, are external modifiable risk factors for the development of all CVD. These elements contribute to cardiometabolic risk elements as hypertension, dyslipidemia, and hyperglycemia (Siren, R., J.G.et al, 2016).

The efficacy of the intervention program to lower extremely high blood pressure and enhance lipid profile appears to be connected to the impacts on CVD, as do the interventions in physical activity and good eating. Participants were told to engage in 150 minutes per week of moderate-intensity physical activity based on the guidelines at the start of the intervention program. Additionally, three months following the intervention, the current trial produced a significant decrease in major adverse cardiovascular events. Our findings are significant because they demonstrate how interactive health education strategies might reduce older persons' CVD risk. More than three-quarters of the participants in both groups stated that they practiced walking, and it was noted in our study that the percentage of people with low physical activity(sedentary) was (92%) in control group, and (66%) in intervention group, and these results are higher than the results of the study by Loukili et al., where the percentage of participants who practiced walking was (14.57%), and the percentage of participants who

practiced moderate physical activity was (30.47%). A study in 38 Muslim countries showed a prevalence of physical inactivity of 32.8%. The prevalence among Arab countries was 43.7%, (Kahan, D.,2014). The outcome of our study is also higher than that of a cross-sectional study conducted in Saudi Arabia on 4758 participants, which had prevalence of low activity (66.6%) (Mabry RM et al., 2010, Al-Zalabani, A.H.,2015).

In the current study we evaluated a wide range of cardiovascular disease risk factors, as recommended by the European Society of Cardiology. These factors included blood pressure, weight, waist circumference, body mass index, total cholesterol, low-density lipoprotein cholesterol, HDL cholesterol, triglycerides, and glycated hemoglobin. With regard to cardiovascular diseases and risk factors for the participants, the study concluded that (74%) in control group and (68%) of intervention group have high blood pressure and that (37.2%) of them suffer from high blood pressure for a period of 6-10 years, and more than half of both groups use antihypertensive treatment, these results of the current study showed that the prevalence of participants with high blood pressure is high compared to study conducted by Loukili et al, which were (42.69%) (Bandyopadhyay, D., et al.,2018), and higher than a national survey in both the United Kingdom and the United States, which was (29.6%) in the United States, and (30%) in the United Kingdom (Onyemelukwe, G.C., et al.,2017), and the presence of such a percentage of people with high blood pressure is due to the difficult economic conditions, psychological instability, the existence of wars and conflicts, and the eating of unhealthy foods (fast foods).

With regard to diabetes mellitus, the study proved that (94%) of the participants in control group, and (40%) of intervention group had diabetes, and that majority of both groups had been suffering from the disease for 6-10 consecutive years, and it was found that most of the patients, by percentage (55%)and (48.9%) in intervention and control group respectively used insulin injections. The current study discovered the number of participants with diabetes and this percentage is higher than the result of a study conducted in the Kingdom of Saudi Arabia and the result was (29.3%), and in a 2015 WHO report from the Middle East region (Bahrain, Kuwait, Oman, and the United Arab Emirates) it was estimated that the prevalence of diabetes ranges between 3.5% and 30% (WHO,2018). The results of the current study showed that the average values of HbA1c in the intervention group decreased from 6.95 to 6.44% (P = 0.000) and the decrease in the values of HbA1c in the control group was from 7.09 to 6.88 (P = 0.001). This indicates that the application of the counselling intervention program was good and effective.

As for the number of times the sugar is measured, a percentage (83%)and (58.3%) of them in control group and intervention group respectively confirmed that they measure their blood sugar daily, With regard to measuring the HbA1c, the results of the current study showed that (95.7%) of participants in control group and (45.8%)of participants in intervention group measured their HbA1c every three months., and these results were inconsistent with the results of two studies conducted by Hager et al and their results were consecutive (Hager, K., et al.,2023). Diabetic patient's perseverance in measuring diabetes and measuring HbA1c prevents exacerbation of the disease, reduces complications, regulates doses, and obtains good health results.

