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DISCOVERY
SCIENTIFIC SOCIETY

Cardiovascular Disease prevention: Assessing knowledge and lifestyle choices through a population survey

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ABSTRACT

Cardiovascular diseases (CVDs) are a leading cause of mortality globally. This cross-sectional study assessed the knowledge and lifestyle behaviors related to CVD prevention in the general population. A sample of 348 adults completed a survey measuring CVD familiarity, health behaviors, and sociodemographic factors during June 2023 to December 2023. Reliability analysis showed high internal consistency of the scale (α=0.721). Cross-tabulations revealed lower CVD familiarity among older adults. Correlation analysis found preliminary evidence of positive associations between physical activity, diet and CVD knowledge. Logistic regression identified age, exercise and smoking as significant predictors of regular blood pressure checks. Comparative analyses by gender and age indicated subtle subgroup differences. The findings emphasize gaps in awareness, lifestyle disparities and complex interactions around CVD prevention. A multipronged, evidence-based approach is required, with tailored strategies for high-risk subgroups.

Keywords: Cardiovascular diseases, Prevention, Knowledge, Lifestyle

1. INTRODUCTION

When discussing the topic of global health, cardiovascular illnesses, which are often referred to as CVDs, continue to be a substantial hazard to both people and countries alike. Other terminology for these disorders includes cardiovascular diseases. It is of the highest significance to do research on comprehensive approaches for the prevention and early intervention of the disease, especially when taking into account the fact that their incidence is continually growing. One of the goals of this research is to investigate the complex interaction that exists between information, lifestyle choices, and the prevention of cardiovascular illnesses. This is one of the aims of this study. In order to accomplish our goal of

exposing the present levels of knowledge and behavioral patterns, we will be conducting a population survey. This will allow us to pave the way for therapies that are guided by public health standards (Hassen et al., 2022).

Diseases of the cardiovascular system include a wide range of disorders, including heart failure, coronary artery disease, and stroke, to name just a few of them. It is still the case that these illnesses are the leading cause of death throughout the whole planet. A startling 31 percent of all fatalities that take place around the world are related to cardiovascular diseases (CVDs), according to information supplied by the global Health Organization (WHO). Throughout the course of the year, these diseases are responsible for the deaths of around 17.9 million people. It has been stated by Zhang et al., (2017) that despite the significant progress that has been made in the field of medical research, a significant number of these events may be associated with risk factors that may be prevented. The fact that these developments have been made lends credence to the argument that has been presented here. The relevance of the issue is shown by the fact that it draws attention to the significant role that lifestyle choices and knowledge play in reducing the burden of cardiovascular diseases on society.

Understanding of the connections that exist between knowledge, lifestyle, and cardiovascular health is crucial, and it is necessary to have a comprehensive understanding of the interactions that take place between these factors. It is possible for people to get the information they want in order to make educated decisions about their health when they have knowledge, which acts as the basis upon which information is produced. If a person is aware of the risk factors, preventative behaviors, and early symptoms connected with a variety of cardiovascular problems, then they will be able to maintain a lifestyle that is beneficial to their heart health. This is directly proportionate to the degree to which they are aware of these things. A person's lifestyle choices include decisions about the management of stress, levels of physical activity, the use of nicotine, and the habits that one has regarding eating, according to the authors (Woringer et al., 2017). For the purpose of determining the current state of cardiovascular health, it is essential to keep in mind that each of these variables plays a significant role.

This study uses a population survey as a dependable way to achieve these objectives in order to finish the research. Our goal is to create insights that may be used to effect targeted interventions, public health campaigns, and educational activities (Ndejjo et al., 2020). This will allow us to enhance the prevention of cardiovascular disease, which is our primary purpose. Finding solutions to increase the prevention of cardiovascular disease is the objective that we have set for ourselves. In order to accomplish this objective, the data pertaining to the levels of awareness, health practices, and socio-demographic characteristics will be gathered and reviewed.

The results of our research are expected to give a more nuanced knowledge of the elements that have an influence on the cardiovascular health of a whole community as a whole. This is something that we are looking forward to. With the help of this comprehensive survey, we have high hopes that we will be able to make a contribution to the development of evidence-based initiatives. These initiatives will enable individuals and communities to make decisions based on accurate information, thereby paving the way for a society that is more heart-conscious and healthier.

