

An Assessment of the Nutritional Knowledge and Eating Habits of Vegetarians in Mauritius

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Abstract

The objectives of this paper were to identify the nutritional knowledge and beliefs of vegetarians, assess their eating habits and also investigate on the reasons why they have adopted a vegetarian diet. A survey questionnaire was adopted for the study. A quota sampling of 100 vegetarians from four different age groups was targeted and a 24-hour dietary recall was used to analyze the eating habits of a sub-sample of twenty respondents. The respondents were found to be mostly of Hindu origin (85%) and the majority were lacto vegetarians who preferred a meat-free diet on grounds of religious beliefs, dislike of animal flesh as well as for ethical reasons respectively. They are knowledgeable about the importance of micro and macro-nutrients in the vegetarian diet, but the food recall also revealed that only three out of the twenty respondents were consuming balanced meals that is they were having foods from the three food groups namely 'food for energy', 'food for growth' and 'food for health'. The mismatch between theoretical knowledge and practice was revealed clearly in the sense that 96 % of

the respondents are aware of the concept of balanced diet however; this was not put into practice when analyzing the meals that were consumed. This calls for dietary guidelines and food guide models which are specific to vegetarians as the Mauritian population comprises mostly of Hindus who follow vegetarian diets.

Keywords: Vegetarian diet, Nutrition, eating habits and knowledge

**For correspondences and reprints*

1. INTRODUCTION

Mauritius has a multi-ethnic population consisting of people of Indian, African, European and Chinese origin. The Hindus who came from India represent around 48.5% of the population, Catholics (32.7%), Muslims (17.3%) and others (1.5%) (Statistics Mauritius, 2012). It is believed that the highest number of vegetarian in the island belong to this particular ethnic group. They also often readily adopt a vegetarian diet since they follow Hinduism which advocates vegetarianism. Furthermore, many of the Hindus convert to vegetarians during the fasting periods throughout the year where animal foods are prohibited and consequently have the tendency to adopt the meat-free diet.

Although there is no universally accepted definition for the term *vegetarian*, the term is nonetheless used to describe a dietary pattern characterized by an emphasis on plant foods and the avoidance of flesh foods, that is, meat, poultry and fish. According to Tull (1996), vegetarians are people who will not consume animal food, for which an animal has had to be slaughtered. There are different types of vegetarians around the world; the lacto-ovo vegetarians are those who consume a diet of plant origin comprising of milk, milk products and eggs, lacto vegetarians have a diet of plant origin supplemented with milk and milk products only. Semi-vegetarians are those who avoid only red meat but consume poultry and others whereas vegans eat all foods of plant origin and no animal originating foods, no dairy products or eggs. There are a wide variety of reasons why people are vegetarian, or choose to avoid some or all animal products. These are economic and geographic reasons, concern for animal welfare, and dislike of animal flesh. Moreover, some people adhere to vegetarianism for health reasons

and believe that meat is harmful to the human body and that a purely vegetarian diet is more nutritious (Farr, 2002). Other common reasons cited are family influences, sensory and taste preferences, philosophical reasons and as a reaction to food safety scares, such as *E. coli*, salmonella coupled with the use of antibiotics or growth hormones in meat production (Sabate, 2001).

Literature has mostly focused on the potential nutritional deficiencies when adopting a vegetarian diet. However, recent research is now emphasizing on the health benefits of meat-free eating. The ADA Report (2009) concluded that appropriately planned vegetarian diets, including total vegetarian or vegan diets, are healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases. However, the main nutritional concern for vegetarians and vegans remain whether the nutrients supplied by meat and fish in an omnivorous diet can be provided in sufficient amounts by the vegetarian foods. There is cause for concern as extra care should be taken by vegetarians to ensure that nutrient needs are being met at the most vulnerable times in the life cycle such as infancy and childhood, adolescence as well as during pregnancy and lactation periods.

