# Socio-economic and hygiene features of street food vending in Gauteng

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**Objectives.** The objectives of the study were firstly to determine the health risks associated with street food vending, secondly to determine the opinions of street food customers on street food vendors, and thirdly to determine how street food vending contributes to the livelihood of street food vendors.

**Design.** Primary research was done among 200 street food vendors and 800 of their customers in South Africa, and 200 samples were taken of the food itself. Socio-economic profiles of the street food vendors were compiled and the hygiene practices followed by them in preparing and serving the food were investigated. Customers were interviewed and their reasons for buying street foods as well as their experiences in consuming street foods were noted. Street food samples were tested to assess the microbiological safety of these foods.

**Setting.** The study was conducted in the metropolitan areas of Gauteng in South Africa.

**Results.** The survey showed a high hygiene standard maintained by most vendors during preparation and serving of the foods, while the microbiological tests showed relatively low microbiological counts. The study indicated that the health risks of consuming street foods are minimal, that street food vendors depend on vending for their livelihood and that their customers appreciate their trade.

**Conclusion.** It is essential that poor people in a developing country such as South Africa be allowed to earn their livelihood by means of an 'easy-to-enter' business such as street food vending when hygiene standards are acceptable.

Increasingly the important contribution that small and micro-enterprises (SMEs) can make to employment and income generation is being recognised worldwide. In South Africa the contribution of these SMEs is particularly noteworthy in view of the fact that the non-agricultural formal sectors downsized by almost a million jobs between 1990 and 2000. As a last resort, many of these unemployed people started their own informal activities to survive. Most of them started with 'easy-to-enter' businesses where a relatively small capital layout is needed, such as in street food vending.

## Defining street foods

The Food and Agricultural Organization (FAO) of the United Nations defines street foods as ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers especially in streets and other similar public places.[1]

The central characteristic of street foods in this definition is location, namely that they are sold on the street. Chakravarty and Chanet[2] found three additional distinguishing characteristics of street foods in India. These are: (i) food prepared in small or cottage-scale factories and brought to the street food stall for sale; (ii) food prepared at the home of the vendor and brought to the street food stall for sale; and (iii) food prepared and sold at the street food stall.

## Street food trade

According to Draper,[3] those who manufacture and/ or sell street foods can be regarded as small-scale operators or micro-entrepreneurs who form part of the so-called informal sector. This is distinct from the formal-sector food industry in a number of ways. Because many individuals in the rapidly increasing urban populations of developing countries have not been absorbed into the formal organised labour market, they have taken up a range of self-employed, small-scale, income-generating activities, both legitimate and illegitimate, which form the informal sector (also sometimes called the tertiary sector or bazaar economy).

According to Escalante de Cruz[4] there are three main categories of street food vendors, which categories are also used in the present study, namely 'mobile' vendors, 'semi-mobile' vendors, who may be stationary or move from one site to another, and 'stationary' vendors who sell their food at the same site each day.

## Health issues

It is recognised that street food vendors are often poor and uneducated and lack an appreciation of safe food handling. Consequently, street foods are perceived to be a major public health risk.

In 1993, the World Health Organization (WHO) undertook a survey in over 100 countries to assess the situation with regard to street-vended food.[5] The survey noted that the majority of countries reported contamination of food (from raw food, infected handlers and inadequately cleaned equipment) and time and temperature abuse to be the major factors contributing to food-borne disease. This was partly due to the fact that infrastructure development was relatively limited, with restricted access to potable water, toilets, refrigeration and washing and waste-disposal facilities. Moreover, registration, training and medical examinations were not among the selected management strategies.[5]

## Problem statement

As in many developing countries, a policy decision has to be taken by local authorities in South Africa to allow people to earn their living from street food vending in areas under their jurisdiction. Before such a decision can be taken, however, three questions should be considered. First of all, do the activities of these vendors pose a health threat or not? Secondly, what are the opinions of the customers of these street food vendors? And thirdly, is the income earned by the street vendor the main source of his/her household's income or is it only an additional income?

