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Three-Frames Approach to Cardiovascular Disease Prevention: A Quasi-Experimental Educational Intervention among Civil Servants in Calabar, Nigeria

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Abstract
Cardiovascular diseases (CVDs) have continued to be a leading cause of death among adults. Civil servants constitute vital workforce, and high CVD burden in this group has implications for national productivity. Unfortunately, guided cardiovascular health education interventions are uncommon. This study assessed the effect of an educational intervention on knowledge and practice of CVD prevention among Nigerian civil servants. Quasi-experimental study design was employed among subjects in distant communities in Cross River State. Multistage technique was used to recruit 172 subjects into one control group (Ogoja) and two intervention groups (Calabar and Ikom). The first intervention group received 4-h daily, 5-day cardiovascular health education, with emphasis on burden, risk factors, and preventive measures including nutrition, stress, alcohol, medicals, exercise, and smoking. The second intervention group received the same content of education, but with the use of **F**ood, **R**est for stress management, **A**lcohol, **M**edicals, **E**xercise, and **S**moking (**FRAMES**) as guide for delivery. Questionnaires were used to assess knowledge and practice at baseline and post-intervention. Data were analyzed using SPSS version 20.0. Knowledge scores and practice of CVD prevention were compared between study groups using inferential statistics. Mean age was 46.3 $\pm$ 7.4 years, and no significant difference in sociodemographic characteristics was observed by comparing the study groups ($p > 0.05$). Baseline knowledge and practice of preventive measures were generally poor, and no significant difference was observed by comparing the groups ($p > 0.05$). At 12 weeks post-intervention, knowledge of CVD was higher in the intervention groups compared with the control group ($p < 0.05$). Unlike control group, both intervention groups had improvement in physical exercise, medical screening, and fruit consumption ($p < 0.05$). There was no significant difference in post-intervention knowledge and practice of CVD prevention by comparing both intervention groups ($p > 0.05$). For effective delivery of cardiovascular health education, the use of "FRAMES" is as effective as its nonuse. Further studies in other settings are recommended.

Keywords: Cardiovascular disease; Risk factors; Health education; Practice; Knowledge.

1. INTRODUCTION

About one in three deaths worldwide is attributable to cardiovascular diseases, including stroke, heart attack, and heart failures, which have continued to take their toll on global health, across diverse cultures and settings [1]. This high prevalence of cardiovascular diseases is also attended by a high prevalence of the associated risk factors, including uncontrolled hypertension, diabetes mellitus, and dyslipidemia, which are established predictors of these largely preventable diseases [2]. With ongoing financial crises in many parts of the globe, the increasing cost of cardiovascular health care has been seen to reflect more on sufferers from poor households [3]. Sub-Saharan African countries appear worst hit by the rapid epidemiological transition from communicable to noncommunicable diseases (including cardiovascular diseases), while they still grapple with the existing neglected tropical diseases [4, 5].

The practice of cardiovascular risk reduction is observed to significantly reduce the occurrence, morbidity, and mortality of cardiovascular diseases [6]. Population-based interventions that modestly reduce cardiovascular risk are noted to improve health, as well as save the healthcare cost [7]. The practice of health promotion interventions, including adequate physical exercise, proper nutrition, low salt intake, and stress management, are however known to be preceded by proper knowledge of cardiovascular disease risk factors and preventive measures [8]. Unfortunately, knowledge of these risk factors is identified to be poor in many settings, with the practice of the requisite preventive measures also being poor even among those with adequate knowledge.

Intervention studies even in developed countries are mainly focused on patients, or persons already having cardiovascular diseases (CVDs) or associated risk factors, with only few studies aimed at population-based primary prevention particularly among apparently healthy individuals. Temme *et al.*, in their educational intervention study in the United States, provided an apparently insufficient dose of 1-h exposure to cardiovascular health information, with the assessment of improvement in knowledge of CVD prevention immediately after exposure, and without the use of the control group [9]. A cross-sectional study in India identified high prevalence of cardiovascular disease risk factors among administrative personnel in a tertiary hospital, suggesting the need for workplace cardiovascular health promotion [10].

