CHAPTER 7:

THE FOOD PROCUREMENT AND HOUSEHOLD INVENTORY METHOD

E Maunder, D Labadarios

Introduction

The measurement of the dietary intake of individuals and groups is central to nutrition research[1,2]. Dietary assessment methodologies may be broadly classified into two categories, namely those for the assessment of the intake of an individual and those for the measurement of the dietary intake of groups and/or HHs. Individual dietary assessment methodologies include the diet history, 24-hour recall (24-H-RQ), weighed and estimated food records and food frequency questionnaires (QFFQ). For the purposes of this survey, two methods of individual dietary assessment were used, namely the 24-H-RQ and the QFFQ, which are presented in Chapters 5 and 6 of this report respectively. The assessment of the dietary intake of groups and/or HHs includes techniques such as the food procurement and HH inventory, which is the subject of this Chapter of the report.

One of the overall aims of this survey was to collect baseline information on food consumption patterns for the formulation of appropriate policy guidelines for food fortification. The data collected in relation to food procurement and the HH inventory was deemed necessary in determining a suitable food vehicle for fortification. In order to use food fortification to reduce micronutrient deficiencies, it is important to select a food vehicle, which is accessible, affordable, widely consumed by the population group at risk of micronutrient deficiencies, and a food, which is stable over time. At least one food vehicle must be used for this purpose, but it may be necessary to use more than one food vehicle depending on the food consumption and patterns of access to a particular food by the population. In order to facilitate the fortification process, a food, which is centrally processed, is considered to be more practical. The latter reduces the number of sites and organisations as well as individuals involved in food processing, who need to be educated, and who need to purchase, install or upgrade equipment for fortification and quality control procedures including the need for the fortification process to be monitored.

Another aim of the survey was to identify factors, which impact on food consumption. Household food security has been identified to be of central

importance in determining food consumption. Food security may be determined by investigating indirect proxy indicators such as real wage rates, employment and prices. More direct indicators for determining food security include food procurement patterns, food, energy and nutrient consumption patterns and people's perceptions of food security. Information on HH food procurement and HH food inventories can therefore be used as direct indicators of HH food security.

It is generally accepted that in South Africa, there is national, but not HH food security [3-5]. It is estimated that despite South Africa's relative wealth, between 30 - 40% of South African HHs do not have assured access to an adequate diet. The currently available data on HH food security in the country has been mainly obtained by using economic proxy indicators. There is, therefore, no nationally representative data, which provides information on direct food security indicators such as food procurement patterns, food availability and food consumption patterns, people's perceptions of food security, energy and nutrient availability and intake as well as nutritional status within the same HH.

A further important objective of the present survey was to use the baseline data to be obtained from the present survey to develop appropriate nutrition education material.   Currently, a Task Team is developing Food Based Dietary Guidelines (FBDG) for South Africa for children aged 5 years and older as well as for adults[6]. The data collected on HH food procurement and the HH food inventory from the present survey would provide important information regarding the foods available in the HH in order to ensure that the FBDG to be developed would be appropriate.

Methodology

A Food Procurement and HH Inventory Questionnaire (FPHIQ) was designed and developed with the aim of obtaining data on:

- **The food procurement patterns:** This information was considered important if a policy on micronutrient food fortification is to reach the

population with a poor micronutrient status. This information was also considered to be necessary in order to ensure that there would be no danger of toxicity in populations with adequate or normal micronutrient status. The design of the present survey was such that data obtained from the food procurement patterns could be compared with the actual consumption data of the child's food intake, which was obtained by the 24-H-RQ and QFFQ. This information is also important in formulating appropriate nutrition education programmes. Food procurement patterns included information on the source of foods, purchasing patterns and food storage, frequency and amounts of purchase as well as the product brand name as follows:

- **The source of foods:** This provided information regarding whether the foods were purchased or domestically produced

- **The purchasing patterns and storage of food:** This information was considered to be essential for policy formulation on food fortification

- **The frequency and amounts of foods purchased:** In addition to the data on food storage at the HH level, this information would provide additional data on the turnover of food and the need for the stability properties of fortificants to be used as well as the popularity of different packaging presentations.

- **The brand names of foods:** This information was also collected in order to determine the number of manufacturers who would need to be contacted should a particular food item be chosen for fortification

- **The amount of food stored (HH Food Inventory):** This would provide information on the amount of food actually found in the HH at the time of the interview. It was also to be related to the prevalence of hunger among HH members, and be used as an indicator of the level of food security in the HH, and, indirectly, in the country. The data collected would also be used to calculate, crudely, how many days of energy supply was available in the HH in relation to the number of HH members

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For the purposes of the present survey, food procurement was defined as the method of obtaining food used by the HH from all sources and included food grown, livestock reared, food donated and/or food purchased. The food procurement part of the FPHIQ, i.e. investigating where people get their food from, was administered in all the randomly selected HHs of all EAs in the survey. Also, for the purposes of the present survey a method was devised in which the list recall method was used to ask respondents about procurement patterns of a list of foods. The list recall method was modified in the sense that no time limit to the recall was incorporated in the questionnaire, as is usually the case[7]. In this way, the usual patterns of procurement and purchase were assessed.   The assessment of the purchasing patterns, therefore, could be considered to be a 'Purchase Frequency Questionnaire'.

