



Knowledge and practices regarding atherothrombosis in the Lebanese population

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Summary

Background: Cardiovascular diseases are the leading cause of death in Lebanon. This study set out to assess the knowledge and practices of the Lebanese regarding atherothrombosis and its risk factors.

Methods: A total of 2010 interviews were conducted with adults aged 30 years and older throughout Lebanon between December 2003 and February 2004.

Results: The responses revealed that 88.9% were aware of atherothrombosis however, only 23.6% correctly defined it. The main determinants of appropriate knowledge were regional distribution, and educational level. The respondents identified the majority of atherothrombosis risk factors and consequences however only half of the respondents mentioned alcohol and diabetes as risk factors and few mentioned peripheral arterial disease as a consequence. The television was the source of health information for 75.6% of the study population. However, only 27% considered they had enough knowledge about atherothrombosis. The health seeking behavior was satisfactory nevertheless there was a lack of a healthy lifestyle. Almost 70% of the respondents did not exercise and 58.5% were overweight and obese. Among the respondents 6.8% reported a previous atherothrombotic episode, and only 86.8% of them were on medications. The costs of the medications were the main reason for discontinuing medication use.

Conclusion: There is a need for a national television campaign targeting lifestyle modification and risk factor knowledge on the one hand. On the other hand, target-specific campaigns are needed in underprivileged areas of Lebanon with high rates of illiteracy and poverty. In addition, policy makers need to address and improve socio-economic characteristics as these play an important role in disease prevention.

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Introduction

Atherothrombosis is the leading cause of death worldwide and its burden is expected to increase in the years to come [1,2]. A major increase is expected to occur in the Middle Eastern crescent with an almost 150% increase in ischemic heart disease (IHD) and cerebrovascular disease mortality in both genders [2]. In Lebanon, Cardiovascular disease (CVD) has been reported to be the leading cause of death in population and community-specific surveys [3,4]. The national statistics support these findings. Cardiovascular disease, cancer and accidents accounted for 36.7%, 36.2% and 3.1% of the total deaths in Lebanon, respectively (Ministry of Public Health, 2006, unpublished report).

Atherothrombosis is a global disease and a major public health problem. It is worth noting that such diseases affect individuals in their peak mid-life years, disrupting the future of families dependent on them and undermining the development of nations by depriving them of workers in their most productive years.

A prerequisite for any public health intervention aiming to reduce atherothrombotic risk factors is the availability of data on the awareness, knowledge and behavior of the general population regarding the disease. Several community-specific studies have been done in the region to assess knowledge about cardiovascular disease risk factors, mainly hypertension and diabetes [5–9]. The majority of these studies targeted patients and not the general population. Findings revealed a lack of adequate knowledge about CVD risk factors with many respondents being unaware of the negative consequences of physical inactivity, obesity, and high fat intake. Using *PubMed* and *MedlinePlus* we could not retrieve any national study in Lebanon, which sought to assess knowledge about atherothrombosis or cardiovascular diseases in the general population. We came across a study in a low-to-middle socio-economic urban community in Beirut district, which assessed the knowledge and attitude of community members [10]. Results revealed that respondents had a high level of knowledge about the negative effects of smoking, lack of physical activity and obesity, but the majority of these individuals had an unhealthy behavior [11].

Hence, based on the published literature and to our knowledge, there is an absence of national data regarding knowledge and lifestyle habits of the Lebanese regarding atherothrombosis. Consequently, an assessment of the above parameters could assist policy makers in developing strategies

and activities to promote the prevention of atherothrombosis at its various levels. This might help the country to avoid the expected increase in atherothrombosis mortality and subsequently to decrease health care costs, which are among the highest in the world.

This study set out to determine the current awareness and knowledge of atherothrombosis among the Lebanese population. In addition, the lifestyle habits pertinent to major atherothrombosis risk factors were assessed.

Materials and methods

Selection of study participants

Based on the latest demographic survey done in 1996, the required sample size was calculated to be 2125 participants, aged 30 years and older. A three-stage cluster sampling was used to select a random sample of participants following the national distribution tables. In the first stage, the governorates were divided into regions. In the second stage, each region was divided into areas with a balance between urban and rural areas and each region had enough areas to reflect the respective percentage of the registered population. In the third and last stage, a systematic random sample of households was selected. The sampling strategy consisted of listing all households within the selected areas, then random selection of the households from the list, and finally interviewing all eligible individuals within a household. All persons aged 30 and older living in the house were listed and included in the study.