In our local Nigerian setting, civil servants in the ministries (rather than tertiary hospitals), may be more representative of the national workforce, and may therefore be a more appropriate group for assessing the effect of an intervention study on

knowledge and practice of cardiovascular disease prevention. Awosan *et al*. in their educational intervention study among secondary school teachers in Sokoto, Nigeria, found significant improvement in knowledge of coronary heart disease, blood pressure, and body mass index (BMI) [11]. However, the intervention included follow-up counseling and physical exercise sessions for 6 weeks, with assessment of effect of intervention at the end of follow up. Evidence-based workplace health promotion in the Nigerian civil service may also improve staff wellbeing and productivity, as well as reduce the loss of useful human resources, insurance, and healthcare management.

The availability of an easy-to-use method or strategy for cardiovascular health information delivery may improve the quality and rate of facility and community-based education and practice through development of better Information Education and Communication (IEC) materials and with engagement of community health workers [12]. Such mnemonics, including the use of Diet Against Systemic Hypertension (DASH), Smart Moms Are Refusing Tobacco (SMART), and 5 A's of smoking cessation, are easier to use for health communication [13, 14]. However, there is currently no such mnemonic that may contain virtually all of the key components of cardiovascular health promotion, for easier provision of comprehensive cardiovascular health education. The **FRAMES** approach, which comprises **F**ood, **R**est, **A**lcohol, **M**edicals, **E**xercise, and **S**moking, is intended to be a mnemonic for easier cognition of the prevention components toward better understanding, self-monitoring, and evaluation of knowledge and practice of cardiovascular disease prevention.

In addition, the study findings will provide more comprehensive local and regional baseline reference measure of the cardiovascular disease risk factor knowledge-base and preventive practice, for future health prevention program planning, policy initiation, and evaluation. This is particularly relevant in view of the current paucity of prevention programs and local data on cardiovascular disease risk factors in Cross River State and the Niger-Delta region of Nigeria. The civil service, which is a key component of the national workforce, is being considered in the conduction of the proposed intervention study, particularly in view of the sedentary nature of their jobs. The primary objective of this study was to assess the effect of using the FRAMES model of cardiovascular health education for improvement in knowledge and practice of cardiovascular disease prevention.

2. METHODS

Calabar, which is one of the two intervention study sites, is the capital city of Cross River State in the oil-rich Niger-Delta region of Nigeria. Other less urban cities in the state are Ikom (second intervention study site) and Ogoja (control study site). The study was thus a quasi-experiment among three groups of state civil servants, comprising two intervention groups (Calabar, group 2 and Ikom, group 3), and one control group (Ogoja, group 1).

The sample size was determined by applying the formula for comparison of two proportions, using previous cardiovascular health educational intervention study conducted in the United States. In each study site, 6 out of 12 ministries were randomly selected by simple random sampling. Systematic random sampling was used to recruit subjects from the official staff register of selected ministries. Respondents that were receiving treatment for cardiovascular diseases were excluded from the study.

The first (control) group 1 did not receive any form of health education during the study period, while group 2 (first intervention group) received conventional cardiovascular health education instruction during the intervention (without use of any acronym as guide). The third group (second intervention group) received the same cardiovascular health education instruction, but with the use of a "**FRAMES**" guide or approach for information delivery. The research team comprises the researcher, a nutritionist, a physiotherapist, and two nurses. They provided cardiovascular health education and administered the questionnaires, following a 2-day training program on the training modules, with detailed explanation of the questionnaire.

The questionnaire was pretested in the Cross River State Ministry of Justice, which had workers with similar sociodemographic characteristics as the other study populations. This was conducted by some of the research team members, to ensure clarity of the questions to the intended study population. The study questionnaire (shown in Appendix II) was developed in accordance with the WHO STEP manual on chronic diseases, European Guidelines for Cardiovascular Disease Prevention, findings from literature review, and the socioeconomic, nutritional, and cultural peculiarities of the study setting.

