Check for updates

RESEARCH ARTICLE

REVISED Effects of sociodemographic and socioeconomic factors on stroke development in Lebanese patients with atrial fibrillation: a cross-sectional study [version 2; peer review: 3 approved]

Diana Malaeb[1,2], Souheil Hallit [ID][3-5], Nada Dia [ID][1], Sarah Cherri[1], Imad Maatouk[1], George Nawas[6], Pascale Salameh[4,7,8], Hassan Hosseini[9,10]

[1]School of pharmacy, Lebanese International University, Beirut, Lebanon
[2]Life Sciences and Health Department, Paris-Est University, Paris, France
[3]Faculty of Medicine and Medical Sciences, Holy Spirit University of Kaslik, Jounieh, Lebanon
[4]Institut National de Santé Publique, Epidémiologie Clinique et Toxicologie - Liban (INSPECT-LB), Beirut, Lebanon
[5]Research Department, Psychiatric Hospital of the Cross, Jal Eddib, Lebanon
[6]College of Pharmacy, Xavier University of Louisiana, Louisiana, USA
[7]Faculty of Pharmacy, Lebanese University, Hadat, Lebanon
[8]University of Nicosia Medical School, Nicosia, Cyprus
[9]Henri Mondor Hospital, Paris, France
[10]Life Sciences and Health Department, Paris-Est Créteil University, Paris, France

Abstract

Background: Non-communicable diseases, the major cause of death and disability, are susceptible to modifiable and non-modifiable risk factors. Atrial fibrillation (AF) increases the risk of stroke by 4 to 5 times and can lead to cardiovascular mortality. This study was conducted to assess the effects of different sociodemographic and socioeconomic factors on stroke development in patients with AF.

Methods: A cross-sectional study was conducted between January and June 2018 on patients recruited from Lebanese community pharmacies. The CHA_2DS_2-VASc scoring system is utilized as a stroke risk stratification tool in AF patients. Participants with a previous physician diagnosis of AF, documented on medical records, were included in this study. Data was collected through a survey that was distributed to all eligible patients.

Results: A total of 524 patients were enrolled in the study with a mean age (± SD) of 58.75 ± 13.59 years with hypertension (78.4%) being the most predominant disease. The results showed that obesity (Beta=0.61, p-value =0.011), retirement and unemployment compared to employment (Beta=1.44 and 1.44, p-value=0.001 respectively), divorced/widow compared to married (Beta=1.38, p-value =0.001) were significantly associated with higher CHA_2DS_2-VASc scores

Open Peer Review

Reviewer Status ✓ ✓ ✓

	Invited Reviewers		
	1	**2**	**3**
version 2 (revision) 10 Nov 2021			
version 1 11 Aug 2021	✓ report	✓ report	✓ report

1. **Feras Jassim Jirjees** [ID], University of Sharjah, Sharjah, United Arab Emirates

2. **Seif El-Hadidi** [ID], Future University in Egypt, New Cairo, Egypt

3. **Muna Barakat** [ID], Applied Science Private University, Amman, Jordan

whereas high versus low socio-economic status (Beta=-1.03, p=0.009) and high school education versus primary education level (Beta=-0.49, p-value=0.025) were significantly associated with lower CHA_2DS_2-VASc scores.

Conclusions: The study highlights that the CHA_2DS_2-VASc score is affected by the presence of various sociodemographic and socioeconomic characteristics in patients with AF. Thus, screening for those factors may predict the progression of cardiovascular disease and may provide an optimal intervention.

Any reports and responses or comments on the article can be found at the end of the article.

Keywords
Stroke; Lebanon; sociodemographic; CHA2DS2-VASc score

> **REVISED** **Amendments from Version 1**
>
> CHA2DS2-VASc score and socioeconomic level (Table 1) were defined. "Ischemic heart disease", "Gulf and Middle East region", "socio-economic", "cardiac patients", "dyslipidaemia" and "jobless" were substituted by "coronary heart disease", "Middle East countries", "socioeconomic", "patients with cardiac disease", "hyperlipidemia" and "unemployed", respectively. "4-5" was replaced by "4 to 5" in the Abstract and Introduction. "Approximately" replaced "≈" in the Introduction. "Healthcare providers" replaced "pharmacists" in the Conclusion. "In" replaced "on", and Sociodemographic and socioeconomic factors were coupled together in the Introduction. Strength was coupled to limitations in the Discussion. Unit for age was added in table 1, as well as updating two references. "Constructive" was removed from the "Effect of socioeconomic status on CHA 2DS 2-VASc score" section. Some sentences were paraphrased. Numerical values were rounded to 2 decimals except for Beta and P-values, which were rounded to 3 decimals. Percentages were rounded to 1 decimal. "(± SD)" was brought forward 3 words in the Abstract.
>
> **Any further responses from the reviewers can be found at the end of the article**

List of abbreviations
AF Atrial fibrillation
M Mean
NCD Non-communicable diseases
SD Standard deviation
TIA Transient ischemic attack or prior stroke
WHO World health organization

Introduction
Non-communicable diseases (NCDs), also known as chronic diseases, are responsible for the premature death of 41 million people globally, accounting for 71% of all deaths annually.[1] According to the World Health Organization (WHO), coronary heart disease and stroke are the world's biggest killers in 2016, accounting for 15.2 million deaths worldwide.[1] The global crude death rate per 100,000 population of high-income, upper and lower-middle-income countries due to stroke is the second-highest following coronary heart disease.[2,3] In Lebanon, NCDs are the major cause of death and disability and are expected to be responsible for 91% of deaths by 2025.[4]

NCDs are susceptible to modifiable and non-modifiable risk factors that are known to trigger their development. Some behavioral changes can be implemented to halt disease progression as the cessation of nicotine, enhancement in physical activity adherence to a healthy diet and appropriate prescriptions.[1,5,6] On the other hand, other factors cannot be altered to modify disease development as age, gender, and previous medical conditions.