Objectives

The objectives of this study are to investigate the present state of knowledge about cardiovascular illnesses and to investigate the complex web of lifestyle decisions that are made by a variety of different groups of people.

2. MATERIALS AND METHODS

Study Design

A quantitative cross-sectional survey design was utilized to assess knowledge and lifestyle choices related to cardiovascular disease prevention in the general population.

Study duration

Study was conducted during June 2023 to December 2023.

Sampling

A sample of 348 participants was selected through a multi-stage random sampling technique. The sample was representative of the population in terms of key demographic variables like gender, age, and education level. The sample size was calculated using the following formula:

n = Z^2 * p*(1-p) / e^2

Where:

n = Required sample size

Z = Z statistic for level of confidence (for 95% confidence, Z = 1.96)

p = Expected proportion or prevalence (if unknown, use 0.5 for maximum variability)

e = Margin of error or precision (used 0.05 for 5% margin of error)

Plugging in the numbers:

n = (1.96)^2 * 0.5*(1-0.5) / (0.05)^2 n = 384

Therefore, the required sample size is 384 to ensure a confidence level of 95% and a 5% margin of error.

A sample of 348 was selected for the study using multi-stage random sampling. Although the sample is slightly less than the calculated 384, it should still provide reasonably precise population estimates given the sampling method and sample characteristics.

Data Collection Tool

A structured questionnaire was developed to collect information on:

Demographic factors: Age, gender, education level

Knowledge about cardiovascular disease prevention

Lifestyle behaviors: Physical activity, diet, tobacco and alcohol use

Sources of information on cardiovascular health

The questionnaire contained a mix of closed-ended questions, Likert scales, and multiple-choice questions. It was pilot tested on 30 participants and revised before full-scale data collection.

Data Collection Procedure

Data was collected through in-person interviews where the questionnaire was administered by trained enumerators at public locations. Quality checks were conducted by re-interviewing 10% of participants.

Data Analysis

Quantitative data analysis techniques were applied using SPSS including:

Descriptive statistics (frequency distribution, graphs)

Reliability analysis (Cronbach's alpha)

Cross tabulation

Correlation analysis

Logistic regression

Comparative analysis

Data was presented using tables and graphs. Statistical significance was assessed at $p<0.05$

3. RESULTS

A reliability analysis is conducted to assess the consistency of the questionnaire. Graphs and frequency distribution are used to examine demographic characteristics such as age, gender, and education. A balanced representation of the 348 participants is ensured by the gender distribution. Levels of education indicate towards a possible relationship between increasing knowledge of cardiovascular disease and greater levels of education. Information sources are examined, including print media and medical experts.

Age-specific educational requirements can be obtained using cross-tabulation analysis, which examines at the correlations between age and knowledge level. Relationships between cardiovascular knowledge and lifestyle choices are demonstrated using correlation

analysis. Regular measurements of blood pressure are predicted by logistic regression, which emphasizes the importance of age, physical activity, and tobacco use. Comparative analysis investigates at differences in knowledge and physical activity patterns based on age and gender.

Reliability Analysis

This technique's objective is to determine the amount of reliable and unreliable data. Although reliability is calculated the other factors, but the demographic variables' reliability is not calculated.

Table 1 Reliability Results

Reliability Analysis	
Cronbach's Alpha Value	0.721

The questionnaire's items are internally consistent, and the overall score is an accurate measure of the concept being evaluated, according to the Cronbach's alpha value of 0.721. This indicates that the questionnaire may be used to measure the construct with confidence because of its high degree of reliability (Table 1).

Demographic Characteristics

To evaluate the demographic variables of this study "Cardiovascular Disease Prevention: Assessing Knowledge and Lifestyle Choices", we firstly use frequency distribution and graphs for all demographic characteristics variables.

Gender Distribution

Table 2 presents an understandable representation of the number of males and females in the sample when it comes to the gender distribution of study participants. Of the 348 participants, 165 participants (47.4%) identify as male, while 183 people (52.6%) identify as female. Maintaining this level of balance is crucial in order to ensure that the findings drawn from the study are representative of the general population, covering different points of view and experiences regarding the prevention of cardiovascular disease, knowledge, and lifestyle choices.