Measurement instrument

A pre-tested questionnaire in Arabic, including five sections, was used to collect the necessary information.

Section 1 included demographic information regarding age, gender, educational level, type of employment, and participant's opinion about major causes of death in Lebanon. The study participants were also asked about their major sources of health information. Section 2 covered awareness and knowledge of the participants about atherothrombosis. To assess the awareness, the following question was asked: "have you ever heard about atherothrombosis (*Jaltat Al Sharayeen*)?" and knowledge was assessed by the subsequent three questions: "Define atherothrombosis"; "Choose the most appropriate definition of atherothrombo-

sis among listed choices”; “Do you consider atherothrombosis as a major public health problem in Lebanon?”. In addition, subjects were asked to choose the risk factors and consequences of atherothrombosis from a list.

Section 3 covered the health seeking behavior and risk factor status of the study participants. Questions were worded as follows: “when was the last time you visited a physician/had your blood pressure/blood sugar/blood lipid measured?” Respondents were then asked if they suffer from and/or are being treated for hypertension, diabetes or hyperlipidemia. Lifestyle habits such as diet and physical activity were also assessed. A self-report of height and weight was collected and answers were used to calculate the body mass index (BMI) as weight (in kg) divided by height (in m) squared, The BMI was then converted into ranges based on the World Health Organization (WHO) classification as follows: normal: $BMI < 25 \text{ kg/m}^2$, overweight (pre-obesity): $25 \leq BMI < 30$ and obese: $BMI \geq 30 \text{ kg/m}^2$. Underweight was not included as a separate category as this study did not aim to study weight ranges in Lebanon.

Section 4 addressed directly the status of the study respondents regarding stroke, myocardial infarction (MI) and atherothrombosis in general. Questions were formulated as follows: “have you ever suffered from stroke/MI/atherothrombosis?” Participants were considered to suffer from atherothrombosis if they answered positively to any of the above three questions. Section 5 covered the respondents’ current and preferred sources of health information about atherothrombosis.

Data collection and analysis

Face to face interviews were conducted by trained field workers between December 2003 and February 2004 throughout Lebanon. Interviewers were instructed to make at least 2 visits at 2 different times of the day before dropping any interviewee living in the household. Verbal consent was obtained from participants after explaining the objectives of the study and before questionnaire administration.

The statistical package for social sciences (SPSS) v.13 was used to enter and analyze the data. Mean and standard deviation (SD) were calculated where appropriate. Awareness and knowledge of atherothrombosis were compared across the different socio-demographic and clinical characteristics. In addition, a comparison between participants with atherothrombosis and those who did not report any disease was carried out. The χ^2 -test was used to de-

tect any significant association between awareness and knowledge and the socio-demographic and clinical characteristics. A two-tailed p -value < 0.05 was considered statistically significant.

Results

Socio-demographic and clinical information

In total, 2010 questionnaires were completed reflecting a 94.5% response rate. The respondents’ general demographic characteristics are listed in Table 1. The male to female ratio was close to 1 and the average age of the study respondents was 49.32 (SD = 12.97) years. There were 27.5% (552) of the respondents considered as functionally illiterate (no schooling or primary education) and only 58.6% (1179) had stable jobs (Table 1).

The majority 75.6% (1519) of the respondents reported watching health programs on television, while about only half of the participants listen to (57.9%) or read (52.1%) health corners. Cardiovascular diseases were perceived as the major and most important cause of death in Lebanon (55.9%) followed by cancer (27.4%) and then by car accidents (8.5%). These figures were similar in all regions. Table 1 reveals the reported prevalence of atherothrombotic diseases among the respondents. Of those who admitted having atherothrombosis, 86.8% (74/86) were on medications. Almost one third of the individuals who were on treatment stopped their medications mostly on their own without a physician’s advice. The high cost of medications and side effects were reported by some persons as the reason for discontinuing the medication. The highest percentage of non compliance with treatment was reported in the Bekaa region (58.4%).

Health seeking behavior of the Lebanese

Table 2 depicts the general health seeking behavior of the respondents whereby the majority regularly visit physicians, as almost 85% had a medical check-up within the current year. However, only a few follow healthy lifestyle habits as 40.5% and 70.1% reported not exercising regularly or eating a healthy diet, respectively. Persons who reported having atherothrombosis had more frequent and significantly better health seeking behavior compared to participants with no disease.

