

# Determinants of eating habits among pre-retired and post-retired Mauritians

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**Abstract:** The aging population (60 years and above) is becoming a global phenomenon and so is in Mauritius and over the last 4 years there has been an increase of 20.4%. There is an inadequate nutrition-related data among the older adults in Mauritius and in addition the factors influencing eating habits warrant investigation. This study aimed to understand how socioeconomic factors (income level and employment status), physical activity level, body mass index, nutritional knowledge is associated with eating habits of pre-retired and post-retired Mauritians. A survey based questionnaire was used to elicit information of the various factors. Chi square test, Independent sample *t*-test, One-way variance analysis and Pearson correlation were the main statistical tests used to determine relationship between eating habits and the different factors. Healthy food items were more frequently consumed by high income earners as compared to low income earners. Similarly, post-retired participants and those having high physical activity level consumed healthy food items more frequently. Low physical activity level was associated with high consumption rate of fast food and low intake of fruits and vegetables. There was also positive influence of nutritional knowledge on eating habits. Income level, employment status, physical activity level and nutritional knowledge have a great impact on the eating habits whereas no relation was found between eating habits and body mass index.

**Keywords:** Socioeconomic Factors, Physical Activity Level, Body Mass Index, Nutritional Knowledge, Eating Habits

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## 1. Introduction

Numerous factors are involved in determining eating habits including gender, marital status and household composition, socio-economic position, income, physical activity, smoking, body mass index (BMI) and health but the influence of these factors on eating habits has received little consideration among older adults [1]. In a cohort study carried out in Denmark, both older men and women reported a decreased intake in the frequency of animal and vegetable fats, milk, eggs, meat products, white bread and potatoes, while they increased intakes of low-fat margarine, fruit, raw vegetables, coarse breads, oatmeal, pasta, rice, cakes and candy [2]. Moreover, Helldan et al. [1] demonstrated that there is a difference in the eating habits of retired persons and working persons and that transition to retirement opens up opportunities for healthier food habits for women. However, differences in eating habits among pre-retired and

post-retired are not always clear-cut. For instance, a longitudinal survey in United Kingdom reported little change between pre-retires and post-retires in intake of fibre rich foods [3].

Retirement age worsens the overall health and increases the risk of developing diseases, such as cardiovascular, metabolic syndrome, osteoporosis and cancer [4]. The National NCD survey [5] carried out in Mauritius reported that in the age group 25 to 74 years, the prevalence of diabetes is 23.6% and that of hypertension is 37.9% and only 16.5% of them undertake sufficient vigorous or moderate physical activity to meet the national guidelines of 30 minutes of exercise each day [6]. Indeed some studies have focused on the exercise level among older adults which put forward that to some extent lower "intensity" exercise can setback mortality or reduce the occurrence of disease for older adults [7].

The increasing prevalence of overweight and obesity affects the older population but this has received quite atten-

tion in recent years. The prevalence of overweight and obesity among Mauritian adults accounts to 35.7% [5]. The preventive actions, particularly among people in transitional stages associated with lifestyle changes, such as occupational retirement is an important fragment of the population to be considered in most countries [8]. To date, one research in Mauritius has focused on the eating habit, nutritional status and portion sizes among the older population aged 58 years old and above [9]. Older people are becoming an increasingly important proportion of the population of developing countries [10], and currently there are 151,860 senior citizens between the age of 60 - 89 years out of a population of 1.2 million in Mauritius who are beneficiaries of contributory and non-contributory pensions by island [11]. Income is expected to decrease after retirement and this can lead to changes in eating habits [1]. For instance, Herne [12] reported that quite a number of elderly cut down their food budgets (e.g. by skipping meals) as income has a strong influence on the quantities and quality of foods purchased [13]. According to the Social security statistics [14], the Basic Retirement Pension is payable to every Mauritian citizen aged 60 years and above, in addition to other pension schemes. To date, in Mauritius most retired earn a meager pension of Rs. 3146 ( $\approx$  \$105)/month [15] and it is unknown how their eating habits vary with those of working older adults.

