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Influence of Diabetes Prevention Education Program and Geographic Location on T2DM Knowledge, Attitude and Practice among Retirees in Enugu

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Abstract

Diabetes mellitus (DM) presents a significant public health challenge globally, and Nigeria is not an exception, with an increasing prevalence particularly among retirees who may face lifestyle changes and increased susceptibility to chronic conditions. This paper investigates the influence of diabetes prevention education programs and geographic location on T2DM among retirees in Enugu State. The study utilizes the quasi experimental research design. Specifically, the pre-test – post-test non randomized control group design was adopted. Three specific objectives with corresponding research questions and null hypotheses guided the study. The population for the study comprised 10,779 of all the registered retirees in Enugu State Public service. A total of 78 retirees constituted the sample for the study. The instrument for data collection was the researcher designed- structured questionnaire titled: Influence of Diabetes Prevention Education Program and Geographic Location on T2DM Knowledge, Attitude and Preventive Practice Questionnaire (DPEPLDKAPQ)" The reliability indices of r= 0.63, and r= 0.75 were obtained. The split half method with Spearman- Brown Correction formula was used to measure knowledge and preventive practice. Cronbach's alpha statistical tool was used to determine the reliability coefficient that measured attitude. Mean and standard deviation were used to answer research questions while t-test was used to test the null hypotheses at .05 level of significance. The findings showed that the mean T2DM knowledge scores of urban retirees exposed were higher, while the mean T2DM attitude and practice scores of rural retirees exposed were higher. In addition, there was no significance influence of location and diabetes prevention education programe in the mean T2DM KAP scores of retirees in Enugu state($\bar{X}$ = 6.49;SD=3.07) and rural ($\bar{X}$ =5.40;SD 2.75); t (76) = 1.522, p= 0.132),(urban, $\bar{X}$ .1.88, SD= 0.53; rural, $\bar{X}$ = 2.05,SD= 0.54; t (78) = - 1.301, p= 0.197) and (urban $\bar{X}$ =; SD = 1.66, rural, $\bar{X}$ = 3.61, SD =1.27; t = 2.138, p=0.055). This implies that diabetes prevention education program and location was not effective in improving T2DM KAP scores of retirees. Based on the findings, it was recommended that there is a need for more public health educational interventions and essential health care services to be taken to the rural and urban population to improve knowledge, attitude and practice of T2DM (KAP).

Keywords: Type 2 diabetes, Prevention education, Retirees, Geographic location,

Introduction

Diabetes Prevention Education (DPE) is essential and effective in reducing the risk factors associated with Type 2 diabetes mellitus (T2DM). The prevalence of T2DM is rising globally, posing substantial health and economic burdens on healthcare systems and individuals alike (Ogurtsova et al..,2017). The prevalence of diabetes in African is increasing rapidly, according to the IDF (2019), 19 million adults (20-79years) were living with diabetes in Africa Region. Nigeria, in particular, faces a significant burden of T2DM, with an estimated prevalence of 5.7% among adults aged 20-79 years in 2019, and the numbers continue to rise (Olamoyegun et al., 2024)

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and impaired glucose regulation. Type 2 diabetes (formerly called non-insulin-dependent, or adult-onset) results from the body's ineffective use of insulin (Center for Diseas Control and Prevention [CDC], 2024). Type 2 diabetes comprises the majority of people with diabetes around the world and is largely the result of excess body weight and physical inactivity (IDF, 2021). However, symptoms may be similar to those of type 1 diabetes. T2 DM is adult-onset and common among the retirees (study subjects). Studies have shown that type 2 diabetes accounts for about 90 to 95 percent of all diagnosed cases of diabetes in adults specially the elderly (65 years and older) (CDC, 2016). Certain factors increase the onset of diabetes.These include age, family history of diabetes, obesity, physical inactivity, race, and high blood pressure (CDC, 2017). However, with adequate knowledge of diabetes preventive majors such as healthy dieting, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes (CDC, 2017).

