

Research Article

Consumer perception on safety and sensory evaluation of street-vended pork Dim Sum (*Siomai*)

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Abstract

Street food often reflects traditional local cultures and offer a unique cultural experience to tourists and even to ordinary consumers. With the increasing pace of globalization and tourism, the safety of street food has become one of the major concerns of public health. A survey had been performed to determine why are the consumers buying street food and what do they consider in buying these. This study showed that 44% of the students surveyed considered food safety as one of the criteria in buying street food. To assess food safety, microbiological analysis has been performed which showed that organisms such as coliforms and *S. aureus* at high levels are present in one of the samples. Sensory evaluation was also performed to determine the preference of the consumers in terms of its odor, appearance and overall acceptability.

Keywords: food safety, microbiological analyses, *E. coli*, Philippines.

Introduction

Street-vended food, as defined by the World Health Organization [1] are “food and beverages prepared and/or sold by vendors in the streets and other public places for immediate consumption without further processing or consumption”. In the Philippines setting, food being sold includes *isaw*, *tokneneng*, *kwek-kwek*, fish balls, squid balls and hotdogs to name a few. Dim Sum are also a popular street food in the country with the inclusion of *siomai*. *Siomai* is prepared from ground pork, beef or shrimp in combination with other extenders such as carrots and then wrapped in wonton wrappers. These are usually steamed or fried before being sold [2].

Changing life styles, including more convenience food for on the go consumption had as a consequence a broad range of emerging microbiological issues in food safety [3]. Food safety is a concept that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (ISO 22000 Standard). There is a need in food safety for the following purpose: global concern, customer requirement, public health security and foster global partnership.

Globally, street food safety and quality have received increasing attention in recent years. In order to ensure street food safety, FAO/WHO have developed many guidelines, such as safety requirements [1], five keys to safer food manual [4], HACCP-based sanitation strategies and

education and training programs. Further, the Food and Agricultural Organization has implemented several projects to strengthen the quality control capacity of local authorities. It has been proved that improper food handling, poor personal and environmental sanitation and inadequate infrastructure such as drinking-water supply and garbage disposal are the main risk factors associated with street-food. Food safety knowledge and sanitation practices of street-food vendors in different countries have been widely studied [5, 6, 7, 8, 9, 10, 11] and it has been shown that the majority of street-food vendors lack appropriate knowledge about hygiene and sanitation practices, which makes it more difficult for them to ensure food safety and quality.

This study aims to understand the preference of consumers of street-food especially *siomai*. Specifically, the study will focus on the microbiological assessment of *siomai* from the street-food vendors near the University of Santo Tomas (UST) and the assessment of *siomai* attributes with respect to consumers buying pattern.

Materials and Methods

Collection of samples

Siomai samples were collected from three vendors at Dapitan and P. Noval streets near the University of Santo Tomas. Sample A was homemade *siomai* prepared by the vendor at their home and then steamed and sold right outside their house. Sample B was ready-to-cook *siomai* which was purchased by the vendor from the local manufacturer in Ongpin and then steamed and cooked near UST. Lastly, Sample C was collected from a vendor with a kiosk which is known seller of steamed *siomai*.

Survey

A survey was conducted to understand why the consumers are buying street food. A questionnaire was developed and distributed to forty-eight students, which included questions like: how often do they consume *siomai*? Why do they buy *siomai*? And if food safety is being considered when they buy *siomai*.

Microbiological analysis

During collection, samples were placed in sterile bags and labeled accordingly. These were then brought to the lab for microbial analyses including enumeration and identification of potential pathogens such as *E. coli*, *Staphylococcus aureus*, and *Salmonella*.

Under aseptic conditions, 25 grams each of the samples were weighed and homogenized in a sterile blender with 225 ml of lactose broth. This resulted in a 1:10 dilution. Further dilutions were prepared by transferring 10 ml of the homogenate to a sterile 90 ml lactose broth until a 1:1000 dilution was achieved. Bottles were shaken vigorously to obtain even distribution of sample.

Aerobic plate count

An aliquot of 1.0 ml from each dilution was placed in duplicate sterile disposable petri dish. Sterile, melted and tempered (at 44.5⁰C) Plate Count Agar was then poured onto the inoculum. The agar and sample were mixed gently and allowed to solidify before incubation. Plates were then placed inside an incubator held at 35⁰C for 48 hours in inverted position. Colonies were counted and plates containing 25-250 colonies were considered for Colony Forming Units (CFU) per gram computation [12].

Coliform and *E. coli* count

An aliquot of 1.0 ml from each dilution was inoculated onto 3MTM PetrifilmTM CC/EC Count Plate. Films were then incubated at 35⁰C for 24 hours to obtain coliform and *E. coli* count. Red and blue colonies with associated bubbles were considered as coliform while blue colonies with

bubbles were counted as *E. coli*. Colony-forming units (CFU) per gram were then computed [13].