Atrial fibrillation (AF) increases the risk of stroke by 4 to 5 times and is estimated to account for approximately 15% of the 15 million strokes that occur worldwide every year.[7–9] Stroke is expected to increase 2.5 times over the next 40 years due to the increased numbers of older individuals.[7–9] The characteristics of patients with AF in the Middle East countries is different from the West due to the high prevalence of obesity, diabetes, and smoking in oil-rich countries.[7] The risk of stroke development in AF patients is assessed through the "congestive heart failure, hypertension, age ≥ 75 years, diabetes mellitus, stroke or transient ischemic attack (TIA), vascular disease, age 64 to 75 years, sex category" score known as CHA_2DS_2-VASc. This score depends on demographic and clinical risk factors and allows health care professionals to quickly assess stroke risk and recommend appropriate therapy to prevent further disease progression.[10]

Sociodemographic and socioeconomic aspects can affect cardiovascular outcomes as certain ethnic groups (African-American/Black), low-income status, low educational level, and unemployment are recognized to negatively impact cardiovascular health.[11,12] In Lebanon, 15% of the population live below the poverty line and 54% in the moderate middle class in 2013. In addition, 54.3% of the Lebanese population aged above 25 years had a secondary level of education in 2017, and the unemployment rate was reported to be 6.2% in 2018.[13]

There is strong evidence that elucidates that socioeconomic determinants are factors that affect cardiovascular diseases indicating an inverse relationship between socioeconomic status and the occurrence of cardiac diseases. Initially, cardiovascular risk factors and diseases were higher in populations with higher socioeconomic status, but then there was a gradual change where the risk factors were higher in groups with lower socioeconomic status groups.[14]

Further studies have shown that higher socioeconomic status patients with non-communicable diseases have access to various medical treatments and have greater accessibility to more specialized hospitals with better-prescribed medicines in comparison to the lower socioeconomic status.[15]

In addition to the socioeconomic status, it has been indicated that structural aspects of an individual's social relationships can predict all-cause mortality from cardiovascular diseases. It has been highlighted that all of the various unmarried states manifested as being single never married, being separated/divorced and being widowed have been all associated with elevated mortality risk from cardiovascular events.[16]

As far as we know, studies that have been conducted in Lebanese patients with cardiac disease assessed the level of patient knowledge on warfarin and the impact of pharmacist counseling, but no study has evaluated the impact of sociodemographic and socioeconomic factors on cardiac disease progression.[17]

Although the CHA_2DS_2-VASc scoring system has been widely adopted as a stroke risk stratification tool in AF patients, it does not take into consideration several of the socioeconomic and sociodemographic factors that contribute to poor cardiovascular outcomes. Accordingly, this study was designed to assess the effect of sociodemographic and socioeconomic factors on CHA_2DS_2-VASc score in Lebanese patients with AF.

Methods
Study design and setting
A cross-sectional study was conducted on patients presented to community pharmacies distributed in different Lebanese geographic districts between January and June 2018. The pharmacies were chosen by simple randomization from the list of pharmacies provided by the Lebanese Order of Pharmacists. The questionnaire was administered face-to-face by trained researchers, who had training before the start of the data collection to ensure that the same procedure was uniformly applied on all patients. All participants who presented to the community pharmacies were screened for possible enrollment in the study and included if they had a previous physician-diagnosed AF documented on their electronic medical profile available in the community pharmacies. No attempt was made to verify the accuracy of the physician's diagnosis. Excluded from the analysis were patients who could not answer the questionnaire adequately either due to a decreased mental alertness or a decreased cognitive function (cognitive disorders, sedated patients, Alzheimer's disease, etc.). A copy of the questionnaire can be found in the *Extended data.*

Data collection
The first part of the questionnaire aimed at collecting the patient's demographic data such as age, gender, work status (employed, retired, unemployed), socioeconomic status (low, moderate, high) and education (primary, middle or high school). The second part included a detailed assessment of the patient's factors to calculate the CHA_2DS_2-VASc score which was assessed for the purpose of the study. The score calculation is performed on all enrolled patients through an assessment of the following criteria: patients aged ≥65 years, female gender, heart failure, prior stroke or TIA, hypertension, diabetes mellitus, vascular disease, coronary heart disease or peripheral artery disease.[18] All medical diseases were assessed by checking the detailed previous medical conditions along with the prescribed medications documented on medical profiles. These factors were incorporated into a CHA_2DS_2-VASc model where each element received 1 point except those aged ≥75 years and those who had a history of stroke or TIA who received 2 points. The CHA_2DS_2-VASc score can range from 0 to 9. The score's interpretation is categorized into "low" if the score is zero, "low-moderate" if the score is one, and "moderate-high" if the score ≥2.[19] Some of the questions under the socio-demographic characteristics (as socioeconomic status, educational level, and social history) in the questionnaire were left unanswered either because the patient did not remember or did not understand what was asked. Sources of bias were addressed by minimizing investigators interference in the data collection, patients were recruited in a way to represent the different Lebanese geographic characteristics, and information related to medical history was retrieved from the electronic medical profiles.

Sample size calculation
Based on a 70% enrolled patients with cardiac disease who were illiterate[20] and in the absence of similar studies in Lebanon, the minimal sample size calculated according to the Epi Info software version 7.2 (population survey) was 323 participants to ensure a confidence level of 95%.