Diabetes Prevention Education Programmes (DPEP) has emerged as effective strategies for mitigating the risk factors associated with T2DM. Diabeties prevention education (DPE) are educational activities geared towards preventing or minimizing diabetes and the onset of its complications. Diabetes prevention education encompasses health education activites such as knowledge of diabetes and diabetes treatment, healthy eating, being physically active, taking medicine, checking of blood sugar, reducing the risk for other health problems, learning to cope with stress, depression, and other concerns (CDC,2018) . The sole aim of diabetes prevention education program is to enable people delay the onset of diabetes, manage the symptoms, tiredness, pains and emotional issues, by learning skills to better manage diabetes (National Institute of Diabetes and Digestive and kidney [NIDDK], 2016). Several studies have demonstrated the effectiveness of diabetes prevention education programs in reducing T2DM incidence. For example, the Diabetes Prevention Program (DPP) in the United States showed that lifestyle interventions aimed at weight loss and increased physical activity reduced the incidence of T2DM by 58% among high-risk individuals. However, the impact of the programs may vary depending on the geographic location and the unique needs of the target population.

Preventive measures refer to actions taken to prevent the occurrence of disease, detect it early, or reduce its impact. These include primary prevention (e.g., lifestyle changes), secondary prevention (e.g., screening), and tertiary prevention (e.g., rehabilitation) (WHO, 2022). Preventive measures are critical in reducing the incidence and complications of T2DM. These include dietary control, regular physical activity, weight management, and routine medical screening. For instance, primary prevention through lifestyle modification has been shown to

significantly reduce the onset of T2DM in high-risk individuals (World Health Organization, 2022).

Knowledge refers to the level of understanding or awareness individuals have about a specific topic, such as disease symptoms, risk factors, or prevention strategies. In public health, knowledge forms the foundation for informed health behaviors (Joho et al., 2023). Adequate knowledge about diabetes, its risk factors, and self-care practices is essential for prevention and effective management. However, gaps in knowledge often hinder individuals from taking timely and appropriate actions.

Attitude refers to an individual's feelings, beliefs, and predispositions toward a particular health behavior or issue. Attitudes can influence the likelihood of adopting healthy behaviors or resisting them. (Yakusu et al., 2023) For example, with adequate knowledge, negative or indifferent attitudes can prevent individuals from adopting healthy behaviors. Attitude includes beliefs about the severity of the disease, the benefits of preventive action, and confidence in one's ability to manage the condition. A study in the Democratic Republic of Congo found that while knowledge levels were moderate, poor attitudes—such as seeing exercise as unnecessary or burdensome- significantly hindered physical activity among T2DM patients (Yakusu et al., 2023).

Practices are the observable health behaviors that individuals engage in. Even with sufficient knowledge and positive attitudes, actual implementation can be limited due to barriers such as cost, lack of time, or insufficient support systems. For example, a study in Nigeria found that many community health workers and patients were aware of diabetes prevention strategies, yet very few engaged in consistent glucose monitoring or dietary regulation (Atibioke et al., 2022).
Retirees are persons who have completed years of service at a job, and are within the ages of 65 years and above, who are dully registered with National Union of Pensioners, Enugu State Council. The elderly population, often with limited income and access to healthcare, faces unique challenges in managing chronic conditions like diabetes. Access to healthcare is a significant issue for retirees with diabetes. A study from the International Diabetes Management Practice Study revealed that only 34.2% of patients were covered by health insurance, and many faced high out-of-pocket costs for medications and supplies. This financial strain can impede effective diabetes management and lead to poor health outcomes (International Diabetes Management Practice Study, 2023)

Location here is simply rural or urban. It is the place where the retirees reside. It is important to find out the effects of diabetes prevention education and location on T2 diabetes among retirees. However, availability of health facilities is more in urban areas which may increase accessibility of care and predispose residents to more health information than those in the rural areas. According to Onyeonoro et al., (2016), diabetes prevalence is generally lower in rural areas compared to urban areas in Nigeria. diabetes was reported 3.2 percent in the rural and 4.1 per cent in the urban, in a study conducted in Abia State.

The study was carried out in the southeast of Enugu State. Enugu State is one of the 36 states in Nigeria. It has 17 local government areas (LGA). Economically, the state is predominantly rural and agrarian, with a substantial proportion of its working population engaged in farming, trading and other services. According to the National Bureau of statistics (2015). Enugu State has 15 pension zones with the population of 10779 retirees. Enugu has good soil-land and climatic conditions which also contribute to its urbanization thereby attracting settlers from other

Nigerian cities and even other countries. The choice of Enugu State for the study was informed by the fact that there is increased level of western life in the state and has resulted in the abandonment of the healthier "traditional lifestyles" by people thereby making them prone to diabeties mellitus. The traditional foods enriched with fiber and vegetables with good amount of proteins, vitamins, fats and oil, carbohydrates, mineral salt and water has been abandoned for caned and processed foods and drinks filled with saturated fats, sugars and chemicals. Over dependent on motorized transport and sedentary life styles might have increased the risk of type 2 diabetes mellitus in the state.