Also for the purposes of the present survey, HH inventory was defined as a list of all the foods and drinks kept in the house at the time of the interview. The HH inventory only included foods that were for HH use but did not include live animals, crops still growing in the garden or food that was being or had been cooked. This part of the FPHIQ was administered in all HHs in an EA that was classified, according to income (Figure 7.1), as being at a high risk for undernutrition.   This part of the FPHIQ was also administered in one randomly selected HH in all other EAs included in the survey. The coordinator and/or team leader informed the fieldworkers which EAs had been selected for the completion of the HH inventory part of the FPHIQ. Only one attempt was made to administer the HH inventory part of the FPHIQ, as there were not sufficient resources to visit all the HHs more than once.

Income

The "derived HH income" was prepared for the present survey by the CSS on the basis of the 1996 Census[8] (Figure 7.1).   It was calculated by adding together all recorded individual incomes of HH members, plus the HHs additional income and remittances received. Because individual income was recorded in intervals rather than exact amounts, an approximate amount had to be estimated for the calculations as follows:

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- For the first class, the amount was the midpoint of the class interval
- For the last class, the amount was based on the trend observed in previous class intervals, and
- For the other classes, the amount was calculated as the logarithmic mean of the top and bottom of the given interval.

Figure 7.1   Relative frequency of average annual family income: South Africa 1999

Average annual income (x 1000)
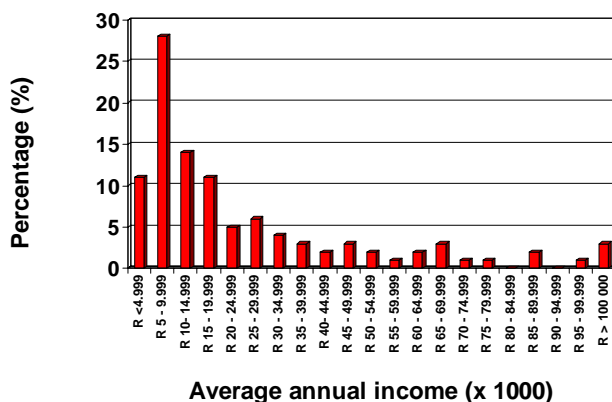
If 'individual income' was missing for a member of the HH younger than 15 years, the income for the child was set to 0. However, if a member of the HH aged 15 years or older had income missing, the 'derived HH income' was set to "missing", as there was insufficient information for the estimate to be reliable. If 'additional money generated' or 'remittances received' were missing, then they were set to 0.

The FPHIQ was tested and adapted in the various stages of its development. In this regard, it should be borne in mind that the prime purpose of the inventory was to gain an overall impression of what type of foods and in what quantities were kept in the HH.

Results

National Trends on Procurement and Food Inventory for the most commonly consumed items

In describing the data obtained by the three different dietary questionnaires employed in the present survey, commonly consumed foods were ranked initially according to the "number of children eating a particular food" for all three questionnaires. This was done in order to achieve a reasonably uniform and understandable format of presentation. However, in deciding on the most meaningful contribution a given food might make to nutrient intake of a child in the event that such a food was to be fortified, the "total amount eaten daily" the "average portions eaten daily" as well as the "portion size" of a given food was taken into account. These two considerations should be kept in mind in the interpretation of the results obtained in the present survey.

On this said basis, therefore, at the national level, the data from the 24-H-RQ indicated that the most commonly consumed food items were maize, sugar, tea, whole milk and brown bread (Table 7.1). These same food items together with hard margarine were also identified as being the most commonly consumed foods by the 24-H-RQ and the QFFQ (Table 7.1). It is equally important to note that these same six items were also the ones that were the most frequently procured (Table 7.1) and the ones that were found most frequently in the house (Table 7.2). Indeed, the agreement of the findings obtained by the three different methodologies is rather substantial, especially for the non-perishable food items (Tables 7.1 - 7.2). Consequently and for the purpose of this report, these 6 food items have been analysed in more detail. When considering bread as a possible food vehicle for fortification, it is important to also consider both brown and white bread as well as brown and white flours. Therefore, this information is also included, collectively, under brown and white bread respectively.

Several general trends were observed at the national level. Firstly, and most importantly, most HHs procured these items by purchasing them (Table 7.3). Subsistence agriculture is not, therefore, a major source of these foods in the

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country.   The procurement patterns of maize meal (Table 7.3) indicated that, on average, the vast majority (94%) of HHs used maize meal, which was purchased, a pattern that was also very similar for the other 4 commonly consumed food items. These items, in particular the dry store items, were primarily bought in supermarkets and to a much lesser extent in small shops (Table 7.4). In terms of frequency of purchase (Table 7.5), the dry store items, maize, sugar, tea and fat were mainly (>70%) purchased on a fortnightly or monthly basis. Brown bread was mainly purchased on a daily or twice a week basis (63%), whereas approximately one third of milk users purchased milk on a daily, weekly or fortnightly basis (Table 7.5). Maize was generally stored in a bucket or alternatively in a bag, container or cupboard (Table 7.6). Sugar and tea were kept primarily in a cupboard, whereas brown bread and whole milk were stored primarily in a cupboard or in the fridge (Table 7.6).