The intervention groups were separately exposed to cardiovascular health education intervention, beginning with the first intervention group (Calabar), and immediately followed by the second intervention group (Ikom). Each group received a 4-h daily, 5-day cardiovascular health education that had virtually the same content, with the only difference being the use of the proposed "**FRAMES**" approach for information delivery to the second intervention group. The control group however did not receive any form of health education during this intervention period.

The educational intervention consisted of a 4-h daily, 5-day worksite cardiovascular health education (comprising three intensive and two reinforcement days the following week). Key mode of delivery was by manual instruction in English, with the aid of power-point slides, posters, and fliers. There were practical demonstrations including interactive question and answer sessions in each of the training days. During and after each session, participants were provided with CVD prevention take-home fliers and posters (obtained from the Federal Ministry of Health, Abuja, Nigeria), for improved re-enforcement of messages. Each of the two intervention groups received virtually same content of cardiovascular health education, with the difference only being the use of "**FRAMES**" as sequence for specific cardiovascular health information delivery for the second intervention group (study group three).

The "**FRAMES**" acronym was used to adapt the workshop materials, and facilitate the sessions, with the acronym letters representing **F**ood, **R**est, **A**lcohol, **M**edicals, **E**xercise, and **S**moking. The "**FRAMES**" approach was an adaptation of existing standardized materials from reputable sources and institutions. These include the Federal Ministry of Health, WHO STEP manual on chronic diseases, European Guidelines on Cardiovascular Disease Prevention, and the nutritional and sociocultural peculiarities of the study setting. Information obtained from these sources were organized into a culturally appropriate "three FRAMES," which entails the triple emphasis of ***background significance, recommended lifestyle, and action steps***, for each of the representative letters in the word "FRAMES," as explained earlier. Appendix III provides more details of a draft material content and guidelines for its development, with the use of posters, flip charts, and PowerPoint. The last phase of the study, which was conducted 12 weeks after the intervention, consisted of similar assessment of knowledge, risk perception, and practice of cardiovascular disease prevention among all the three (intervention and control) groups. For ethical reasons, the control group was exposed to similar conventional cardiovascular health education at the end of the study.

Knowledge of cardiovascular disease as a primary outcome measure in the study consisted of knowledge of the significance or burden of CVD relative to other common diseases, knowledge of CVD risk factors, and knowledge of CVD preventive measures. These three components were assessed in the third section of the questionnaire, with correct answer to each question contributing one point to a respondent's knowledge score. The percentage knowledge score was obtained for each respondent. Moreover, the mean of the percentage scores was obtained for each study group. The proportion of respondents providing correct answers to key questions, as well as the mean percentage knowledge scores were compared between the study groups at baseline and twelve (12) weeks after intervention.

Practice of CVD prevention measures was the only secondary outcome measure in the study. The practice measures that were assessed in the fourth section of the questionnaire, in tune with the FRAMES acronym, consisted of the practice of appropriate nutrition, stress management, moderation in alcohol intake, medical screening, physical exercise, and nonsmoking. The proportion of respondents practicing each of these preventive measures was determined and compared between the study groups, at baseline and twelve (12) weeks after the intervention. In addition, the factors associated with the practice of physical exercise as a CVD prevention measure were assessed using multiple Poisson regression.

Descriptive and inferential statistics were employed for data analysis. The data obtained from the pre-exposure and post-exposure questionnaires were entered and analyzed with the use of SPSS version 20.0 software. The sociodemographic characteristics of the respondents were described using means and frequencies, and displayed with tables, graphs, and charts. The Chi-square test of proportion was used to compare the proportion of subjects that had adequate knowledge of each of the cardiovascular disease risk factors. Moreover, each of the preventive measures was practiced between study groups.

Table 1: Socio-demographic characteristics of respondents.

