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Title: Knowledge, Attitudes and Practices of Diabetics attending the Carenage Health Centre, in St. George West, Trinidad

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KNOWLEDGE, ATTITUDES AND PRACTICES OF
DIABETICS ATTENDING THE CARENAGE HEALTH
CENTRE, IN ST GEORGE WEST, TRINIDAD.

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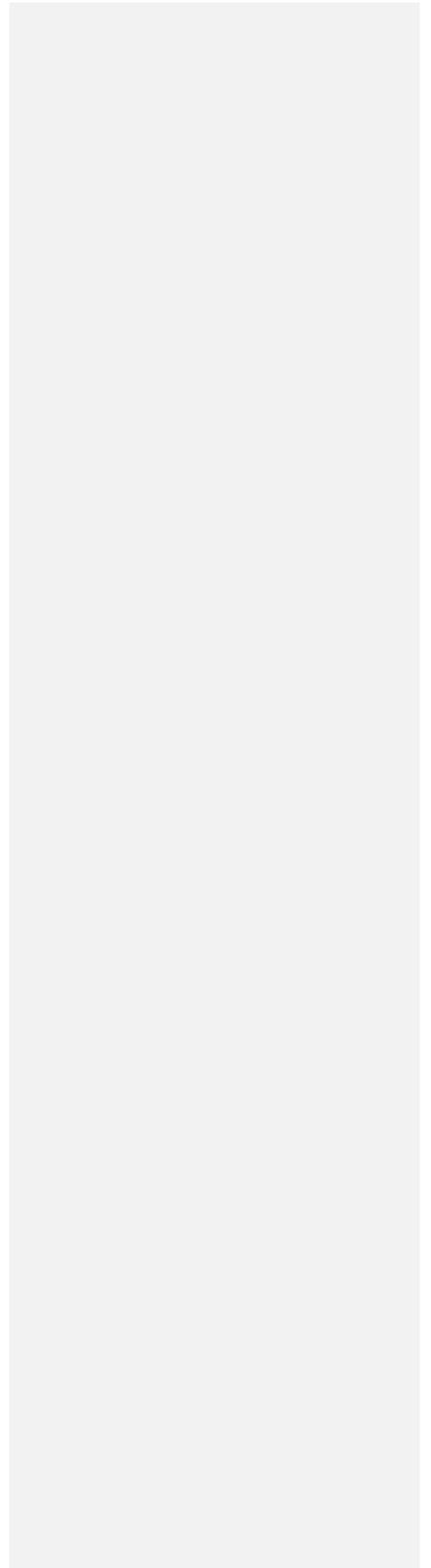
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ABSTRACT

The knowledge attitudes and practices (KAP) of adults patients with Diabetes Mellitus attending the Carenage Health Centre in St. George West, Trinidad were explored. Consenting patients were asked to complete a KAP questionnaire containing 47 demographic, knowledge, attitude and practice questions. Results were analyzed to assess patients had good or poor diabetes self-management practices, and good or poor knowledge of diabetes and negative or positive attitudes. Participant knowledge was found to be deficient in relation to the nature, causes and treatment of diabetes and the need for regular eye examinations and foot inspection. The participants were found to have poor practices in relation to regular exercise and consumption of sweetened beverages and refined flour products. The participants had positive attitudes to diabetes education and to the need for self- management of their diabetes. None of the independent demographic variables were found to have a significant effect on the knowledge of the respondents with regard to diabetes. The only variable which was found to have a significant effect of the practice of respondents in relation to diabetes was gender in that males were more likely than females to exercise for at least half an hour on most days of the week.

CHAPTER 1- INTRODUCTION

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Statement of the Problem

Trinidad and Tobago has the fifth highest per capita rate of diabetes in the world and the highest in the Western Hemisphere. (Nicholls 2010) One out of every four hospital admissions is attributed to diabetes, which is now the second leading cause of death in women and the leading cause of blindness in Trinidad and Tobago. (Nicholls 2010, 16).

The Health Report Card for Trinidad and Tobago, 2011, published by the Directorate of Health Policy Research Planning in the Ministry of Health, indicates that in 2006, 13.6% of deaths were caused by Diabetes Mellitus which was the 3rd leading cause of death in Trinidad and Tobago. This is almost twice the global average. The IDF Diabetes Atlas 2012 Fifth edition update (International Diabetes Federation 2012) estimates the number of diabetics in Trinidad to be 120,3000, and the expenditure per capita on people with diabetes (public and private) to be US\$1,181.88. It has been estimated that the direct government health care costs of diabetes in 2007 was US\$49,335,000. This was 10% of the total government expenditure on health, and these costs are rising.

Purpose of the Study

The purpose of the present study was to examine the knowledge levels, attitudes and practices of diabetics in the urban setting of Carenage in Trinidad. This will aid in the design of targeted self-management education interventions.

Objectives

The objectives of the study were:

1. to determine the knowledge attitudes and practices regarding diabetes of patients with diabetes attending the Carenage Health Centre in St. George West, Trinidad, and
2. to identify factors that influence the knowledge, attitudes and practices of these patients.

Hypothesis

The hypothesis is that the majority of diabetics in the target population do not have a basic understanding of the disease.

The alternative hypothesis: The majority of patients with diabetes in the target population have a basic understanding of the disease.

Significance of the Study

The potential utility of the study is:

1. to contribute towards better understanding of the subjects' attitudes and level of knowledge regarding diabetes;
2. to reveal any aspects of diabetes education that may need to be addressed or reinforced.
3. to better understand the factors that influence the subjects' knowledge, attitudes and practices in order to assist in designing more effective intervention programmes.

CHAPTER II- LITERATURE REVIEW

A study conducted by the Diabetes Outreach Programme of the T&T Health Sciences Initiative (TTHSI) in 2012 (Johns Hopkins 2012) states that diabetes is now the second leading cause of death and the leading cause of blindness in Trinidad and Tobago, affecting an estimated 150,000 people, with 1,000 new cases every year. Approximately 65 percent of heart disease, the leading cause of mortality in Trinidad is attributable to pre-existing diabetes. The TTHSI study found that the high prevalence of diabetes in Trinidad and Tobago is partly attributable to increased calorie intake and more sedentary behaviour due to the increasing affluence of the population.

When diabetes is not well managed, it is associated with complications which include retinopathy causing blindness, heart disease, kidney disease, hypertension, stroke, neuropathy, foot ulcers or amputations, causing disability and premature mortality.

Good diabetes management has been demonstrated to reduce the risk of developing complications (American Diabetes Association 2003). A fundamental requirement for improving diabetes management is an effective ongoing patient, family and community education programme aimed at improving knowledge and health attitudes and achieving required dietary, exercise and health practice modifications.

Health literacy is crucial for diabetics to manage their health. Health Literacy is defined by Institute of Medicine (IOM) as: “The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health

decisions” (Committee on Health Literacy 2004). Diabetics with limited health literacy may face challenges in taking the correct dosage of medication, selecting a healthy diet, monitoring their glucose levels, and reducing risks.