Procurement and Food Inventory

Maize Meal

Although, nationally, the procurement patterns of maize meal indicated that in the overwhelming majority (94%) of HHs maize meal was purchased, there was some variation in this pattern between Provinces ranging from only 80% of the maize meal being purchased in the Free State to 100% of the maize meal being purchased in Mpumulanga (Table 7.7). Most of this variation could be explained by maize meal being procured as part of pay, 17% in the Free State and 9% in the Northern Cape. Only a small percentage of HHs nationally (3%) grew/milled their own maize, but in the Eastern Cape this comprised a significant proportion of HHs (11%).

Nationally, the most frequently used types of maize meal were Special Enriched Maize Meal and Sifted White (Table 7.8), which was used by 57% and 24% of HHs respectively. It should also be noted that whilst only 5% of HHs nationally used domestically milled maize, a significant minority of HHs in the Eastern Cape (13%) and the North West Province (17%) used domestically milled maize meal. The source of this domestically milled maize varied. In the Eastern Cape, most of the domestically milled maize was produced by the HHs themselves. By contrast in the North West Province, in

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the HHs using domestically milled maize (17%) (Table 7.8), almost all the HHs purchased this domestically milled maize meal (Table 7.9). Further the maize, which was received as part of pay in the Free State and the Northern Cape was generally processed by the food industry (Table 7.9).

A wide variety of brands of maize meal were used. Nationally, Impala was used by the highest proportion of HHs (19%), followed by Ace (11%) and Iwisa (10%). On a provincial basis, Induna and Tafelberg (Northern Province; 13% and 11% respectively), Super Sun (Mpumulanga; 61%) and Westra and Iwisa (North West Province; 20% each) were also frequently used (Table 7.10).

With regard to the purchasing patterns nationally, of those HHs which did purchase their maize, (Table 7.11), most HHs (86%) purchased maize meal on a fortnightly or monthly basis with only 9% of HHs purchasing their maize meal on a weekly basis. The majority of these HHs (80%) purchased their maize meal in a supermarket (Table 7.12), with a substantial minority (18%) purchasing maize meal from small shops. There were marked provincial variations regarding the place of purchase with a larger proportion of HHs in Northern Province, North West Province and Mpumulanga purchasing their maize from small shops (45%, 34% and 29% respectively). The amount of maize bought on each shopping occasion varied considerably (Table 7.13) with 82% of HHs nationally buying more than 10kg at a time. Of this 82%, 16% of HHs bought more than 80kg at a time. There were also marked provincial variations in the amounts bought. The majority (68%) of HHs in the Western Cape, where there were more frequent purchasing patterns on a weekly basis (Table 7.11), bought 5kg or less, whilst in the Northern Province, with less frequent purchasing patterns, 72% of HHs bought 80kg or more of maize meal.

Sugar

Almost all HHs nationally (99%) used sugar, which was purchased (Table 7.14). The large majority of HHs (83%) purchased sugar on a fortnightly or monthly basis. In the Western Cape, approximately one third (35%) of HHs

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purchased sugar on a weekly basis (Table 7.15). Nationally, most of the HHs (85%) purchased sugar from supermarkets and 14% purchased sugar from small shops (Table 7.16). Provincial variations in the place of purchase could be seen with a larger proportion of HHs in Northern Province, North West Province and Mpumulanga purchasing their sugar from small shops (25%, 30% and 21% respectively). The amounts of sugar bought (Table 7.17) varied considerably with 2.5 - 5kg amounts being purchased most frequently by HHs in the Free State, Gauteng and Western Cape, whilst 12.5 - 20kg was purchased most frequently in other Provinces. Nationally, the most popular brand (Table 7.18) was Hullets (used by 59% of HHs). There was, however, considerable provincial variation with Selati used by a large majority of HHs in Gauteng, Mpumulanga and Northern Province (65%, 85% and 88% respectively).

Whole Milk

With regard to the procurement patterns of whole milk, again the very large majority of HHs nationally (Table 7.19) purchased it (93%). It is interesting to note some provincial variations in the source of whole milk. For example, 6% of HHs in the Eastern Cape procured their whole milk by rearing animals, 13% of HHs in the Free State received their whole milk as part of pay, and whole milk was received from clinics/NGO's/donations by approximately 7% of HHs in the Free State, 5% in the Eastern Cape and 4% in Northern Province.

Whole milk tended to be more frequently purchased (Table 7.20) than maize or sugar with about one third of HHs purchasing daily or twice per week, one third weekly and one third purchasing whole milk every fortnight or monthly. Nationally, supermarkets were the most frequent place of purchase for whole milk (65% of HHs), but a proportion of HHs (30%) purchased milk from small shops (Table 7.21). The amounts of milk purchased most frequently were 1 - 2 and 2 - 3 litres (Table 7.22). Most HHs (79%) used fresh or long-life whole milk with only 10% of HHs using whole milk powder (Table 7.23).