Characteristics	Intervention		Control	Total n (100%)	Chi-Square	*P*-value
	Group 2 (*n* = 63) No (%)	Group 3 (*n* = 57) No (%)	Group 1 (*n* = 52) No (%)			
Age groups (years)						
≤35	6 (28.6)	7 (33.3)	8 (38.1)	21 (100)	5.18	0.52
36-45	24 (47.1)	14 (27.5)	13 (25.4)	51 (100)		
46-55	27 (35.1)	27 (35.1)	23 (29.8)	77 (100)		
56-65	5 (22.7)	9 (40.9)	8 (36.4)	22 (100)		
Sex						
Males	24 (35.3)	20 (29.4)	24 (35.3)	68 (100)	1.44	0.49
Females	38 (36.9)	37 (35.9)	28 (27.2)	103 (100)		
Marital status						
Single	6 (28.6)	6 (28.6)	9 (42.8)	21 (100)	10.4	0.11
Married	50 (44.2)	35 (31.0)	28 (24.8)	113 (100)		
Divorced	3 (15.0)	9 (45.0)	8 (40.0)	20 (100)		
Widowed	4 (22.2)	7 (38.9)	7 (38.9)	18 (100)		
Educational level						
Primary	6 (28.6)	7 (33.3)	8 (38.1)	21 (100)	3.34	0.5
Secondary	6 (33.3)	4 (22.2)	8 (44.4)	18 (100)		
Tertiary	51 (38.3)	46 (34.6)	36 (27.1)	133 (100)		
Staff cadre						
Junior	13 (25.5)	22 (43.1)	16 (31.4)	51 (100)	4.21	0.12
Senior	48 (40.3)	35 (29.4)	36 (30.3)	119 (100)		

Independent t-test was used to compare the mean knowledge scores, mean risk scores, and other continuous variables (including BMI and mean arterial blood pressure). This was performed by comparing all the three study groups at baseline and at 12 weeks post-intervention to assess the effect of the educational interventions, and between both intervention groups to assess effect of the use of FRAMES approach compared with conventional (non-FRAMES) approach. The level of statistical significance was fixed at $p < 0.05$ for all tests.

Prior ethical approval for the study was sought and obtained from the Cross River State Research Ethics and the University of Calabar Teaching Hospital Research Ethics and Review committees. The objective of the study was explained to study subjects, who were also assured of confidentiality. Informed and written consent was obtained from the selected subjects before exposing them to the interventions, and obtaining data from them.

3. RESULTS

Baseline and 12 weeks post-intervention data from the three study groups were obtained from one hundred and seventy two (172) respondents, comprising sixty-three (63), fifty-seven (57), and fifty-two (52) respondents from groups 1 (control), 2 (standard health education), and 3 (FRAMES-based health education), respectively. Mean (SD) age of all the respondents was 46.3 (7.4) years ranging from 30 to 64 years. No significant difference in sociodemographic characteristics was observed by comparing the study groups ($p > 0.05$, Table 1).

Table 2 shows significant improvement in knowledge of CVD risk factors after 3 months intervention for both intervention groups 2 and 3 ($p < 0.001$), but not for control group 1 ($p > 0.05$). For group 1, there was no significant improvement in practice of any of the preventive measures at 3 months post-intervention ($p > 0.05$). However, both groups 2 and 3 had significant improvement in consumption of fresh fruits, reduction in consumption of sugary foods/drinks, physical exercise, medical screening, mean arterial blood pressures, and body mass indices ($p < 0.05$). Improvement in sleep adequacy and alcohol consumption was not significant for both groups 2 and 3 ($p > 0.05$). The mean number of bottles of alcohol consumed was however significantly reduced in both groups 2 and 3 ($p < 0.05$).

At 3 months post-intervention, there was no significant difference in knowledge of CVD risk factors and preventive measures, comparing groups 2 and 3, in virtually all factors and preventive measures assessed ($p > 0.05$; Tables 3). There was also no significant difference in the mean percentage knowledge scores comparing groups 2 (86.2 ± 12.1) and 3 (82.8 ± 9.12) ($t = 0.16$, $p = 0.87$).

