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Food Habits/Preferences among Adults in a Tertiary Healthcare Institute

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Abstract
Background: The lack of local produce and the abundance of cheap and easily accessible fast food have led to an unfavorable food environment in Trinidad and Tobago, which has encouraged unhealthy eating. This study explored food habits and preferences among adult patients at a public tertiary healthcare institute. Methods: Patients were selected from adult medical and cardiac wards of public healthcare facilities using convenience sampling. The inclusion criteria were consenting adults who could communicate freely. The exclusion criteria included confused or critically ill patients. Patients were interviewed using a pre-tested questionnaire, which included eight commonly used categories of the diet (fruits, vegetables, sugar, salt, "low-fats," carbohydrates, meat/protein, and wheat/grains). Furthermore, the variables were recoded as 1 = positive food choice and 0 = negative food choice. Descriptive and statistical analyses were performed. Results: Most patients based their main meals on starchy foods (89.9%), followed by high salt intake (75%) and high meat (72.4%). Approximately half (45.5%) of the population preferred fewer vegetables, and approximately one-third (35.1%) did not prefer "low-fat products." There were 3 to 4 food risks that revealed differences by age, sex and ethnicity with greater occurrence in the over 50s, males and Indo-Trinidadian. At least 26.6% of the patients ate larger meals at night, and 61.5% admitted skipping breakfast at least once a week. Conclusion: Negative food habits and preferences are prevalent and generally homogeneous across subgroups except by age, sex and ethnicity which show higher occurrence of food risks in the over 50s, males and Indo-Trinidadian.

Keywords: Food Preferences, Food Habits, Public Health Environment, Healthy Food Lifestyles, Sociological Food Interventions

1. Introduction

Food is integral to survival and health. However, incorrect, excessive, or inadequate food intake can have negative consequences. Unhealthy food intake can increase the risk of cardiovascular diseases (Gao et al., 2021; Nestel et al., 2022); obesity, hypertension, diabetes, hyperlipidemia, and cancer (Giovannucci, 2018); allergies (Pal et al., 2012); complications, including stroke, myocardial infarction, peripheral vascular disease, sleep apnea, and

psychological problems, such as depression (Firth et al., 2020; Rao et al., 2008). The association between diet and the development of coronary artery disease (CAD) is controversial and sometimes contradictory (Zhang and Hu, 2012). Esrey et al. (1996) and Bahall (2019) concluded that no clear link exists between diet and the development of CAD in their local context, perhaps because it is difficult to quantify what someone eats (Anand et al., 2015). Food intake and its quantity have been reported to be related to or controlled by food preferences (Drewnowski & Hann, 1999; Bellisle, 2006; Kulothungan, 2018). In fact, food preferences may be a better indicator of actual food intake and a more useful marker because of the challenges in quantifying food intake (Drewnowski & Hann, 1999). Food intake is primarily determined by genetics and physiological or biological needs, including hunger, appetite, and taste; economics, such as cost, income, and availability; physical, including access and comfortable eating places; education; time; social factors, such as culture, family, peers, and meal patterns; psychological factors, such as mood, stress, and guilt; and attitudes, beliefs, and knowledge about food (Puoane et al., 2006; Bellisle, 2006). The social environment may also contribute to eating practices. In Trinidad and Tobago, there is a vast and easily accessible fast-food industry with over 128 restaurants (Prestige, n.d.) comprising KFC, Subway, Starbucks, TGI, and Pizza Hut. The total number of fast-food outlets is estimated to exceed 3000, including "street stalls and kiosks." The remainder consists mostly of full-service restaurants, cafés and bars, and fast-food eateries (Food, n.d.). This exposure and an accompanying sedentary lifestyle make citizens more prone to fast food intake (Bahall, 2022). The intake of various fast/junk foods, such as pizza, burgers, noodles, chips, soft drinks, and candies; Indian delicacies, samosas, vada, pagodas, chips, candy gum, most sweets, fried fast food, and carbonated beverages have little or zero nutritional value (Global, n.d.; Soo et al., 2018; Dan Ramdath et al., 2011); and can cause harm and have several adverse health effects. A healthy diet consists of many fresh vegetables and fruits, a significant amount of cereals, little added salt and sugar, and considerably fewer carbohydrates and meat. Other factors other than the type of food include the timing and amount. There is a higher incidence of cardiovascular diseases in the elderly, males and Indo-Trinidadians. This study explored the general eating habits, preferences, and differences among subgroups (sex, ethnicity, age, cardiovascular risks, Myocardial Infarction (MI) status, and comorbid medical diseases).