Purpose of the Study

The purpose of the study was to investigate the influence of diabetes prevention education programme and geographic location on T2DM knowledge, attitude and practice among retirees in Enugu State. Specifically, the study sought to determine:

1. influence of location and diabetes prevention education programe (DPEP) in the mean T2DM knowledge scores of retirees in Enugu State.
2. influence of effect of location and diabetes prevention education programe (DPEP) in the mean T2DM attitude scores of retirees in Enugu State.
3. influence of effect of location and diabetes prevention education programe (DPEP) in the mean T2DM preventive practice scores of retirees in Enugu State.

Research Questions

1. What is the influence of location and diabetes prevention education programe (DPEP) in the mean T2DM knowledge scores of retirees in Enugu State?
2. What is the influence of effect of location and diabetes prevention education programe (DPEP) in the mean T2DM attitude scores of retirees in Enugu State?
3. What is the influence of effect of location and diabetes prevention education programe (DPEP) in the mean T2DM preventive practice scores of retirees in Enugu State?

Hypotheses

The following null hypotheses were formulated to guide the study and were tested at .05 level of significance.

1. There is no significance influence of location and diabetes prevention education programe (DPEP) in the mean T2DM knowledge scores of retirees in Enugu State.
2. There is no significance influence of location and diabetes prevention education programe (DPEP) in the mean T2DM attitude scores of retirees in Enugu State.
3. There is no significance influence of location and diabetes prevention education programe (DPEP) in the mean T2DM preventive practice scores of retirees in Enugu State.

Methods

In order to accomplish the purpose of the study, the quasi experimental research design involving the pre-test – post-test non-randomized control group design was used. Cohen, Manion and Morrison (2018) asserted that a quasi-experimental research design is a type of design that facilitates the investigation of interaction effect of added indepndent variable (factors) on the treatment variable (DPEP).

The population for the study consisted of all the registered retirees (10779) in Enugu State (Enugu State Ministry of Finance2020).The sample size for the study was 78 retirees. Sample size was determined using the comparison of two means of independent samples formula (Clifton, 2018).

Subsequently, intact or pre-existing groups of retirees in two pension zones were used for the study. Simple random sampling Technique of balloting without replacement was employed to sample two pension zones (Enugu zone and Nsukka zone) out of the 16 pension zones in Enugu State. A researcher designed structured questionnaire titled Influence of Diabetes Prevention Education Program and Geographic Location on T2DM Knowledge, Attitude and Preventive Practice Questionnaire (DPEPLDKAPQ) was used to collect data from the respondents. The questionnaire contained twenty five items and was divided into four sections. (A,B,C & D). The items in the DPEPLDKAPQ were derived from literature (Félix et al., 2021; Eigenmann et al., 2011). Section A contains four items on the socio demographic variables of the respondents which are age, gender,level of education and location. Section B contains nine items that measured knowledge of T2DM. The section B of the DPEPLDKAPQ was assigned and respondents were requested to choose one correct answer from the options letter A-D. The diabetes knowledge items were assigned a score "1" for correct response and a score of "0" for incorrect response. Therefore, the total T2DM knowledge scores range from 0 to 9. Subsequently, the mean and standard deviation (SD) were computed. Section C contains nine items that measured attitude towards T2DM (T2DM attitude) Section C of DPEPLDKAPQ was assigned a four point Likert type response option of "Strongly Agree (4 points)", "Agree (3 points)", Disagree (2pionts)" and "Strongly Disagree (1 point)" while section D contains seven items that elicited responses on preventive practices for T2DM among retirees. Section D of the DPEPLDKAPQ was assigned a nominal/dichotomous response option of "Yes" or "No". The respondents were asked to place a tick (√) using the response options that best describe their diabetes knowledge, attitude and preventive practices adopted. Procedure was employed for the diabetes preventive practice. A "Yes" response to preventive practice was assigned a score of 1 while a "No" response to a preventive practice was assigned a score of "0". The total T2DM preventive practice score ranges from 0 to 7 (ie., 0-7). Next, the mean and standard deviation (SD) were computed for the pretest and post-test scores of the retirees