The main reason for carrying out this study is to determine whether the meals consumed by the vegetarians are balanced and include a variety of foods. The research objectives were to identify the nutritional knowledge and beliefs of vegetarians, assess their eating habits and to investigate their reasons to adopt a vegetarian diet. This study is further justified, due to a lack of appropriate information on the status and prevalence of vegetarianism in Mauritius.

2. METHODOLOGY

A survey using personal interviews was found to be the most appropriate research method for this particular study which emphasizes on people's knowledge, choices, and beliefs. The approach used to collect data was a quantitative one and the instrument used in this survey was a questionnaire which was administered via face-to-face interviews. The questionnaire was divided into four sections as follows:

- Reasons for adopting a vegetarian diet
- Nutrition knowledge and beliefs
- Dietary patterns
- Food habits

Most of the questions were close-ended ones allowing for quick completion and easy data processing. Two open-ended questions were also asked to solicit people's suggestions on how to improve a vegetarian's diet. In order to motivate participants to participate in the study, assurance of confidentiality of responses obtained and anonymity were given.

The questionnaire also consisted of a food frequency checklist which intended to find out information on the type and frequency of food present in the vegetarian diet. A dietary recall questionnaire was administered to a sub-sample of twenty respondents to assess the eating habits of the vegetarians. Given the difficulty in accessing the population of vegetarians in Mauritius, a quota sample of 100 vegetarians was chosen for this particular study. The target population was divided into four different age groups, namely 15-18 (adolescents), 19-25 (young adults), 26-40 (young/middle adults) & above 40 (middle/older adults) aged people to represent the different stages of lifecycle. Twenty-five respondents were selected from each quota, giving a total of 100 respondents. To ensure representativeness sample respondents were selected from a variety of locations which include secondary school students, university students, university staff, officers in the public sectors as well as some from the private sector and devotees gathered at a temple that came from different parts of the island.

A dietary assessment was done on the basis of the previous day dietary recall. In order to analyse the data obtained from the respondents, five individuals were selected from each age group (15-18 years, 19-25 years, 26-40 years, > 40 years) amounting to twenty respondents. This was done by comparing the meals with the three food groups- plate model advocated by the Ministry of Health and Quality of life and consequently make out whether their meals consisted of foods coming from the three food groups. The plate model stipulates that for a meal to be balanced, foods should be consumed from each group namely the energy-giving foods, the body –building foods and the protective foods. Here, it should

be noted that emphasis was not the amount of nutrients taken but the type of foods consumed.

All questionnaires were edited, coded and the data entered into the SPSS statistical software. The analysis comprised mainly of frequencies and cross tabulations of relevant questions. Microsoft Excel was used to construct the various charts.

3. RESULTS

Demographic profile and reasons for adopting a vegetarian diet.

Fifty-nine percent respondents were female and the rest were male. Respondents of hindu origin comprised 85% of the respondents. The remainder was distributed amongst Muslims (3%), Catholics (4%) and other category (8%). The results therefore pertain mainly to people of hindu origin and description due to religious affiliations would not be possible given the limited non-hindu category. The main reasons invoked by respondents for being vegetarians were due to religious beliefs (54.5%), followed by those being vegetarian for ethical reasons (47.5%) and dislike for animal flesh (43.4%). Economic reasons (3%) and influence by peers (9.1%) were found to be the least factors for adopting a vegetarian lifestyle among all the age groups (Fig 1). Three out of four of the respondents were found to have other vegetarian family member at home.