To shed some light on these questions, the Bureau of Market Research (BMR) at the University of South Africa (UNISA) and the Department of Biotechnology and Food Technology at the Tshwane University of Technology (previously the Technikon Pretoria) were requested by the Department of Health (DOH) of the South African Government to conduct a study in Gauteng. This study was carried out under a Food and Agricultural Organization (FAO) project entitled 'Improving street food in South Africa' (reference number TCP/SAF/8924). The findings in this article are based on that study.[6]

## Method followed in the primary research

### Vendors

#### Questionnaire

The questionnaires used for interviewing were developed with input from the DOH and pilot tested before use. The questionnaire consisted of dichotomous and multiple-choice questions, scaled and ranking questions, and a few open-ended questions. The following main issues were dealt with in the street food vendors' questionnaire: demographic information on vendors, features of street food outlets, toilet and water facilities, vendor hygiene, handling of utensils, waste disposal, food preparation, and financial affairs of vendors.

### Observation form

Not all information was obtained from the questionnaire. Some aspects pertaining to vendors required observation. An observation form was developed that made provision for observing and recording the following aspects of vendors: status of nails and hands, smoking and taking care not to cough over food, wearing jewellery and/or bangles on arms, and handling of food and money without washing hands in between.

### Data-gathering procedures

In the absence of a sample frame of street food vendors, a judgemental sample of survey areas was selected throughout Gauteng, a province in South Africa with 5.2 million inhabitants in 2000,[7] to ensure that all possible areas of vendor concentration were included – for instance taxi ranks, railway stations, the central business district (CBD), industrial areas and pension payout points. The following areas in Gauteng were included in the study: Alexandra, Benoni, Centurion, Germiston, Halfway House, Johannesburg, Kagiso, Katlehong, Kempton Park, Kramerville, Mabopane, Marlboro, Olifantsfontein, Pretoria, Randburg, Randfontein, Sandton, Shoshanguve, Soweto, Vosloorus and Wadeville. Two hundred vendors were selected for the sample. In the absence of proper information on the total population and sample frame of street vendors, the study had to fall back on a non-probability sampling technique, which meant that the results could not be weighted to a universe. The researcher adhered to the ethical code of primary research as stipulated by the Southern African Marketing Research Association.[8] The purpose of the study and confidentiality of individual results was explained to the vendors, whereafter all of them responded to the questionnaire. Three junior researchers from the BMR at UNISA did the sampling, socio-economic interviewing and observation. All three are graduates and had experience in interviewing and sampling. They followed a judgemental approach in their sampling, whereby they tried to make the sample as representative as possible. All types and sizes of vendor operation were considered for inclusion in the study.

The 200 interviews were conducted at the locations shown in Table I.

| Table I. | Location of vendors included in study | | |
|---|---|---|---|
| **Location of vendor** | | *N* | % |
| Residential area | | 2 | 1.0 |
| Transport area (taxi ranks, railway and bus stations) | | 95 | 47.5 |
| Transport area near hospital | | 3 | 1.5 |
| Transport area in commercial area | | 50 | 25.0 |
| Industrial area | | 24 | 12.0 |
| Commercial area | | 18 | 9.0 |
| Construction site | | 2 | 1.0 |
| Hospital | | 6 | 3.0 |
| Total | | 200 | 100.0 |

## Customers

### Questionnaire

Procedures for development and testing of the customer questionnaire were similar to those used for the vendor questionnaire. However, different types of questions were used to cover the following topics: demographic information on respondents, frequency of buying street food, opinion on prices and reason for choice of vendor, quality of food, stomach aches because of consumption of street food, monthly amount spent on street food, and the three main reasons (in order of importance) for buying street food.

### Data-gathering procedures

The same junior researchers who interviewed the vendors interviewed at least 4 customers per vendor. A non-probability convenience sampling method was followed to select respondents. On completion of an interview, the next customer was interviewed. After the interviewers had completed the required 4 interviews, they moved on to the next selected vendor. Eight hundred customers were interviewed by the same interviewers who interviewed the vendors. Questionnaires were completed anonymously.