2. Methods

The study was conducted at a public tertiary healthcare institute, which was a 745-bed hospital serving approximately 600 000 people. The hospital provides free 24-hour service to all citizens—the sample frame comprised all adult patients who attended this public healthcare institute. Quota sampling was conducted to obtain at least 400 patients based on a 5% margin of error, and the prevalence of patients engaged in poor dietary practices was 50%. Patients were selected from adult medical and cardiac wards using convenience sampling. The inclusion criteria were adult patients (> 18 years), able to communicate freely and be interviewed for approximately 20 minutes. Exclusion criteria were patients who were confused or critically ill. Potential patients were approached and informed about the nature and usefulness of the study and were asked about their willingness to participate. Data were collected partially from medical records and face-to-face interviews using a pre-tested questionnaire coded to conceal patient identity. Some of the survey data were previously used in another study. The questionnaire comprised socio-demographics, medical history, lifestyle practices, and food/dietary practices categorized as fruits, vegetables, starches, fats, meat, whole heat/cereals, sugars, salt, and other questions, such as nighttime eating and fried oil usage. A trained pre-medical student collected data on food habits and preferences. Food variables were recoded into 1 = positive choice (i.e., good food preferences/habits) and 0 = negative choice (i.e., bad food preferences/habits). Furthermore, the following eight food categories were selected: low preference for fruits, vegetables, whole-wheat/cereals, low-fat products, and/or high preference for salt, sugar, starchy foods, and meats/protein. Based on the local context, the food preference/habit was defined as "*If a person consumes a given item three or more times per week."* The definitions of specific food risks are presented in Table 1. Food preferences/practices are good proxies for quantifying food (Nur et al., 2010; Stanga et al., 2003). Dietary patterns or preferences may better reflect diet (Kulothungan, 2018) and be more obtainable from the patient. Such studies on preferences/habits were reported by Duffy et al. (2007).

Table 1: Food risk definitions

	Category	Variable - food risk
1.	*Fruits*	Low preference for fruits
2.	*Vegetables*	Low preference for vegetables
3.	*Whole wheat/cereals*	Low preference for whole wheat/cereals
4.	*Fats*	Low preference for "low-fat products" when available
5.	*Carbohydrates/starches*	High preference for meals around starchy foods
6.	*Meat/protein*	High preference for meat/proteins
7.	*Salt*	High preference for salt
8.	*Sugar*	High preference for sugar

The collected data were entered into a secure computer that was only accessible to the researcher and assistant. Analysis was performed using SPSS version 21(IBM, Armonk, New York), and descriptive and statistical analyses were performed using Pearson's chi-square test. In addition, Pearson's chi-square test was used to determine the existence of associations between food factors and selected variables, including age, sex, ethnicity, MI status, and medical diagnoses.

3. Results

3.1 Socio-demographics

The patients were mainly > 50 years (58.7%), males (55.1%), Indo-Trinidadian (73.1%), married (50.8%), employed (50.1%), and non-Acute Myocardial Infarction (68.9%). Table. 2.

Table 2: Socio-demographics

Characteristics	N	%
Age (n = 634)		
≤ 50 yrs	262	41.3
> 50 yrs	372	58.7
Sex (n = 642)		
Male	354	55.1
Female	288	44.9
Ethnicity (n = 642)		
Afro-Trinidadian	104	16.2
Indo-Trinidadian	469	73.1
Mixed	64	10.0
Marital status (n = 638)		
Single	162	25.4
Married	324	50.8
Employment status (n = 629)		
Employed	315	50.1
Unemployed	314	49.9
Case type (n = 644)		
AMI	200	31.1
Non-Acute Myocardial Infarction	444	68.9

**The sum of certain percentages for the respective demographic is not 100% because the category "other" was omitted during the analysis.*

3.2 Overall food preferences/habits

Of the types of food preferred by patients, starchy food accounted for the highest proportion (89.9%), followed by high salt intake (75.0%) and high meat intake (72.4%). However, approximately half of the population (45.5%) preferred fewer vegetables, and approximately one-third (35.1%) did not prefer "low-fat products" (Table 3).