Statistical analysis
An independent person who was unaware of the goals of this research conducted the data coding and analysis using the version 23.0 of the Statistical Package for Social Sciences (SPSS) software. Continuous variables were presented as mean (M) and standard deviation (SD), and the categorical variables were presented as frequency (percentage). The statistical analysis adjusted for the missing values by accounting for the valid percentage in the results output. The Student *t*-test was used to compare the means of the maximum two groups; for means of three and above, the ANOVA test was applied. In the case of non-homogeneity, non-parametric tests substituted the parametric tests. Variables with a $p < 0.05$ in the bivariate analysis were included in the linear regression to assess its association with the dependent variable, the

CHA_2DS_2-VASc score. Potential confounders have been eliminated when $p > 0.2$ to avoid misleading results. $P < 0.05$ was considered statistically significant.

Ethics approval and consent to participate

The methods were performed in accordance with the latest relevant guidelines and regulations. The study design was approved by the ethics committee at the Lebanese International University. Written informed consent was obtained from all enrolled patients before the start of the study and their personal identifying information was removed from the data set to respect their autonomy and confidentiality.

Results

Sociodemographic characteristics

Out of the 800 questionnaires distributed, 524 patients (65.5%) had AF and were consequently enrolled in the study. Lack of diagnosis by an AF physician is a potential factor for non-enrollment. The sociodemographic and socioeconomic factors of patients included in this study are summarized in Table 1. The mean age of the participants was 58.75 ± 13.59 years, with the majority being males (61.2%) and from rural areas (63.2%). Around 57.2% attended at least high school and 42% had a medium economic status. The majority of the studied population (75.6%) had a CHA_2DS_2-VASc score of ≥ 2. As for the past medical history, hypertension (78.4%) and hyperlipidemia (67.6%) were the most prevalent concomitant conditions. The mean score ($\pm$ standard deviation) of the CHA_2DS_2-VASc score was 3.07 ± 1.92; out of 524, 206 (39.3%) had a CHA_2DS_2-VASc score that is at least equal to the mean.

Bivariate analysis

The results of the bivariate analysis showed a significantly higher CHA_2DS_2-VASc score in case of divorce or death of a spouse ($p = 0.001$). A higher mean score was found in cases of unemployment or retirement compared to employment ($p = 0.001$). A lower mean score was significantly associated with a higher socioeconomic status ($p = 0.001$) as well as higher education ($p = 0.001$). Obesity was significantly associated with a high mean score ($p = 0.006$) (Table 2).

Multivariable analysis

The results of the linear regression showed that obesity (Beta = 0.610, $p = 0.011$), retirement and unemployment compared to employment (Beta = 1.440, $p = 0.001$ each), divorced/widow compared to married (Beta = 1.380, $p = 0.001$), were significantly associated with higher CHA_2DS_2-VASc scores whereas high versus low socioeconomic status (Beta = -1.030, $p = 0.009$) and high school education versus primary education level (Beta = -0.490, $p = 0.025$) were significantly associated with lower CHA_2DS_2-VASc scores (Table 3).

Discussion

This cross-sectional study was conducted to investigate the impact of sociodemographic and socioeconomic characteristics on CHA_2DS_2-VASc score in Lebanese AF patients. Sociodemographic characteristics may directly affect the development of cardiovascular disease that are not currently accounted for in the CHA_2DS_2-VASc score criteria. The findings of our study show that obesity, retirement and unemployment compared to employment, and divorced/widow compared to married were significantly associated with higher CHA_2DS_2-VASc scores whereas high versus low socioeconomic status and high school education versus primary education level were significantly associated with lower CHA_2DS_2-VASc scores.

Effect of job status on CHA_2DS_2-VASc score

Our results showed that both unemployed and retired participants were associated with higher CHA_2DS_2-VASc scores compared to patients with jobs, which is consistent with the results of another study.[21,22] The factors responsible for the increased risk amongst the unemployed are of various causes, which can involve behavioral and lifestyle risk factors, such as smoking, poor diet, alcohol consumption and lack of exercise, all of which increase the risk of cardiovascular disease development and complications.[23] In addition to increased smoking and alcohol consumption by unemployed patients, there are other causes, such as financial insecurity and adverse socioeconomic status, which lead to inappropriate health behaviors. Unemployed individuals may not have adequate financial support and/or decreased social involvement which increases the risk of developing cardiovascular and psychological diseases. It has been described that there is a strong correlation between unemployment and the negative effects on cardiovascular and psychological morbidity due to the activation of certain biological factors that are closely linked with acute cardiac events and depression.[24]

In addition, unemployed participants were found to have a higher risk of obesity, lower fruit and vegetable consumption, and restricted physical activity.[25,26] A cross-sectional study in a rural Malay population in Malaysia showed being unemployed or a housewife is associated with metabolic syndrome.[27]

Table 1. Socio-demographic characteristics and past medical history of participants.