## Micro-organisms

### Procedures followed

A junior researcher from the Department of Biotechnology at the Tshwane University of Technology took one food sample from each of the more popular meals bought daily from the 200 vendors. These meals consisted of meat and chicken stews and maizemeal porridge. One sample of either the stew or the maizemeal porridge was taken per vendor. Of the 200 samples taken, 87 were meat and/or chicken samples and 113 were maizemeal porridge samples. The samples were taken throughout the day until 16h00 at the latest, when the team returned to the laboratory. Only 1 of the 200 vendors requested payment for the food sample taken for testing.

Approximately 250 g of food was taken with a washed and dried spoon which was dipped into alcohol and flamed. The sample was then placed in a Nasco Whirl Pak bag, sealed and labelled appropriately. Before sampling, the holding temperature of the food was measured using a portable thermocouple, also washed, dried, dipped into alcohol and flamed before each sampling. The thermocouple was inserted into the centre of the food mass and held until a reading was measured. The location, date, sample number, temperature measured and type of sample were entered onto a sheet. The samples were immediately placed into a cooler box containing ice and transported to the microbiology laboratory at the Department of Biotechnology and Food Technology. At the Department, the samples were refrigerated at 2°C for a maximum of 24 hours, whereafter they were plated. It was agreed with the DOH that standard microbiological analyses according to South African Bureau of Standards (SABS) International Organization (ISO) standards with some modifications would be used to test the samples. The modifications differed according to the analysis done and are referred to in the description that follows of the microbiological analyses agreed upon.

**Total aerobic plate count.** The total aerobic plate count is intended to indicate the level of micro-organisms in a product.[9] Ten grams of the sample taken were weighed and put into 90 ml peptone water, and then placed in a Stomacher for 2 minutes. Subsequent 10-fold dilutions were made to $10^{-6}$. All dilutions were plated by the pour-plate method, in duplicate, using plate count agar (PCA), according to SABS ISO method 4833:1991. Average counts obtained were expressed as colony-forming units per gram of food (cfu/g).

**Coliform count and *Escherichia coli*.** Coliforms are defined as Gram-negative rods that produce acid and gas from lactose during metabolic fermentation.[10] *Escherichia coli* 0157:47 represents one of hundreds of strains of the bacterium *E. coli*. Although most strains are harmless and live in the intestines of healthy humans and animals, this strain produces a powerful toxin and can cause severe illness.[11] The above dilutions were plated by the pour-plate method, in duplicate, using violet-red bile agar (VRB) according to SABS ISO method 4832:1991. *E. coli* was differentiated from other coliforms using standard microbiological tests. A positive indole test and the presence of short Gram-negative rods was taken as positive for the presence of *E. coli*.

**Salmonella.** Salmonella is an infection caused by a Gram-negative bacillus of the *Salmonella* genus. Infection with these bacteria may affect only the intestinal tract, or may spread from the intestines to the bloodstream and then to other body sites. The cause of this infection is contaminated food or water, or direct contact with other infected humans.[12] Twenty-five

grams of the food sample taken were placed into 225 ml of buffered peptone water and incubated at 37°C for 24 hours, according to SABS ISO method 6579:1993 (E). The presence or absence of salmonella was determined by means of laboratory tests designed to identify this form of bacteria.

***Staphylococcus aureus.*** *Staphylococcus aureus*, often simply referred to as 'staph', is a bacterium commonly found on the skin and in the nose of healthy people.[13] Staphylococci are Gram-positive spherical bacteria that occur in microscopic clusters, with *S. aureus* being yellow in colour and *S. epidermidis* being white in colour. Dilutions from total aerobic platelet count (TAPC) were plated onto Baird-Parker agar containing appropriate supplements, in duplicate, using the spread-plate method, according to ISO method 6888:1983 (E). Five typical colonies were picked off and the coagulase test was conducted using the Staphylase Kid DIR 595. Coagulase-positive colonies were recorded as *S. aureus*.