Nutritional Knowledge (NK) is a less commonly investigated factor which can equally affect eating habits of older adult. NK is also one among many significant factors that influences eating habits [16]. However, many studies have been unable to demonstrate a clear link between NK and dietary behaviour [17].

The current study aims to study the eating habits of the pre-retired and post-retired Mauritians aged 55 - 70 years old both individually and as a whole. The principle objectives are (i) to clarify the relationship between socioeconomic factors on eating habits among pre-retired and post-retired Mauritians, (ii) to find out whether there is a link between physical activity level (PAL) as well as BMI with eating habits and (iii) to determine if there is an association between nutritional knowledge with eating habits.

## 2. Methods

### 2.1. Participants

This cross-sectional study was conducted among a group of 500 pre-retired (approaching retirement age) and post-retired persons aged 55 - 70 years old who were selected using a stratified sampling method. Research has been granted approval by the University Research Ethics Committee and prior consent were obtained from all participants. The sample was taken from both rural and urban areas of Mauritius. Equivalent numbers of male and female respondents were approached to avoid gender prejudice.

Retired was identified as not working for pay currently and for the past 3 months and self-reported as retired.

Therefore, the retired category included retirees who had recently retired as well as those who were retired for a longer period [18]. Working participants included people who were either full-time employed, part-time employed or self employed. The sample excluded respondents who were not currently working but did not identify themselves as retired, people who are mentally and physically disabled, and diabetic respondents who were undergoing dialysis.

### 2.2. Questionnaire

A 34-item coded questionnaire was used which consisted mainly of close-ended questions in order to facilitate response from the participants [19]. Socio-demographic data such as gender, age, employment status, income level, and education level; family structure and marital status [20] were recorded.

A Food Frequency Table (FFT) adapted from the Short Form Food Frequency Questionnaire (SFFQ) developed by the Nutritional Epidemiology Group at Leeds University was used to assess eating habit. The FFT consisted of 15 food items based on the dietary guidelines for the prevention of non-communicable diseases in Mauritius [5] and the modified MyPyramid for Older Adults [21]. To generate a food score by food group, scores were assigned as follows: 7 = eaten daily; 3 = eaten three or more times per week; 1 = eaten once a week; 0 = rarely or never eaten. Foods were categorized into nine different food groups so that food scores could be calculated and used to find out how the different socioeconomic factors affects the consumption frequencies. Furthermore, other questions were used to assess other facts pertaining to eating habits such as meal skipping [22], fast food consumption, amount of water and type of milk used.

Physical activity was assessed using the shortened version of the self-reported International Physical Activity Questionnaire (IPAQ) [20]. PAL calculated in metabolic equivalents (MET) -minute per week which was classified as high, moderate and low intensity. Its validity has been tested in 12 countries showing that self-administered, last 7 days IPAQ instrument has suitable validity properties for evaluating different domains of physical activity (PA), PA intensities and total PA in healthy adults [23]. Seven nutrition knowledge questions were adapted from the General nutrition knowledge questionnaire for adults by Parmenter and Wardle [24]. A score of 1 was assigned to a good answer and 0 for a wrong answer on a total of 25 marks.

BMI which is a continuous variable was calculated as weight, in kilograms, divided by the square of height, in meters [25]. According to World Health Organization [26], BMI was classified as underweight, normal, overweight and obesity.

### 2.3. Statistical Analysis

The collected data were analyzed using SPSS version 17.0. The Chi-square test, Independent sample t-test, One-way ANOVA and Pearson product moment correlation was used

during the analysis. The critical value for significance was set at  $p < 0.05$  for all analysis.

### 3. Results

#### 3.1. Socio-Demographic Characteristics

The socio-demographic characteristics of participants have been summarized in Table 1. Of the 500 respondents, 40% were pre-retired while 60% were retired. The majority of the participants was from urban areas (55.8%) and was educated (83.6%). Moreover, the sample consisted of equal number of males and females.