Characteristics (N = 524)		Frequency (%) or Mean ± SD
Age (years)		58.75 ± 13.59
Gender	Male	318 (60.7)
	Female	202 (38.6)
	Missing	4 (0.8)
Marital status	Married	426 (81.3)
	Single	38 (7.3)
	Divorced or widow	54 (10.3)
	Missing	6 (1.1)
Work status	Employed	252 (48.1)
	Unemployed	158 (30.2)
	Retired	90 (17.2)
	Missing	24 (4.6)
Dwelling region	Urban	192 (36.6)
	Rural	330 (63)
	Missing	2 (0.4)
Socioeconomic status	Low (below 1000 USD)	26 (5)
	Medium (1000-2000 USD)	216 (41.2)
	High (above 2000 USD)	272 (51.9)
	Missing	10 (1.9)
Education (years)	Primary school (1-6)	128 (25)
	Middle school (7-9)	92 (17.9)
	High school (minimum 10)	294 (57.2)
	Missing	10 (1.9)
BMI (kg/m^2)	Normal (18.5-24.9)	102 (19.5)
	Overweight (25-29.9)	210 (40.8)
	Obese (≥30)	172 (32.8)
	Missing	40 (6.9)
Current smoking status	Non- smoker	254 (48.5)
	Smoker	262 (50)
	Missing	8 (1.5)
Past medical history	Congestive heart failure	84 (16.5)
	Depression	92 (18)
	Deep vein thrombosis or pulmonary embolism	90 (17.7)
	Diabetes mellitus	206 (40.1)
	Hyperlipidemia	350 (67.6)
	Hypertension	406 (78.4)
	Migraine	70 (13.7)
	Peripheral artery disease	70 (13.6)
	Stroke	122 (23.7)
	Transient ischemic attack	40 (7.9)
Family history	Heart disease	374 (72.5)
	Stroke	234 (45.9)

%, percentage; SD, standard deviation; BMI, body mass index.

Table 2. Bivariate analysis of the participants' characteristics.

Characteristics (N = 524)		Mean ± SD	p-value
Marital status	Married	2.95 ± 1.9	0.001
	Single	2.32 ± 1.86	
	Divorced or widow	5.07 ± 2.21	
Work status	Employed	2.28 ± 1.68	0.001
	Unemployed	4.08 ± 1.88	
	Retired	4.04 ± 2.1	
Socioeconomic status	Low	3.92 ± 2.17	0.001
	Medium	3.55 ± 2.13	
	High	2.75 ± 1.87	
Education (years)	Primary school (1-6)	4.03 ± 2.08	0.001
	Middle school (7-9)	3.65 ± 2.16	
	High school (minimum 10)	2.59 ± 1.8	
BMI (kg/m^2)	Normal (18.5-24.9)	3.08 ± 2.05	0.006
	Overweight (25-29.9)	2.87 ± 1.97	
	Obese (≥30)	3.53 ± 2.1	
Residence	Urban	3.23 ± 2.23	0.387
	Rural	3.07 ± 1.92	
Current smoking status	Non- smoker	3.22 ± 2.03	0.423
	Smoker	3.08 ± 2.05	

SD, standard deviation; BMI, body mass index.

Table 3. Multivariable analysis: linear regression taking the CHA$_2$DS$_2$-VASC score as the dependent variable.

Characteristics (N = 524)		Unstandardized β	Standardized β	p-value	95% CI
Marital status (Married[†])	Single	−0.22	−0.03	0.507	−0.86; 0.42
	Divorced or widow	1.38	0.21	0.001	0.81; 1.94
Work status (Employed[†])	Unemployed	1.44	0.33	0.001	1.04; 1.83
	Retired	1.44	0.27	0.001	0.97; 1.92
Socioeconomic status (Low[†])	Medium	−0.66	−0.16	0.089	−1.42; 0.1
	High	−1.03	−0.25	0.009	−1.79; −0.26
Education (years) (Primary school[†])	Middle school	−0.14	−0.03	0.599	−0.67; 0.39
	High school	−0.49	−0.12	0.025	−0.93; −0.06
BMI (kg/m^2) (Normal[†])	Overweight	0.03	0.01	0.895	−0.43; 0.49
	Obese	0.61	0.14	0.011	0.14; 1.07

[†]Reference.
β, beta; 95% CI, 95 percent confidence interval; BMI, body mass index.

Effect of socioeconomic status on CHA_2DS_2-VASc score

Our study showed that lower socioeconomic status is associated with higher CHA_2DS_2-VASc score which is consistent with the results of another study conducted by Ghazali et al.[28] It is explained that lower socioeconomic status is usually correlated with poor health as the socioeconomic status reflects the level of education, income, and type of occupation. Similar findings were reported by Sabry et al. regarding health and economic status during the COVID pandemic.[29] According to a population-based study of 11,247 Australian adults aged ≥25 years, and women with lower education were associated with a higher risk of metabolic disorders manifested by hyperinsulinemia, hypertriglyceridemia, abdominal obesity and hypertension that trigger the risk of cardiovascular occurrence.[30] According to the literature, a low educational level is associated with poor health because of the limited access, and lack of comprehensive understanding of health-related information.[26] Furthermore, lower socioeconomic factors are not only associated with higher metabolic disorders but are correlated with engagement in a variety of behaviors that exert a detrimental effect on health.[31,32]

The previous findings can be explained by the fact that people from the low socioeconomic factors are less motivated, lack the appropriate access and opportunity, and are unable to afford healthier food, and/or time for healthy recreational activities which may have a negative impact on health and increase the risk of cardiac disorders.[33–35]

Effect of obesity on CHA_2DS_2-VASc score

Our results concluded that obese participants have higher CHA_2DS_2-VASc scores compared to normal-weight patients which are reflected in previous studies.[27,36] According to Selvarajah et al. the prevalence of diabetes, hypertension, and hyperlipidemia increase with obesity which are all known established risk factors for cardiovascular development.[37]

It is established that obesity influences the pathogenesis of atherosclerosis through the association with metabolic and inflammatory systems.[38] The adipose tissue secretes proteins that are known to regulate biological and physiological states and play a vital role in obesity, atherosclerosis pathogenesis, metabolic derangements, and inflammatory process.[39]