Trinidad faces four main challenges in reducing and treating persons with diabetes: 1) high prevalence, 2) mixed socioeconomic factors, 3) substantial economic impacts, and 4) delivery of treatment, in particular treatment of foot wounds (Boda, 2013, 37). One major problem is the very large population to diabetes healthcare provider ratios in some many areas which result in limited time with the physician at the public health clinic system (Boda 2013, 35). This makes properly targeted diabetes education programmes particularly important.

A review of 72 studies on the effectiveness of Self-Management Training in Type 2 Diabetes (Norris 2001) concluded that there was evidence to support the effectiveness of self-management training in T2DM, particularly in the short term. In a recent 3-year study conducted in Trinidad, Dr. Babwah found that where regular monitoring of glyceimic control was combined with ongoing patient education about diabetes, diet and exercise at a primary care centre, this led to improved glyceimic control after 3-years. (Babwah 2011, 334)

However the Penal Self-Care study conducted in 2011 in the Penal region of Trinidad, found that one in three diabetes patients at the Penal Health Centre failed to take the medication prescribed for high blood sugar, blood pressure or cholesterol and nearly all failed to engage in regular physical exercise. The study concluded that interventions are necessary to address the behavioural and self-care needs of the patient population, including peer-counsellor programs for diabetes self-care education and training. (Johns Hopkins 2012)

Several studies have explored the specific knowledge, attitudes and practices (KAPs) of diabetics. These studies were undertaken as a result of the finding that the implementation of the necessary lifestyle modifications involving dietary changes, exercise and health practices are influenced by the knowledge, attitudes and practices of the individual diabetic, in addition to his or her values and culture. These studies establish a baseline for understanding diabetes knowledge levels and as well as current attitudes and practices, and the factors that influence them, which vary between different societies and cultures.

A KAP study of diabetic patients in the United Arab Emirates published in 2013 (Al-Maskari 2013) showed low levels of diabetes knowledge among patients in the UAE. Levels of general education and a history of diabetes in a first degree relative were found to have a positive impact on diabetes knowledge. A similar study in Ethiopia found that half of the respondents had a good knowledge level and 37% had good practices. Lower age groups, higher educational status, increased duration of diabetic therapy and higher income levels were found to be associated with good knowledge and practice (Feleke 2013, 114-115). A KAP study in Kenya found that only 27% of respondents had good knowledge of diabetes, with general educational levels being the main factor associated with greater diabetes knowledge levels. A KAP study in a rural community in the Phillipines also found that age and educational attainment were the most important factors that were positively associated with good diabetes knowledge (Ardena 2010, 160). Conversely, another study conducted among diabetic patients in Qatar found that level of educational attainment, gender or years since diabetes diagnosis did not affect knowledge regarding diabetes (Kheir 2011). The latter study found that attitude, in the sense of the patient's perception of how the disease was affected by their own behavior, was correlated with level of educational attainment.

A recent study conducted in the United States among low income diabetics found that variations in individual attitudes, perceptions and behaviors surrounding diabetes and self-management of appeared to reflect the individual's knowledge and opinions rather than patient's age, sex, or culture (Onwudiwe 2011, 27).

The Penal Self-Care Study, referred to above (Johns Hopkins 2012) found that nearly all the diabetic patients at the Penal Health Centre lacked understanding of how to manage their diabetes effectively and how the disease affects the human body. However the findings published to date did not explore the factors associated with diabetes knowledge or practices.

Some studies have shown that increasing knowledge of proper diabetic practices does not necessarily result in the consumption of lower non-nutrient dense foods (Pakseresht 2010, 100). Knowledge alone does not always result in behaviour change. In a study conducted among diabetics in Kenya, over 49% of those with good knowledge of diabetes demonstrated poor practices (Maina 2011, 17). However a meta-analysis of disease management programs for improving diabetic care in Canada concluded that such programs have favourable impacts on glycemic control with a pooled reduction of 0.38 in HbA1c compared to usual care. Disease management programs for diabetes included patient education, dietary and exercise counselling, self-monitoring, knowledge of disease and medication, coaching, treatment adjustment, monitoring and care coordination (Pimouguet 2011, 115). This appears to indicate that education for diabetics is effective in improving practices when it is a component of a holistic programme of diabetes management. This is in keeping of the findings of Dr. Babwah in Trinidad (Babwah, 2011).

In light of the potential impact of education on health literacy and health outcomes for diabetics as outlined above, the present study sought to assess the level of knowledge, attitudes and practices towards diabetes in the target population, and to identify any areas where diabetic knowledge was generally deficient together with factors which might be associated with knowledge, attitudes and behavior.

CHAPTER III –METHODOLOGY

Research Design

The study is a cross-sectional analytic study involving previously known diabetics attending the chronic disease clinic at the Carenage Health Centre. All participants had diabetes, were at least 18 years of age, able to speak and understand English clearly and willing to answer the questionnaires. Approximately 50 patients attend the chronic disease clinic which is held once per week at the Carenage Health Centre. Appointments were made approximately every four months. Based on these data, the total number of patients attending the chronic disease clinic was estimated to be approximately 800. Approximately 25% of the patients attending the chronic disease clinic are diabetics. Accordingly the total number of diabetics attending the clinic was estimated to be 200.

Data was not available to determine the population of Carenage, which is the area served by the Health Centre. In view of the fact that the number of diabetics is merely 200, the best approach to have adopted would have been to survey all diabetics attending clinic. However this would have taken four months, which was not feasible. Another approach to determine the sample size would have been to use the population of the chronic disease clinic as the relevant population for determination of a representative sample size, and to base the calculation on a desired confidence interval 0.05%. The relevant calculation (set out in Appendix 1) yielded a sample size of 74. In order to achieve a representative sample, therefore, it would have been necessary for all the diabetics attending the clinic to participate.

However due to the fact that approval from the Ethics Committee of the North West Regional Health Authority was not received until March 17th 2014, there was insufficient time to

interview more than 43 participants. Accordingly the results obtained are inconclusive due to the small sample size.

Subjects

The study was conducted among diabetics attending the chronic disease clinic at the Carenage Health Centre in the town of Carenage, which is a low to middle income fishing village located on the north west coast of Trinidad and Tobago. Almost all of the participants had low incomes and were over the age of forty with almost half being over the age of 65. A large proportion of the subjects were retired.

Instrument

The instrument used was a four-part questionnaire adapted by the researcher from a questionnaire used in a similar study in Western Nepal, and on the survey instruments provided online by the Michigan Diabetes Research Training Center which were adjusted to suit the local culture and expanded to include questions on dietary practices. The dietary practice questions were formulated based upon a press release describing the Patient Self Care Risk Assessment used in the Penal Self Care Study by the TTHSI Diabetes Outreach Programme. The questionnaire consisted of 47 questions.