Results

Table: **Analysis of Influence of Location on T2DM Knowledge scores of Retirees in Enugu State (n=78)**

	Location									
	Urban (n= 52)					Rural **(n=26)**				
	Pre-test		**Post-test**			**Pre-test**		**Post-test**		
variable	$\bar{X}$	**SD**	$\bar{X}$	**SD**	**MD**	$\bar{X}$	**SD**	$\bar{X}$	**SD**	**MD**
Knowledge of T2DM	4.36	1.65	6.49	3.07	2.13	4.73	1.75	5.40	2.75	0.67

Note. $\bar{X}$ = mean; SD = standard deviation; MD = mean difference

Results in table 1 showed the mean scores and their corresponding SD values of location on knowledge scores of retirees. The table further shows that retirees in urban had a pre-test T2DM knowledge score of 4.36 (SD= 1.65) and a post-test T2DM knowledge score of 6.49 (SD= 3.07) while retirees in rural had a pre-test T2DM knowledge scores of 4.73 (SD= 1.76) and a post-test T2DM knowledge score of 5.40 (SD=2.75). The mean difference scores of 2.13 and 0.67 for retirees, respectively showed that urban retirees had higher T2DM knowledge more than rural retirees. The results suggest that urban retirees knowledge of T2DM increased more than rural retirees.

Table 2:

Analysis of Influence of Location on T2DM Attitude Scores of Retirees in Enugu State(n=78)

	Location									
	Urban (n= 52)					Rural **(n=26)**				
	Pre-test		**Post-test**			**Pre-test**		**Post-test**		
Variable	$\bar{X}$	**SD**	$\bar{X}$	**SD**	**MD**	$\bar{X}$	**SD**	$\bar{X}$	**SD**	**MD**
Attitude of T2DM	2.09	0.51	1.84	0.51	-0.25	2.25	0.59	2.17	0.55	-0.08

Note. $\bar{X}$ **= mean; SD = standard deviation; MD = mean difference**

Results in table 2 showed the mean scores and their corresponding SD values of location on attitude scores of retirees. Regarding T2DM attitudes, the]table shows that urban and rural retirees had a pre-test scores of 2.09 (SD=0.51) and 2.25 (SD=0.59), respectively. At the post-test, retirees in urban and rural had T2DM attitudes scores of 1.84 (SD=0.51) and 2.17(SD= 0.55), respectively. The mean difference scores of - 0.25 and -0.08 for retirees respectively indicated that rural retirees had higher T2DM attitude scores than urban retirees. Therefore, the results suggest that T2DM attitude of rural retirees improved more than urban retirees.

Table 3

Analysis of Influence of Location on T2DM Preventive Practice scores of Retirees in Enugu State (n=78)

	Location									
	Urban (n= 52)					Rural **(n=26))**				
	Pre-test		**Post-test**			**Pre-test**		**Post-test**		
Variable	$\bar{X}$	**SD**	$\bar{X}$	**SD**	**MD**	$\bar{X}$	**SD**	$\bar{X}$	**SD**	**MD**
Preventive practice T2DM	3.79	1.23	4.04	1.62	0.25	4.17	1.09	4.25	1.48	0.08

Note. $\bar{X}$ **= mean; SD = standard deviation; MD = mean difference**

Results in table 3 showed the mean scores and their corresponding SD values of location on preventive practice scores of retirees. Furthermore, the table shows that at the pre-test, retirees in urban and those in rural had T2DM preventive practice scores of 3.79 (SD = 1.23) and 4.17 (1.09), respectively. At the post-test, retirees in urban and rural had T2DM preventive practice scores of 4.04 (SD=1.62) and 4.25 (SD= 1.48), respectively. The mean difference scores of 0.25 and - 0.08 for urban and rural retirees indicated that rural retirees adopted T2DM preventive practice more than urban retirees in Enugu State.