Effect of marital status on CHA_2DS_2-VASc score

Our results showed that widowed and divorced status were significantly associated with higher CHA_2DS_2-VASc score which is consistent with the results of a recent meta-analysis.[40] There are several mechanisms postulated to explain the protective effect of marital status on cardiovascular diseases. Social causation theory suggests that individuals benefit from spousal support[41] where living with another person, specifically the partner, allows for earlier recognition and response to warning symptoms.[42,43] It was further discussed that single patients had longer delays in seeking medical consultation,[42,44,45] were more likely to be non-adherent to medications.[46] In addition, partners exert a positive effect on the quality of life depicted through the engagement of health behaviors such as a healthy lifestyle and greater financial resources, especially in households with a dual-income making better healthcare more accessible.[42,47,48] Another reason that explains the effect of marriage on cardiovascular diseases is the stress-related theory, which suggests that partner loss or poor-quality relationships may have a detrimental impact on the economic, behavioral and emotional well-being of an individual that increases susceptibility to diseases.[49] Specifically, biological stress may ultimately worsen cardiovascular risk factors such as hypertension, impaired vagal tone, hyperlipidemia, diabetes, and the progression of atherosclerosis.[50] It is further highlighted that married status can exert a buffering role through the informational or emotional resources from a spouse promoting adaptive behavior and reducing the excessive neuroendocrine response to acute or chronic stressors translated to a reduced risk of cardiovascular diseases.[51]

Strengths and limitations

Our study has some limitations: first, the questionnaire used was not validated and self-applied based on subjective assessment of the respondent, so the information could be biased given that recall bias might influence individuals' responses. Although the patients were recruited from different Lebanese geographic areas yet they might not be representative of the whole Lebanese areas which can hinder generalizing the results to the entire population. In addition, the refusal of some patients to participate in the study might have led to unintended selection bias. Our study has elucidated a preliminary possible association between sociodemographic factors and risk of stroke development among AF patients in Lebanese patients where some risk factors might be population-specific since disease profiles may be different in terms of lifestyle, genetics and demography. A better planned longitudinal study may be of value since the study is cross-sectional where it is impossible to know which comes first, the illness or the socioeconomic factor. Finally, there was no control group. The strengths of our study were the enrollment of a large sample of subjects and the utilization of the validated tool CHA_2DS_2-VASc score to assess the odds of stroke in patients with AF.

Conclusion

This study highlighted the fact that non-communicable diseases should not be assessed through the past or present medical history only; it should rather be evaluated through a thorough investigation of socioeconomic and socio-demographic factors. The findings of this study support the fact that work, economic, and marital status may modify the

odds of non-communicable disease in patients with baseline cardiac disease. Consequently, the study raises the need for the integral role healthcare providers have in educating and minimizing the influence of socioeconomic factors other than those included in the current guidelines and which can increase the risk for developing cardiovascular disease.

Data availability

Underlying data

OSF: Effects of Sociodemographic and Socioeconomic Factors on Stroke Development in Lebanese Patients with Atrial Fibrillation: a cross-sectional study. https://doi.org/10.17605/OSF.IO/PJC6A.[52]

This project contains the following underlying data.

- Data_Anonymous_Results_stroke with Afib_Dr Diana Malaeb_2020.sav

Extended data

OSF: Effects of Sociodemographic and Socioeconomic Factors on Stroke Development in Lebanese Patients with Atrial Fibrillation: a cross-sectional study. https://doi.org/10.17605/OSF.IO/PJC6A.[52]

This project contains the following extended data.

- Questionnaire_Stroke with Afib_Dr Diana Malaeb_2020.doc

- Formulas used in the analysis_Stroke with Afib_Dr Diana Malaeb_2020.docx

- Data key_CV score_Dr Diana Malaeb_2020.docx

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Acknowledgments

We thank all the patients who participated in this study.

References

1. World Health Organization: **Noncommunicable diseases - Key Facts.** 2018.
   Reference Source

2. World Health Organization: **The top 10 causes of death.** 2018.
   Reference Source

3. World Health Organization: **Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016.** 2018.
   Reference Source

4. World Health Organization: **Noncommunicable Diseases (NCD) Country Profiles.** 2018.

5. El Hadidi S, Rosano G, Tamargo J, *et al.*: **Potentially inappropriate prescriptions in heart failure with reduced ejection fraction: ESC position statement on heart failure with reduced ejection fraction-specific inappropriate prescribing.** *Eur. Heart J. Cardiovasc. Pharmacother.* 2020.
   Publisher Full Text

6. Forouzanfar MH, A A, Alexander LT, *et al.*: **Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015.** *Lancet.* 2016; **388**(10053): 1659–724.
   PubMed Abstract | **Publisher Full Text** | **Free Full Text**

7. Zubaid M, Rashed WA, Alsheikh-Ali AA, *et al.*: **Gulf Survey of Atrial Fibrillation Events (Gulf SAFE): design and baseline characteristics of patients with atrial fibrillation in the Arab Middle East.** *Circ Cardiovasc Qual Outcomes.* 2011; **4**(4): 477–82.
   PubMed Abstract | **Publisher Full Text**

8. Kannel WB, Benjamin EJ: **Status of the epidemiology of atrial fibrillation.** *Med Clin North Am.* 2008; **92**(1): 17–40, ix.
   PubMed Abstract | **Publisher Full Text** | **Free Full Text**

9. Mozaffarian D, Benjamin EJ, Go AS, *et al.*: **Executive summary: heart disease and stroke statistics-2015 update: a report from the American Heart Association.** *Circulation.* 2015; **131**(4): 434–41.
   Publisher Full Text

10. January CT, Wann LS, Alpert JS, *et al.*: **2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines and the Heart Rhythm Society.** *Circulation.* 2014; **130**(23): 2071–104.
    PubMed Abstract | **Publisher Full Text**