Table 2 Gender Distribution

Gender	Frequency	Percentage (%)
Male	165	47.4
Female	183	52.6
Total	348	100

Age

Table 3 reveal a comprehensive analysis of the age distribution of research participants, which provides significant data about the age distribution of the sample. The table & graph shows a diverse representation in different age groups. The age group of 55–65 represents the highest percentage of participants (overall, 18.1% of the sample), which is closely followed by the 18–24 age group (18.1%). Participants in the 45–54 category constitute 17.2% of participants, whereas those in the 25–34 and 35-44 categories bring approximately 16.4% and 19.4%, respectively. The smallest group was those 65 years old or older, accounting for 15.2% of the participants.

Table 3 Age wise distribution of the participants

AGE	Frequency	Percentage (%)
18-24	63	18.1
25-34	57	16.4
35-44	52	14.9
45-54	60	17.2

55-64	63	18.1
65 or older	53	15.2
Total	348	100

Educational Level

Table 4 shows the level of education of the study sample. Almost 23.6% of participants having completed high school or below education, 27% of participants completed some college or technical degree, 23.3% of participants completed bachelor's degree, and 26.1% of participants completed master's degree. These finding indicates that mostly educated people are more aware of the knowledge of cardiovascular disease.

Table 4 Education level of the participants

Educational Level	Frequency	Percentage (%)
High school or below	82	23.6
Some college/technical school	94	27
Bachelor's degree	81	23.3
Master's degree	91	26.1
Total	348	100

Information Sources on Cardiovascular Disease

Table 5 and Figure 1 explore the information sources of participants regarding cardiovascular disease. These finding indicates that mostly educated people are more aware of the knowledge of cardiovascular disease. With 22.1% of respondents selecting print media (newspapers and magazines), print media stands out as the most popular source of information on CVD. This implies that traditional media will always be crucial for communicating health information. Internet and online sources come in second with 21%, showing how important digital platforms are becoming for obtaining health information. Websites, social media, and health apps may all fall under this category.

Table 5 Information Sources on Cardiovascular Disease

Information Sources on Cardiovascular Disease	Frequency	Percentage (%)
Healthcare Professionals	67	19.3
Internet/Online Sources	73	21
Television	62	17.8
Print Media (Newspaper, Magazines)	77	22.1
Friends and Family	69	19.8
Total	348	100

Third place goes to healthcare professionals (19.3%), demonstrating that people still appreciate the guidance and advice of medical professionals when it comes to CVD. TV stands at 17.8%, indicating that health efforts and TV shows can have a big impact on increasing public knowledge of CVD. Even while they are not the most frequent source, friends and relatives still have some influence (19.8%). This highlights the significance of social networks and peer-to-peer communication in influencing health-related knowledge and behavior.

The findings show that people use a wide range of information sources to learn about CVD. This emphasizes the need for multifaceted methods to public health communication that make use of social media, healthcare professionals, conventional and digital media, and traditional and digital media in order to successfully reach people and provide them with accurate and easily understandable information about managing and preventing CVD.

