

# Food consumption and wastage patterns in a student canteen - data from Faculty of Medicine, University of Kelaniya, Sri Lanka

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## Abstract

**Background** - Food wastage has become one of the most concerning global issues. While one-third of the food produced for human consumption is wasted, one-ninth of the world population does not have enough to eat. Hence, the reduction of food wastage and proper waste management is of paramount importance for global sustainability.

**Objectives** - To determine the amount of food consumed and wasted at the faculty canteen during lunchtime; to determine the students' perceptions of food wastage and make recommendations to avoid food wastage.

**Method** – – A descriptive cross-sectional study was carried out from November 2019 to December 2019. Plate waste of the students who consumed lunch at the main canteen of the Faculty of Medicine, University of Kelaniya was measured for six days to determine the percentage of food waste. A questionnaire was given to 200 students to obtain information regarding their reasons for food wastage and the knowledge of food waste management methods at the Faculty of Medicine.

**Results** - Out of 420.48kg of food served during lunchtime of the six days observed, 110.87kg (26.4 %) was wasted. The mean food wastage per student was 139.5g. Among the reasons for food wastage, “poor smell/taste” and “lack of variation of the food” were the main reasons. The majority stated that they would waste less food if the presentation of the food were better. If the results were extrapolated to all state universities, the total waste is 15.96 tons at the cost of 1.368 million rupees per day.

**Conclusion** - - Simple interventions such as making students aware of its economic impact and changing food serving methods may minimize waste.

**Keywords** - - food wastage, waste management, served food

## Introduction

Food wastage refers to food ready for human consumption but not consumed and discarded<sup>1</sup>. Nearly 30 % of the food (1.3 billion tons) produced for human consumption is wasted every year<sup>2</sup>. In Sri Lanka, within the Colombo municipal council area, 353 tons/day, of organic waste is discarded as short-term biodegradable food waste.<sup>3</sup>

Food waste at the consumer level attracts particular attention because, when the produced food does not end by consumption, the food itself and the resources utilized in its' production, transportation, and disposal are used inefficiently. With the rapid growth of the population and the decline of the availability of resources per person, food waste intensifies the global food shortage and malnutrition<sup>4</sup>.

In addition to resource loss, food waste has adverse effects on environmental and economic aspects as well. Increased deforestation to maximize the agricultural yield in search of fertile lands, results in loss of natural habitat. The carbon footprint of food produced but not consumed is estimated as 3.3 tonnes of CO<sub>2</sub> equivalent, accelerating the impacts of climate change<sup>5</sup>. The direct economic cost of food waste produced by agricultural products alone is about 750 billion USD<sup>5</sup>.

Knowledge regarding the reduction of food wastage and its' proper management is preceded by data on the current status of food wastage. In this background, this study was carried out to quantitatively assess the food wastage at the main canteen of the Faculty of Medicine, University of Kelaniya.

Food wastage and the lack of waste management have become major contributing factors for the increasing rate of environmental pollution. Improper waste management also leads to hazards such as the collapse of the Meethotamulla dumpsite on the 14th of April 2017, leading to 30 deaths and destruction of over 140 houses<sup>3</sup>. Therefore, the knowledge regarding the reduction of food wastage and proper waste management is imperative.

Although many researches have been conducted in other countries for quantitative assessment of food wastage and to measure the food wastage at universities<sup>6</sup>, only a few such researches have been published on food wastage, and the negative impact of it on their relevant setting in Sri Lanka<sup>7,8</sup>. However none of them were focused on the quantitative assessment of food wastage or

on assessment of food waste at Sri Lankan universities. Therefore, the contribution of the university students to the total food waste generated in the country requires more exploration. This study was conducted to bridge this knowledge and literature gap.

### Methodology

A descriptive cross-sectional study was conducted from 1<sup>st</sup> of November 2019 to 1<sup>st</sup> of December 2019 at the main canteen of the Faculty of Medicine, University of Kelaniya. The canteen has an approximate area of 400 m<sup>2</sup>, which can occupy around 300 students in one sitting. An average of 200 meals are sold per day. All the students who consumed food from the faculty main canteen during the study period were included in the study. The students who only consumed beverages from the faculty canteen, academic staff, non-academic staff, and visitors who consumed food from the faculty canteen were excluded.

The weight of the lunch plates of all students who consumed lunch during a period of six days (Monday to Saturday) from 11 a.m. to 2 p.m. were measured in grams. If the weight of the plate after consumption of food was higher than the dry weight of the plate, it was defined as food wastage and considered as the criteria for giving the questionnaire to the students, unless they had filled it once before. Overall, 795 plates were measured during this period, and 200 participants filled the questionnaire.