***Bacillus cereus.*** *Bacillus cereus* is a bacterium that forms Gram-positive endospores, which are faculta-tively aerobic sporeformers whose cells are large rods. Spores are the reproductive elements of lower organisms, such as protozoa, fungi, and cryptogamic plants.[14] Dilutions from TAPC were plated onto *B. cereus* selective agar containing appropriate supple-ments, in duplicate, using the spread-plate method, according to SABS ISO method 7932:1993. All plates were incubated at 30°C for 48 hours. Typical *B. cereus* colonies were counted and average counts obtained were expressed as cfu/g.

## Results of the socio-economic vendor survey

### Profile of street food vendors

Table II shows the profile of the street food vendors interviewed in the study. Almost half of this group (48.0%) had a secondary school qualification, but 13.0% had no formal schooling. The vast majority (90.5%) of the vendors were female. The average distribution favoured the 31 - 40-year age group, with 38.5% falling into this group, followed by the 21 - 30-year age group (27.0%) and the 41 - 50-year age group (24.5%) (Table II).

Only 18% of the vendors indicated that they knew about training programmes for informal street traders, while only 31.5% knew anything about the 10 golden rules for healthy food preparation. The DOH displays these rules visually on large posters at places where street food vendors usually operate.

### Features of street food outlets

Maizemeal porridge, a traditional South African meal, and meat were sold by 172 or 86.0% of the 200 vendors interviewed. Sales of porridge and meat contributed

| Table II. | Profile of street food vendors | | |
|---|---|---|---|
| | | *N* | % |
| Level of education | | | |
| None | | 26 | 13.0 |
| Primary school | | 65 | 32.5 |
| Secondary school | | 96 | 48.0 |
| Std 10+ diploma/certificate | | 12 | 6.0 |
| Tertiary | | 1 | 0.5 |
| Gender | | | |
| Male | | 19 | 9.5 |
| Female | | 181 | 90.5 |
| Age group (years) | | | |
| < 20 | | 2 | 1.0 |
| 21 - 30 | | 54 | 27.0 |
| 31 - 40 | | 77 | 38.5 |
| 41 - 50 | | 49 | 24.5 |
| >5 | | 18 | 9.0 |
| Total | | 200 | 100.0 |

64.9% to the total sales of the outlets selling these two foods. The rest of the income derived from a wide variety of other products. Tea, bread, vetkoek (a type of dumpling) and eggs were sold by 26.5% of the vendors, and these sales accounted for 27.6% of their total sales.

Street food vendors contribute very little to job creation in South Africa. One-third (33%) of the vendors operated a one-person business, while only 1 employed 8 employees. The average for all 200 vendors was 1.98 employees, including the vendors themselves.

Almost all the vendors (199 or 99.5% of the 200) indicated that their street food business was the main source of their household income (Table III). Only 1 vendor indicated that the income from the street food outlet formed a secondary source of income for their household. Relatively few sources other than income from the street food outlet were mentioned as sources of household income (Table III).

More than half (52%) of the vendors indicated that they had needed less than R400 to start their business. The average start-up capital for all 200 vendors was R1 403. However, if the 8 who used more sophisticated equipment such as caravans are excluded, the start-up capital drops to R620. The average monthly turnover of the vendors was R4 638, and their input or supply cost R3 069, giving a net income of R1 659, which is 19% higher than the average minimum living level of R1 389 calculated by the BMR of UNISA for March 2000.[15]

### Vendor hygiene

The type of protective clothing and frequency of change of clothing are shown in Table IV. Most of the vendors (60.5%) wore a full apron as protective clothing. However, 28 (14.0 %) did not wear protective clothing. Only one-third of them (34.5%) had their hair covered. Most of the vendors wearing protective clothing (*N* = 172) changed their protective clothing daily (80.8%) (Table IV).

| Table III. | Main sources of income of street food vendor households ($N = 200$) | | |
|---|---|---|---|
| **Source of income** | | ***N*** | **%** |
| This business | | 199 | 99.5 |
| Formal sector wage employment (other h/h members) in private firm | | 10 | 5.0 |
| Formal sector wage employment (other h/h members) in public sector | | 7 | 3.5 |
| Formal sector wage employment (respondent) in private firm | | 5 | 2.5 |
| Taxi transport | | 6 | 3.0 |
| Formal sector wage employment (respondent) in public sector | | 3 | 1.5 |
| Non-agricultural business of other h/h members | | 3 | 1.5 |
| Social assistance/pension/other benefits | | 1 | 0.5 |

h/h = household.