Tea

Practically all HHs (99%) in the survey sample obtained their tea by purchase (Table 7.24), generally on a fortnightly or monthly basis (81%) (Table 7.25) and primarily from supermarkets (83%), (Table 6.26). Eighty-four percent of HHs bought amounts between 100 and 750g (Table 7.27) with Joko and Ceylon (general) being the most popular brands (Table 7.28).

Bread and Wheat Flour

Brown bread

Fifty-two percent of HHs nationally used brown bread. Almost all of these HHs (98%) obtained brown bread by purchase (Table 7.29). The Northern Cape and the Western Cape Provinces had a slightly lower percentage of HHs purchasing brown bread, which was compensated by the greater percentage of HHs (11% and 9% respectively) making their own brown bread. The HH inventory, which was taken only in the lower income EAs, and 5% of the survey population, showed only 12% of the HHs had brown bread in their food stores at the time of the survey (Table 7.2). A high proportion of HHs (68%) bought brown bread daily or twice per week (Table 7.30), 75% of HHs bought 1 - < 2 loaves of brown bread (Table 7.31) and 72% of HHs purchased brown bread from small shops (Table 7.32). Most HHs (97%) use brown rather than wholewheat bread, but it is interesting to note that 19% of HHs in the Western Cape use whole wheat bread (Table 7.33).

White bread

Procurement patterns for white bread were very different from those for brown bread, in that, nationally, of the just under half of the HHs (43%) procuring white bread 55% of white bread users made their own bread (Table 7.34). The percentage of HH using homemade white bread rose to 79% in the Eastern Cape and North West Province. However, for the 43% of HHs, which purchased white bread, the procuring patterns, in general, were very similar to those for brown breads, namely, a high proportion of HHs (68%) bought white bread daily or twice per week (Table 7.35). Almost an equal majority (74%) of HHs bought 1 - 2 loaves of white bread (Table 7.36) and 57% of HHs purchased white bread from small shops (Table 7.37).

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Brown wheat flours

At the national level, most HHs (92%) using brown flours purchased the flours (Table 7.38) with the exception of the Northern Cape. It should, however, be noted that only a small proportion of HHs nationally (4%) obtained the flour as part of their pay, a practice that was apparently very common in the Northern Cape (57%). Purchasing patterns indicated the majority (69%) of the HHs bought flour fortnightly or monthly (Table 7.39), primarily from supermarkets (Table 7.40), with just under half of the HHs buying it in 12.5 – 25Kg packages (Table 7.41). Eighty two percent of HHs used brown flour and 18% used whole meal flour (Table 7.42).

White wheat flour

Almost all HHs (99%) that procured white flour did so by purchasing (Table 7.43). Nationally, a large proportion of HHs (68%) procured white flour. In the Northern Cape, 8% of HHs received white flour as part of pay. White flour was bought in bulk (12.5 - 25kg) by half of the HHs (51%) (Table 7.44) on a monthly or fortnightly basis (82% of the HHs; Table 7.45), and mainly from supermarkets (88%; Table 7.46). Only a small proportion of the flour bought was of the self-raising type (9%; Table 7.47).

Use of Maize Meal, Sugar and Bread/Wheat Flours

At the national level, 94% of the HHs procured maize, 93% procured sugar and 89% procured bread/flour (Table 7.48). This table also shows that the percentage of HHs which did not procure anyone of these items in the various combinations shown is, indeed, very small, varying from 0.5-2%.

Hard Margarine/Cooking fat

At the national level, 84% of the HHs used hard margarine and the remainder used cooking fat (Table 7.49). The Provinces with the lowest consumption of hard margarine, namely the Eastern Cape, and KwaZulu/Natal, had the highest consumption of cooking fat. These food items were almost exclusively (99%) purchased (Table 7.50) primarily (92%) on a weekly or fortnightly basis (Table 7.51) from supermarkets (87%) and small shops (13%) (Table 7.52). The amounts most commonly (77%) purchased were those of 500 g – 1Kg

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and 1- 2 Kg (Table 7.53). The most popular brand bought (Table 7.54) was Rama, followed by Rondo.

Procurement and Household Inventory Patterns

The national average number of food items procured by HHs was 35 (Table 7.55; Figure 7.2). At the provincial level, this number of procured food items varied from 16 in the Free State to as high as 67 in the Western Cape. HHs in tribal areas also had a lower number of procured food items (26) as compared with formal (45) and informal (34) urban areas (Table 7.55; Figure 7.3). The number of food items, however, actually found in the HH according to the HH food inventory, was considerably lower than that of those procured, with the national average being 9 food items per HH (Table 7.56; Figure 7.4). At the provincial level, the Provinces with the lowest (5) and highest (17) number of food items in the HH inventory were the Free State and the Western Cape respectively (Table 7.56; Figure 7.4). Little variation was seen, however, between the number of food items present in rural and urban HHs (8 and 10 items per HH respectively) (Table 7.56; Figure 7.5).