4. DISCUSSION

This workplace intervention study was aimed at assessing the effect of educational intervention, including the use of "FRAMES" acronym for cardiovascular health education, with the letters in the acronym represents **F**ood, **R**esting, **A**lcohol, **M**edicals, **E**xercise, and **S**moking. The study assessed knowledge, perception of risk, and practice of cardiovascular disease prevention among civil servants at baseline and at 12 weeks after intervention. Participants in the intervention groups had statistically significant improvement in risk perception and knowledge of CVD, as well as practice of regular physical exercise, consumption of fresh fruits, and medical screening. There was, however, no significant improvement in these measures among the participants in the control group.

At baseline knowledge of cardiovascular disease risk factors and preventive measures, was seen to be poor in all three groups studied. Poor knowledge was seen in virtually all of the thirty questions assessed, with an overall mean knowledge score of 11.8 (36.8%). This is considerably lower than that obtained in a similar study in the United States, which reported a baseline overall mean score of 12.2 (61.6%), though 20 questions that focused only on heart attack prevention were used [9]. Although this study was more comprehensive with the inclusion of several other cardiovascular disease prevention areas compared with the US study, the lower score recorded is not unexpected. This is so in view of the lack of heart disease educational intervention programs in the study setting.

In this study, knowledge of cardiovascular disease as the leading cause of death among Nigerian adults was also poor, with only a little above one-fifth (11, 21.6%) having such knowledge. Again, this is lower compared to findings in a study in similar setting, among university staff, conducted by Ansa *et al*., where 27.7% (136) knew heart disease to be the leading cause of death among the Nigerian adults [15]. Although the level of education was not observed in this study to be associated with the knowledge of cardiovascular disease, university staff could have had more academic workplace exposure to cardiovascular health information compared to civil servants, possibly accounting for the difference.

This study also found poor practice of CVD prevention among civil servants at baseline. With high prevalence of poor dietary habits, lack of regular physical exercise, poor daily rest, and lack of medical screening, the potential for higher burden of CVD in the future may be quite high. In this study, there was considerably lower proportion of respondents reporting regular physical exercise (28, 16.3%), but similar proportion practicing routine medical screening (39, 22.8%), compared with previous cross-sectional study among university staff. In the previous study, 58.4% and 25% of respondents reported regular physical exercise and routine medical screening, respectively [15]. This study also reported higher prevalence of cigarette smoking

Table 2: Baseline and three months post-intervention knowledge and practice of CVD prevention.

Variable	Group 2 (*n* = 63)		Group 3 (*n* = 57)		Group 1 (*n* = 52)	
	Baseline No (%)	**Endline No (%)**	**Baseline No (%)**	**Endline No (%)**	**Baseline No (%)**	**Endline No (%)**
Mean % knowledge score	38.7 (26.9)	86.2 (12.1)	33.4 (29.4)	86.8 (9.6)	38.0 (26.0)	38.7 (27.2)
t-test statistic	19.8		16.8		1.22	
p-value	0.000		0.000		0.82	
Consumed fresh fruits/veg						
Yes	9 (14.3)	32 (50.8)	16 (28.1)	40 (70.2)	22 (42.3)	24 (46.2)
No	54 (85.7)	31 (49.2)	41 (71.9)	17 (29.8)	30 (24.0)	28 (53.8)
McNemar χ^2 statistic	6.1		9.4		44.5	
p-value	0.000		0.000		0.5	
Consumed sugary foods						
yes	46 (73.0)	38 (60.3)	32 (56.1)	17 (29.8)	25 (49.0)	25 (49.0)
No	17 (27.0)	25 (39.7)	25 (43.9)	40 (70.2)	26 (51.0)	26 (51.0)
McNemar χ^2 statistic	35.4		18.9		36.3	
p-value	0.000		0.000		1	
Had adequate sleep(≥6 h/day)						
Yes	42 (67.7)	45 (71.4)	41 (71.9)	44 (77.2)	39 (75.0)	39 (75.0)
No	20 (32.3)	18 (28.6)	16 (28.1)	13 (22.8)	13 (25.0)	13 (25.0)
McNemar χ^2 statistic	0.2		0.42		32.9	
p-value	0.65		0.52		1	
Had adequate phys. exercise						
Yes	21 (33.3)	30 (47.6)	8 (14.0)	20 (35.1)	6 (11.5)	7 (13.5)
No	42 (66.7)	33 (52.4)	49 (86.0)	37 (64.9)	46 (88.5)	45 (86.5)
McNemar χ^2 statistic	34		17.2		43.6	
p-value	0.004		0.000		1	
Had medical screening						
Yes	23 (37.1)	35 (55.6)	9 (15.8)	15 (26.3)	7 (13.5)	9 (17.3)
No	39 (62.9)	28 (44.4)	48 (84.2)	42 (73.7)	45 (86.5)	43 (82.7)
McNemar χ^2 statistic	4.3		29.9		38.6	
p-value	0.04		0.03		0.5	
Smoke cigarette						
Yes	8 (12.7)	8 (12.7)	6 (10.7)	5 (8.9)	8 (15.4)	8 (15.4)
No	55 (87.3)	55 (87.3)	50 (89.3)	51 (91.1)	44 (84.6)	44 (84.6)
McNemar χ^2 statistic	63		45.8		52	
p-value	1		1		1	
Consume alcoholic drinks						
Yes	37 (58.7)	34 (54.0)	38 (67.9)	36 (64.3)	35 (67.3)	34 (65.4)
No	26 (41.3)	29 (46.0)	18 (32.1)	20 (35.7)	17 (32.7)	18 (34.6)
Exact McNemar χ^2	0.3		0.16		47.7	
p-value	0.59		0.69		1	