| Table IV. | Type of protective clothing and frequency of change of clothing | |
|---|---|---|
| **Clothing/frequency** | ***N*** | **%** |
| Type of clothing | | |
| Full apron | 121 | 60.5 |
| Half apron | 18 | 9.0 |
| Overall | 33 | 16.5 |
| Hair covering | 69 | 34.5 |
| None | 28 | 14.0 |
| Frequency of change* | | |
| Every day | 139 | 80.8 |
| Every 2 days | 21 | 12.2 |
| Every 3/4 days | 5 | 2.9 |
| Weekly | 1 | 0.6 |
| Will not say | 6 | 3.5 |
| Total | 172 | 100.0 |

* Only those wearing protective clothing, $N = 172$.

| Table V. | Hygienic status of the vendors observed ($N = 200$) | |
|---|---|---|
| **Feature** | ***N*** | **%** |
| Short/clean nails | 199 | 99.5 |
| Hands free of sores | 197 | 98.5 |
| Smoking while working with food | 2 | 1.0 |
| Coughing over food | 1 | 0.5 |
| Jewellery/bangles on the arms | 64 | 32.0 |
| Handling food and money without washing hands in between | 82 | 41.0 |

The level of education, gender and age of respondents may have influenced their preparation and handling of street foods. One hundred and ninety-four (97.0%) of the 200 vendors washed their hands after visiting the toilet, mostly with running water. Table V shows the hygienic status of vendors as observed by the interviewers. The table shows that some areas can be improved, such as wearing jewellery and/or bangles on the arms (32%), and handling food and money without washing hands in between (41%) (Table V).

## Handling of utensils and waste

The vast majority of vendors (87.5%) used separate utensils for raw materials and cooked food, 86.0% washed the utensils before starting with the preparation of a new batch of food, 93.5% used hot water and detergent to wash the utensils, 89.5% changed the water at least 3 times per day, and 98.0% used a cloth to dry the utensils after washing.

Thirty-five (17.5%) of the 200 vendors had a garbage disposal facility within 5 m of their outlets, while 31 (15.5%) had to walk more than 100 m to the nearest garbage disposal facility. More than one-third threw their refuse in municipal bins (39.0%) or left it behind, wrapped (36.0%). More than half (56.0%) of the 200 vendors poured waste water into the storm water drainage system. However, a considerable percentage (41.5 %) poured waste water onto the pavement or road surface.

## Results of the customer survey

Eight hundred customers were interviewed using a prestructured questionnaire.

## Profile of the customers

The majority of the respondents were black (98.9%) and male (88.4%), and half of them were single, with 41.9% falling into the 26 - 35-year age group. Almost two-thirds of those (64.1%) who bought street foods had some secondary school qualification; however, people with post-secondary qualifications (8.0%) as well as university graduates (7.9%) also bought street foods. A relatively large percentage of the customers of street food vendors were in the transport business, mostly in the taxi trade (40.4%), and in sales occupations (27.0%).

## Customer satisfaction with street foods

On the basis of an index, according to which the most important reason for buying street foods is allocated a value of 3, the second most important reason a value of 2 and the third most important reason a value of 1,

it was possible to assess the importance of the reasons given. The reason with the highest average value (reason a) was equated with 100 and the values of other reasons (n) were calculated in accordance with the above, using the formula $\frac{\bar{n}}{\bar{a}} \times 100$, where, $\bar{n}$ = the average of the reason under consideration and $\bar{a}$ = the average of the reason with the highest measure of importance.

The index of importance for reasons for buying street foods in Table VI is highest for the tastiness of street foods (100), followed by nutritional value (72), proximity or convenience (62) and cleanliness (55).

In order of importance, the reasons for preferring to buy from a specific street food vendor were fresh food prepared daily (100), followed by proximity to work (55), friendly vendor (54) and clean dishes (44) (Table VI).