Figure 7.2   **The mean number of food items procured by HHs as determined by the FPHIQ by province: South Africa 1999**
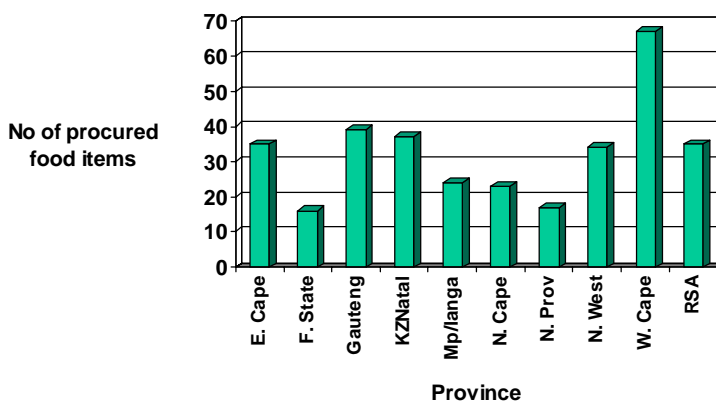
Figure 7.3   The mean number of food items procured by HHs as determined by the FPHIQ by area of residence: South Africa 1999
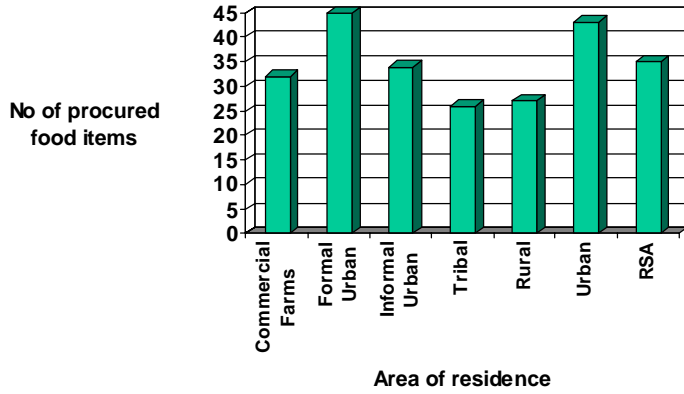
No of procured
food items

Area of residence

Figure 7.4   The mean number of food items procured by and found in HHs as determined by the FPHIQ by province: South Africa 1999

No of procured
food items

Province

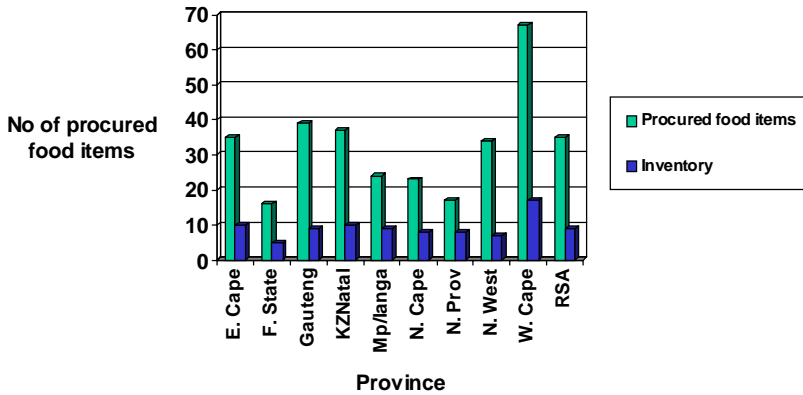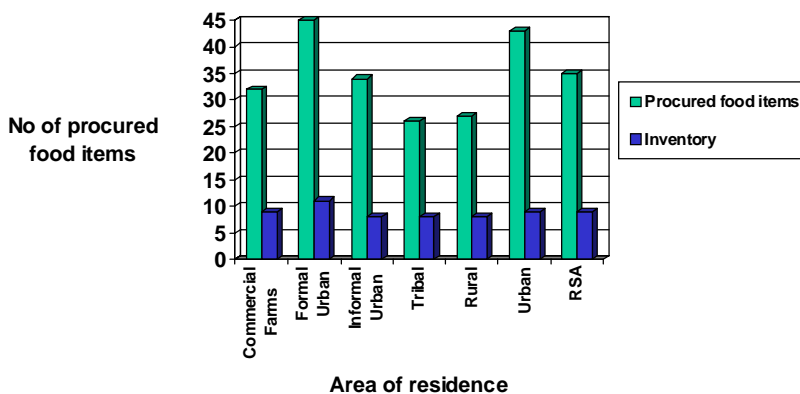Procured food items

Inventory

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Figure 7.5 **The mean number of food items procured by and found in HHs as determined by the FPHIQ by area of residence: South Africa 1999**

At both the national and provincial level maize and sugar were consistently the most frequently procured food items (Tables 7.57 – 7.66) as well as the items most frequently found in the inventory of the HHs of the present survey (Table 7.67 – 7.76). Other food items that were very frequently, but less consistently and variably according to Province, procured and held in the HH inventory included, salt, tea, rice, bread and milk (Tables 7.67 – 7.76).