Section 1 9 - Demographic questions.

Section 2 15 - Knowledge questions.

Section 3 3 - Attitude questions.

Section 4 20 - Dietary and Health Practice questions

The independent variables included in the Demographic questions are age, gender, duration of diabetes, educational attainment, employment status, marital status and ethnic origin. Pilot testing of the questionnaire was done with two Carenage community residents to ensure that they were easily understood.

The sole researcher was present to ensure completion of the questionnaires, answer any questions, and to complete questionnaires for those who requested that it be read to them and their verbal responses recorded on the questionnaire.

Procedures

All persons who identified themselves as diabetics and who attended the chronic disease clinic during the period of the study were invited to participate. Those who agreed to participate had the purpose of the study clearly explained to them before they completed the study questionnaire and were informed that they were under no obligation to participate. All participants signed an informed consent form in the format provided by the North West Regional Health Authority (“NWRHA”), the health authority under which the town of Carenage falls. An information sheet was given to participants which explained the purpose of the study, the type of information sought and the confidentiality of the responses, as well as a telephone number to contact at the University of the West Indies in the event that there were any questions or complaints.

Participants were requested to choose the one answer only. Appropriate answers were assigned 1 point. Other answers were assigned a score of zero.

Ethical Considerations

Ethical approval and clearance was obtained from the Ethics Committee of the North West Regional Health Authority. Prior approval was also sought and obtained from the Chief Medical Officer of Health for the St George West Region of Trinidad.

Statistical Analysis

The collected data were checked for completeness and entered into SPSS version 21 for analysis. Tests were performed using 0.05 as the level of significance. Descriptive statistics were used to analyze the demographic data. Chi-square testing was conducted to determine associations between practices and demographical variables and analysis of variance was conducted to determine the factors that affected the diabetes knowledge of the participants.

CHAPTER IV- RESULTS

Demographic Characteristics of Participants

The demographic characteristics of the study sample of the 43 participants attending the Carenage Health Centre are shown in Table 1. The mean age of the study participants was 64 years (range 27-87 years) with only three participants below the age of 40 years and 20 over the age of 65. Slightly more females (56%) participated. The majority had only primary school education (67%) and were not currently employed, most of them being retired. The education levels and household income of the participants are shown in Figures 1 and 2 respectively. The majority were of African ethnicity (67%). Only 37% were married or in a common law union. Seventy percent had a household income of less than \$6,000 per month. Of these, 29.5% had an income of less than \$3,000. Thirty-four percent had diabetes for more than 10 years.

Figure 1- Educational Levels of Participants

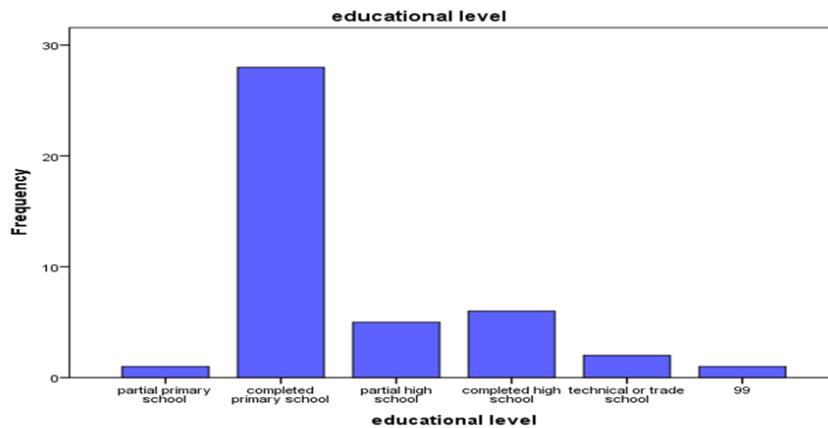


Figure 2- Household Income of Respondents

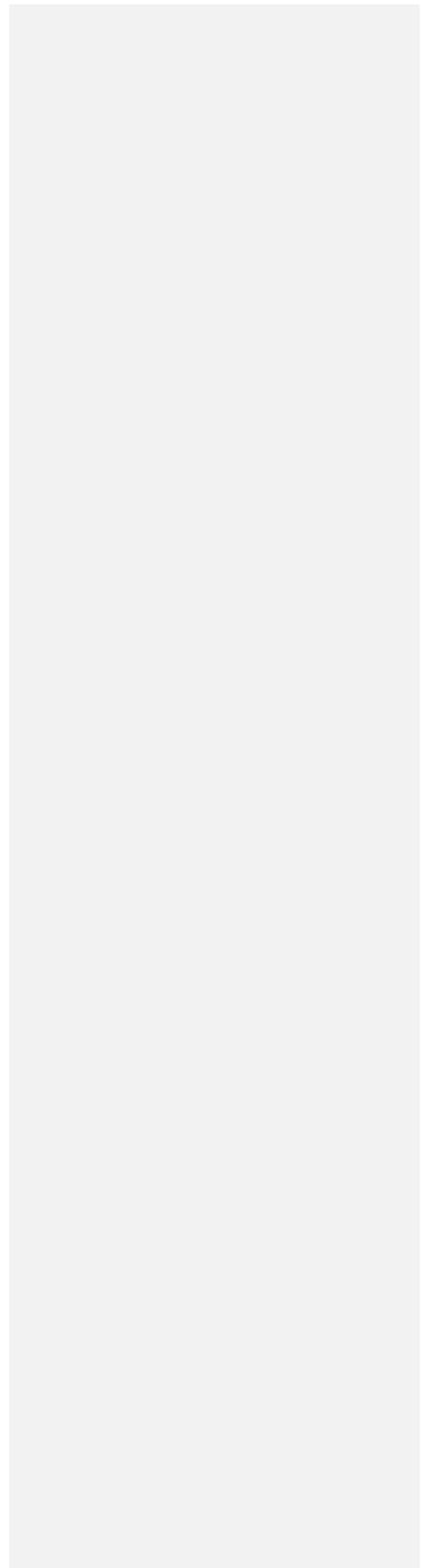
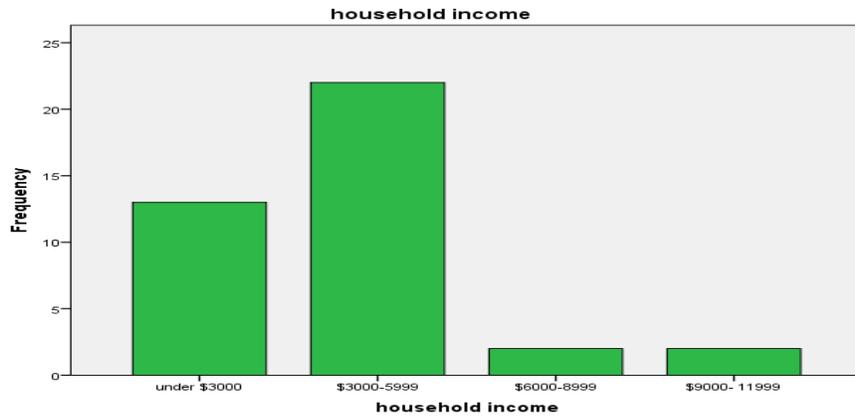