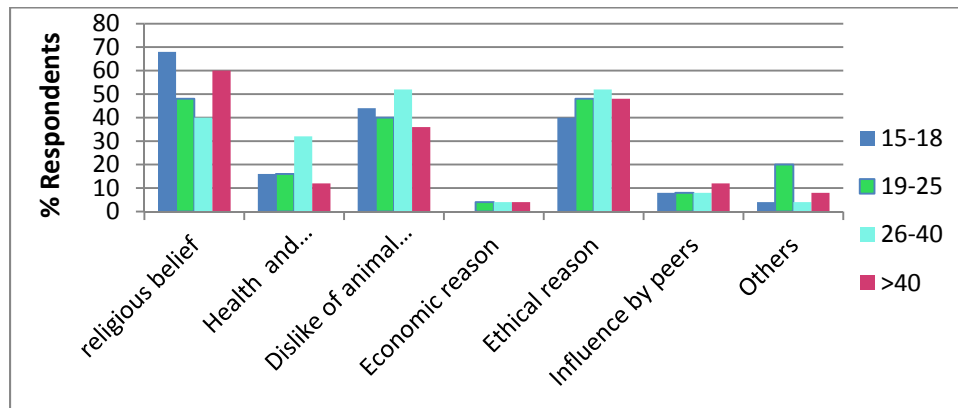


Figure 1: Reasons for becoming a vegetarian by age groups

Types of vegetarianism practiced by the respondents

Lacto vegetarian diet was found to be the most practiced diet among all age groups followed by vegan and lacto-ovo vegetarian diet. The least adopted diets were the semi-vegetarian and ovo-vegetarian (Fig 2).

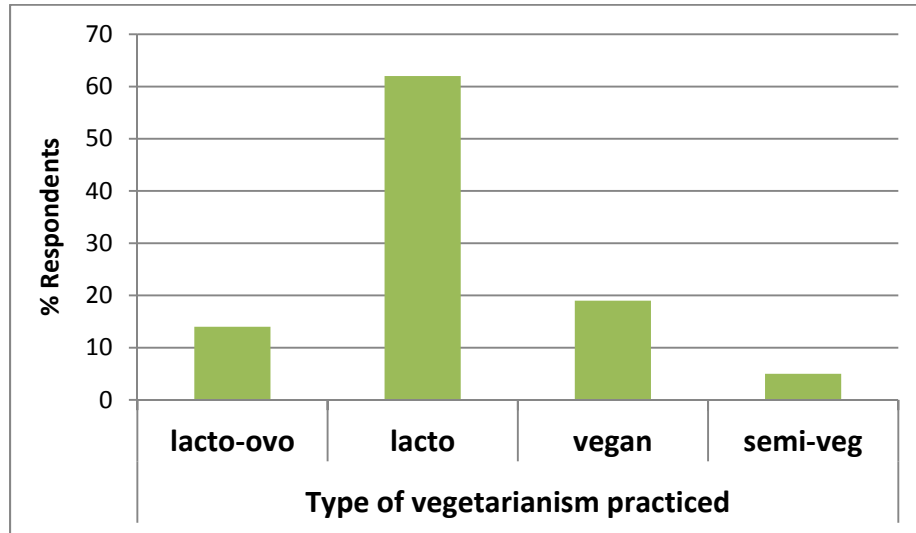


Figure 2: Type of vegetarianism practiced

Vegetarians' nutritional knowledge and belief

Overall, a high percentage of the respondents displayed a fair nutritional knowledge and awareness. For instance, 98% of them knew that fruits and vegetables are rich in vitamins and dietary fibres and 88% agreed that soya beans, cereals, nuts and pulses are the richest sources of protein for vegetarians. Furthermore, 80% vegetarians correctly answered that dietary fibre is one of the benefits of a vegetarian diet.

More than half of the respondents surveyed knew that dark green leafy vegetables are rich in iron. However there are cases of significant lack of knowledge and information that were observed, for instance 24.4% males and 15.3% females were not aware that commercially prepared vegetable foods contain high amount of salt and trans-fat which may cause hypertension and increase the blood cholesterol level. Thirty six percent of respondents did not know that pulses such as lentils are a rich source of iron while 10% of the

respondents stated that dairy products are poor sources of calcium for vegetarians.