Food Consumption in relation to HH Income

The frequency of consumption of the first 25 most frequently consumed food items as determined by the 24-H-RQ, the QFFQ as well as by the FPHIQ was analysed according to income as obtained from both the socio-demographic questionnaire (S-DQ) and the Census 1996 data[6] (Tables 7.77 – 7.96). Although caution needs to be exercised in the interpretation of this data, which needs to be analysed in greater detail, it would, overall, appear that maize and sugar were consistently procured and consumed in all HHs in almost all Provinces irrespective of income. It is also of interest to note that HHs with the higher income tended to have a more frequent consumption of protein of animal origin. Nevertheless, HHs with the lower income procured a significantly lower mean number of food items in all Provinces and all areas of residence when compared with HHs with the higher income (Table 7.97 –

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7.98). This was the case irrespective of whether the income data used to stratify HHs was obtained from the Census 1996[6] data (Table 7.97) or the S-DQ of the present survey (Table 7.98; Figure 7.6 – 7.7). These findings are strongly supported by those of the HH inventory, namely HHs in the lower income group had significantly fewer food items in the house at the time of the interview (Table 7.99 – 7.100; Figure 7.8 – 7.9). Further support regarding the impact of income on food procurement and HH inventory is provided by the significantly fewer average number of food items consumed by children as determined by the QFFQ (Table 7.101 – 7.102; Figure 7.10 - 7.11) and the 24-H-RQ (Tables 7.103 – 7.104; Figure 7.12 - 7.13). It is, therefore, important to note that all four methodologies employed collectively support the role of income as being decisive in the consumption and procurement of foods.

Figure 7.6   **The mean number of food items procured as determined by the FPHIQ in relation to income as obtained by the Census `96 and the S-DQ by province: South Africa 1999**
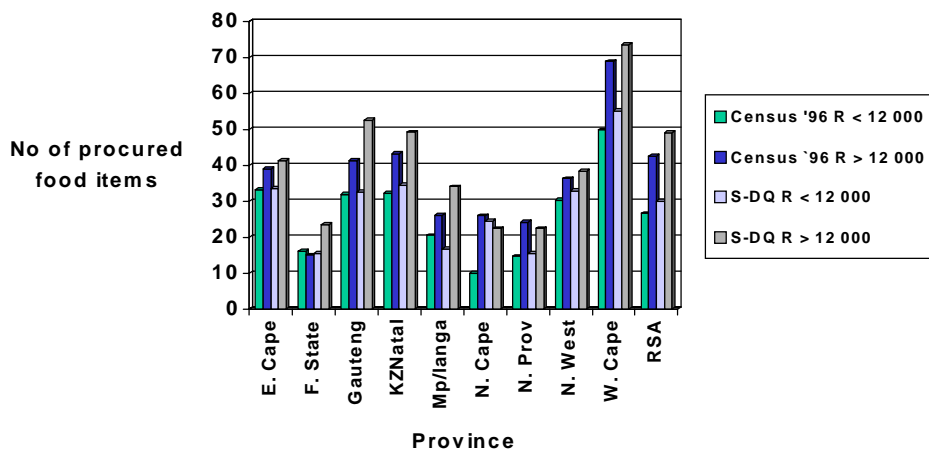
Figure 7.7 **The mean number of food items procured as determined by the FPHIQ in relation to income as obtained by the Census `96 and the S-DQ by area of residence: South Africa 1999**
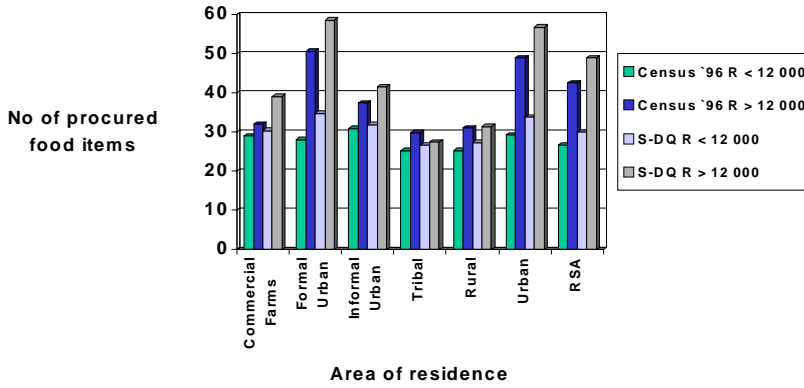
No of procured
food items

Area of residence

Figure 7.8 **The mean number of food items in the HH inventory as determined by the FPHIQ in relation to income as obtained by the Census `96 and the S-DQ by province: South Africa 1999**
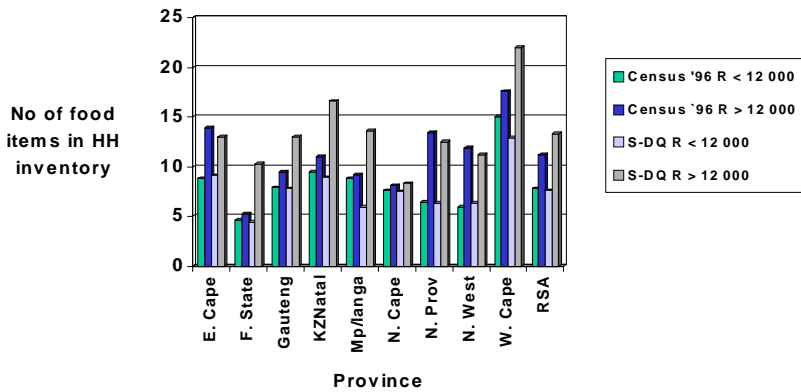
No of food
items in HH
inventory