### Process of data collection

Data collection was done in two steps. The first step was to measure food wastage. There were two types of plates being used at the canteen. Two stations were allocated for weighing plates, and they were measured to the closest gram using two digital scales, by two investigators.

The first station was placed at the food distributing counter of the canteen. Participants were given a temporary number and their plate weight was recorded. The type of food plate was also recorded. In the second station, the plate weight was measured again before discarding residues into the waste bin.

At the second station, a questionnaire was given to consenting participants that fulfilled the criteria of contributing to food wastage mentioned above. The completed questionnaires were then collected.

Descriptive statistics were used to describe food wastage, reasons for food waste, and suggestions to avoid food waste.

Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya. The participants were given an information sheet explaining the nature of the study, and any concerns expressed by them were addressed before the consent form was signed. Permission to recruit research participants and to conduct the study within faculty premises was obtained from the Dean of the Faculty of Medicine, University of Kelaniya.

### Results

Data were gathered from a study population of 795 students within the duration of six days. A total weight of 420.48kg of food was served during the six days, and 110.87kg of food (26.37 %) was wasted (Table 1). A mean food wastage of 139.46g per student during the lunch period was recorded.

The perception and knowledge of 200 students regarding food wastage were assessed via a questionnaire. Only 6 % of the participants claimed to be daily diners of the canteen while 36.81 % reported that they only dined at the canteen once in three days.

The assessment of the type of food wasted revealed that the majority of participants (70%) wasted rice, followed by vegetables by 20% of participants. Fish and fruits were hardly (2 % & 0 %) wasted. The main reasons for wastage were recorded as concerns with “smell/taste of food” by 42.5 % of the participants and “lack of variation of the food” by 41 % (Figure 1).

Among the participants, 46 % reported that they waste 1/8 of the food served to their plate while 49.6 % stated that they would waste less food if the “presentation was better” and 32 % stated that they would waste less “when they are better informed about the negative effect of food wastage on the environment”. Questions regarding the participants’ estimation of daily food wastage revealed that the estimation of 36 % was 50-100 kg, and 27 % estimated it was over 100kg, while 17 % estimated it was below 25 kg.

There were 110 responses to the open question, “What is the current program in the faculty for food waste management?”, and among these responses, 45 participants (41%) were of the notion that the food was used for “feeding animals” while another 42 assumed it was used for production of compost or biogas. Eight (7.27%) of them were not aware of any program.

Table 1: Food consumption and wastage at the faculty canteen during lunch period

DAY	NUMBER OF STUDENTS	WEIGHT OF FOOD SERVED (g)	WEIGHT OF FOOD WASTED (g)
Monday	67	32824	7899
Tuesday	131	69821	19821
Wednesday	174	91674	23671
Thursday	134	75208	23627
Friday	161	85372	22135
Saturday	128	65577	13716
Total	795	420 476	110 869