Table 3: Overall food preferences among the participants

Food risk	**n (%)**
Low fruit preference (n = 632)	391 (60.9)
Low vegetable preference (n = 632)	292 (45.5)
Low "low-fat products" preference (n = 628)	224 (35.1)
High sugar preference (n = 631)	187 (29.2)
High salt preference (n = 631)	481 (75.0)
High starchy food preference (n = 631)	576 (89.9)
Low whole wheat/cereal preference (n = 631)	186 (29.0)
High meat/proteins preference (n = 627)	461 (72.4)

3.3 Food preferences by sociodemographic and MI status

No significant differences were observed between age and food risks, except for the consumption of fruits and vegetables, sugar intake, and meat preference, which were more common in the over 50s. For sex, significant differences were found in food risks, namely, "low-fat", sugar, starch, wheat, and meat, which were more common among men. Differences between Afro and Indo-Trinidadians were observed in vegetable, salt, and meat intake, with increased food risks among Indo-Trinidadians. Differences between the employed and unemployed were observed in vegetable and meat intake, with food risks being more prevalent among the employed. In addition, significant differences were found in vegetable and "low-fat" intake associated with marital status (Table 4). However, no differences were observed in food risk and MI status, except for meat (Table 5).

Table 4: Food risk factors vs. demographics

Food risk	Age (n (%))		p-value	Sex (n (%))		p-value	Ethnicity (n (%))			p-value	Employment Status (n (%))		p-value	Marital Status (n (%))		p-value
	≤ 50 years	> 50 years		Male	Female		African	Indian	Mixed		Employed	Unemployed		Single	Married	
Low fruit preference	178 (46.0)	209 (54.0)	0.003	224 (57.6)	165 (42.4)	0.150	66 (17.0)	282 (72.5)	38 (9.8)	0.859	199 (52.1)	183 (47.9)	0.246	106 (27.3)	196 (50.5)	0.303
Low vegetable preference	134 (46.4)	155 (53.6)	0.018	172 (58.9)	120 (41.1)	0.094	56 (19.2)	197 (67.7)	37 (12.7)	0.021	158 (55.4)	127 (44.6)	0.017	90 (30.8)	138 (47.3)	0.017
Low "low-fat product" preference	86 (38.7)	139 (61.3)	0.346	144 (64.6)	79 (35.4)	0.000	40 (17.9)	157 (70.4)	24 (10.8)	0.633	107 (49.1)	111 (50.9)	0.671	60 (27.0)	95 (42.8)	0.004
High sugar preference	91 (49.7)	92 (50.3)	0.006	124 (66.7)	62 (33.3)	0.000	32 (17.2)	140 (75.3)	13 (7.0)	0.433	105 (56.8)	80 (43.2)	0.033	52 (27.8)	97 (51.9)	0.380
High/high salt preference	198 (41.9)	274 (58.1)	0.606	274 (57.1)	206 (42.9)	0.104	72 (15.0)	359 (74.9)	47 (9.8)	0.043	235 (50.1)	234 (49.9)	0.963	118 (24.6)	248 (51.8)	0.629
High starchy foods preference	228 (40.2)	339 (59.8)	0.080	329 (57.3)	245 (42.7)	0.002	93 (16.2)	422 (73.5)	55 (9.6)	0.642	276 (49.1)	286 (50.9)	0.120	144 (25.2)	295 (51.6)	0.480
Low whole wheat/cereals preference	74 (40.0)	111 (60.0)	0.654	120 (64.9)	65 (35.1)	0.002	33 (17.8)	141 (76.2)	10 (5.4)	0.098	83 (46.1)	97 (53.9)	0.198	47 (25.3)	92 (49.5)	0.838
High meat/proteins preference	205 (54.3)	248 (54.7)	0.000	271 (59.0)	188 (41.0)	0.005	86 (18.7)	323 (70.4)	47 (10.2)	0.037	253 (56.3)	196 (43.7)	0.000	115 (25.1)	235 (51.3)	0.850