11. Caleyachetty R, Echouffo-Tcheugui JB, Muennig P, *et al.*: **Association between cumulative social risk and ideal cardiovascular health in US adults: NHANES 1999-2006.** *Int J Cardiol.* 2015; **191**: 296–300.
    PubMed Abstract | **Publisher Full Text**

12. National Stroke Association: **Minorities and Stroke.**
    Reference Source

13. Trading Economics: **Lebanon unemployment rate.**
    Reference Source

14. Davari M, Maracy MR, Khorasani E: **Socioeconomic status, cardiac risk factors, and cardiovascular disease: A novel approach to determination of this association.** *ARYA Atheroscler.* 2019; **15**(6): 260–66.
    PubMed Abstract | **Publisher Full Text** | **Free Full Text**

15. Mendis S, Abegunde D, Yusuf S, *et al.*: **WHO study on prevention of recurrences of myocardial infarction and stroke (WHO-PREMISE).** *Bull World Health Organ.* 2005; **83**: 820–9.
    PubMed Abstract | **Free Full Text**

16. Molloy GJ, Stamatakis E, Randall G, *et al.*: **Marital status, gender and cardiovascular mortality: behavioural, psychological distress and metabolic explanations.** *Soc Sci Med.* 2009; **69**(2):

223–8.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

17. Choumane NS, Malaeb DN, Malaeb B, *et al*.: **A multicenter, prospective study evaluating the impact of the clinical pharmacist-physician counselling on warfarin therapy management in Lebanon.** *BMC Health Serv Res.* 2018; **18**(1): 80.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

18. Samaha A, Zouein F, Gebbawi M, *et al*.: **Associations of lifestyle and dietary habits with hyperlipidemia in Lebanon.** 2017.
Publisher Full Text

19. Lane DA, Lip GY: **Use of the CHA(2)DS(2)-VASc and HAS-BLED scores to aid decision making for thromboprophylaxis in nonvalvular atrial fibrillation.** *Circulation.* 2012; **126**(7): 860–5.
PubMed Abstract | **Publisher Full Text**

20. Janati A, Matlabi H, Allahverdipour H, *et al*.: **Socioeconomic Status and Coronary Heart Disease.** *Health Promot Perspect.* 2011; **1**: 105–10.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

21. Parsons C, Patel SI, Cha S, *et al*.: **CHA(2)DS(2)-VASc Score: A Predictor of Thromboembolic Events and Mortality in Patients With an Implantable Monitoring Device Without Atrial Fibrillation.** *Mayo Clin Proc.* 2017; **92**(3): 360–9.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

22. Zagozdzon P, Zaborski L, Ejsmont J: **Survival and cause-specific mortality among unemployed individuals in Poland during economic transition.** *J Public Health (Oxf).* 2009; **31**(1): 138–46.
PubMed Abstract | **Publisher Full Text**

23. Montgomery S, Cook D, Bartley M, *et al*.: **Unemployment, cigarette smoking, alcohol consumption and body weight in young British men.** *Europ J Public Health.* 1998; 8.
Publisher Full Text

24. Empana JP, Sykes DH, Luc G, *et al*.: **Contributions of depressive mood and circulating inflammatory markers to coronary heart disease in healthy European men: the Prospective Epidemiological Study of Myocardial Infarction (PRIME).** *Circulation.* 2005; **111**(18): 2299–305.
PubMed Abstract | **Publisher Full Text**

25. Kee C, Jamaiyah H, Safiza MN, *et al*.: **Abdominal Obesity in Malaysian Adults: National Health and Morbidity Survey III (NHMS III, 2006).** *Malays J Nutr.* 2008; **14**(2).
PubMed Abstract

26. Safiza N, Khor GL, Shahar S, *et al*.: **The Third National Health and Morbidity Survey (NHMS III) 2006: nutritional status of adults aged 18 years and above.** *Malay J Nutri.* 2008; **14**: 1–87.

27. Mohamed H, Mitra A, Mohd Zainuddin LR, *et al*.: **Women Are at a Higher Risk of Metabolic Syndrome in Rural Malaysia.** *Women Health.* 2013; **53**: 335–48.
PubMed Abstract | **Publisher Full Text**

28. Ghazali SM, Seman Z, Cheong KC, *et al*.: **Sociodemographic factors associated with multiple cardiovascular risk factors among Malaysian adults.** *BMC Public Health.* 2015; **15**(1): 68.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

29. El Hadidi S, Samir Bazan N, Byrne S, *et al*.: **Heart Failure Prescribing Quality at Discharge from a Critical Care Unit in Egypt: The Impact of Multidisciplinary Care.** *Pharmacy (Basel).* 2020 Sep 1; **8**(3): 159.
Publisher Full Text | **Free Full Text**

30. Kavanagh A, Bentley RJ, Turrell G, *et al*.: **Socioeconomic position, gender, health behaviours and biomarkers of cardiovascular disease and diabetes.** *Soc Sci Med.* 2010; **71**(6): 1150–60.
PubMed Abstract | **Publisher Full Text**

31. Keyes KM, Hasin DS: **Socio-economic status and problem alcohol use: the positive relationship between income and the DSM-IV alcohol abuse diagnosis.** *Addiction.* 2008; **103**(7): 1120–30.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

32. Grittner U, Kuntsche S, Graham K, *et al*.: **Social Inequalities and Gender Differences in the Experience of Alcohol-Related Problems.** *Alcohol Alcohol.* 2012; **47**(5): 597–605.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

33. Cutler DM, Lleras-Muney A, Vogl T: **Socioeconomic status and health: dimensions and mechanisms.** *National Bureau Econ Res.* 2008. Report No.: 0898-2937.
Publisher Full Text