S. aureus count

From the same dilution series, an aliquot of 1.0 was inoculated onto 3MTM Petrifilm™ StaphExpress Count Plate. Films were then incubated at 35°C for 22-24 hours. Red violet colonies were considered as *S. aureus*. Colony Forming Units (CFU) per gram were then computed [14].

Salmonella

Pre-enrichment was performed by placing 25g of sample in 225 ml of lactose broth and incubated at 35°C for 24 hours. From the incubated lactose broth, 1 ml portion was transferred to each tube of Tetrathionate broth (TTB) and Rappaport- Vassiliadis (RV) medium. RV medium replaced Selenite Cysteine broth. Tubes were incubated at 35°C for 24 hours. Incubated tubes were mixed using vortex mixer and a loopful was obtained from each tube and streaked on solidified Bismuth Sulfite (BS) agar, Xylose Lysine Desoxycholate (XLD) agar and Hektoen Enteric (HE) agar. Plates were incubated in inverted position at 35°C for 24 hours. After incubation, plates were examined for typical *Salmonella* colonies [12].

Sensory evaluation

Samples collected from the vendor were coded with three-digit numbers and presented to forty-eight students of UST as panelists. Individual answer sheets were provided to the panelists who were asked to rate the sample using the 7-point Hedonic scale. Appearance, odor and overall acceptability were the attributes evaluated. ANOVA and Tukey's test were used in the statistical calculation at 95% confidence level.

Results and Discussion

The survey was performed to understand why the students are buying street-vended *siomai* and what are their considerations in buying food. Figure 1 shows that 71% of the students tend to buy *siomai* from the street-vendors. According to them, they buy *siomai* because it satisfies their hunger, it tastes delicious and is affordable and cheaper compared to those being sold in the fast food chains. This is in alignment with what WHO [1] had reported that these street-vended products are a convenient source of food which are inexpensive and nutritious at the same time.

Of the forty-eight students surveyed, 52% of them responded that street-vended *siomai* is a food not safe to eat as shown in Figure 2. This is in alignment also with Figure 3 where 44% of the respondents considered food safety as one of the factors in buying street-vended *siomai* aside from its taste.

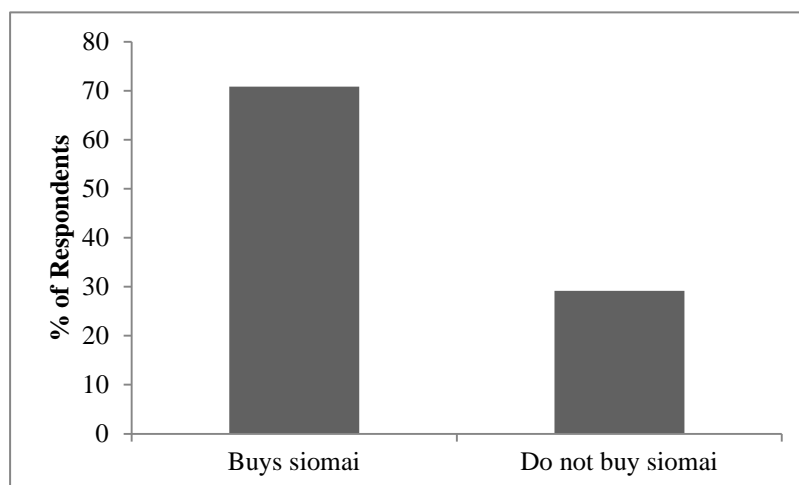


Figure 1. Percentage of respondents who buy street-vended *siomai*.

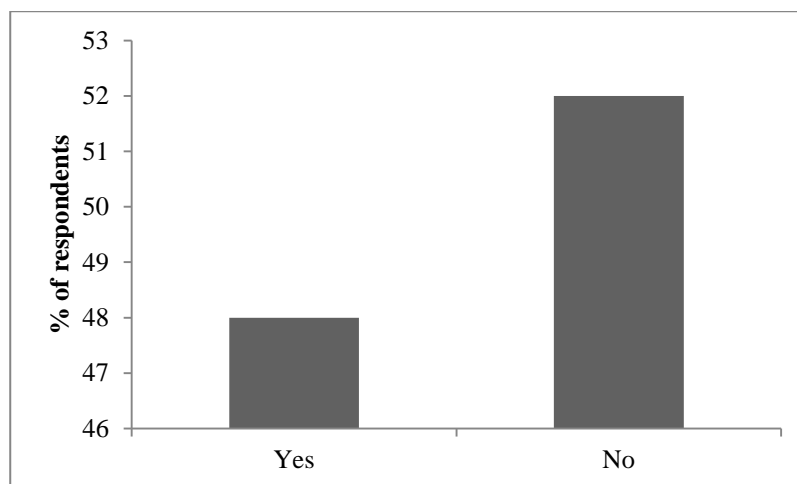


Figure 2. Percentage of respondents who consider street-vended *siomai* as a safe food to eat.