Table 5: Food preference vs. MI status

Food Preference	n (%) Non-Myocardial Infarction	MI	p-value	OR	CI (95%)
Low fruit	275 (70.3)	116 (29.7)	0.311	1.192	0.848–1.676
Low vegetable	206 (70.5)	86 (29.5)	0.395	1.157	0.826–1.620
Low “low-fat”	159 (71.0)	65 (29.0)	0.383	1.171	0.821–1.669
High sugar	133 (71.0)	54 (29.0)	0.615	1.156	0.796–1.678
High salt	149 (32.4)	311 (67.6)	0.598	0.900	0.609–1.331
High starchy foods	399 (69.3)	177 (30.7)	0.607	1.153	0.670–1.986
Low whole wheat/cereals	129 (69.4)	57 (30.6)	0.889	1.027	0.710–1.486
High meat/proteins	333 (72.2)	128 (27.8)	0.014	1.718	1.194–2.473

Note. CI=confidence interval; OR=odds ratio

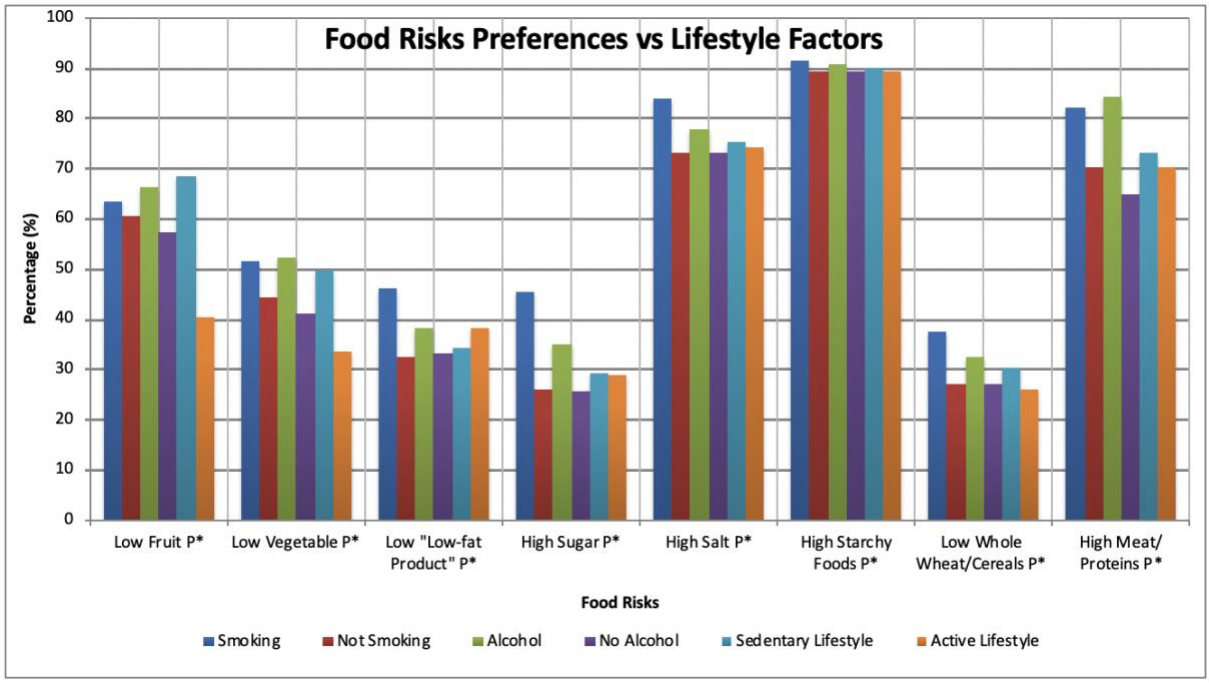
No differences were found between patients with and without hypertension and those with and without obesity. However, sugar and meat intake significantly differed between patients with and without diabetes (p = 0.002 and p = 0.016, respectively) (Table 6).