(22, 12.9%) and alcohol consumption (110, 64.3%), compared with previous study which reported a prevalence of 2.2% (11) and 31.6% (158) for cigarette smoking and alcohol use, respectively [15].

Findings also suggest that more urban settings may have poorer practice, with less consumption of fruits and higher consumption of sugary foods and drinks, compared with less urban or more rural settings. This is similar to findings in a cross-sectional study in South Africa, where over two-thirds (68%) of the urban residents were found to consume less that than the recommended five servings of fruits daily [16]. This suggests the possible adverse role of urbanization on dietary lifestyle, as also evident in the mean BMI being higher among respondents in the urban study setting.

This study has shown that educational intervention is useful for improvement in knowledge of CVD risk factors and preventive measures. This is evident in the significant post-intervention improvement in the mean percentage knowledge score for the intervention group (50.7% increase), compared with the control group (0.7% increase). This is comparable to findings

Table 3: Post-intervention knowledge and practice of CVD prevention among intervention groups.

Variable	Intervention		Test statistic	*p*-value
	Group 2 (*n* = 63) *n* (%)	**Group 3 (*n* = 57) *n* (%)**		
Mean (SD) % knowledge score	86.2 (12.1)	82.8 (9.6)	$t = 0.16$	0.87
Consumed fresh fruits in past 24 h				
Yes	32 (50.8)	40 (70.2)	4.68	0.03
No	31 (49.2)	17 (29.8)		
Total	63 (100)	57 (100)		
Consumed sugary drinks in last 24 h				
Yes	38 (60.3)	17 (29.8)	11.2	0.001
No	25 (39.7)	40 (70.2)		
Total	63 (100)	57 (100)		
Had ≥6 h daily sleep in past 24 h				
Yes	45 (71.4)	44 (77.2)	0.52	0.47
No	18 (28.6)	13 (22.8)		
Total	63 (100)	57 (100)		
Had adequate exercise in last 1 week				
Yes	30 (47.6)	20 (35.1)	1.93	0.16
No	33 (52.4)	37 (64.9)		
Total	63 (100)	57 (100)		
Had medical screening in past 3 months				
Yes	35 (55.6)	15 (26.3)	10.5	0.00
No	28 (44.4)	42 (73.7)		
Total	63 (100)	57 (100)		
Smoke cigarette				
Yes	8 (12.7)	5 (8.9)	0.43	0.51
No	55 (87.3)	51 (91.1)		
Total	63 (100)	56 (100)		
Consume alcoholic drink				
Yes	34 (54.0)	36 (64.3)	1.3	0.25
No	29 (46.0)	20 (35.7)		
Total	63 (100)	56 (100)		

in a similar intervention study conducted among secondary school teachers in Sokoto, which reported a mean improvement of 47.7% increase in knowledge post-intervention [11]. The slight difference in post-intervention increase (50.7 vs. 47.7%) in the two studies could have been due to the difference in scope, with this study focusing on educational intervention alone, while previous study included initial and follow-up sessions of exercise training.