Table 1- Demographic Characteristics of the Study Sample , n=43

Characteristics	Number (n)	Percentage of the sample
Age		
<40 years of age	3	7
40-65 years of age	20	46.5
>65 years of age	20	46.5
Gender		
Male	19	44.2
Female	24	55.8
Duration of diabetes		
< 1 year	4	9.1
2-10 years	16	36.4
>10 years	15	34.1
Unknown	8	20.5
Marital Status		
Never married	14	32.6
Married	13	30.2
Common Law Union	3	7
Separated/Divorced	3	7
Widowed	10	23.3
Ethnic Origin		
African	27	62.8
Indian	3	7
Mixed	12	27.9
Chinese	1	2.3
Educational Level		
Partial primary school	1	2.3
Completed primary school	28	65.1
Partial High School	5	11.6
Completed High School	6	14
Technical or Trade School	2	4.7
No Response	1	2.3
Employment Status		
Working	8	19
Not working	34	34
Household Income per month		
Under \$3000	13	29.5
\$3000-5999	22	50
\$6000-8999	2	4.5
\$9000-11999	2	4.5
No Response	4	9.1

Diabetes Knowledge

The overall mean score on diabetes knowledge was 8.7 correct answers out of 15 answers, or 58%. The minimum score was 2 and the maximum was 13. The results for each knowledge question are shown in Table 2. The knowledge questions which had the highest overall percentage of incorrect answers were those dealing with the nature and causes of diabetes, the treatment of diabetes, the frequency of eye examinations and the requirements for proper diabetic footcare.

Analysis of variance was conducted to determine the factors that affect diabetes knowledge of the participants. This indicated that none of the demographic characteristic had a significant effect on knowledge scores. The results of this analysis are set out in Table 3.

Table 2- Knowledge Gaps: Knowledge Questions with incorrect responses

Question	n	%
What is diabetes	23	53.5
Major causes of diabetes	28	65.1
Symptoms of diabetes	17	39.5
Most accurate method to monitor diabetes	13	30.2
Effect of high blood pressure on diabetics	7	16.2
Frequency of blood pressure measurement	18	41.8
Frequency of eye examinations	31	72.0
Purpose of regular urine tests	8	18.6
Factors to control blood sugar	12	27.9
Elements of well-balanced diet	12	27.9
Diabetic foot care requirements	21	48.8
Treatment of diabetes	18	41.8
Action for low blood sugar	14	32.5
Effect of untreated diabetes	9	20.9
Greatest blood sugar rise from (white) sugar, bread or rice	19	44.2

Table 3- Mean Knowledge Scores by Demographic Characteristics

Characteristics	Mean (std. dev)	p-value
Age		
<40 years of age	9.67 (1.528)	.165
40-65 years of age	9.45 (2.819)	
>65 years of age	7.80 (2.949)	
Gender		
Male	8.11 (3.017)	.236
Female	9.17 (2.761)	
Duration of diabetes		
< 1 year	8.00 (1.633)	.228
2-10 years	7.81 (3.311)	
>10 years	9.53 (2.386)	
Unknown		
Marital Status		
Never married	8.57 (3.251)	.362
Married	8.62 (2.219)	
Common Law Union	12.00 (1.732)	
Separated/Divorced	8.33 (3.215)	
Widowed	8.1 (3.178)	
Ethnic Origin		
African	8.63 (2.589)	.477
Indian	9.33 (1.528)	
Mixed	8.33 (3.701)	
Chinese	13.00 -	
Educational Level		
Partial primary school	9.00 -	.242
Completed primary school	7.93 (2.595)	
Partial High School	9.4 (4.393)	
Completed High School	10.00 (2.191)	
Technical or Trade School	11.50 (2.121)	
Employment Status		
working full time working	9.83 (2.483)	.878
part-time	9.50 (3.536)	
unemployed looking for work	8.00 -	
unemployed not looking for work	10.00(1.414)	
homemaker	7.83(2.787)	
Retired	8.38(2.924)	
Disabled unable to work	8.00(4.320)	
Household Income per month		
Under \$3000	7.77 (3.270)	.383
\$3000-5999	9.05 (2.836)	
\$6000-8999	10.00 (1.414)	
\$9000-11999	11.00 (2.828)	

Attitudes to Diabetes

There were three questions assessing attitudes towards diabetes, namely: (1) importance of patients learning about diabetes, (2) whether patient actions affect health more than health practitioners' actions (3) whether blood sugar control can prevent complications. The number and percentages of positive responses are shown in Table 5. One hundred percent of patients surveyed agreed that people with diabetes should learn a lot about the disease so that they can take charge of their own diabetic care. Seventy-nine percent were of the view that what the patient does has more effect on the diabetic patient than anything that the doctor, nurse or dietician can do. Ninety-three percent agreed that keeping blood sugar close to normal can help prevent the complications of diabetes.

Table 4: Participants' Attitudes towards Diabetes

	Attitude: n (%)	
Question	Positive	Negative
Importance of patient learning re diabetes	43 (100)	0 (0)
Patient actions affect health more than health practitioner action	34 (79)	9(21)
Can blood sugar control prevent complications	40 (93.0)	3(7)

Diabetes Practices

The overall mean number of responses indicating good diabetes practices was 8.7 (SD \pm 2.629) answers out of 16 answers, or 54%. The results in relation to each practice question are shown in Table 5. The questions which revealed the highest overall percentage of poor practices were

those dealing with regular exercise, the consumption of sweetened beverages, the frequency of eye examinations and urine checks and following the recommended diet. The reasons cited by the 14 respondents who said that they did not follow the recommended diet are set out in Figure 3. Most did not follow the diet for financial reasons or because they did not like the food recommended.

Consistent with the failure to lack of regular exercise, 51% of participants did not consider themselves to be physically fit, and 25.6% considered themselves to be overweight.