Table 6: Food risks vs. diabetes, hypertension, and obesity

Food risk	Diabetes			Hypertension			Obesity		
	Yes	No	p-value	Yes	No	p-value	Yes	No	p-value
Low fruit preference	62.0	60.2	0.651	59.3	62.1	0.486	59.6	60.9	0.811
Low vegetable preference	41.7	47.4	0.169	41.4	48.5	0.076	44.9	45.8	0.887
High fat preference	33.5	36.3	0.487	34.7	35.9	0.765	33.7	35.7	0.718
High sugar preference	21.3	33.0	0.002	25.1	31.7	0.069	34.8	27.9	0.182
High salt preference	75.5	75.1	0.911	72.7	77.0	0.215	78.7	75.0	0.463
High starchy foods preference	91.7	88.8	0.264	92.1	88.1	0.095	94.4	88.9	0.116
Low whole wheat/cereals preference	25.5	31.1	0.137	29.6	29.0	0.872	27.0	29.8	0.592
High meat/proteins preference	66.4	75.4	0.016	69.5	74.6	0.161	77.0	71.9	0.317

Food risks and lifestyle factors (smoking, alcohol, and sedentary)

Food preferences were similar in patients regardless of lifestyle factors, such as smoking, alcohol consumption, and sedentary lifestyle (Figure 1).



P* - Preference

Figure.1. Food risks vs. lifestyle factors

3.4 Other eating habits

Overall, 26.6% of the patients ate large meals at night. Although most participants (95.9 %) preferred home-cooked meals, at least 40.3% ate fast food less than once a week, 18.2% ate twice a week, 7.8% ate three times a week, and 1.4% ate out every day, regardless of whether it was consumed at home or outside. In addition, of the participants, 61.5%, 27.2%, and 7.5% skipped breakfast at least once, 2–3 days, and 4–5 days per week, respectively.

4. Discussion

Most patients were aged > 40 years (78.2%), male (55.1%), Indo-Trinidadian (73.1%), married (50.8%), and employed (50.1%) and had hypertension (41.9%). This study revealed a greater preference for starchy food (89.9%), high salt intake (75%), and high meat intake (72.4%), non-preference for "low-fat products" (35.1%). Most patients had low fruit intake (60.9%), and preferred low vegetable intake (45.1%). This contrasts with the findings of Shahar et al. (2002) based on a study of geriatric patients, which revealed that participants preferred fruits, vegetables, and beans instead of milk, red meat, and dairy products. These atherogenic food factors are major contributors to diabetes, hypertension, and obesity, which can lead to stroke and heart attack. According to the International Diabetes Federation Atlas, Trinidad and Tobago ranked tenth in the Caribbean and North America, with a prevalence of diabetes of 13% (International et al. (2013). Another study showed the incidence of self-reported diabetes and hypertension to be 19.5% and 30.2%, respectively (Chadee et al., 2013). World Health Organization reported the hypertensive burden of Trinidad and Tobago to be 27% (World, n.d.). Sisa et al. (2021) also reported that the country has a "high cardiometabolic burden attributable to diet." Furthermore, the younger population, because of sedentary lifestyle, and greater exposure to readily available, cheap junk food, there may be a greater propensity to consume unhealthy foods (Bellisle, 2006; Narine et al., 2007; Dan Ramdath et al., 2011; Francis-Granderson et al., 2018). These may be partly responsible for the higher levels of obesity as reported by Rambaran et al. (2018), where "the combined percentage of overweight and obese schoolchildren increased steadily from 12% in 2001 to 51.5% in 2018. High fruit, vegetable, and whole wheat/grain intake have been associated with decreased inflammation (Hosseini et al., 2018; Milesi et al., 2022), whereas inflammation has been linked to high carbohydrates (Karimi et al., 2021), saturated fats (Berg et al., 2020), protein, such as processed and red meats (Papier et al., 2022; Ley et al., 2014), sugar (Ma et al., 2022), and salt (Balan et al., 2020; Zhu et al.,