Province

Figure 7.9 **The mean number of food items in the HH inventory as determined by the FPHIQ in relation to income as obtained by the Census `96 and the S-DQ by area of residence: South Africa 1999**
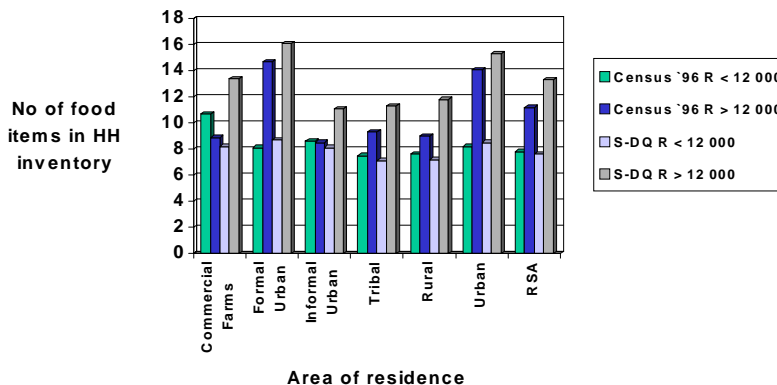
No of food items in HH inventory

Area of residence

Legend:
- Census `96 R < 12 000
- Census `96 R > 12 000
- S-DQ R < 12 000
- S-DQ R > 12 000

Figure 7.10 **The mean number of food items consumed as determined by the QFFQ in relation to income as obtained by the Census `96 and the S-DQ by province: South Africa 1999**

No of food items consumed

Province

Legend:
- Census '96 R < 12 000
- Census `96 R > 12 000
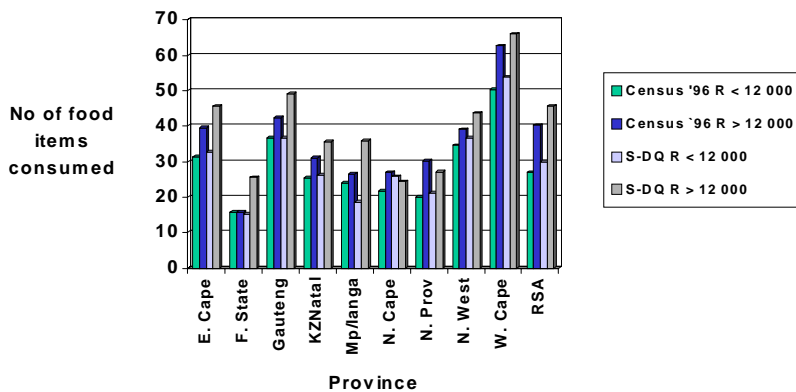- S-DQ R < 12 000
- S-DQ R > 12 000

Figure 7.11   **The mean number of food items consumed as determined by the QFFQ in relation to income as obtained by the Census `96 and the S-DQ by area of residence: South Africa 1999**

Figure 7.12   **The mean number of food items consumed as determined by the 24-H-R in relation to income as obtained by the Census `96 and the S-DQ by province: South Africa 1999**
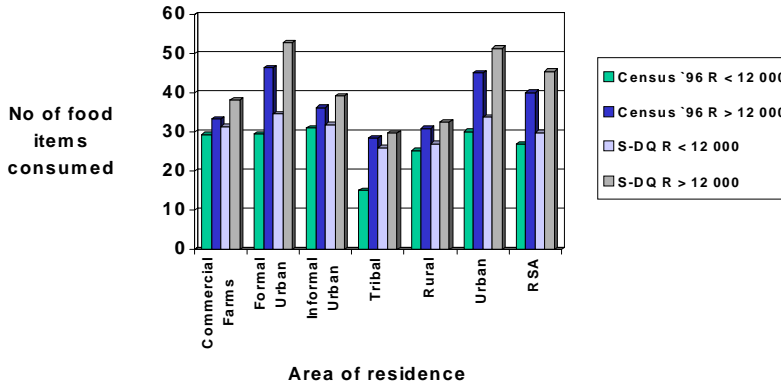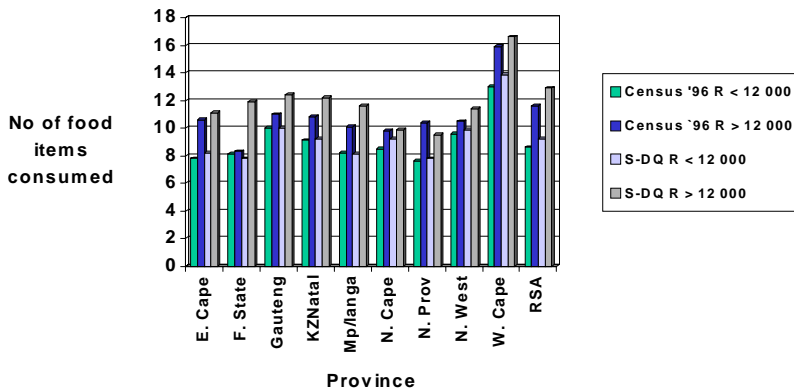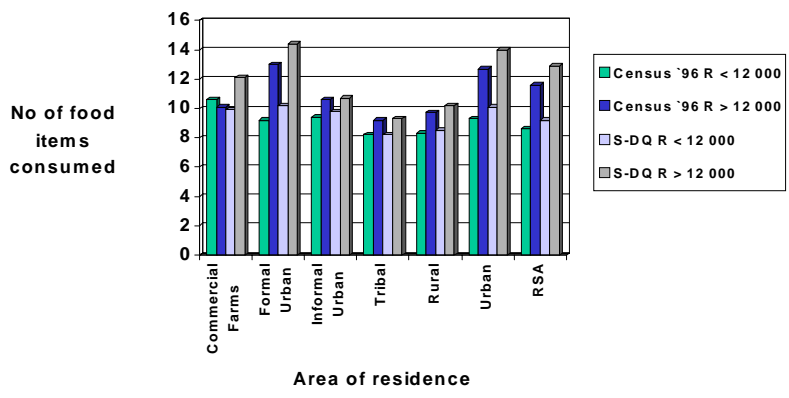
Figure 7.13   **The mean number of food items consumed as determined by the 24-H-R in relation to income as obtained by the Census `96 and the S-DQ by area of residence: South Africa 1999**