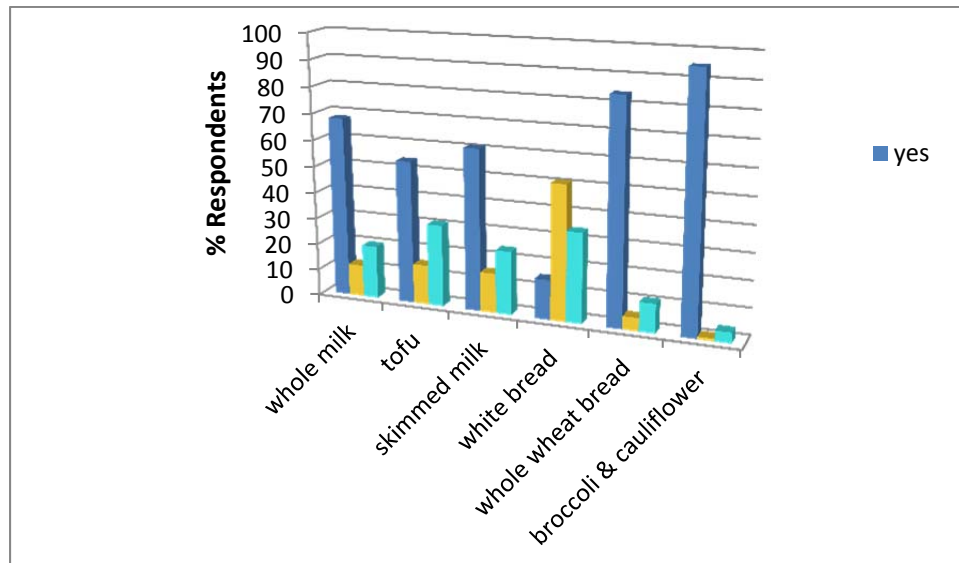


Figure 3: Foods considered 'good for health' by vegetarians

The respondents had quite a good knowledge about the foods considered good for their health. 95% were aware that broccoli and cauliflower are good food for health and 84% of the respondents knew that consuming whole wheat bread is a better food for health compared to white bread (15%). However, response obtained for whole milk (68%) as a better food compared to skimmed milk (61%) show evidence of misconception (Fig. 3).

Vegetarians' food beliefs

Most of the respondents had the correct vegetarian food belief. 74% of them agreed that vegetarians do get enough proteins in their diet. Slightly more of the females (79.7%) than the males (70.7%) seem to believe that foods such as soy, broccoli and tomatoes are foods which help in disease prevention and health promotion. On the other hand, more males (82.9%) than females (67.8%) believed that vegetarians get enough proteins in their diet (Fig. 4). Respondents are of the opinion that sugary products (95%) and fast foods (90%) need to be minimized in their diet.

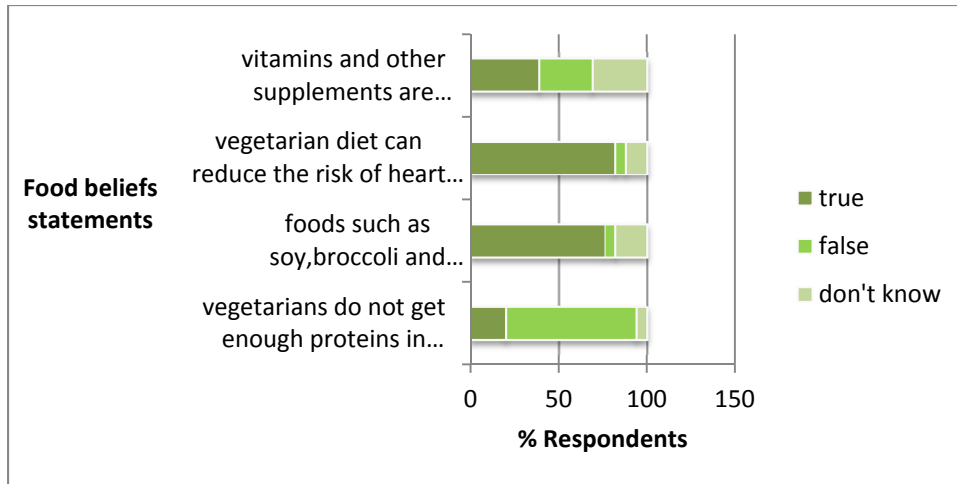


Figure 4: Food belief statements of vegetarians in general

Eating habits

The food frequency analysis revealed that around 70% of the respondents took three meals in a day (Fig. 5). Bread (93%), milk (91%), rice (81%), green leafy vegetables (74%), fresh fruits (75%), and breakfast cereals (55%) are among the food items with the highest % frequency consumption per day among the respondents surveyed. Foods like pasta (55%), farata (51%), cabbage (75%), soya beans (52%), tofu & teokon (42%), dried fruits (45%), fresh fruit juices (42%), and meat alternatives (47%) were those which were preferably consumed weekly among respondents. In addition, foods such as cottage cheese (29%), ice cream (57%) & bread pudding/custard (47%) were mostly consumed once monthly.