## Results of the microbiological tests

Since a non-probability sampling method was used for selection of the vendors and the survey was conducted only in Gauteng, the results of the study cannot be generalised to the whole of South Africa. This is particularly true with regard to microbiological aspects because factors such as weather conditions and food preferences differ across provinces.

The holding temperatures of the food samples varied widely, with the lowest recorded temperature being 20.1°C and the highest being 98.8°C. Holding temperature plays an important role in the growth of the microbiological traces tested in the study and will be referred to in the discussion of the results.

Table VII shows the percentages of samples that tested positive for selected microbiological analyses. However, the magnitude of some of the traces was very low, as will be seen in the discussion that follows (Table VII).

### Aerobic count

Of the 87 meat/chicken samples, only 40 (46.0%) exhibited plate counts, of which 28 samples (32.2%) exhibited counts < 300 cfu/g. In the case of maizemeal porridge, 30 samples (26.6%) exhibited plate counts, of which 15 samples (13.3%) exhibited plate counts < 300 cfu/g. Those samples exhibiting counts higher than 300 cfu/g (12 meat/chicken samples and 15 maizemeal porridge samples), fell into the acceptable range of below log 6 per gram, with only 1 sample being the exception, with a count of above log 6 (TNTC). The holding temperature of this sample was 26.3 °C.

### Coliform count

Ten (11.5%) meat/chicken samples showed coliform counts, 5 of which were identified as containing *E. coli*. Of these 5 samples, 3 were held at temperatures favourable for growth of *E. coli*, 1 at a holding temperature of 32°C, 1 at a holding temperature of 30°C and 1 at a holding temperature of 26.3°C. The remaining 2 samples, which both showed < 150 cfu/g, were held at higher temperatures, i.e. 98,8°C and 57.6°C, respectively.

Of the maizemeal porridge samples, 15 (13.2%) showed coliform counts, only 6 of which indicated *E. coli*. Of these 6 samples, only 2 were held at temperatures favourable for the growth of *E. coli*, i.e. 1 was held at 40.5°C and the other at 23.0°C. Even in these 2 cases, the counts were lower than other positive samples that were at higher holding temperatures.

### *Staphylococcus aureus*

In the case of *S. aureus*, only 3 samples (3.4%) of meat/chicken and 13 samples (11.5%) of maizemeal porridge tested positive for this organism (< 10 cfu/g). All 3 positive meat/chicken samples were held at

| Table VI. | Index of importance of main reasons for buying street foods and preference for a street food vendor (*N* = 800) |
|---|---|

| Reason for buying | Index |
|---|---|
| Tasty | 100 |
| Nutritious | 72 |
| Close (convenient) | 62 |
| Clean | 55 |
| Very cheap | 34 |
| **Reason for preference** | |
| Fresh food prepared daily | 100 |
| Close to work | 55 |
| Friendly person | 54 |
| Clean dishes | 44 |
| Clean surroundings | 23 |
| Gives credit | 14 |
| Cheaper than others | 17 |

| Table VII. | Samples that tested positive for selected microbiological analyses |
|---|---|

| Sample type | N | TAPC (%) | CC (%) | EC (%) | SA (%) | BC (%) | S (%) |
|---|---|---|---|---|---|---|---|
| Meat/chicken | 87 | 46.0 | 11.5 | 5.7 | 3.4 | 10.3 | 0.0 |
| Maizemeal porridge | 113 | 26.6 | 13.3 | 5.3 | 11.5 | 5.3 | 0.0 |

TAPC = total aerobic platelet count; CC = coliform count; EC = *Escherichia coli*; SA = *Staphylococcus aureus*; BC = *Bacillus cereus*; S = salmonella.

temperatures favourable for growth of *S. aureus*, viz. 42.2ºC, 26.3ºC and 25.2ºC.

### *Bacillus cereus*

*B. cereus* was isolated from only 9 meat/chicken samples (10.3%) and 6 maizemeal porridge samples (5.3%). In all these cases, counts were very low (< 150 cfu/g). This is encouraging, as *B. cereus* is often associated with leftover foods, particularly foods containing starch such as maizemeal porridge, in which it will rapidly increase (from log 6 to log 7 per gram) at room temperature. At these high levels, this organism becomes a health hazard. Only 4 of the 200 vendors indicated in the questionnaire that they use leftovers for re-sale, which is confirmed by the above results.