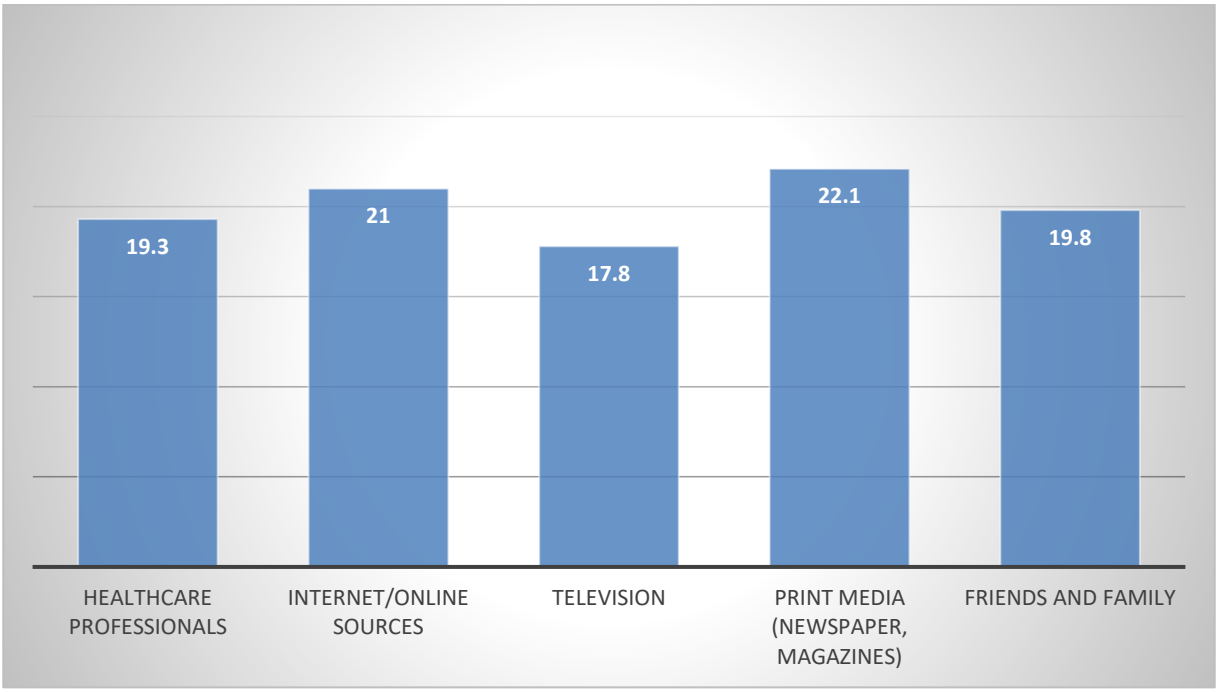

Figure 1 Information Sources on Cardiovascular Disease

Cross Tabulation: Relationship Between Age and Knowledge level

Table 6 presents a cross-tabulation analysis of the relationship between the surveyed population's age and knowledge levels concerning the prevention of cardiovascular disease. The distribution among individuals who identify as "Very Familiar", "Somewhat Familiar", or "Not Familiar at All" with cardiovascular disease prevention is presented in the table across different age groups.

Table 6 Cross Tabulation of Age and Knowledge level

AGE	Very Familiar	Somewhat Familiar	Not Familiar at All
18-24 Years	35	25	15
25-34 Years	40	30	20
35-44 Years	30	20	18
45-54 Years	25	22	15
55-64 years	18	15	9
65 or older	5	4	2

Of the participants in the 18–24 age range, 35 claim to have a high level of familiarity with cardiovascular disease prevention, 25 report having a moderate level of familiarity, and 15 report having no familiarity at all. In the same way, participants between the ages of 25 and 34 show a varied distribution, 40 are very familiar, 30 are moderately familiar, and 20 are not familiar at all. 30 respondents, aged 35 to 44, indicate they are extremely familiar, 20 indicate they are somewhat familiar, and 18 claim they are not at all familiar. The general pattern persists all over age groups, emphasizing differences in each group's level of knowledge. This comprehensive study helps in identifying particular age groups that may benefit from focused educational programmes to raise awareness and understanding of the prevention of cardiovascular disease.

Correlation Analysis

Correlation analysis is used to investigate the relationship between two variables. The value of correlation ranges from -1 to +1. In this study, we analyze the correlation between the lifestyle choices and level of knowledge about cardiovascular disease.

Table 7 Correlation Analysis

Correlation Analysis				
	Physical Activity	Fruit/ vegetable consumption	Tabaco Use	Alcohol Consumption
Knowledge Level	0.25	0.15	-0.10	0.22

A moderate but favorable correlation between physical activity and knowledge of cardiovascular disease is indicated by a positive correlation coefficient of 0.25. This implies that people who engage in more physical activity have a tendency to know slightly a little more about this health issue. The 0.15 correlation value suggests that knowledge of cardiovascular disease and the consumption of fruits and vegetables are positively correlated, although actually weak. Although there is a favorable correlation, it might not be as strong as the correlation identified with physical activity.

There exists a negative correlation between tobacco use and cardiovascular disease knowledge, as indicated by a correlation coefficient of -0.10. This suggests that there may be a small average knowledge gap in cardiovascular health among tobacco users. A moderately positive relationship (r = 0.22) has been identified between alcohol consumption and cardiovascular disease knowledge. This suggests that those who drink alcohol was able, on average, know a little bit more about this health issue. These relationship results offer complex insights into the relationship between lifestyle choices and cardiovascular health knowledge. The complicated interaction between behaviors and knowledge in the framework of preventing cardiovascular disease is highlighted by the relationships, regardless their relatively small nature. These insights can direct focused initiatives that raise awareness and promote healthy lifestyle choices with the purpose of effectively promoting cardiovascular health (Table 7).