34. Lantz PM, House JS, Mero RP, *et al*.: **Stress, life events, and socioeconomic disparities in health: results from the Americans' Changing Lives Study.** *J Health Soc Behav.* 2005; **46**(3): 274–88.
PubMed Abstract | **Publisher Full Text**

35. Layte R, Whelan CT: **Explaining social class inequalities in smoking: the role of education, self-efficacy, and deprivation.** *Europ Soc Rev.* 2009; **25**(4): 399–410.
Publisher Full Text

36. Mohamud WN, Ismail AA, Sharifuddin A, *et al*.: **Prevalence of metabolic syndrome and its risk factors in adult Malaysians: results of a nationwide survey.** *Diabetes Res Clin Pract.* 2011; **91**(2): 239–45.
PubMed Abstract | **Publisher Full Text**

37. Selvarajah S, Haniff J, Kaur G, *et al*.: **Clustering of cardiovascular risk factors in a middle-income country: a call for urgency.** *Eur J Prev Cardiol.* 2013; **20**(2): 368–75.
PubMed Abstract | **Publisher Full Text**

38. Unamuno X, Gómez-Ambrosi J, Rodríguez A, *et al*.: **Adipokine dysregulation and adipose tissue inflammation in human obesity.** *Eur J Clin Invest.* 2018; **48**(9): e12997.
PubMed Abstract | **Publisher Full Text**

39. João AL, Reis F, Fernandes R: **The incretin system ABCs in obesity and diabetes - novel therapeutic strategies for weight loss and beyond.** *Obes Rev.* 2016; **17**(7): 553–72.
PubMed Abstract | **Publisher Full Text**

40. Wong CW, Kwok CS, Narain A, *et al*.: **Marital status and risk of cardiovascular diseases: a systematic review and meta-analysis.** *Heart.* 2018; **104**(23): 1937.
PubMed Abstract | **Publisher Full Text**

41. Fournier S, Muller O, Ludman A, *et al*.: **Influence of socioeconomic factors on delays, management and outcome amongst patients with acute myocardial infarction undergoing primary percutaneous coronary intervention.** *Swiss Medical Weekly.* 2013; **143**: 0.
PubMed Abstract | **Publisher Full Text**

42. Kilpi F, Konttinen H, Silventoinen K, *et al*.: **Living arrangements as determinants of myocardial infarction incidence and survival: A prospective register study of over 300,000 Finnish men and women.** *Soc Sci Med.* 2015; **133**: 93–100.
PubMed Abstract | **Publisher Full Text**

43. Sorlie PD, Coady S, Lin C, *et al*.: **Factors associated with out-of-hospital coronary heart disease death: the national longitudinal mortality study.** *Ann Epidemiol.* 2004; **14**(7): 447–52.
PubMed Abstract | **Publisher Full Text**

44. Austin D, Yan AT, Spratt JC, *et al*.: **Patient characteristics associated with self-presentation, treatment delay and survival following primary percutaneous coronary intervention.** *Eur Heart J Acute Cardiovasc Care.* 2014; **3**(3): 214–22.
PubMed Abstract | **Publisher Full Text**

45. Hadi Khafaji HA, Al Habib K, Asaad N, *et al*.: **Marital status and outcome of patients presenting with acute coronary syndrome: an observational report.** *Clin Cardiol.* 2012; **35**(12): 741–48.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

46. Wu J-R, Lennie TA, Chung ML, *et al*.: **Medication adherence mediates the relationship between marital status and cardiac event-free survival in patients with heart failure.** *Heart Lung.* 2012; **41**(2): 107–14.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

47. Dupre M, Nelson A: **Marital history and survival after a heart attack.** *Soc Sci Med.* 2016; **170**.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

48. Floud S, Balkwill A, Canoy D, *et al*.: **Marital status and ischemic heart disease incidence and mortality in women: a large prospective study.** *BMC Med.* 2014; **12**(1): 42.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

49. Quinones PA, Kirchberger I, Heier M, *et al*.: **Marital status shows a strong protective effect on long-term mortality among first acute myocardial infarction-survivors with diagnosed hyperlipidemia--findings from the MONICA/KORA myocardial infarction registry.** *BMC Public Health.* 2014; **14**: 98.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

50. Vujcic I, Vlajinac H, Dubljanin E, *et al*.: **Long-term prognostic significance of living alone and other risk factors in patients with acute myocardial infarction.** *Ir J Med Sci.* 2015; **184**(1): 153–8.
PubMed Abstract | **Publisher Full Text**

51. Akimova E, Pushkarev G, Smaznov V, *et al*.: **Socio-economic risk factors for cardiovascular death: Data from 12-year prospective epidemiologic study.** *Russian J Cardiol.* 2015; **110**: 7.

52. Dia N: **Effects of Sociodemographic and Socioeconomic Factors on Stroke Development in Lebanese Patients with Atrial Fibrillation: A Cross-Sectional Study.** *OSF.* 2021.
Publisher Full Text

Open Peer Review

Current Peer Review Status: ✓ ✓ ✓

Version 1

✓ **Muna Barakat** [iD]

Faculty of Pharmacy, Applied Science Private University, Amman, Jordan

Thank you for giving me this opportunity in reviewing the article "Effects of sociodemographic and socioeconomic factors on stroke development in Lebanese patients with atrial fibrillation: a cross-sectional study". The article is really interesting and informative as it highlights a vital problem in the community. The findings thus should be used as a tool to enhance patient counselling about the risk factors including diseases and life style measures that should be implemented to minimize the occurrence of chronic diseases.

No further comments were raised, and I believe it is suitable to index.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Clinical practice

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 08 Sep 2021

Nada Dia, Lebanese International University, Beirut, Lebanon

Dear Dr. Barakat,

Thank you so much for your time and input.
The co-authors and I were happy to read your feedback.