Chi-square analysis was conducted to determine whether there was any association between practices and demographic factors. Results of this analysis are shown in Table 6. The only association that this revealed was that men were more likely than women to exercise for at least 30 minutes on most days of the week

Table 5- Poor Practices: Practice Questions with answers indicating poor practice

Question	n	% Poor
Exercise 30 mins. on most days	22	52.3
Follows controlled diet	19	45.3
Does not often miss medication	8	19.0
BP check 6mths ago or less	2	4.8
Eye exam 1 year ago or less	20	47.6
Urine check < 1 week ago	40	93.0
Fruit consumption >3x per week	13	30.9
Green vegetable >3x per week	18	42.8
Non-starchy veg >3x per week	14	33.3
Peas and beans >3x per week	13	30.9
Fast food <1x per week	6	14.3
Fish consumption >1 x per week	15	35.7
White flour < 5x per week	13	40.0
White rice < 5x per week	9	21.4
Sweetened drinks < 2x per wk.	39	95.1
Alcohol < 2x per week	2	5.5

Figure 3: Reasons Patients do not Follow Recommended Diet

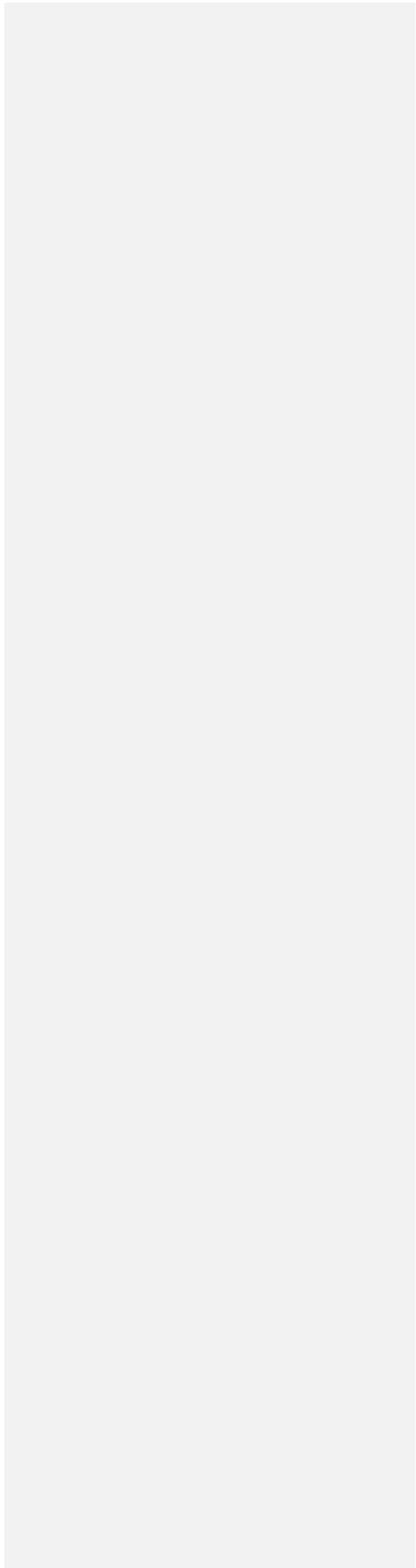
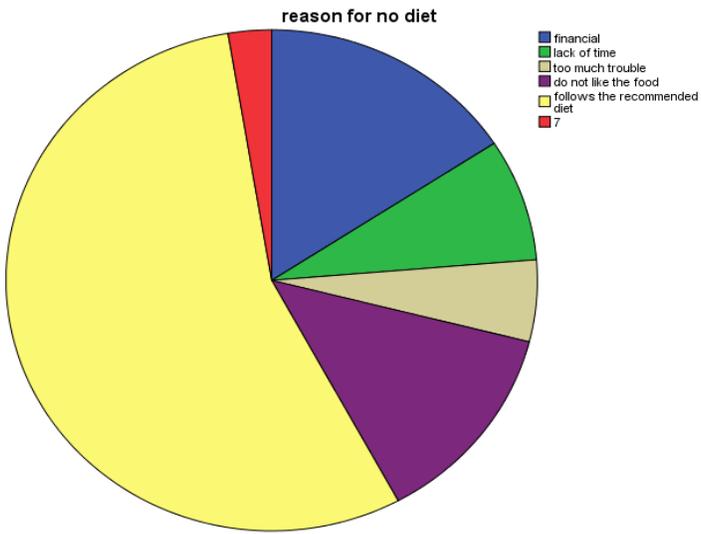


Table 6- Association between Practices and Demographic Characteristics

Practice	<i>p-value</i>							
	Age	Gender	Diabetes Period	Marital Status	Ethnic Origin	Education Level	Employ. Status	H/hold Income
Exercise 30 mins. most days	.149	.010	.143	.472	.682	.751	.727	.562
Follows controlled diet	.568	.258	.981	.720	.761	.406	.356	.453
Does not often miss medication	.101	0	.179	.314	.165	0	.022	.835
BP check 6mths ago or less	.931	.456	.458	.312	.011	1.0	.719	.120
Eye exam 1 year ago or less	.519	-	.271	.568	.718	.117	.207	.276
Urine check < 1 week ago	.479	-	.262	.664	.758	.598	.438	.504
Fruit consumption>3x per week	.339	-	.598	.177	.495	.120	.235	.353
Green vegetable >3x per week	.201	-	.751	.311	.140	.844	.869	.217
Non-starchy veg >3x per week	.399	-	.649	.407	.315	.796	.911	.353
Peas and beans >3x per week	.185	.235	.409	.042	.495	.117	.339	.456
Fast food <1x per week	.491	.363	.428	.737	.033	.055	.388	.526
Fish consumption>1 x per week	.311	.497	.775	.805	.576	.207	.824	.679
White flour < 5x per week	.061	.903	.310	.132	.068	.796	.454	.751
White rice < 5x per week	.062	.497	.205	.277	.312	.833	.547	.183
Sweetened drinks < 2x per wk.	.299	.865	.871	.778	.893	.902	.910	.653
Alcohol < 2x per week	.636	.986	.179	.104	.660	.278	.077	.765

CHAPTER 5- DISCUSSION

This study was conducted to assess attitudes and levels of knowledge and practices in relation to diabetes mellitus, and to determine the factors that influence attitudes, knowledge and practices. The study showed that the mean knowledge score (\pm SD) was 58%. It is difficult to compare these results with the many other KAP studies done in different societies using different instruments.

Respondents appeared to lack knowledge of the nature, causes and treatment of diabetes although they generally knew the symptoms of diabetes and were well informed of the potential complications. This appears to be similar to the findings of Penal Self Care Study conducted in a rural setting in Trinidad (Johns Hopkins 2012) which found that nearly all patients lacked understanding of how the disease affects the human body. The lack of knowledge about proper foot care practices is also similar to the Penal study. There was also similarity with respect to dietary adherence, with 45% of Carenage patients reporting non-adherence to the recommended diet. In Penal 62% of patients paid attention to diet only half of the time.

However the findings differ significantly from the Penal study in relation patient attitude towards taking medication. In Penal most patients reported that they forgot to take their medications, or stopped taking them when they felt better. In Carenage, however, 81% of patients reported that they did not often forget to take their medication.

The initial hypothesis was that the majority of diabetics in the target population do not have a basic understanding of the disease. The mean knowledge level of 58% appears to indicate that the knowledge level is above a basic understanding, but the knowledge seems to be primarily in connection with what is required to control blood sugar levels, what the diabetic diet should

comprise, and the potential complications as a result of not maintaining near normal blood sugar levels.