As a follow-up to the cases of risk factors, the current study revealed that more than half of the participants in both groups are infected and taking medication to treat high cholesterol, and this percentage is lower compared to the result of the study (cardiovascular epidemiology) in the United Arab Emirates, where the prevalence rate reached 74% (Radaideh, G., et al. 2017).

Nutrition plays a pivotal role in promoting health, and a lack of fruits and vegetables can contribute to disease. The current study confirmed that the percentage of consumption of fruits by the participants was high (62% and 46%) in the intervention group and the control group, respectively, and about the consumption of vegetables was (66%) of the intervention group, and (58%) of the control group that consumed more of two servings per day, was higher than the result of a study conducted in 52 countries that participated in the LIMIC Global Health Survey in (2002-2003) and the rate of fruit and vegetable consumption was low (78%) (Hall, J.N., et al., 2009), and was identical With the result of a study conducted by Loukili et al regarding eating three servings per day of fruit, but the results of our study differed with the result of a paragraph about eating vegetables also in the

study of Loukili et al, by more than three servings of vegetables per day, while the current study found that the largest percentage Participants who ate two servings per day (Loukili, H., et al., 2020).

Conclusion

According to the aforementioned findings, patients with CVD are able to adopt and maintain a variety of lifestyle changes over the course of twelve weeks that can lower and regulate blood pressure, HbA1c, lose weight, and increase serum HDL-C levels. Therefore, managing modifiable cardiovascular risk factors is crucial for all patients with CVD. These results highlight the need for more targeted, insightful, and thorough education regarding the consequences of variables including diabetes, high blood pressure, obesity, and inactivity on cardiovascular disease in the Region. Interventions to lower the patient's risk could involve better food, exercise, and education about lifestyle variables.

Reference

[1] **ALHABIB**, **K. F**., BATAIS, M. A., ALMIGBAL, T. H., ALSHAMIRI, M. Q., ALTARADI, H., RANGARAJAN, S. & YUSUF, S. 2020. Demographic, behavioral, and cardiovascular disease risk factors in the Saudi population: results from the Prospective Urban Rural Epidemiology study (PURE-Saudi). BMC Public Health, 20, 1213.

[2] **ALI**, **S**., MISGANAW, A., WORKU, A., DESTAW, Z., NEGASH, L., BEKELE, A., et al. 2020. The burden of cardiovascular diseases in Ethiopia from 1990 to 2017: evidence from the Global Burden of Disease Study. International Health, 13, 318-326.

[3] **ALSFORD, D.P.,** 2020. Multidisciplinary, multiple risk factor cardiovascular disease primary prevention programme in community pharmacy: a feasibility study: a thesis presented in partial fulfilment of the requirements for the degree of MSc Programme in Nutrition & Dietetics, School of Sport, Exercise and Nutrition, Massey University, Albany, New Zealand

[4] **ALSHEIKH-ALI AA**, Omar MI, Raal FJ, Rashed W, Hamoui O, Kane A, et al.2014. Cardiovascular risk factor burden in Africa and the middle east: the Africa middle east cardio vascular epidemiological (ACE) study. PLoS One. 9(8): e102830.

[5] **AL-ZALABANI, A** & Al-Hamdan, N & Saeed, A. 2015. The prevalence of physical activity and its socioeconomic correlates in Kingdom of Saudi Arabia: A cross-sectional population-based national survey. Journal of Taibah University Medical Sciences. 15. 10.1016/j.jtumed.2014.11.001.

[6] **AMINI**, M., ZAYERI, F. & SALEHI, M. 2021. Trend analysis of cardiovascular disease mortality, incidence, and mortality-to-incidence ratio: results from global burden of disease study 2017. BMC Public Health, 21, 401.

[7] **BAYS**, H. E., TAUB, P. R., EPSTEIN, E., MICHOS, E. D., FERRARO, R. A., BAILEY, A. L., et al. 2021. Ten things to know about ten cardiovascular disease risk factors. Am J Prev Cardiol, 5, 100149.