#### 3.2. Socioeconomic Factors and Eating Habits

The income groups were classified into three categories as: 1: Low ( $< \text{Rs } 5000 \approx \$ 167$ ,  $\text{Rs } 5001 - \text{Rs } 10000 \approx \$ 167 - \$ 333$ ), 2: Moderate ( $\text{Rs } 10001 - \text{Rs } 20000 \approx \$ 333 - \$ 667$ ,  $\text{Rs } 20001 - \text{Rs } 30000 \approx \$ 667 - \$ 1000$ ), 3: High ( $> \text{Rs } 30001 \approx \$ 1000$ ). There was a statistically significant difference at the 5% level between the three income groups and consumption frequency of breakfast cereal, whole-meal bread, white bread, rice, fresh fruit, dairy product, beans/pulses, red meat, lean meat, white fish and oily fish. However, no significant difference was found for pasta, dried fruits, vegetables and fizzy drinks. Our results also indicated that as income increases so does the consumption frequency of the food items except for rice.

Most of the pre-retired and post-retired Mauritians consumed whole/full fat milk irrespective of income level (67.4% low income earners, 50.0% middle income earners and 47.7% high income earners). Additionally, more participants with moderate and high income consumed semi-skimmed and skimmed milk compared to those with a low income, which was statistically significant. In general, the participants consumed fried foods '1-2 times per week'. It was noted that a majority of respondents (42.6%) with low income consumed fried foods 'rarely/never' while 60.0% of participants with high income had fried foods '1-2 times per week'. Generally most participants had fast food 'Rarely/never', among which 42.6% had a low income and 18.5% had a high income. Chi square test showed that the association between type of milk consumed ( $p < 0.001$ ), fried food consumption ( $p = 0.006$ ) and fast food consumption ( $p < 0.001$ ) was significantly associated with income level.

A statistically significant association was found between employment status and the consumption of 8 food items (whole-meal bread, vegetables, red meat, lean meat, processed meat, white fish, oily fish and fizzy drinks). For instance, consumption of whole-meal bread and vegetables was higher among post-retired participants while pre-retired participants had higher consumption of red meat, lean meat, processed meat, white and oily fish as well as fizzy drinks. Employment status was also significantly associated with consumption frequency of fried ( $p = 0.018$ ) and fast foods ( $p < 0.001$ ) with a higher consumption frequency both fried and fast foods among the pre-retired participants. On the other

hand, no significant association was obtained between type of milk consumed and employment status.

**Table 1.** Socio-demographic characteristics of participants.

Characteristics		Number of respondents	Percentage of Respondents %
Gender	Male	250	50.0
	Female	250	50.0
Age group	55-60	216	43.2
	61-65	142	28.4
	66-70	142	28.4
Area of Residence	Rural	221	44.2
	Urban	279	55.8
Employment status	Pre-retired	200	40.0
	Post-retired	300	60.0
	None	82	16.4
Education level	Primary	171	34.2
	Secondary	171	34.2
	Tertiary	76	15.2

#### 3.3. Physical Activity Level (PAL) and Eating Habits

There was a statistically significant difference between PAL and rice [ $F(2, 497) = 3.58, p = 0.029$ ], fresh fruit [ $F(2, 497) = 6.40, p = 0.002$ ], vegetable consumption [ $F(2, 497) = 10.2, p < 0.001$ ] and white fish consumption [ $F(2, 497) = 7.29, p < 0.001$ ] whereas no significant difference was noted between PAL and consumption frequency of other food items. Rice consumption rate was higher among participants with low PAL while fresh fruits and vegetables were more frequent among high PAL participants. Fried foods were most often consumed '1 - 2 times per week' among the three categories of PAL. A higher frequency (47.2%) of eating fried foods was observed among participants with low PAL while 44.7% of participants with high PAL consumed fried foods 'Rarely/never'. However, the associations between PAL and consumption of fried foods as well as fast foods were not statistically significant.