The prevalence rates of atherothrombosis risk factors among the study participants are reported in Table 1. No significant difference in the

Table 1 Socio-demographic and clinical characteristics of the study participants

Characteristics	Number (n = 2010)	Percentage
Socio-demographic characteristics		
Age groups^a		
30–40	627	31.2
41–50	525	26.1
51–60	449	22.3
61–70	255	12.7
Above 70	138	6.9
Males	1103	54.9
Governorate		
Mount Lebanon	682	33.9
North	431	21.4
South	319	15.9
Bekaa	303	15.1
Beirut	275	13.7
Educational level^a		
No Schooling	189	9.4
Primary education	363	18.1
Complementary education	409	20.3
Secondary education	462	23.0
University degree	571	28.4
Type of work		
Employee	664	33.0
Private business	462	23.0
Housewife	438	21.8
Daily worker	203	10.1
Unemployed	128	6.4
University staff	63	3.1
Retired	52	2.6
Clinical characteristics		
Atherothrombosis risk factors		
Hypertension	464	23.1
Hyperlipidemia	416	20.7
Diabetes	278	13.8
Obesity	278	13.8
History of Atherothrombotic diseases		
Stroke	26	1.3
Myocardial infarction	45	2.3
Any other atherothrombotic episode	86	4.3

^a Sixteen (0.8%) respondents did not report their age and their educational level.

prevalence of risk factors was found between genders. However, there was a significant increase in the prevalence of atherothrombosis risk factors with age ($p < 0.01$). In addition, the majority of the participants were in the overweight range, with an average BMI of 26.28 (SD = 4.64 kg/m²) and with the following distribution: 40.3% BMI < 25, 45%

BMI = 25–29.9, and 13.5% BMI \geq 30. Only 1.1% did not report their height and weight.

Awareness and knowledge about atherothrombosis

About three-fourths of the study population (71.5%) perceived atherothrombosis as a public health problem, more so in the capital, Beirut, 87.6% (241) than anywhere else. The lowest percentage was in the North 57.8% (249) seconded by the South 68.3% (218). All the rest were close to the overall country average. The respondents' awareness and general knowledge about atherothrombosis and its risk factors and consequences are depicted in Tables 3 and 4. Only 9% of the respondents provided the correct definition, i.e. "presence of a thrombus in an atherosclerotic vessel" on their own. This figure rose to 23.6% when respondents were asked to pick the correct definition among 6 choices. Some 43.2% defined atherothrombosis as a narrowing in a coronary artery. As shown in Table 3, place of residence (governorate) and educational level were the main determinants for the provision of the correct definition of atherothrombosis. University graduates were almost six times more likely to provide the correct definition compared to participants with no schooling. Moreover, there was a significant difference between regional awareness and knowledge about atherothrombosis ($p < 0.001$). Beirut and Mount Lebanon, which have the highest literacy rates, provided the highest percentage of correct definition of atherothrombosis reaching 30.5% and 29.8%, respectively. An interesting finding is that although the South residents reported four times more awareness of atherothrombosis compared to Beirut, the South provided almost 60% less correct definition of atherothrombosis than Beirut. A possible explanation for this discrepancy is that the residents had heard about the disease from previous awareness campaigns however, they did not grasp the information adequately to be able to define the disease. There was no significant variability in awareness and knowledge among the different age categories, except that participants over 70 years of age had the least awareness and knowledge compared to other age groups. Although it did not reach statistical significance, the proportion of participants with atherothrombosis or its risk factors who correctly defined atherothrombosis was less compared to the proportion of healthy participants. As shown in Table 4, most people in all regions considered hyperlipidemia and blockage of a coronary artery as the most important risk factors of atherothrombosis, thus indicating a belief

Table 2 Health seeking behaviour of the study participants according to disease status