[8] **BOSU**, W. K., REILLY, S. T., AHETO, J. M. K. & ZUCCHELLI, E. 2019. Hypertension in older adults in Africa: A systematic review and meta-analysis. PLoS One, 14, e0214934.

[9] **CERCATO**, C. & FONSECA, F. A. 2019. Cardiovascular risk and obesity. Diabetology & Metabolic Syndrome, 11, 74.

[10] **FEIGIN**, V. L., BRAININ, M., NORRVING, B., GORELICK, P. B., DICHGANS, M., WANG, W., et al. 2020. What Is the Best Mix of Population-Wide and High-Risk Targeted Strategies of Primary Stroke and Cardiovascular Disease Prevention? 9, e014494.

[11] **FRANCULA-ZANINOVIC**, S. & NOLA, I. A. 2018. Management of Measurable Variable Cardiovascular Disease' Risk Factors. Curr Cardiol Rev, 14, 153-163.

[12] **GHAMRI, R. A**., Alzahrani, N. S., Alharthi, A. M., Gadah, H. J., Badoghaish, B. G., & Alzahrani, A. A. 2019. Cardiovascular risk factors among high-risk individuals attending the general practice at king Abdulaziz University hospital: a cross-sectional study. BMC cardiovascular disorders, 19(1), 268. https://doi.org/10.1186/s12872-019-1261-6.

[13] **HAGER, K**., Shi, P., Li, Z., Chui, K., Berkowitz, S. A., Mozaffarian, D., et al. 2023. Evaluation of a Produce Prescription Program for Patients with Diabetes: A Longitudinal Analysis of Glycemic Control. Diabetes care, 46(6), 1169–1176. https://doi.org/10.2337/dc22-1645.

[14] **HALL, JN**, Moore S, Harper SB, Lynch JW.2009. Global variability in fruit and vegetable consumption. Am J Prev Med. 2009 May; 36(5):402–409.e5. https://doi.org/10.1016/j.amepre.01.029 PMID: 19362694.

[15] **HASSEN**, H. Y., NDEJJO, R., VAN GEERTRUYDEN, J.-P., MUSINGUZI, G., ABRAMS, S. & BASTIAENS, H. 2022. Type and effectiveness of community-based interventions in improving knowledge related to cardiovascular diseases and risk factors: A systematic review. American Journal of Preventive Cardiology, 10, 100341.

[16] **HUSSAIN**, A. M. & LAFTA, R. K. 2019. Burden of non-communicable diseases in Iraq after the 2003 war. Saudi Med J, 40, 72-78.

[17] **KAHAN D**.2014. Adult physical inactivity prevalence in the Muslim world: Analysis of 38 countries. Prev Med Rep. 2015 Jan 1; 2:71–5. https://doi.org/10.1016/j.pmedr. 12.007 PMID: 26844051

[18] **MABRY, RM**, Reeves MM, Eakin EG, Owen N.2010. Evidence of physical activity participation among men and women in the countries of the Gulf cooperation council: a review. Obes Rev Off J Int Assoc Study Obes. Jun; 11(6):457–64.

[19] **MOHAMMAD**, A. M., RASHAD, H. H., HABEEB, Q. S., RASHAD, B. H. & SAEED, S. Y. 2021. Demographic, clinical and angiographic profile of coronary artery disease in Kurdistan region of Iraq. Am J Cardiovasc Dis, 11, 39-45.

[20] **MUKHOPADHAY, S**, Mukherjee A, Khanra D, Samanta B, Karak A, Guha S. 2021.Cardiovascular disease risk factors among undergraduate medical students in a tertiary care center of eastern India: a pilot study. Egypt Heart J. Oct 26;73(1):94. doi: 10.1186/s43044-021-00219-9. PMID: 34704184; PMCID: PMC8547573.

[21] **NG**, **M.,** FLEMING, T., ROBINSON, M., THOMSON, B., GRAETZ, N., MARGONO, C., et al. 2014. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet, 384, 766-81.