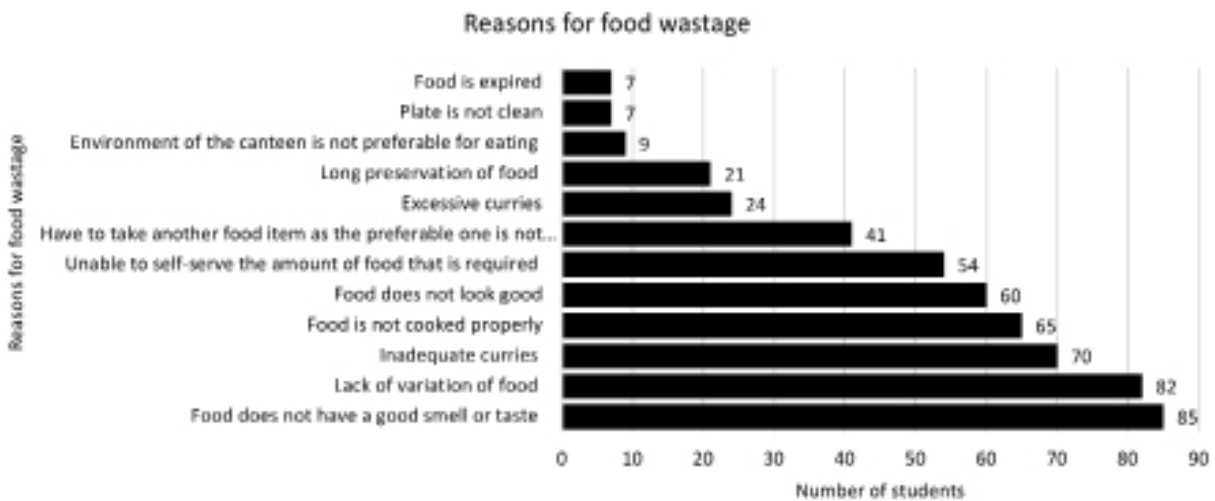


Figure 1: Reasons for food wastage

**Discussion**

Our results indicated that 26.4 % of served food was wasted, with a mean of 139.5g of food waste per student. Engström and Kanyama reported that plate waste is the single largest source of loss, constituting 11–13 % of the amount of food served<sup>9</sup>. Similar research done in China shows that food waste is 20 % of the total food served<sup>10</sup>. In industrialized countries surprisingly this value is much less, for example, 5.7 % in Finland<sup>11</sup>, 12 % in the U.S.<sup>12</sup> and 15 % in Italy<sup>13</sup>.

The quantification of food waste provides a clear picture of its economic impact. If the results were extrapolated to all state university students in Sri Lanka, which is 103818 students<sup>14</sup> in number, the total amount of plate waste would be 15.96 tons per day. Taking the standard price of a lunch packet as 50 rupees, the

total waste will amount to a staggering cost of Rs.1.368 million per single day for lunch (calculated as 103818/day \* Rs.50 \*26.367%).

Students who consumed food at the canteen varied from 6 % daily diners to 36.81 % who only dined once in three days. Our observations during the study period also indicated that most students bring food from home on Monday and fewer students dined at the canteen on Saturday resulting in the lowest consumption being recorded during these two days. Taking the above information into consideration, the amount of lunch cooked by the canteen staff can be altered to reduce the excess amount of unserved food. Forecasting models that predict the number of students coming to the cafeteria each day have been effectively used to reduce food wastage in previous studies.<sup>15</sup>

The results showed that the majority of participants (70%) considered rice as their main food waste while only 20.5% considered vegetables as the main food waste. According to Liu et al., staple food like rice and noodles (43%), and vegetables (42%) were the dominant proportions of the plate waste<sup>10</sup>. Rice is considered the main component of a typical Sri Lankan meal as it occupies about 50% of the plate. The canteen catering service provides an equal amount of rice to each and every student. Alternatively, customized methods of serving food such as individualizing the rice servings or implementing a lunch buffet will enable students to get only the desired amount and the type of food, leading to less amount of food waste as a whole.

The top three responses for reasons of food wastage were lack of good smell or taste (42.5%), lack of variety (41%), and inadequate curries (35%). A similar study from Malaysia shows that the temperature and taste of food are the strongest dimensions that influence plate waste generation, based on regression analysis<sup>16</sup>. As reported by Liu et al., the lack of food choice and unsatisfactory food taste were the two main drawbacks, making up 40% and 31% of the total respondents respectively<sup>10</sup>. These results are similar to findings of this study. Therefore, it is clear that by improving the taste of the food, a significant amount of food waste can be avoided. To improve the taste, the quality of food needs to be increased, which will ultimately increase the cost of food. However, increasing the cost of food would affect its' affordability among students.

On assessment of the personal estimation of plate waste by the participants, 46% of the participants estimated that they waste around 12.5 % of the food served, almost half of the actual mean wastage. This highlights that they were unaware of the amount of food they individually waste.

When the total amount of canteen food wastage was evaluated, the majority (63.5 %) correctly estimated it to be over 50kg. This indicates that most of the students were aware of the massive amount of food wasted each day, probably because they witness a large amount of food inside the waste bins. However, it is worth discussing whether students have thought about their accountability for the waste generated. It is essential to educate consumers about their contribution to this massive amount of food wastage to reduce it in the future. This was highlighted when 32.5 % responded that they would waste less food if they were better informed about the negative effect of food waste on the environment. Literature shows that education campaigns, with simple and affordable informative posters in strategic areas of canteens, lead to significant reduction in the waste consumption index<sup>17</sup>. This is a feasible strategy that can be utilized in the local context.

Currently, most of the food waste generated at the canteen is collected by a pigsty at no cost, and a small amount is utilized to feed the stray animals within the faculty premises. Another portion is collected to generate biogas. The exact proportions of above mentioned are unavailable. According to the food waste

hierarchy, feeding food waste to animals is the second-best preferred method of reducing excess food and food waste<sup>18</sup>.

### Conclusion

A significant amount of plate-waste was generated during lunchtime at the canteen of the Faculty of Medicine, University of Kelaniya, despite the students' awareness about the amount. Simple interventions such as making students aware of its' environmental impact and changing food serving methods may minimize waste. Therefore, careful attention to reducing food wastage via identified factors would be paramount for a sustainable future.

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