Table 4

Summary of Independent Samples of t-test Influence of Location on the Mean T2DM Knowledge Scores of Retirees Enugu State (n=78)

Variable	Location	N	$\bar{X}$	SD	Std.EM	T	p-value
Knowledge	Urban	52	6.49	3.07	0.4262		
of T2DM	Rural	26	5.40	2.75	0.5399	1.522	0.132

Note. $\bar{X}$ = mean, SD= Standard Deviation, Std.Em= standard error of mean ,t= t-test value

Results in table 4 show the influence of location on the mean knowledge scores T2DM. The result further show that there was no significant difference in the mean T2DM knowledge scores of urban ($\bar{X}$ = 6.49;SD=3.07) and rural ($\bar{X}$ =5.40;SD 2.75); t (76) = 1.522, p= 0.132. Since the p-value is greater than 0.05 level of significance, the null hypothesis is not rejected. The implication is that location has no significant influence on T2DM knowledge scores of retirees.]

Table 5

Summary of Independent Samples of t-test Influence of Location on the Mean T2DM Attitude Scores of Retirees Enugu State (n=78)

Variable	Location	N	$\bar{X}$	SD	Std.EM	T-value	p-value
Attitude	Urban	54	1.88	0.53	O.1056		
of T2DM	Rural	26	2.05	0.54	0.2258	-1.301	0.197

Note. $\bar{X}$ = mean, SD= Standard Deviation, Std.Em= standard error of mean, t = t-test value

Results in table 5 show the influence of location on the mean attitude scores T2DM. In addition, the table shows that there were no significant differences in the mean T2DM attitude score

(urban, $\bar{X}$ =1.88, SD= 0.53; rural, $\bar{X}$ = 2.05,SD= 0.54; t check(78) = - 1.301, p= 0.197) of retirees based on location. The results imply that location had no significant influence on the mean T2DM , attitude scores of retirees in Enugu state

Table 6

Summary of Independent Samples of t-test Influence of Location on the Mean T2DM Preventive Practice Scores of Retirees Enugu State (n=78)

Variable	Location	N	$\bar{X}$	SD	Std.EM	T-value	p-value
Practice of T2DM	Urban	54	4.33	1.66	0.2258		
	Rural	26	3.61	1.27	0.2485	2.138	0.055

Note. $\bar{X}$ = mean, SD= Standard Deviation, Std.Em= standard error of mean ,t= t-test value

Results in table 6 show the influence of location on the mean preventive practice scores of T2DM. In addition, the table shows that there were no significant differences in the mean T2DM practice score (urban $\bar{X}$ =; SD = 1.66, rural, $\bar{X}$ = 3.61, SD =1.27; t = 2.138, p=0.055) of retirees based on location. The results imply that location had no significant influence on the mean T2DM preventive practice scores of retirees in Enugu state.

Discussion

The findings in table 1 revealed that, the influence of location on the Mean T2DM Knowledge Scores of urban retirees was higher. This finding concurs with the findings of (2017). The authors concluded that both urban and rural dwellers had better knowledge about DM compared to controls. Mohammed et al. (2018) established that there is statistical difference in the scores of urban dwellers. However, the difference may be associated with greater awareness and availability of health facilities in the urban.
The findings in table 2 and 3 revealed that the influence of location on the Mean T2DM attitude and practice scores of rural retirees was higher.. This finding is not expected therefore, it is surprising. It disagrees with the findings of Mohammed et al. (2018) who revealed that urban dwellers had good and acceptable attitude and practice regarding DM. Similarly, the study disagrees with the findings of Kaniz et al. (2017). The authors concluded that urban residence had good attitude and practice towards diabetes mellitus. However, the study concurs with the findings of Yitayeh et al. (2020) who established that urban residence had poor practice score regarding diabetes. The finding may be attributed to the fact that DPEP improved the attitude and practice of the rural more than the urban.

The findings in table 4, 5 and 6 revealed that location has no significant influence on the mean T2DM knowledge, attitude and preventive practice scores of retirees..This finding is unexpected, therefore surprising .This finding contradicts the findings of (2017). The authors concluded that both urban and rural dwellers had better knowledge about DM similarly, the findings is in agreement with the findings of Herath_et al. (2017). The authors revealed in a study that urban residents had poor practice toward diabetes. However, the agreement in the study might be

attributed to the fact that knowledge of the urban and rural dwellers did not influence their attitude which led to poor practice.

Recomendations

Based on the findings and conclusion of this study, the following recommendations were made;

1. Geographical location should be considered in planning and organizing health education interventions like diabetes prevention education programs to improve the knowledge, attitude and preventive practice of the general public.
2. Government and non-governmental agencies should collaborate to ensure that educational intervention and essential health care services are taken to the rural and urban population to improve knowledge attitude and practice of T2DM.

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