[22] **ONYEMELUKWE GC**, Ogunfowokan O, Mbakwem A, Alao AK, Soroh K, Omorodion O, et al. 2017. Cardiovascular risk factors in adult general out-patient clinics in Nigeria: a country analysis of the Africa and Middle East cardiovascular epidemiological (ACE) study. Afr Health Sci. 17(4):1070–81.

[23] **PALLAZOLA**, V. A., DAVIS, D. M., WHELTON, S. P., CARDOSO, R., LATINA, J. M., MICHOS, E. D., et al, QUALITY & OUTCOMES 2019. A clinician's guide to healthy eating for cardiovascular disease prevention. 3, 251-

[24] **RADAIDEH G**, Tzemos N, Ali TM, Eldershaby Y, Joury J, Abreu P. 2017. Cardiovascular Risk Factor Burden in the United Arab Emirates (UAE): The Africa Middle East (AfME) Cardiovascular Epidemiological (ACE) Study Sub-analysis. Int Cardiovasc Forum J [Internet]. Jun 3 [cited 2018 Jan 26]; 11(0).

[25] **RAJAT, F.,** Hamzeh, B., Pasdar, Y., Safari, R., Moradinazar, M., Shakiba, E., et al. 2019. Prevalence, awareness, treatment, and control of hypertension and their determinants: Results from the first cohort of non-communicable diseases in a Kurdish settlement. Scientific reports, 9(1), 12409. https://doi.org/10.1038/s41598-019-48232-y.

[26] **RALAPANAWA**, U. & SIVAKANESAN, R. 2021. Epidemiology and the Magnitude of Coronary Artery Disease and Acute Coronary Syndrome: A Narrative Review. J Epidemiol Glob Health, 11, 169-177.

[27] **LOUKILLI H**. 2020. Risk Factors Among Young Adults: A STEPwise-Approach-Based Study in Three University Setups in Morocco. The Open Public Health Journal. 13. 465-470. 10.2174/1874944502013010465.

[28] **ROTH**, G. A., MENSAH, G. A., JOHNSON, C. O., ADDOLORATO, G., AMMIRATI, E., BADDOUR, L. M., et al. 2020. Global Burden of Cardiovascular Diseases and Risk Factors, 1990-2019: Update from the GBD 2019 Study. J Am Coll Cardiol, 76, 2982-3021.

[29] **SAEED**, **K. M. I**., RASOOLY, M. H. & NEJABY, M. 2020. Profile of risk factors for noncommunicable diseases in major cities of Afghanistan: WHO STEP wise approach. East Mediterr Health J, 26, 388-399.

[30] **SARKI, A. M.,** NDUKA, C. U., STRANGES, S., KANDALA, N. B. & UTHMAN, O. A. 2015. Prevalence of Hypertension in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. Medicine (Baltimore), 94, e1959.

[31] **SHARIFI-RAD**, **J**., RODRIGUES, C. F., SHAROPOV, F., DOCEA, A. O., CAN KARACA, A., SHARIFI-RAD, M., et al. 2020. Diet, Lifestyle and Cardiovascular Diseases: Linking Pathophysiology to Cardioprotective Effects of Natural Bioactive Compounds. Int J Environ Res Public Health, 17.

[32] **SIREN R**, Eriksson JG, Vanhanen H. 2016. Observed changes in cardiovascular risk factors among high-risk middle-aged men who received lifestyle counselling: a 5-year follow-up. Scand J Prim Health Care. 34(4):336–42.

[33] **TSAO**, C. W., ADAY, A. W., ALMARZOOQ, Z. I., ALONSO, A., BEATON, A. Z., BITTENCOURT, M. S., et al. 2022. Heart Disease and Stroke Statistics—2022 Update: A Report from the American Heart Association. 145, e153-e639.

[34] **WORLD HEALTH ORGANIZATION**, W. H. 2018. A healthy diet sustainably produced: information sheet. World Health Organization.

/