A strikingly different finding of this study compared to other similar KAP studies in other countries was the lack of association between any demographic factors and the levels of patient knowledge of diabetes. The KAP study conducted in the United Arab Emirates showed that level of education, male gender, family history of diabetes, frequency of seeing a diabetes educator and duration of diabetes were all associated with knowledge levels. (Al-Maskari 2013, 6) In northwest Ethiopia, knowledge levels were significantly associated with lower age, with educational levels and with increasing duration of diabetes treatment. (Feleke 2013). This is consistent with similar studies conducted in other countries. (Maina 2011) (Badaran 2004).

This may be due to the fact that the participants in this survey were almost all over 40 and of similar educational levels, most of them having only completed primary school. It is however surprising that the knowledge levels were not higher among those who had been diagnosed with diabetes for a longer time. This implies either that the source of their knowledge was not their health care provider or that once they were provided initially with information about the disease, there was no ongoing education programme at the Health Centre. The fact that appointments for repeat visits are generally given every four months, and the large numbers of patients who are seen at each clinic may account for the lack of continuing diabetes education.

Some studies have shown that increasing knowledge of proper diabetic practices does not necessarily result in the consumption of lower non-nutrient dense foods (Pakseresht, 2010). More than two-thirds of participants were aware that a combination of diet, exercise and medication were necessary to control blood sugar and 93% knew that controlling blood sugar helps prevent

the complications of diabetes, and yet 52% did not exercise on at least four days per week. Similarly most patients were aware of the elements of a healthy diet but 95% consumed sweetened beverages more than twice per week. One exception was in relation to eye examinations, where it appeared that the poor practice was directly related to lack of knowledge. Most participants were not aware of the need for annual eye examinations and therefore they did not seek to have their eyes examined at least once per year.

This study did find any association between general educational levels and good practices. However general educational levels are not the same as specific health education about diabetes mellitus, its causes and treatment. Other factors, such as psychosocial problems may be important factors in achieving adherence to recommended patient self-management regimens. (Peyrot 2005, 1379) However other studies, including studies conducted in Trinidad (Babwah 2011) (Gulliford 1999, 939) have concluded that ongoing patient education about diabetes, diet and exercise, combined with regular monitoring of glycemic control, advice about compliance with medication and addressing patients' concerns and fears about diabetes, leads to improved glycemic control over time.

The overall mean number of responses indicating good diabetes practices was 8.7 (SD \pm 2.629) answers out of 16 answers, or 54%. This percentage of patients with good practices is similar to the percentage of patients with good knowledge, although correlation testing was not done as the questions were not in the same subcategories. The areas in which poor practices were highest related to frequent consumption of sweetened beverages, which is very common in Trinidad, not having eye examinations at least once per year and not having regular urine checks. The lack of regular urine checks could be due to the alternative use of blood glucose monitoring, which is more accurate than urine monitoring. There was also a lack of regular exercise, particularly

among women. This may be due to the fact that a large proportion of the respondents were elderly people who had other ailments which made it difficult for them to exercise regularly. However, there was no clear association found between age and exercise.

Forty-five percent of the respondents indicated that they did not follow the diet as recommended by their doctor or nurse. It was unclear whether this was due to the fact that in some cases, they had not been given a diet to follow. In the 14 responses which provided reasons for non-compliance, financial cost was the main reason cited, followed by dislike of the food recommended. This appears to indicate that further education is required as to methods of preparing healthy low-cost meals.

The majority of the respondents appeared to follow fairly good dietary practices, with the exception of continued consumption of white flour products and sweetened beverages. Very few consumed alcohol (5.5%) in excess or ate fast foods more than once per week (14.3%). As with the knowledge levels, there were no clear demographic factors that were shown to influence practices in relation to diabetes management. The only association of significance was between gender and exercise. Male diabetics were more likely than females to exercise for 30 minutes on most days of the week. This may possibly be due to the high crime in the Carenage area which makes elderly women more afraid than men to leave their homes to exercise in the early morning or late afternoon, when the weather is cooler.

In other studies several factors have been identified as being associated with good practice of diabetic participants. In the Northwest Ethiopia Study, the factors associated with good practices were ages, gender, educational status, marital status, monthly income and duration of therapy. (Feleke 2013, 117-118) It may be that the age of the respondents, the fact that most of them had

low incomes and were retired, and the fact that the number of those respondents outside of these groups was so small as to be insignificant, may have led to the failure to identify these factors.

The attitudes of the respondents to the need for continuing diabetic education was extremely positive, (100%) indicating extreme receptiveness to any education programmes that can be made available. In fact, the researcher was frequently questioned during the course of the study about the best foods to eat and about whether the answers provided by the particular respondent to the questionnaire were correct.

Seventy-nine percent of participants believed that what they did had more effect on their diabetes than anything that a health practitioner did. This indicates that they are well aware of the need for self-management and self-management of their diabetes. 93% believed that keeping blood sugar close to normal levels would help prevent diabetic complications, which is consistent with their good knowledge about diabetic complications. These positive attitudes show that these respondents are likely to be very receptive to any diabetes education programme that is made available to them.

CHAPTER VI- CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

Conclusion

The study revealed very positive attitudes and medium levels of knowledge, and practice among diabetic patients attending the Carenage Health Centre. There were no factors identified that were associated with the knowledge of the participants. Gender was the only factor identified that was associated with good exercise practices.

Limitations

One limitation to the generalizability of the research is the fact that due to lack of time, it was conducted only among patients from a single urban health centre and hence may not be capable of being generalized to the entire diabetic population of Trinidad and Tobago or even to the entire diabetic population of urban Trinidad. Almost half of the study population was over the age of 65 so that the results may not be typical of other areas of the country.

Another limitation is the fact that the number of respondents (43), was not sufficiently large to produce statistically significant results. There were also limitations in the design of the questionnaire, in that no information was sought about patients' sources of knowledge about diabetes. This would have been useful in making recommendations for future patient education.

The researcher did not have access to patient files to determine whether higher knowledge levels in patients had a positive effect on the management of their blood sugar levels and on the

incidence of complications and the effect of actual practices rather than those reported in the questionnaire.

Recommendations

Ongoing educational programmes should be developed and delivered at Health Centres or elsewhere within communities in Trinidad and Tobago teaching about diabetes, its causes in the human body, and recommended dietary, exercise and self-monitoring practices. These programmes should include information about recommended frequency of eye and other examinations. Advice should be included about cost effective, simple preparation of foods for diabetics and their families.

Further research is required at other Health Centres throughout Trinidad and Tobago using larger samples to identify whether there are factors that influence levels of knowledge and behaviour among diabetics.

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APPENDIX 1

Sample Size Calculation

$$n = Z^2 pq / e^2$$

Where n= sample size

p= the proportion of the population with the attribute of interest = 0.25%

$$q = 1 - p = 0.75$$

z= standard normal value of Z-Score which has a value of 1.96 at the 95% confidence level

e= confidence interval =5%= 0.05

$$\text{In this case } n = (1.96)^2 \times 0.25 \times 0.75 / 0.05^2 = 288$$

For small populations $n = n / (1 + n / \text{population}) = 288 / (1 + 288 / 800) = 211.76 = 212$.