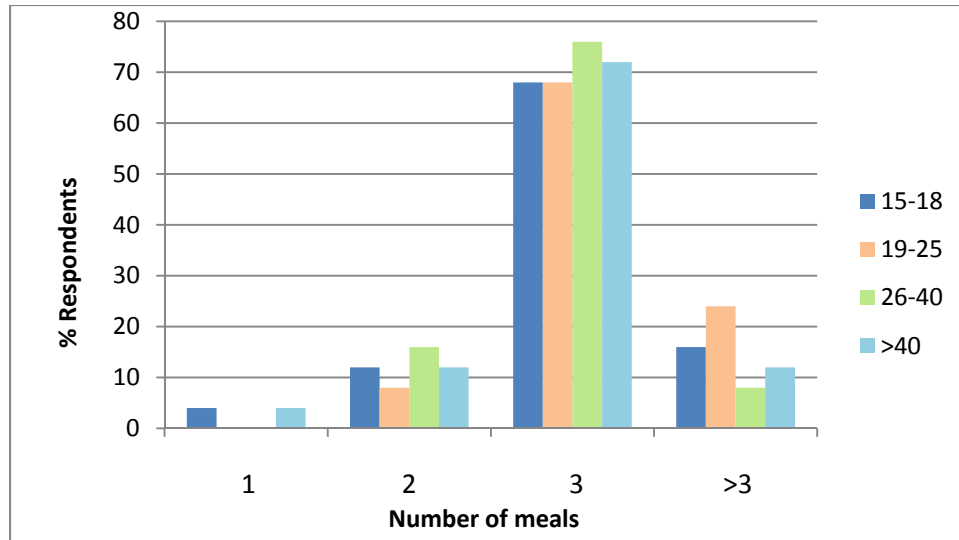


Figure 5: Frequency of meal consumption among vegetarians with respect to age.

Analysis of the meals were done using the the three food groups model and it was found out that only 15% of the sample consumed a balanced diet for breakfast. The foods mostly taken for breakfast were cereals and milk, tea and biscuits and bread and butter. Hence foods from the ‘food for health group’ were missing. 35% were found to consume a balanced diet for lunch. As for the rest, the food taken came predominantly from the ‘food for energy group’ and very few foods were from the ‘food for health’ and ‘food for growth group’. The most common foods consumed for lunch were bread and potato curry, pizzas and commercial vegetarian burgers.

For their dinner, 1 out of 2 respondents were found to consume a balanced diet in terms of the food which came from all the three food groups. An analysis of the meal also showed that the foods mostly consumed were rich in carbohydrates and fats. Most of the foods mentioned were rich sources of energy giving nutrients. It was found that more that 50 % of the respondents were consuming vegetable salads or at least a fruit for dinner. Foods mostly consumed for dinner by the vegetarians were farata (chapati), rice, lentils, beans curry, soya beans, pastas and koftas.

As for the snacking behavior of vegetarians, it was observed that 85% of the respondents consumed potato chips, banana chips, chocolates, fried savories and

biscuits. Furthermore 51% of respondents were found to consume snacks either between 08.00-11.00 a.m. or 13.00-16.00 p.m.