Findings in this study also showed that health education provided with the framework of health belief model is effective toward improvement in risk perception, knowledge, and practice of cardiovascular disease prevention. This is in tune with the findings from several studies that utilized the model for provision of educational intervention in various health and nonhealth related areas [17, 18]. Some of the studies have however reported better success when the HBM is applied alongside with other useful models, including the transtheoretical model and adult learning theories [18].

In this study, there was no significant difference in proportion of respondents that had knowledge of virtually each of the risk factors and preventive measures assessed at 3 months post-intervention by comparing both intervention groups. This indicates that providing CVD educational intervention using the "FRAMES" acronym is as effective as providing similar content of intervention without the use of an acronym. In other words, provided the content of information is the same, the FRAMES approach is as effective as a non-FRAMES approach to cardiovascular health education. Different from "DASH," which is an acronym for antihypertensive diet, the FRAMES acronym is a guide, with each of the letters guiding the process of information delivery, covering the vital areas for cardiovascular disease prevention.

The word "FRAMES" may therefore be viewed as a "pillar" or "frame" through which cardiovascular health information may be provided in a simple but comprehensive manner, without the omission of vital components. This is particularly useful in view of the inter-relatedness of the prevention areas, with potentially significant adverse outcome of omitting any of

the "FRAMES" components. Consequently, the sequence of the letters in "FRAMES" may not be followed in any specific order (as seen in this study), but may remain a guide for use, with avoidance of omission. In other words, an educator may decide to begin with Exercise, then Alcohol, Food, Smoking, etc., until all the words in "FRAMES" are exhausted. In the delivery of information, however, there must be an emphasis of the background significance, recommendation, and action for each of the components of the "FRAMES."

5. CONCLUSION

This study has demonstrated significant improvement in knowledge and practice of cardiovascular disease prevention, following health educational intervention. It also showed that the use of "**FRAMES**" acronym is as effective as the nonuse of the acronym, for health information delivery. In other words, there is similar improvement in knowledge and practice of cardiovascular disease prevention, compared to the use and nonuse of "FRAMES" approach for health education. The "FRAMES" simply provides a guide, as well as ensures that none of the prevention areas is omitted during such an educational intervention. It may also be a guide for self-monitoring and evaluation of an individual's knowledge and practice of preventive measures.

Employer-driven workplace cardiovascular health education should be advocated, by the Nigeria workers' unions, with the aim of improving knowledge and practice of cardiovascular disease prevention, particularly among civil servants, whose administrative duties are often sedentary. The FRAMES approach for delivery of cardiovascular health education is also recommended for use, particularly as guide to the instructors, as well as self-monitoring and evaluation tool for the practice of CVD prevention.

The government of Nigeria, as a major employer of labor, should view it as their responsibility to ensure that cardiovascular health education and facilities for practice of cardiovascular disease prevention are made available at workplaces. This includes workplace fitness centers and occupational health clinics. This may be a cost-effective measure of reducing the burden of cardiovascular diseases, as well as improvement in productivity through availability of healthier workforce. Further research on the effect of the use of FRAMES for the provision of cardiovascular health education in other settings and with other study population groups is also recommended. These settings include private companies, uniform service men, and their non-civil service establishments.

6. LIMITATIONS OF THE STUDY

Recall bias could have occurred, as some respondents found it difficult to remember certain practices such as medical screening in last one year and number of bottles of alcohol consumed in last one week. In addition, owing to the referral of intervention and control group respondents that had abnormal screening test for medical management, additional counseling education could have been received at the referral point, thereby making it difficult to assess the knowledge obtained from the study. Lack of genetic data and family history of subjects is also a recognized limitation.

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Conflict of Interest
There is no conflict of interest to declare.

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