Health behavior	All (n = 2010)		No disease (n = 1873)		Disease ^a (n = 137)		p-Value
	N	%	n	(%)	n	(%)	
Last Medical check up							
≤1 month ago	629	31.3	558	(29.8%)	71	(51.8%)	<0.001
>1 month and ≤3 months ago	439	21.8	409	(21.8%)	30	(21.9%)	NS
>3 months and ≤1 year ago	639	31.8	612	(32.7%)	27	(19.7%)	0.024
Several years ago or never	303	15.1	294	(15.7%)	9	(6.6%)	<0.001
Last BP[*] measurement							
≤1 month ago	440	21.9	781	(41.7%)	87	(63.5%)	<0.001
>1 month and ≤3 months ago	363	18.1	342	(18.3%)	21	(15.3%)	NS
>3 months and ≤1 year ago	408	20.3	392	(20.9%)	16	(11.7%)	NS
Several years ago or never	371	18.5	358	(19.1%)	13	(9.5%)	<0.001
Last FBS[*] measurement							
≤1 month ago	493	24.5	444	(23.7%)	49	(35.8%)	<0.001
>1 month and ≤3 months ago	343	17.1	318	(17.0%)	25	(18.2%)	0.026
>3 months and ≤1 year ago	562	28.0	523	(27.9%)	39	(28.5%)	0.024
Several years ago or never	612	30.4	588	(31.4%)	24	(17.5%)	0.002
Last lipid levels measurement							
≤1 month ago	382	19.0	346	(18.5%)	36	(26.3%)	<0.001
>1 month and ≤3 months ago	409	20.3	372	(19.9%)	37	(27.0%)	<0.001
>3 months and ≤1 year ago	630	31.3	587	(31.3%)	43	(31.4%)	0.012
Several years ago or never	589	29.3	568	(30.3%)	21	(15.3%)	0.001
Physical activity for >30 min							
Never	811	40.5	752	(40.1%)	63	(46.0%)	NS
Occasionally	631	31.4	598	(31.9%)	33	(24.1%)	NS
Daily or weekly	564	28.1	523	(27.9%)	41	(29.9%)	NS
Follow a low fat diet							
No	1409	70.1	1332	(71.1%)	77	(56.2%)	—
Yes	601	29.9	541	(28.9%)	60	(43.8%)	<0.001

^a Disease group includes all participants who reported the occurrence of stroke, myocardial infarction or any atherothrombotic episode.

^{*} BP: blood pressure; FBS: fasting blood sugar; NS: not significant *p*-values are for the comparison between disease and no-disease groups.

that having a blockage is a risk factor rather than an outcome. On the other hand, more than half of the population did not consider diabetes or alcohol as risk factors. The lowest percentage of people recognizing risk factors was in the Bekaa, likely reflecting a lower level of education. When people were asked to select the three most important risk factors of atherothrombosis, hyperlipidemia occupied the first place (57.9%). Smoking was second (45.3%), while closure of coronary arteries was ranked third (39.7%). Regarding the consequences of atherothrombosis, most people selected the worst outcomes with the majority (87.7%) recognizing myocardial infarction (MI) followed by blockage of coronaries (80.6%) and sudden death (80%). However, less than half of the respondents recognized peripheral arterial disease as a consequence of atherothrombosis (Table 4).

Information sources on atherothrombosis

Data showed that only 27.3% of the respondents believed they had enough information about atherothrombosis while 55% believed otherwise and the rest (16.9%) did not know. Current sources of information on atherothrombosis were mostly the television (58.2%) and healthcare workers (50.3%). When participants were asked about their preferred sources for information on atherothrombosis, health care workers were the favored (61.7%) followed by the television (55.5%).

Discussion

Although a majority of the study participants (88.9%) reported being aware of atherothrombosis,

Table 3 Awareness and correct definition of atherothrombosis by socio-demographic characteristics