## Discussion

### Hygiene features

The most important finding of this study is the way in which the socio-economic results regarding the hygiene practices of street vendors support the findings of the microbiological survey. The survey among vendors showed that a high standard of hygiene was maintained by most of them during preparation and serving of the foods, while the microbiological tests showed relatively low microbiological counts and low incidences of pathogens tested for (in the case of salmonella, total absence). This finding is corroborated by the responses of customers. The results of 5 other studies done among street food vendors in South Africa came to similar conclusions. In a study of 6 vendors in Johannesburg[16] where 51 ready-to-eat street foods, 18 dishwater and 18 surface scrub samples were collected and analysed it was found that the foods analysed were of acceptable quality and safety. The second study[17] done from February to August 1998, in which 132 samples of beef, chicken, salad and gravy were collected from 2 street vendors over 11 replicate surveys, came to the same conclusion, namely that the quality and safety of the foods analysed was acceptable.[17]

A study by Kubheka, Mosupye and Von Holy[18] of 16 vendors in central Johannesburg, analysed 110 samples and concluded that the observed lack of hygiene under which the operations took place was not a major determinant of the quality and safety of ready-to-eat street-vended salads and gravies.

In a study by Mukhola[19] in the Tshitale/Hlanganani area in the Limpopo province, 16 cooked beef, 45 cooked chicken, 58 fried fish and 60 water samples and 62 hand swabs were analysed for microbiological growth. The number of organisms detected from the different foodstuffs yielded very low or low colony counts. Similarly, a paper entitled 'Improving street food vending in South Africa: Achievements and lessons learned' prepared by the International Union of Microbiological Societies[20] presented at the FAO/WHO Regional Conference on Food Safety for Africa in Harare, Zimbabwe, in 2005 concluded that the results of a study conducted on street food vending in Bloemfontein found that, overall, the microbiological quality of foods from which samples were taken was within acceptable safety limits.

### Customer satisfaction

Customers of street food vendors appreciated the service they got from vendors. They cited tastiness of street food as the main reason for buying street food and they selected vendors who prepared fresh food only. The price of street food was also acceptable to them.

### Economic features

The study showed that although street food vendors have a relatively low income, it is their main source, if not their only source, of income. Most of the 229 street food vendors interviewed in Tshitale/Hlanganani said they were able to support their children from their street food income in respect of their basic needs such as education, clothing and food.[19] Relatively small start-up funds are required for street food vending, and even though street food vending does not form a career for many, it does supply a temporary income until something better shows up.

## Conclusion

In a developing country like South Africa where the unemployment rate is quite high, where a section of the population is still living in Third-World conditions, where many people are unschooled, without formal qualifications and relatively poor, it is absolutely essential that they be allowed to earn a livelihood by means of an 'easy-to-enter' business. This study of street food vendors in Gauteng showed that the hygiene standard of the products they offered is quite acceptable and that they have enough satisfied customers. However, training in hygiene aspects such as not wearing jewellery and bangles, washing hands after handling money, and the treatment of leftovers will contribute to higher standards of hygiene. In conclusion, it is recommended that the study be extended to the other provinces in South Africa and that other aspects be included to determine how street food vendors can be assisted to enable them to move from the so-called 'second economy' (informal sector) to the 'first economy' (formal sector).

1. Food and Agricultural Organization. *Street Foods*. Report of an FAO expert consultation, Jogjakarta, Indonesia 5 - 9 December 1988. FAO Food and Nutrition Paper 46. Rome, 1989.
2. Chakravarty I, Chanet C. Street foods in Calcutta. *Food, Nutrition and Agriculture* 1996: **17/18**: 30-37. **http://www.fao.org/docrep/W3699T** (last accessed November 2005).
3. Draper A. *Street Foods in Developing Countries: The Potential for Micronutrient Fortification*. London: London School of Hygiene and Tropical Medicine, 1996. **http://www.mostproject.org/streetfoods2.PDF** (last accessed November 2005).