#### 3.4. Body Mass Index (BMI) and EATING HABITS

There was statistically significant difference in frequency of vegetable intake [ $F(3, 496) = 2.71, p = 0.044$ ] and whole-meal bread [ $F(3, 496) = 3.01, p = 0.030$ ] consumption with BMI. Vegetable consumption for overweight participants was significantly different from obese participants while whole-meal bread consumption varied between normal and obese participants. However, there was no statistically significant difference between BMI and consumption frequency of the other food items. Fried foods were most commonly consumed '1- 2 times per week' among participants within the different classes of BMI. 50.0% of obese

participants had fried foods '1-2 times per week'; while most overweight participants (5.2%) ate fried foods daily. Fast food consumption was more frequent 'Once/week' among underweight participants (23.1%) compared to 18.3% of overweight and 7.6% obese participants. However, a chi square test revealed no statistically significant association between consumption of fried and fast foods and BMI.

**Table 2.** Relationship between nutritional knowledge (NK) and consumption frequency of different food items

Food Items	Pearson Coefficient (r)	Sig. value (2-tailed)
Breakfast cereal	0.210	0.000**
Whole-meal bread	0.133	0.003**
White bread	-0.144	0.001**
Rice	-0.114	0.011*
Pasta	0.092	0.041*
Fresh fruits	0.240	0.000**
Dried/canned fruits	0.104	0.020*
Vegetables	0.199	0.000**
Beans/Pulses	-0.025	0.574
Dairy products	0.145	0.001**
Red meat	0.094	0.036*
Lean meat	0.047	0.299
Processed meat	0.024	0.594
White fish	0.179	0.000**
Oily fish	0.156	0.000**
Non alcoholic fizzy drinks	0.004	0.920

\* $p < 0.05$ ; \*\* $p < 0.01$  is considered as statistically significant

### 3.5. Nutritional Knowledge (NK) and Eating Habits

A small, positive correlation between frequency of consuming breakfast cereal, pasta, fresh fruit, dried/canned fruits, vegetables, dairy product, red meat, white fish and oily fish and nutritional knowledge (NK) was found which were all statistically significant. Moreover, there was a small, negative correlation between frequency of consuming white bread and rice and NK, which was statistically significant.

## 4. Discussion

Participants with a high income consumed breakfast cereals, whole-meal bread, fresh fruits, red meat, chicken/turkey, processed meat and oily fish more frequently than those with low income. This could be because healthier food items such as lean meats, fish, or fresh fruit and vegetables are far more costly per calorie than are added sugars and added fats [13]. This difference in eating habit between these two SES groups can be supported by strong evidence pro-

vided by Fokeena and Jeewon [27], who found that in Mauritius, refined cereals, full-cream milk and dairy products, and high fat protein sources provide calories at cheaper prices compared to wholegrain cereals, low-fat milk and dairy products, and low-fat protein sources, fruits and vegetables. Moreover, healthier types of milk choices such as semi-skimmed and skimmed milk were mostly consumed among older adults. In most studies, skim or low-fat milk was the preferential choice for those in the highest SES categories [13].

One interesting finding in this study is that fried foods and fast food consumption were found to be higher among pre and post retirees with higher income. This finding corroborates those carried out in South Africa which also reported that fast food intake was much higher in the highest 'living standards measurement' (LSM) compared with the low LSM. Since, fast foods are sold from outlets in formal structures such as buildings and malls and frequently operate as a franchise [28] they tend to be more expensive in developing countries. However, Galobardes *et al.* [29] found that fried food consumption were higher among men and women with lower SES as result of lower education which can cumulatively affect income level and consequently impact eating habits.