2014). Pro-inflammatory (Khatun et al., 2021) foods are unhealthy and do not fit into the Mediterranean or cardiac diet (Richards, 2020). The Mediterranean or a plant-based diet (Tuso et al., 2015) causes a decrease in plaque progression and even plaque regression. The good effects of fruits (Zhao et al., 2017) and vegetables (Blekkenhorst et al., 2018) are widely reported for their ultimate anti-atherogenic effects (Yusuf et al., 2004). Salty food increases the chance of developing hypertension (Rust & Ekmekcioglu, 2017; Choi et al., 2020), and fatty food causes hyperlipidemia (Kreisberg et al., 2005; Carson et al., 2020; Chiu et al., 2017). Sweetened foods increase the risk of cardiovascular events (Janzi et al., 2020), diabetes (Tseng et al., 2021), acne (Penso et al., 2020), and obesity Faruque et al., 2019). Similar findings have been reported for the association between carbohydrates, diabetes, and other cardiovascular risks (Mohan et al., 2018).

Of the eight food types explored, most participants (approximately 70%) in the overall population and patients with confirmed MI indulged in using at least four food risks (Figure 2). This is consistent with other studies where a high preference for fast food, beverages, ice cream, sweets, soft drinks, and cookies was observed (Nur et al., 2010).