4. DISCUSSION

From the survey, respondents were found to adopt vegetarianism mainly on religious ground, dislike of animal flesh as well as for ethical reasons. The fact that the respondents were of Hindu faith confirms this finding given that vegetarianism forms part of Hinduism which encourages adoption of a meatless diet. In addition to this, it is known that the process of becoming a vegetarian usually involves social interaction with someone close who already practices vegetarianism, often a family member (Maurer, 2002). This can be confirmed by the findings of our study which show that more than 75 % of the population surveyed were found to have other vegetarian family member at home. Hence, it is most probable that the youngsters were influenced by their parents' dietary pattern and thus cannot be related to the other reasons given above.

The most common type of vegetarianism practice (all age groups combined) is lacto vegetarian diet although the lacto-ovo vegetarian diet is the most popular one worldwide. Nearly 80% of the Seventh Day Adventist (SDA) vegetarians, the most widely studied group of vegetarians in United States, consume a lacto-ovo vegetarian diet (Mangel *et al.* 2010). The shift to vegetarianism normally precedes by elimination of red meat from the diet, followed by poultry, seafood and for some, then eggs and dairy products. The respondents aged 24-40 years were seen mostly to follow a lacto vegetarian diet. They appear to be prompted by health and weight control grounds and an objection to animal slaughter as depicted from the results obtained and also most probably they prefer not to consume eggs as eggs form part of the production of the chicken. On the other hand, people who go vegan are more likely to be motivated by ethical concerns or dislike of animal flesh and hence they abandon the consumption of all animal products and by-products.

Some food beliefs held by the vegetarians emerged from this study, for instance, a high percentage of respondents have declared their ignorance about the fat

content of avocados despite the fact that avocados have long been claimed as a high-fat content fruit. This might surely be related to the fact that avocados being a fruit, is normally considered to be rich in vitamins and low in fat. The consumption of too many avocados can lead to obesity. Furthermore, whole milk was identified as a better food compared to skimmed milk which again can be harmful to those already suffering from obesity. There are some respondents who are not aware that dairy products are good sources of calcium. This reveals a lack of knowledge despite national campaigns on television about the importance of milk consumption for calcium gain which is in turn good for bone strengthening.

Respondents have declared not knowing that convenience foods contain high amount of salt and trans-fat and which may lead to hypertension and increase level of cholesterol if these foods are consumed regularly. In the same vein, respondents also pointed out that whole milk is better than skimmed milk showing their misconceptions about specific facts. Therefore, it becomes apparent that respondents lack certain specific nutritional information as nutritional knowledge tends to be mostly of a general nature. Although television programs and debates on diet-related diseases such as obesity and diabetes are broadcasted regularly on the local channels in Mauritius, there is the need to disseminate nutritional value as well as address more aggressively misconceptions and beliefs about food by the Ministry of Health and Quality of life.

Vegetarians had a rather good knowledge about the foods considered good for health. They appeared to be well versed about the beneficial effect of cruciferous vegetables such as broccoli and cauliflower. This is a good point as vegetarians can have adequate amount of antioxidants. In general, respondents claimed that vegetables and fruits are the most essential parts in a diet. This is in line with the Unified Dietary Guidelines in the United States which lays emphasis on a diet based on a variety of plant foods including vegetables and fruits to reduce the risk of chronic diseases (ADA, 2003). The study reveals that the majority of respondents believed that vegetarian foods can help in disease prevention and health promotion. This relates more to the general belief of the Hinduism faith

which stipulates that vegetarians lead healthier and longer lives rather than the nutritional benefits of such diet. Knowledge about the protein content of foods such as red beans, cheese and oatmeal was very good among the respondents. However many respondents believed that vegetarians do not get enough protein in their diet. This may be due to the fact that for sources of protein, the emphasis has always been on protein quality of animal foods and because of this, they might have assumed that most probably vegetarians' de-facto are not getting enough protein. The food groups model also emphasize on the animal sources of protein foods and not much information on the vegetable sources are provided.