Logistic Regression

Logistic regression is a statistical technique used to analyze the relationship between one or more independent variables and it predicts the odds of an event happening. In this analysis, we use the logistic regression for regular blood pressure checks. For this analysis, we use the regular blood pressure checks as a "Dependent variable" and age, education level, physical activity and tobacco use as an "Independent variable".

Table 8 Logistic Regression for Regular Blood Pressure Checks

Predictor	Odd Ratios	P-value
Age	1.75	0.02
Educational Level	0.85	0.55
Physical Activity	2.21	0.01
Tobacco Use	0.59	0.01

The findings of the logistic regression analysis, especially provides information on how each independent variable impacts individual chances of having regular blood pressure evaluations, are shown in (Table 8). The multiplicative change in the probabilities of the result for a one-unit increase in each independent variable is represented by the "Odds Ratios". The age odds ratio of 1.75 means that the probability of people getting frequent blood pressure checks increases by a factor of 1.75 for every unit rise in age. The statistical significance of the relationship is indicated by the related p-value of 0.02. About Educational Level a 15% decrease in the danger of getting regular blood pressure checks is related to every unit rise in educational level, with an odds ratio of 0.85. Nonetheless, the 0.55 p-value indicates that there is no statistical significance in this relationship.

For Physical Activity a one-unit increase in physical activity has a relationship to more than a twofold increase in the probability of getting regular blood pressure checks, according to an odds ratio of 2.21. The statistical significance is indicated by the corresponding p-value of 0.01. For tobacco use the odds ratio of 0.59, there is a 41% reduction in the chance of regular blood pressure checks for those who smoke. The p-value of 0.01 indicates that there is statistical significance in this relationship. These results offer significant fresh perspectives on the variables influencing the probability of regular blood pressure checks. The statistically significant correlations show

possible areas for focused interventions to promote preventive health behaviors and routine blood pressure monitoring within various demographic groups. These relationships are especially evident with age, physical activity, and tobacco use (Table 8).

Comparative Analysis: Responses across Different Demographic Groups

Table 9 is a comparative analysis that focuses at the knowledge levels of various gender groups regarding cardiovascular disease. Responses classified as "Very Familiar", "Somewhat Familiar", and "Not Familiar at All" are included in the table. Of the male participants, 95 report having a high level of familiarity with cardiovascular disease prevention, 72 report having a moderate level, and 20 report having no familiarity at all. Of the female participants, 85 report having a high level of familiarity with cardiovascular disease prevention, 63 report having a moderate level, and 13 report having no familiarity at all.

Table 9 Comparison of Knowledge Level by Gender

Gender	Very Familiar	Somewhat Familiar	Not Familiar at All
Male	95	72	20
Female	85	63	13

The differences in knowledge among study participants who were male and female are demonstrated by these results. Although a significant percentage of respondents in both genders show a high degree of knowledge, variations in the responses' distribution. Understanding and addressing these differences can help create specialized educational programs that raise awareness of cardiovascular health while additionally taking into consideration the specific needs and preferences of different demographics.

Table 10 Comparison of Physical Activity by Age Groups

AGE	Daily	3-5 times/week	1-2 times/week	Rarely	Never
18-24 Years	40	20	10	5	0
25-34 Years	45	30	15	5	5
35-44 Years	30	15	8	5	2
45-54 Years	25	10	8	3	2
55-64 years	15	10	7	4	1
65 or older	15	8	4	3	0

The distribution of physical activity levels among different age groups is shown in (Table 10). The data presented shows the frequency of participation in various exercise routines, which can be categorized into four different groups "Daily", "3-5 times/week", "1-2 times/week", "Rarely", and "Never". Among those in the 18–24 age range, a significant portion participate in physical activity on a daily basis (40), however this frequency tends to decrease with age. Interestingly, all of the people in this age group indicate they have never done any physical activity at all.

Comparably, of those between the ages of 25 and 34, the majority exercise every day (45), but only a tiny percentage (5) declare they never do so. The pattern maintains across all age groups, while the frequency of physical activity differs. The table offers an in-depth examination of the various ways that age groups engage in physical activity, demonstrating a variety of exercise routines across the people surveyed (Table 10).