Characteristics	Awareness			Knowledge		
	Percentage ^a	OR	[95% CI]	Percentage ^a	OR	[95% CI]
Age groups						
30–40	89.5%	1.00	—	24.6%	1.00	—
41–50	90.5%	1.12	[0.76, 1.65]	23.4%	0.94	[0.72, 1.23]
51–60	89.5%	1.01	[0.68, 1.49]	24.1%	0.97	[0.73, 1.29]
61–70	89.4%	0.99	[0.62, 1.59]	24.7%	1.01	[0.72, 1.41]
Above 70	76.8%	0.39 ^{***}	[0.24, 0.62]	15.2%	0.55 [*]	[0.33, 0.91]
Gender						
Females	88.6%	1.00	—	23.5%	1.00	—
Males	89.1%	1.04	[0.79, 1.39]	23.8%	1.01	[0.83, 1.25]
Governorate						
Beirut	94.2%	1.00	—	30.5%	1.00	—
Mount Lebanon	82.8%	0.30 ^{***}	[0.17, 0.51]	29.8%	0.96	[0.71, 1.31]
North	92.3%	0.74	[0.40, 1.38]	20.9%	0.60 ^{**}	[0.42, 0.85]
South	98.7%	4.86 ^{***}	[1.61, 14.73]	14.7%	0.39 ^{***}	[0.26, 0.58]
Bekaa	82.5%	0.29 ^{***}	[0.16, 0.52]	16.8%	0.46 ^{***}	[0.31, 0.68]
Educational level						
No Schooling	77.2%	1.00	—	10.1%	1.00	—
Primary education	85.4%	1.72 [*]	[1.10, 2.69]	16.5%	1.77 [*]	[1.02, 3.06]
Complementary	87.2%	2.01 ^{**}	[1.30, 3.11]	21.6%	2.47 ^{**}	[1.46, 4.17]
Secondary education	90.2%	2.71 ^{***}	[1.69, 4.35]	18.3%	2.00 [*]	[1.17, 3.43]
University degree	95.8%	6.71 ^{***}	[3.94, 11.42]	37.7%	5.40 ^{***}	[3.27, 8.94]
Type of work						
Unemployed	91.4%	1.00	—	18.8%	1.00	—
Daily worker	83.3%	0.47 [*]	[0.23, 0.96]	11.8%	0.58	[0.31, 1.07]
Employee	92.6%	1.18	[0.59, 2.34]	27.1%	1.61	[1.00, 2.59]
Private business	88.3%	0.71	[0.36, 1.40]	27.3%	1.62	[0.99, 2.65]
University staff	93.7%	1.38	[0.42, 4.54]	39.7%	2.85 ^{**}	[1.45, 5.58]
Housewife	84.9%	0.53	[0.27, 1.04]	19.4%	1.04	[0.63, 1.73]
Retired	90.4%	0.88	[0.29, 2.68]	21.2%	1.16	[0.52, 2.58]

OR: unadjusted odds ratio based on bivariate analysis; CI, confidence interval.

^a Percentages are those within each category of the socio-demographic variable (not used for OR computation).

^{*} $p < 0.05$.

^{**} $p < 0.01$.

^{***} $p < 0.001$.

less than 10% could define it properly. This might be related to the fact that the general population could have heard of the concept from previous awareness campaigns but they did not have a thorough knowledge of the disease. The inadequate knowledge is best illustrated by almost half of the subjects not recognizing diabetes as a risk factor and peripheral arterial disease as a consequence of atherothrombosis. The prevalence figures for risk factors, which relied on the self-reported disease status are comparable to those obtained by studies which used actual measures. In fact, an overall prevalence of hypertension and diabetes of 25% and 13%, respectively, was reported in Beirut [4]. Another study done in three communities within Lebanon revealed an overall prevalence of diabetes of 13.1% [11]. A third community-based

study found almost 21% of the community to be dyslipidemic [10]. As for obesity, a national study with objective measurement of height and weight reported that 36% and 17% of adults aged 20 years and above were pre-obese and obese, respectively [12]. Therefore, our figures are quite close to those from other studies in Lebanon.

The regional and educational variability in knowledge of atherothrombosis, its risk factors and consequences needs to be underscored. The correlation between education and cardiovascular diseases has been repeatedly demonstrated in industrialized nations. In Lebanon, the South and the Bekaa peripheral areas include a population with a relatively lower socio-economic and educational status and different traditional values compared to Beirut and Mount Lebanon. Findings from

Table 4 Awareness and knowledge of atherothrombosis among study participants according to disease status

	All (n = 2010) %	No disease (n = 1873) %	Disease ^a (n = 137) %
Awareness	88.9	88.8	90.5
Knowledge			
Correctly defined atherothrombosis	23.6	23.8	21.9
Risk Factors recognition			
Blockage of coronaries**	87.0	87.6	78.8
Hyperlipidemia	86.7	86.8	85.4
Overweight and obesity	81.4	81.8	75.9
Cigarette smoking	77.1	77.4	73.0
Hypertension	77.0	77.5	70.8
Sedentary life	75.8	76.1	72.3
Waterpipe smoking	70.3	70.7	65.7
Atherosclerosis	66.7	66.4	71.5
Alcohol	50.4	50.3	51.1
Diabetes	48.3	50.9	53.1
Consequences recognition			
Myocardial infarction	87.7	87.9	84.7
Coronary artery disease	80.6	80.4	83.9
Sudden death*	80.0	79.5	87.6
Stroke	79.9	80.0	78.1
Arterial rupture*	77.0	77.6	69.3
Cardiac hypertrophy	75.0	75.1	73.7
Cerebrovascular accident	70.8	70.7	72.3
Hypertension	62.1	62.4	58.4
Brain haemorrhage	60.1	60.2	59.9
Inability to move	59.6	59.2	65.0
Paralysis*	51.3	50.6	62.0
Peripheral arterial disease	41.4	41.3	42.3
Visual problems	41.3	41.5	38.0