One of the most interesting findings of the study is the fact that the majority of the respondents were found to take three or more meals per day, which suggests that meal skipping is very rare or almost inexistent among the vegetarians. Generally vegetarians have diet restrictions and most probably the fear that they may be having nutritional inadequacy motivate them to eat regular meals thereby explaining why meal skipping is not common amongst them. A well-balanced vegetarian diet will normally provide adequate amounts of all the essential nutrients required by the body for any stages of the life cycle. However some types of vegetarian diet which impose restrictions on some specific foods need to call for suitable alternatives in order to meet the requirements of the individual. There is adequate evidence from the findings that meals were not well-balanced as the foods consumed were mostly coming from the 'food for energy group'. Consumption of fried snacks among the vegetarians which were taken up to twice a day is considered high. This may eventually lead to obesity and consequently to degenerative non communicable diseases.

One of the benefits of a lacto vegetarian diet is the tacit high consumption of dietary fiber and milk intake. The vegetarians were noted having the highest consumption for milk, bread and rice, vegetables such as tomatoes and green leafy vegetables, raw salads and fresh fruits were also consumed. The vegetarian food checklist showed that the majority of respondents consume milk at least once per day and others consume milk products regularly. This would be mostly beneficial to the 15-18 (adolescents) and 19-25 (young adults). However there may be cause for concern for the 26-40 (young/middle adults) & above 40

(middle/older adults) if the milk consumed is whole milk because of the energy and fat content of the overall diet.

Vegetarians also seem to make good use of pulses for e.g. lentils mostly consumed on a daily/weekly basis, are rich in proteins. Still, more frequent use of pulses is necessary as these are the main sources of protein for vegetarians. Furthermore the American Cancer Society and the American Heart Association highly recommend vegetarian grains and fruits to meet the requirements of a balanced diet (ADA, 2003). Surprisingly it was observed that the consumption of soya-based products is not too popular among the respondents. This may be because either there has been an overconsumption which resulted in avoidance or a lack in the knowledge of how to prepare new interesting dishes out of soya or simply a dislike of soy foods. Vegetarians should be encouraged to consume more soy based foods since they are high biological value protein food comparable to animal products (Beezadhur, 2002). Soy foods are very important meal component for those who are still in the growing up phase (adolescents) as they are in need of the 10 essential amino acids to meet their growth spurt. On average, nuts/almonds were found to be consumed occasionally. As a good source of protein, nuts could also be used to add variety to the vegetarian diet.

Vegetarians should make the extra effort to eat a variety of raw fruits and vegetables high in ascorbic acid to enhance the iron absorption as absorption of iron from plant foods is improved by the presence of Vitamin C. In addition, meat alternatives (veggie burgers & sausages), cottage cheese and yoghurt which are often fortified with vitamins and minerals, are used rarely and even not consumed at all by some. High prices of these items can be a limiting factor for their consumption or respondents may not be used to eat such foods.

5. CONCLUSION

Several factors contributing to adoption of a vegetarian diet were observed in the study. Religious beliefs and ethical reasons were the two primary motives to omit meat from the diet. Most vegetarians in Mauritius include milk and milk products (i.e. they are lacto-vegetarians) and hence they manage to retrieve the required essential nutrients from the dairy foods intake. It is noted that respondents had an

average nutritional knowledge, but some misconceptions were also noted. Vegetarian diets, as in any other types of diet can have potential health threats. That is why emphasis should be on the consumption of a wide variety of foods so that there is enough supply of all nutrients.

It is also noted that there are evidence that vegetarians were not having well balanced meals. Consumption of sweets, oily and fatty snacks are high. A large proportion of vegetarians consume high fiber foods as well as carbohydrate foods. Consuming too many carbohydrate rich foods and oily snacks has serious health implications, namely overweight, obesity and cardio-vascular diseases. Foods like soy foods, nuts, almonds and cottage cheese which are rich sources of some essential nutrients are consumed only occasionally by vegetarians. This calls for dietary guidelines and food guide models which are specific to vegetarians, more so as the Mauritian population comprises mostly of Hindus who follow vegetarian diets. Nutrition campaigns and messages should have specific components targeted for vegetarians. Sensitizing campaigns on meat alternatives and how to make interesting dishes out of them should be promoted. There is also the need to make available vegetarian products at reasonable cost so as to increase its affordability and thus bring variety to the vegetarian diet.

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