4. DISCUSSION

The key findings of this study provide valuable insights into the current state of knowledge and lifestyle behaviors related to cardiovascular disease prevention in the population. The high Cronbach's alpha value of 0.721 indicates that the survey instrument had a high level of internal consistency and reliability in measuring the constructs of interest. The balanced gender representation and diversity across age groups and education levels also ensures that the sample is reasonably representative of the population. Similarly in a previous study in order to accomplish our goal of exposing the present levels of knowledge and behavioral patterns, we will be conducting a population survey. This will allow us to pave the way for therapies that are guided by public health standards (Hassen et

al., 2022). The cross-tabulation analysis reveals variances in cardiovascular disease familiarity across different age groups. Younger participants aged 18-24 demonstrated higher familiarity compared to older participants above 55 years. This highlights the need for targeted educational efforts among older adults to improve their cardiovascular health literacy.

Similarly, it has been stated previously by Zhang et al., (2017) that despite the significant progress that has been made in the field of medical research, a significant number of these events may be associated with risk factors that may be prevented. The correlation analysis, although showing mostly weak associations, provides preliminary evidence of interrelationships between health behaviors and disease knowledge. The positive correlation of physical activity with knowledge corroborates findings from other studies regarding the clustering and synergistic effects of multiple lifestyle factors on health outcomes. The logistic regression model identifies age, physical activity level, and tobacco use as significant predictors of regular blood pressure monitoring behavior. This points to specific demographic and risk profiles that must be prioritized for interventions promoting preventive checks.

Finally, the comparative analysis by gender and age group reveals subtle differences in knowledge levels and physical activity patterns within subgroups. Although small, accounting for these differences can help in designing customized communication and behavior change strategies tailored to the unique needs of each sub-population. Overall, the study results emphasize significant gaps, sociodemographic disparities, and complex interlinkages that must be addressed through a multi-pronged, evidence-based approach for promoting cardiovascular health in communities. Similarly, a person's lifestyle choices include decisions about the management of stress, levels of physical activity, the use of nicotine, and the habits that one has regarding eating, according to the authors (Woringer et al., 2017).

5. CONCLUSION

This study provides valuable insights into the current state of cardiovascular health knowledge and behaviors. Reliability analysis confirmed that the survey instrument consistently measured the constructs of interest across the sample. The analyses revealed gaps in disease awareness between younger and older adults, highlighting the need for targeted educational efforts, especially among older people to improve their cardiovascular literacy. While mostly weak, the positive correlations found between health behaviors like physical activity and disease knowledge, align with previous evidence on clustering effects of lifestyle factors. Significant predictors of preventive behaviors were identified through regression modeling, pinpointing priority demographic and risk groups for intervention.

Finally, comparative analyses illuminated subtle differences within population subgroups that can inform customized communication and behavior change strategies accounting for unique needs. Overall, the findings emphasized deficiencies in knowledge, disparities across sociodemographic factors and complex interrelationships around cardiovascular disease prevention that must be addressed through a multifaceted, evidence-based approach. The study results call for tailored strategies focused on identified high-risk groups as part of broader public health efforts to promote cardiovascular health at the community level.

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Ethical Approval

The study was approved by the Medical Ethics Committee of PUMHSW wide letter No. 753 Dated 15-05-2023.

Informed Consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES

1. Hassen HY, Bowyer M, Gibson L, Abrams S, Bastiaens H. Level of cardiovascular disease knowledge, risk perception and intention towards healthy lifestyle and socioeconomic disparities among adults in vulnerable communities of Belgium and England. BMC Public Health 2022; 22(1):197. doi: 10.1186/s12889-022-12608-z
2. Ndejjo R, Nuwaha F, Bastiaens H, Wanyenze RK, Musinguzi G. Cardiovascular disease prevention knowledge and associated factors among adults in Mukono and Buikwe districts in Uganda. BMC Public Health 2020; 20(1):1151. doi: 10.1186/s12889-020-09264-6
3. Woringer M, Nielsen JJ, Zibarras L, Evason J, Kassianos AP, Harris M, Soljak M. Development of a questionnaire to evaluate patients' awareness of cardiovascular disease risk in England's National Health Service Health Check preventive cardiovascular programme. BMJ open 2017; 7(9):e014413. doi: 10.1136/bmjopen-2016-014413
4. Zhang H, Jiang Y, Nguyen HD, Poo DCC, Wang W. The effect of a smartphone-based coronary heart disease prevention (SBCHDP) programme on awareness and knowledge of CHD, stress, and cardiac-related lifestyle behaviours among the working population in Singapore: a pilot randomised controlled trial. Health Qual Life Outcomes 2017; 15(1):49. doi: 10.1186/s12955-017-0623-y