The result herein shows that employment status had a significant influence on consumption rate of different food items. As occupation also forms part of the indexes of SES [13], therefore along with income, occupation status also is a major determinant of eating habits among pre-retired and post-retired persons. It determines income and consequently, access to certain food products [29]. The present findings are supported by a study carried out by Helldan *et al.* [1] who found in a follow-up study that healthy food habits among women improved more after retirement than those of the continuously employed. These changes in food habits could be associated with other lifestyle factors related to retirement, such as increased leisure time (kitchen-gardening) and more time for cooking.

Data from this study also indicated that employment status was also significantly associated with consumption frequency of fried ( $p = 0.018$ ) and fast foods ( $p < 0.001$ ) with a higher consumption frequency among the pre-retired participants. Pugo Gunsam and Murden [9] also noted that eating out was an uncommon eating habit among the elderly population of Mauritius. Results also corroborate Sharkey *et al.* [30] who reported that increased age is associated with less frequent consumption of fast foods. One possible explanation might be that our older population still has a preference for traditional home-made foods due to strong influence by beliefs related to appropriate food behavior and expected characteristics of foods and meals, many of which had been formed during childhood [31]. Conversely, some of the pre-retirees could have higher fast food consumption as they are more exposed to cafeterias and fast foods outlets at work and they devote less time for cooking as compared to their post-retired counterparts [18].

This study demonstrates that frequency of rice consump-

tion was higher among older adults with low PAL compared to those with high PAL while fresh fruits and vegetable were also more frequently consumed among participants with moderate and high PAL (significantly different). Fried food consumption was also higher among participants with low PAL. These findings are thus in line with the results of the Transtheoretical Model (TTM) which demonstrates that healthy eating habits increase with increase in PAL [32]. Results from this study are also consistent with the study carried out by Serdula et al. [33] who found that the frequency of intake of fresh fruits, fresh vegetables, or salad increased with increase in PAL. Therefore, these people are more health conscious as high PAL is positively associated with good eating habits [34].

Only the association between BMI and consumption frequency of two food items (whole-meal bread and vegetables) was statistically significant. For instance, obese participants were found to consume vegetables more frequently than the overweight participants. This shows that the obese respondents are aware that vegetables may assist dietary weight management [35]. However, no significant association was noted between fresh fruit consumption and the other food items and BMI which could be due to some other parameters influencing this eating behaviour such as culture but these were not studied. The present results corroborate Patterson et al. [36] who observed no association between fruit consumption and BMI in participants of the Second National Health and Nutrition Examination Survey in United States. 50.0% of overweight participants often consumed fried foods while a reasonable number of obese individuals (5.2%) ate fried foods daily. Interestingly, fast food consumption was more frequent among underweight individuals (23.1%). One probable justification of this finding could be that due to their slender body, the underweight participants were less calorie conscious as compared to the overweight and obese respondents who were more likely to restrain fast food consumption as these are considered to be large portion size, and energy-dense foods that are high in calories and total fat [30].

A small, positive correlation between frequency of consuming breakfast cereal, pasta, fresh fruit, dried/canned fruits, vegetables, dairy product, red meat, white fish and oily fish and nutritional knowledge (NK) was found which were all statistically significant (Table 2). Moreover, there was a small, negative correlation between frequency of consuming white bread and rice and NK, which was statistically significant. A plausible explanation while dietary behaviour is inconsistent with NK for older adults even though they have good NK is their inability to apply technical NK [37].

## 5. Conclusion

Many factors have an influence on the eating habits of pre-retired and post-retired Mauritians, such that, rate of consuming healthy foods was higher among high income earners and post retired participants. Unhealthy eating habits

such as low consumption frequency of fruits and vegetables and high consumption frequency of fried food were more common among participants with low PAL. The results of the current study are both encouraging and discouraging with regard to the influence of NK on food selection as an increase in NK was associated with both increase consumption of healthy foods and unhealthy foods while no associations were found between NK and the other food items. Therefore, the government should promote nutrition education about good eating habits among this age group to minimise expenditure on health care system.

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