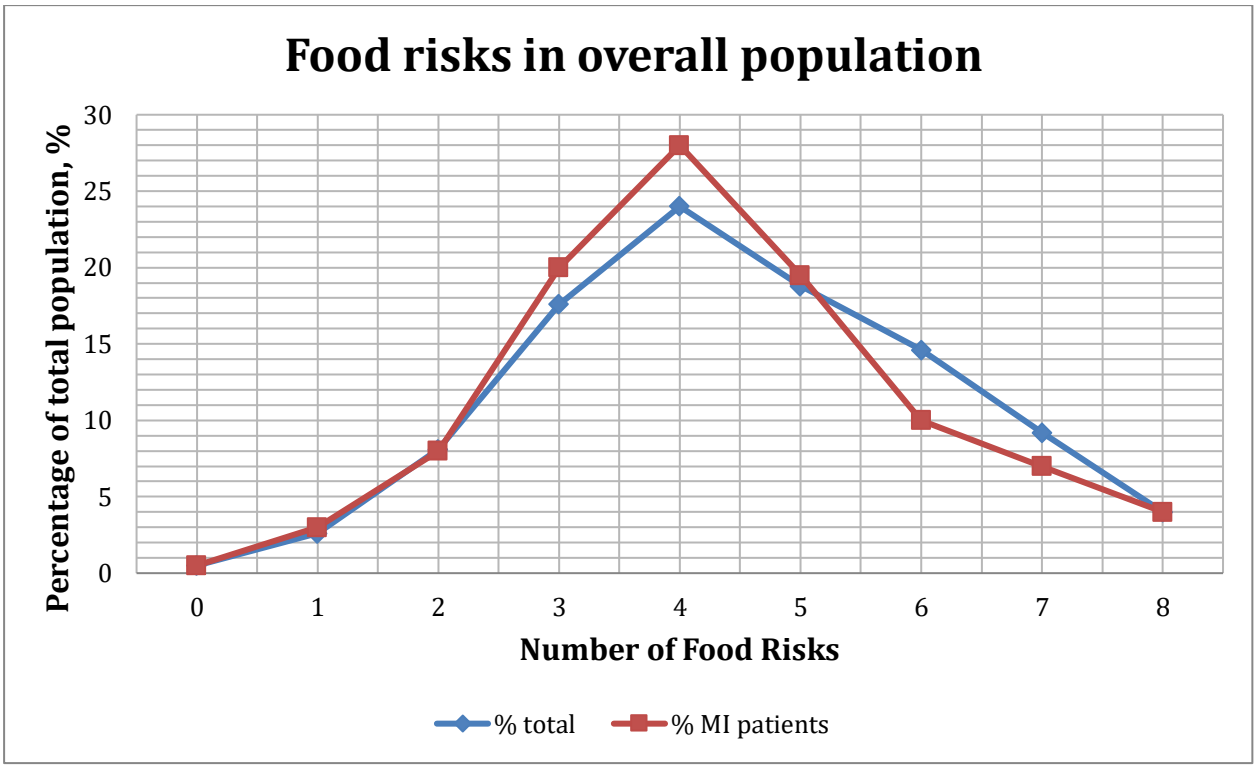


Figure 2: Food risks in overall and AMI population

This study revealed an absence of significant association between certain food risks and the subgroups particularly selected sociodemographic factors. This contrasts with the findings of Bortkiewicz et al. (2019) and Lockheart et al. (2007). Furthermore, significant differences in medical diseases (diabetes, hypertension, and obesity) subgroups were absent between the presence or absence of the medical condition, except in the patients with diabetes, which revealed differences in sugar and meat intake which were more common among non-diabetics.
There were no significant differences in sociodemographic factors, such as age, gender, and ethnicity, except for certain specific food types (Table 4). There were 3 to 4 food risks that revealed differences by age, sex and ethnicity with greater occurrence in the over 50s, males and Indo-Trinidadian. A study by Shiferaw et al. (2012) revealed differences by sex, with males preferring meat and females preferring vegetables. No significant differences were observed in food preferences or habits for the MI status. This contrasts with the findings of Bortkiewicz et al. (2019), who reported that patients with MI consumed fruit, raw vegetables, cheese, vegetable oils, and fish less frequently, and "the consumption of salty or fatty foods was significantly higher" in MI cases. The local context may differ, and we tend to eat similar foods. No differences were found in sedentary lifestyles, smoking, or alcohol consumption. This contrasts with the findings of Jezewska-Zychowicz et al. (2018), who found an association

between “both healthy and unhealthy dietary patterns and some sedentary behavior.” Alharbi et al. (2021) concluded that eating and sedentary lifestyle habits were almost the same between cases and controls. Heydari et al. (2010) reported a positive association between cigarette smoking and an unhealthy diet, whereas Kesse et al. (2001) and Fawehinmi et al. (2012) reported an association between diet and alcohol consumption.

Other eating practices that indirectly affect patients are eating at night, eating outside, and skipping meals, particularly breakfast. In this study, 26.6% of the participants reported eating larger meals at night. This contrasts with the findings of Zhang et al. (2020), who reported that 6.9% of participants reported eating at night. Zhang et al. (2020) concluded that “habitual night eating was positively associated with the progression of arterial stiffness, a hallmark of arteriosclerosis, and biological aging.” In addition, night eating is associated with cardiovascular events and obesity (Okada et al., 2019). In this study, at least 27.4% ate outside, and 61.5% missed breakfast at least once per week.

4.1 Limitations

This study had some limitations. First, this was a single-center study with a catchment of relatively poor and predominantly Indo-Trinidadian population. However, extrapolation may not be reasonable for developed countries. Second, patients relied on the recall of their dietary preferences and habits. Although recall may be better than actual consumption, it may still pose challenges because the responses are subjective. Third, resource constraints generate smaller subgroups; therefore, subgroup analyses may be inaccurate. Fourth, fatty food preference is difficult to extract because of the varied interpretations for high-fat and more fatty foods. Finally, there was no distinction between saturated and unsaturated foods. Nevertheless, general food preferences were easily identified regarding other food risks, ensuring acceptable deductions.

5. Conclusion

Unhealthy food usage is relatively high, regardless of the subgroup; most of the population prefers at least four unhealthy food types or risks. There were 3 to 4 food risks that revealed differences by age, sex and ethnicity with greater occurrence in the over 50s, males and Indo-Trinidadian. There was no association of food risks by Myocardial Infarction status and lifestyles. Overall, the population appears to have homogeneous eating habits except with socio-demographic factors namely age, sex and ethnicity. Changing from an unhealthy food preference to a more acceptable one would require individual and societal efforts, as well as new cultural norms and legislation for processed food producers and other stakeholders. More research needs to be done on infrastructural, social and cultural determinants of food preferences and habits.

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