Due to the small size of the population, the most accurate method would be to survey all the diabetics attending the clinic.

APPENDIX II

DIABETES SURVEY**SECTION I**

Please answer each of the following questions by filling in the blanks with the correct answers or by choosing one best answer.

1. Age: ___ years old
2. Birth date: ___ / ___ / ___
(Month / Day / Year)
3. Sex: ₁ Male ₂ Female
4. What year were you first told you had diabetes? (Please enter the year) ___

5. What is your marital status?
₁ Never married
₂ Married
₃ Common Law Union
₄ Separated/Divorced
₅ Widowed
6. What is your ethnic origin/race? (check one box)
₁ African ₅ Caucasian
₂ Indian ₆ Arab
₃ Mixed
₄ Chinese ₇ Other _____
7. How much education have you had? (check one box)
₁ Did not complete primary school

- ₁ Primary school only
- ₂ Some high school incomplete
- ₃ Completed high school
- ₄ Technical or trade school
- ₅ University graduate
- ₆ Postgraduate degree

8. Which of the following best describes your current employment status? (check one box)

- ₁ Working full-time, 35 hours or more a week
- ₂ Working part-time, less than 35 hours a week
- ₃ Unemployed or laid off and looking for work
- ₄ Unemployed and not looking for work
- ₅ Homemaker
- ₆ In educational institution
- ₇ Retired
- ₈ Disabled, not able to work
- ₉ Something else? (Please specify): _____

9. What is your total household income? (Check one box)

- ₁ under \$3,000
- ₂ \$3,000- \$5,999
- ₃ \$6,000- \$8,999
- ₄ \$9,000- \$11,999
- ₅ \$12,000- \$14,999
- ₆ More than \$15,000

SECTION 2

10. Diabetes is a condition in which the body contains:

- A higher level of sugar in the blood than normal
- A lower level of sugar in the blood than normal
- Either a higher or a lower level of sugar in the blood than normal

- I don't know
11. The major cause of diabetes is:
- increased availability of insulin in the body
 - decreased availability of insulin in the body
 - I don't know
12. The symptom(s) of diabetes is/are:
- Increased frequency of urination
 - Increased thirst and hunger
 - Increased tiredness
 - Slow healing of wounds
 - All of the above
 - I don't know
13. The most accurate method of monitoring diabetes is:
- Checking blood glucose levels
 - Checking urine sugar
 - I don't know
14. In a diabetic patient, high blood pressure can increase or worsen:
- The risk of heart attack
 - The risk of stroke
 - The risk of eye problems
 - The risk of kidney problems
 - All of the above
 - I don't know
15. A diabetic patient should measure his or her blood pressure:
- Once a year
 - Once every six months
 - Once every two or three months
 - Once every month
 - Once every week
 - Every day
 - Need not check at all
 - I don't know

16. A diabetic patient should have his or her eyes checked:

- Once a year
- Once every two years
- Once every six months
- Once every month
- Need not check at all
- I don't know

16A. Regular exercise will help in:

- Increasing blood circulation
- Helping the insulin to work better
- I don't know

17. Regular urine tests will help in knowing:

- How well the liver is functioning
- How well the kidneys are functioning
- How well the diabetes is controlled
- I don't know

18. The important factor(s) that help in controlling blood sugar are:

- A controlled and planned diet
- Regular exercise
- Medication
- All of the above
- None of the above

19. A well-balanced diet includes:

- Green leafy vegetables
- Foods rich in fiber
- Low sugar, oil and fat
- All of the above
- I don't know

20. For proper foot care, a diabetic patient:

- Should inspect and wash the feet every day

- Should choose the best possible footwear
- Should walk barefoot inside and outside the house
- Should not walk barefoot inside and outside the house.

21. Treatment of diabetes comprises:

- Antibiotics
- Blood transfusions
- Insulin or Metformin
- Taking more bitter vegetables
- I don't know

22. When blood sugar is low what is the best thing to do?

- Take medicine
- Take insulin
- Take sugar
- I don't know

23. If diabetes is not treated, this can lead to:

- Eye problems

- Kidney problems
- Foot ulcers
- Heart problems
- All of the above
- I don't know.

24. Which causes the largest increase in blood sugar, 1 tablespoon white sugar, 1 slice white bread or 1 tablespoon cooked white rice?

- 1 tablespoon white sugar
- 1 slice white bread
- 1 tablespoon cooked white rice
- They all increase blood sugar by the same amount
- I do not know

SECTION 3

25. People with diabetes should learn a lot about the disease so that they can be in charge of their own diabetic care.
- Yes
 - No
26. Generally I believe that what the patient does has more effect on the health of the diabetic patient than anything that a doctor or nurse or dietician can do.
- Yes
 - No
27. Keeping the blood sugar close to normal can help prevent the complications of diabetes.
- Yes
 - No

SECTION 4

28. Do you exercise for at least 30 minutes per day on at least 4 days of the week?
- Yes
 - No
29. Are you following a controlled diet as recommended by your nurse or doctor or dietician most of the time?
- Yes
 - No
30. Do you often miss taking the doses of your diabetic medication?
- Yes
 - No
31. If you are not following a controlled diet as recommended, what is the main reason that you are not doing so?
- Financial

- Family-related problems
- Lack of time
- Too much trouble
- I do not like the food
- I follow the recommended diet.

32. When was your blood pressure checked last before today?

- Less than one week ago
- One week ago
- One month ago
- Two months ago
- Six months ago
- One year ago

33. When did you have your last eye examination?

- Less than one month ago
- One month ago
- Six months ago
- One year ago
- Two years ago
- Not done at all

34. When was your urine checked last before today?

- Less than two days ago
- Less than one week ago
- Less than two weeks ago
- One month ago
- Two months ago
- Six months ago

35. How often do you eat fresh fruit?

- More than once per day
- Once per day
- 3-5 times per week

- 1-2 times per week
- Less than once per week

36. How often do you eat leafy green vegetables such as bhaji, callaloo, patchoi, cress or lettuce?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

37. How often do you eat other fresh non-starchy vegetables such as carrots, tomatoes, bodi, ochroes, eggplant, christophene, sweet peppers, cabbage, cauliflower, cucumbers or broccoli?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

38. How often do you eat peas or beans such as pigeon peas, red beans, lentils, black-eyed peas or channa?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

39. How often do you eat fast food?

- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

- Less than once per month

40. How often do you eat fish?

- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week
- Less than once per month

41. How often do you eat bread, bake, sada or roti made from white flour?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

42. How often do you eat white rice?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

43. How often do you drink beverages (including soft drinks) that are sweetened with sugar?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week

44. How often do you consume alcohol?

- More than once per day
- Once per day
- 3-5 times per week
- 1-2 times per week
- Less than once per week
- Less than once per month