^a Disease group includes all participants who reported the occurrence of stroke, myocardial infarction or any atherothrombotic episode.

* $p < 0.05$ for the comparison between disease and no-disease groups.

** $p < 0.01$ for the comparison between disease and no-disease groups.

the West probably apply to our population, who with lower education had less knowledge of the disease, likely leading to high-risk behaviors such as smoking, and physical inactivity. Moreover, the poverty and stress experienced by the inhabitants of the Bekaa and the South which are constantly attacked during wars that hit Lebanon also play a role in the inability of the residents to care for their lifestyle habits. Poverty was one of the major reasons for non-compliance in the Bekaa. Hence, it is important to consider socio-economic and political determinants of cardiovascular disease besides traditional CVD risk factors in future awareness campaigns.

In general, the majority of the respondents had an acceptable health seeking behavior. However, in Lebanon, preventive health care is rarely encouraged. As a result, "healthy" respondents had significantly less health seeking behavior compared to individuals with atherothrombotic dis-

ease. Moreover, lifestyle modifications were not followed by the majority of the respondents although they knew that sedentary lifestyle, high fat diet and obesity are risk factors for atherothrombosis. Similar findings were reported in an urban community in Beirut, whereby people had a relatively good knowledge about CVD risk factors but unhealthy behaviors [10]. Therefore, future campaigns need to promote physical activity and healthy diet through special programs. Descriptions of the consequences of atherothrombosis are also important, particularly stressing the mortality and morbidity of stroke and PAD, or major complications including vision problems, and paralysis. PAD requires special attention as more than half of the respondents did not consider it a consequence of atherothrombosis. However, it is well known that the majority of patients with PAD are asymptomatic and PAD is a powerful indicator of systemic atherothrombotic disease [13,14].

Even having a related disease does not necessarily result in better knowledge. In Egypt, 90% of diabetics had poor knowledge about the disease and its complications [9]. In Pakistan, only 14% of tertiary care hospital attendants could define “Coronary Artery Disease” and the majority had a poor health seeking behavior as 35%, 65.3% and 84.6% never had measured their blood pressure, glucose or cholesterol levels, respectively [6]. Similar to our study results, education was associated with knowledge and behavior in Egypt, Pakistan, the United Arab Emirates and Turkey [6,8,9,15]. Therefore, socio-economic determinants of disease need to be highlighted in awareness campaigns and set as a target by policy makers in order to reduce cardiovascular diseases.

This study is a cross-sectional survey that relied on self-reported data. Hence, the estimates of CVD risk factor prevalence may underestimate the true prevalence of these diseases. Although, the respondents’ health seeking behavior is relatively good, yet, we cannot rule out the presence of a social desirability bias that might have led the respondents to provide the answer expected by the interviewer. To our knowledge and based on a *PubMed* and *MedlinePlus* search, this is the first study in Lebanon and in the region to include a national sample to assess knowledge and practices regarding atherothrombosis. Moreover, these findings are of particular significance as epidemiological studies have shown that CVD are the leading causes of death in Lebanon and the region and are expected to increase in the years to come.

Based on the results of this study, two approaches for atherothrombosis prevention are required:

1. A national awareness campaign is needed in order to highlight the importance of diabetes as a risk factor and particularly to promote lifestyle modification and primary prevention.
2. Community-based campaigns are needed in the South and the Bekaa governorates especially in rural areas. In some regions, in particular the Bekaa, more than one-fifth of their populations are illiterate, hence the need to adapt campaign messages based on the educational level of the targeted audience. In these areas, campaigns are needed on site using oral presentations and pictures instead of written messages and brochures. Focus group discussions could be used among other methods. Socio-economic determinants of disease should be considered in these campaigns.

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