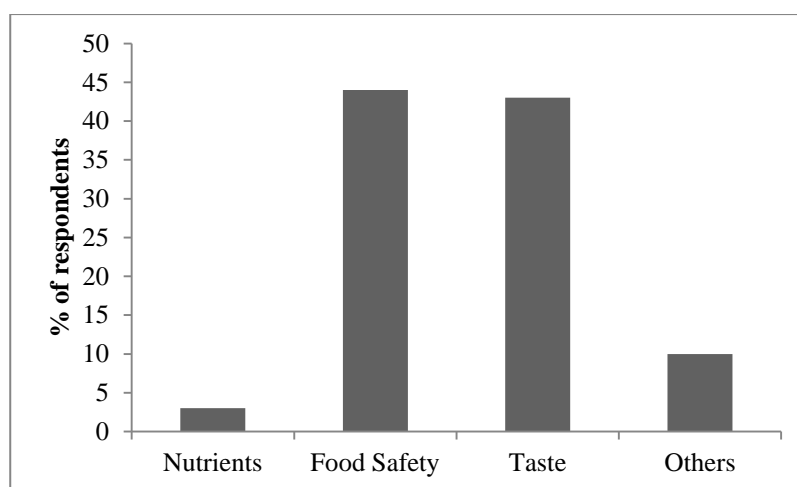


Figure 3. Factors considered by the respondents when buying street-vended *siomai*.

Since food safety is an important factor considered in buying the street-vended *siomai* and since they considered it as a food not safe to eat, samples collected were analysed for microbial contamination including the presence of food-borne pathogens such as *E. coli*, *S. aureus* and *Salmonella* sp. using either the conventional method or the Rehydratable film method (i.e. Petrifilm™). An abundant amount of viable aerobic organisms were obtained from the samples as shown in Table 1.

Using the conventional method for determining aerobic plate count, Sample B contained the highest aerobic microorganisms. Handling, particularly the improper holding temperature as well as containers during transport may have contributed to this high count. Sample A, on the other hand is a homemade dumpling prepared and sold in Dapitan. High count of aerobic microorganism was also obtained from this sample. Coliform and *S. aureus* were also detected from the sample using Petrifilm™. *S. aureus* is highly vulnerable to destruction by heat treatment and by nearly all sanitizing agents. Thus, presence of these organisms and *E. coli* indicates unsanitary processing and post processing activities such as packaging, handling and storing/vending. Microbial growth was further supported by the improper holding temperature employed on the cooked sample. It was kept at ambient temperature inside a regular steamer while displayed on the vending table. On the other hand, Sample C contained relatively low amount of microorganisms. Also, pathogenic microorganisms were not detected from the sample. This could be attributed to the practices employed that prevented further proliferation of microorganisms.

Uncooked goods were kept in a chiller while cooked dumplings were maintained hot in a large steamer during vending. All samples tested were negative for the presence of *E. coli* and *Salmonella*.

Table 1. Microbial load of three street-vended dumplings.

Sample	Aerobic plate count (cfu/g)	Coliform (cfu/g)	<i>E. coli</i> (cfu/g)	<i>S. aureus</i> (cfu/g)	<i>Salmonella</i> sp. (in 25 gram sample)
Sample A	66,000	6,900	<10	1,200	Absent
Sample B	TNTC	<10	<10	<10	Absent
Sample C	1,300	<10	<10	<10	Absent

In addition to food safety, respondents also considered the taste as part of the factors in buying street-vended *siomai*. Sensory evaluation was performed, but focused only on the appearance, odor and overall acceptability due to the food safety consideration. From the three samples presented to the panelists, sample A is significantly different from the two samples in terms of odor and overall acceptability as shown in Table 2. From the panelists evaluation, some have noted a foul odor from sample A thus giving it a lower rating although the foul odor had not been described or identified.

Table 2. Sensory evaluation results of three *siomai* samples.

Attribute	Sample A	Sample B	Sample C
Appearance	4.66 ^a	5.15 ^a	5.00 ^a
Odor	4.00 ^b	5.60 ^a	4.98 ^a
Overall Acceptability	4.34 ^b	5.40 ^a	5.04 ^a

*Values are expressed as means. Means that do not share a letter per row are significantly different ($p < 0.05$).

Conclusion

This study showed that food safety and organoleptic properties are important factors in buying street-vended *siomai*. Food handlers should be made aware in terms of food safety as high levels of microorganisms may thrive in street food as evidenced above. Moreover, food safety assessment must be done to other street-vended food products as there might be potential risks during consumption.

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