Sincerely,
Nada Dia and the co-authors

Competing Interests: No competing interests were disclosed.

Reviewer Report 23 August 2021

https://doi.org/10.5256/f1000research.57699.r92213

✔ **Seif El-Hadidi** (iD)

Faculty of Pharmacy, Future University in Egypt, New Cairo, Egypt

- This article is of good quality, fit for indexing and citation.
- The article is well-written and raises an interesting question.
- However, I have some weak points for revision before final indexing.
    1. Some citations can be added as inserted below.
       - 1a) Sabry *et al.* (2021[1]): This paper is nearly of similar content regarding the social determinants but in COVID-19 among the population of a low-middle Income country.
       - 1b) PIPHFrEF is a very good statement for meds that are harmful in cardiac diseases & particularly, HF where AF is a prognostic factor (El Hadidi *et al.*, 2020[2]).
       - 1c) The role of pharmacists in NCD management might not be well elaborated in the Middle East. El Hadidi *et al.* (2020[3]) might be a good reference for pharmacists' role in NCD in limited resources.

    2. The real questionnaire should be attached as supplement material (even if in Arabic/French Language) for reproducibility.

    3. I prefer to change the term "jobless" to "unemployed" as I think it is more ethical.

4. I prefer to briefly define the criteria/criterion/reference of high/low socioeconomic levels in USD.

5. Some English writings in the intro need to be revised before submission e.g. sentences should not start with abbreviations.

6. In the 4th paragraph of the intro, a very brief comparison of Lebanon people to a neighbouring country might be needed.

Overall, this manuscript will be very interesting after doing the above recommendations and insertion of the recommended citations.

References
1. Sabry N, ElHadidi S, Kamel A, Abbassi M, et al.: Awareness of the Egyptian public about COVID-19: what we do and do not know.*Inform Health Soc Care*. 2021; **46** (3): 244-255 PubMed Abstract | Publisher Full Text
2. El Hadidi S, Rosano G, Tamargo J, Agewall S, et al.: Potentially Inappropriate Prescriptions in Heart Failure with Reduced Ejection Fraction (PIP-HFrEF).*Eur Heart J Cardiovasc Pharmacother*. 2020. PubMed Abstract | Publisher Full Text
3. El Hadidi S, Samir Bazan N, Byrne S, Darweesh E, et al.: Heart Failure Prescribing Quality at Discharge from a Critical Care Unit in Egypt: The Impact of Multidisciplinary Care.*Pharmacy (Basel)*. 2020; **8** (3). PubMed Abstract | Publisher Full Text

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Cardiology; Drug-therapy optimisation & Guideline-led Prescribing; Critical Care Medicine; Infectious Diseases; Pharmacoepidemiology.

I confirm that I have read this submission and believe that I have an appropriate level of

expertise to confirm that it is of an acceptable scientific standard.

Author Response 08 Sep 2021

Nada Dia, Lebanese International University, Beirut, Lebanon

Dear Dr. El-Hadidi,

Thank you for your time and valuable input.
Whenever possible, the articles you refer to were added to the section of references. The questionnaire was not attached as it is mentioned in the extended data. A study similar to the one we conducted in Lebanon was hard. Hence comparison was not possible.
The remaining changes were applied as requested.
Kindly let us know if further questions/improvements were needed.

Sincerely,
Nada dia and the co-authors

Competing Interests: No competing interests were disclosed.

Reviewer Report 23 August 2021

https://doi.org/10.5256/f1000research.57699.r92211

Feras Jassim Jirjees 🆔
College of Pharmacy, University of Sharjah, Sharjah, United Arab Emirates

The manuscript was written in a scientific manner. There are several important points in this study. There are some corrections, especially in the writing, that I would ask the authors to make.

Abstract:
- Introduction: "4-5" should be "4 to 5".
- Aim: the authors should add "socioeconomic factors" to the aim of the study.
- Results: "with a mean age of 58.75 (± SD) ± 13.59 years" should be written as "with a mean age (± SD) of 58.75 ± 13.59 years".

Introduction:

Page 3:
- Paragraph 3: "~15%", it is better as "approximately 15%" (no symbol).
- Paragraph 3: "Gulf and Middle East region", Gulf countries are part of the Middle East region; therefore, it should be the "Middle East countries".

Page 4:
Ethics approval and consent to participate:
- ○ No ethics approval number or code, please add it.

Results:

Page 4, Sociodemographic characteristics:
- ○ Number or percentage should either have one digit after decimal or two digits

Page 5, Table 1:
- ○ Age: add (years).

Page 8, Conclusion:
".... the study raises the need for the integral role <u>pharmacists</u> have in educating ..." It should be <u>healthcare providers</u> instead of pharmacists alone.

Finally, in general, please use "socioeconomic" instead of "socio-economic" in all of the manuscript.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Pharmacotherapeutics, Cardiovascular diseases, Diabetes, and medication adherence

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 08 Sep 2021

Nada Dia, Lebanese International University, Beirut, Lebanon

Dear Dr. Jirjees,

Thank you for your time and input. All the requested modifications were applied.
Nonetheless, the ethics approval number was not listed because in 2018 the Lebanese
International University did not release numbers for any accepted study.
Kindly let us know if further information is needed.

Sincerely,
Nada Dia

Competing Interests: No competing interests were disclosed.

The benefits of publishing with F1000Research:

• Your article is published within days, with no editorial bias

• You can publish traditional articles, null/negative results, case reports, data notes and more

• The peer review process is transparent and collaborative

• Your article is indexed in PubMed after passing peer review

• Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000 Research