45. When you consume alcohol, how many drinks do you usually consume?

- 1
- 2
- 3
- 4
- 5
- More than 5

46. Would you describe yourself as overweight?

- Yes
- No

47. Would you describe yourself as physically fit?

- Yes
- No

APPENDIX III

APPENDIXCodes for Questionnaire1.Variable Name- new age

Variable Label- age of responder

Variable Values- 1-less than 40; 2- 40-65; 3- more than 65

Variable Type- Numeric

2.Variable Name- dob

Variable Label- date of birth

Variable Values- None

Variable Type- date

3.Variable Name- gender

Variable Label- gender of responder

Variable Values- 1-less than 40; 2- 40-65; 3- more than 65

Variable Type- Numeric

4.Variable Name- newdiag

Variable Label- year diabetes diagnosed

Variable Values- 1 –less than 1; 2- 2-10; 3- more than10

Variable Type- Numeric

5.Variable Name- status

Variable Label- marital status

Variable Values- 1-never married; 2- married; 3- common law union; 4-separated/divorced; 5-widowed

Variable Type- Numeric

6.Variable Name- ethnicity

Variable Label- ethnic origin

Variable Values- 1-African; 2-Indian; 3-Mixed; 4-Chinese; 5-Caucasian; 6-Arab; 7-Other

Variable Type- Numeric

7.Variable Name- edu

Variable Label- educational level

Variable Values- 1-partial primary school; 2- completed primary school; 3- partial high school; 4- technical or trade school; 5-university graduate; 6- postgraduate

Variable Type- Numeric

8.Variable Name- employ

Variable Label- employment status

Variable Values- 1-working full time; 2- working part-time; 3- unemployed looking for work; 4- unemployed not looking for work; 5- homemaker; 6- in educational institution; 7-retired; 8- disabled unable to work; 0- other

Variable Type- Numeric

9.Variable Name- income

Variable Label- household income

Variable Values- 1-under \$3000; 2- \$3000-5999; 3- \$6000-8999; 4- \$9000-11999; 5- 12000-15000; 6-more than 15000.

Variable Type- Dollar

10.Variable Name- bloodsugar

Variable Label- nature of diabetes

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

11.Variable Name- causes

Variable Label- causes of diabetes

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

12.Value Name- symptoms

Variable Label- symptoms of diabetes

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

13.Variable Name- monitor

Variable Label- best way to monitor diabetes

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

14.Value Name- BP

Variable Label- effect of high bp

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

15.Variable Name- BPFreq

Variable Label- BP Measurement frequency

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

16.Variable Name- eyes

Variable Label- frequency of eye examination

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

17.Variable Name- urine

Variable Label- frequency of urine tests

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

18.Variable Name- factors

Variable Label- blood sugar control factors

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

19.Variable Name- diet

Variable Label- well balanced diet

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

20.Variable Name- feet

Variable Label- proper diabetic footcare

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

21.Variable Name- treatment

Variable Label- treatment of diabetes

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

22.Variable Name- lowBS

Variable Label- action for low blood sugar

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

23.Value Name- untreated

Variable Label- untreated diabetes

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

24.Variable Name- highBS

Variable Label- high blood sugar action

Variable Values- 0-incorrect answer; 1-correct answer;

Variable Type- Numeric

25.Variable Name- Learning

Variable Label- diabetic learning

Variable Values- 1-yes; 2-no

Variable Type- Numeric

26.Variable Name- Patient

Variable Label- patient vs doctor effect

Variable Values- 1=yes; 2=no

Variable Type- Numeric

27.Variable Name- BSnorm

Variable Label- normal BS and complications

Variable Values- 1=yes; 2 -no

Variable Type- Numeric

28.Variable Name- ptexercise

Variable Label- does patient exercise

Variable Values- 0=no; 1=yes;

Variable Type- Numeric

29.Variable Name- ptdiet

Variable Label- does patient follow diet

Variable Values- 0=no; 1=yes

Variable Type- Numeric

30.Variable Name- ptmedic

Variable Label- patient medication

Variable Values- 0=yes; 1=no

Variable Type- Numeric

31.Variable Name- nodiet

Variable Label- reason for no diet

Variable values- 1-financial; 2-family related problems; 3-lack of time; 4- too much trouble; 5- do not like the food; 6- follows the recommended diet

32.Variable Name- newBPchk

Variable Label-last BP check

Variable Values- 1-every 1-6 months; 0-less than 1 month or more than every 6 months

Variable Type- Numeric

33. Variable Name-neweye

Variable Label-last eye exam

Variable Values-0-more than one year ago; 1-one year or less

Variable Type- Numeric

34.Variable Name-newurinck

Variable Label- last urine check

Variable Values- 0-more than 1 week ago; 1-one week or less

Variable Type- Numeric

35. Variable Name-newfruit

Variable Label-fresh fruit frequency

Variable Values-0-less than 3 times per week; 1-3 or more times per week

Variable Type- Numeric

36.Variable Name-newgreenveg

Variable Label-green veg frequency

Variable Values- 0-less than 3 times per week; 1-3 or more times per week

Variable Type- Numeric

37.Variable Name- newnostarch

Variable Label-nonstarch veg frequency

Variable Values- 0-less than 3 times per week; 1-3 or more times per week

Variable Type- Numeric

38.Variable Name- newpeas

Variable Label- peas or beans frequency

Variable Values- 0=less than 3 times per week; 1=3 or more times per week

Variable Type- Numeric

39.Variable Name-newffood

Variable Label- fast food frequency

Variable Values- 0=once per week or more; 1-less than once per week

Variable Type- Numeric

40.Variable Name - newfish

Variable Label- fish eating frequency

Variable Values- 1=once per week or more; 0=less than once per week

Variable Type- Numeric

41.Variable Name- newwhiteflour

Variable Label-white flour eating

Variable Values- 0=more than twice per week; 1- 2 or less times per week

Variable Type-Numeric

42. Variable Name-newwhiterice

Variable Label-white rice eating

Variable Values- 0=more than twice per week; 1=2 or less times per week

Variable Type-Numeric

43.Variable Name- newdrinks

Variable Label- sweetened drink frequency

Variable Values- 0=more than twice per week; 1=twice a week or less

Variable Type-Numeric

44.Variable Name-newalcoh

Variable Label-alcohol frequency

Variable Values- 0=more than twice per week; 1=twice per week or less

Variable Type-Numeric

45.Variable Name-newalconumber

Variable Label-alcohol drinks consumed

Variable Values-1=1 drink; 2=2 drinks; 3=3 drinks; 4=4 drinks; 5=5 drinks; 6=more than 5 drinks

Variable Type-Numeric

46.Variable Name-overwgt

Variable Label-overweight

Variable Values-1=yes; 2=no

Variable Type-Numeric

47.Variable Name- fit

Variable Label-physically fit

Variable Values- 1=yes; 2=no

Variable Type-Numeric