4. Escalante de Cruz A. The street food sector in Asia and the Pacific. *AP Consumer* 2003; **29**(3). **http://www.ciroap.org/food/documents/** (last accessed November 2005).

5. World Health Organization. *Food Safety Issues: Essential Safety Requirements for Street-Vended Foods.* Geneva: WHO, 1996.

6. Martins JH, Anelich LE. *Socioeconomic and Hygiene Features of Street Food Vending in South Africa.* Pretoria: Unisa, Bureau of Market Research, 2000.

7. Steenkamp HA, Van Wyk H de J. *Population Estimates for South Africa by Magisterial District, Metropolitan Area and Province, 1996.* (Research report no 274.) Pretoria: Bureau of Market Research, 2000.

8. Southern African Marketing Research Association. *SAMRA Yearbook 2004.* Johannesburg: SAMRA, 2004.

9 Maturin LJ. Aerobic plate count. In: *Bacteriological Analytical Manual.* Rockville, MD: US Food and Drug Administration Center for Food Safety and Applied Nutrition, 2002. **http://vm.cfsan.fda.gov/~ebam/bam-3.html** (last accessed November 2005).

10. 3M Microbiology. *3M Petrifilm Coliform Count Plates: Interpretation Guide.* Berkshire, UK: 3M, 2003. **http://www.mmm.com/microbiology/home/products/ petrifilm/petriprod/.../intguide.htm** (last accessed November 2005).

11. Centers for Disease Control and Prevention. Division of Bacterial and Mycotic Diseases. *Escherichia coli 0157:47.* Atlanta, GA: CDC, 2001. **http://www.cdc.gov/ ncidod/dbmd/diseaseinfo/escherichiacoli_g.htm** (last accessed November 2005).

12. McKinley Health Center. *Salmonella.* Urbana-Champaign: University of Illinois, 2000. **http://www.mckinley.uiuc.edu/health-info/dis-cond/commdis/salmonel.html** (last accessed November 2005).

13. Centers for Disease Control and Prevention. Division of Healthcare Quality Promotion (DHQP). *Antimicrobial Resistance: MRSA – Methicillin Resistant Staphylococcus aureus.* Atlanta, GA: CDC, 2003. **http://www.cdc.gov.ncidod/hip/aresist/ mrsafaq.htm** (last accessed November 2005).

14. US Food and Drug Administration Center for Food Safety and Applied Nutrition. *Foodborne Pathogenic Microorganisms and Natural Toxins Handbook.* Rockville, MD: US Food and Drug Administration Center for Food Safety and Applied Nutrition, 2003. **http://vm.cfsan.fda.gov/~mow/chap12.html** (last accessed November 2005).

15. Martins JH, Maritz ME. *Minimum and Supplemented Living Levels in the Main and Other Selected Urban Areas of the RSA, March 2000* (Research Report No. 278). Pretoria: Bureau of Market Research, 2000.

16. Mosupye FM, Von Holy A. Microbiological quality and safety of ready-to-eat street-vended food in JHB, South Africa. *J Food Prot* 1999; **62:** 1278-1284.

17. Mosupye FM, Von Holy A. Microbiological hazard identification and exposure assessment of street food vending in JHB, South Africa. *Int J Food Microbiol* 2000; **61:** 137-145.

18. Kubheka LC, Mosupye FM, Von Holy A. Microbiological survey of street-vended salad and gravy in JHB, South Africa. *Food Control* 2001; **12:** 127-131.

19. Mukhola, MS. Factors influencing the safety and quality of street food in rural areas. MTech thesis, Northern Gauteng Technikon, 2000.

20. International Union of Microbiological Societies, International Committee on Food Microbiology and Hygiene (IUMS – ICFMH). *Improving Street Food Vending in South Africa: Achievements and Lessons Learned.* Proceedings of the FAO/WHO Regional Conference on Food Safety for South Africa, Harare, Zimbabwe, 3 - 6 October 2005.