Transport Used for Food Purchasing

Most HHs transported their food purchases using taxis (51%), with walking being the next most frequently used mode of transport (24%). In the present survey, only 11% of the population used their own cars for this purpose (Table 7.105).

Crop and Livestock Production

Only 33% of HHs nationally produced crops and 25% owned livestock (Tables 7.106 - 7.107). There were marked urban/rural and provincial variations. Forty-eight percent of rural HHs produced crops and 43% owned livestock. There was a high percentage of HHs, which produced crops in KwaZulu/Natal (59%), Eastern Cape (57%) and the Northern Province (44%), (Table 7.106). The most frequently type of crop grown was green/other vegetables (40%) followed by mealies/corn (26%) and imifino/herbs (16% of HHs), (Table 7.108). Similarly, these same Provinces and also the North West Province had a high percentage of HHs which owned livestock, Eastern Cape (50%), KwaZulu/Natal (43%), North West (34%) and Northern Province (24%), (Table 7.107).

With the exception of the Northern Cape, three quarters of the HHs that did grow their maize consumed all of it in the HH (Table 7.109), primarily as a

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vegetable. In this regard, a higher percentage of HHs in commercial farms (80%), informal urban (71%) tribal (75%) and rural (75%) areas consumed their home grown maize than HHs in formal urban areas (Table 7.110). In relation to maize, a higher percentage (83%) of HHs grew and consumed their own root vegetables irrespective of the area of residence (Tables 7.111 – 7.112). A similar pattern was observed for the consumption of "other vegetables" (Tables 7.113 – 7.114) and "imifino/herbs" (Tables 7.115 – 7.116) grown at home.

Thirty-four percent of HHs in the North West Province also owned livestock. Nationally, the most frequently owned type of livestock was poultry (35%), followed by goats/sheep (30%) and cattle (26%), (Table 7.117).

Preservation of Food

Alternative methods of preserving food were being used by 12% of the HHs predominantly in the rural areas (Table 7.118). The Provinces with the highest usage of alternative storage methods were the Eastern Cape (16%), Mpumalanga (21%) and the Northern Province (39%). The most frequent method of alternative storage was drying (69%) (Table7.119) and the foods most commonly stored were morog/imifino (31%), mealies (22%), meat (18%) and beans/nuts/groundnuts (10%), (Table 7.120).

Food Procurement, Household Inventory and Anthropometric Status

The children's anthropometric status (H/A and W/A) correlated (Spearman's r = 0.18 and 0.19 respectively) significantly ($p < 0.0001$) with the procurement of food items of animal origin. This was the case for children of all age groups, for children in five (H/A; $p < 0.05$) and four (W/A; $p < 0.05$) of the nine Provinces and for children living in urban (H/A; W/A; $p < 0.0001$), rural (H/A, $p < 0.0018$; W/A, $p < 0.0001$), formal urban and tribal areas. Similarly, anthropometric status correlated (H/A, r = 0.19; W/A, r = 0.22) with the procurement of milk and dairy products in children living in urban and rural areas in four (H/A, $p < 0.05$) and five (W/A, $p < 0.05$) of the nine provinces. The correlation between HH inventory and anthropometric status in relation to food items of animal origin including milk and dairy products was overall

inconsistent. This may well be due to the perishable nature of these products as well as to their more frequent purchase in smaller quantities and, therefore, to their quicker consumption.

In summary, therefore, and in general terms, the different methodologies employed in the present survey are substantially supportive of maize and sugar being the two most frequently and consistently consumed foods in the country, followed by tea, whole milk, brown bread and margarine. It is equally important to note that these same six items were also the ones that were found most frequently in the house. Furthermore, most HHs procured these items by purchasing them and subsistence agriculture was not a major source of these foods in the country. These items were primarily bought in supermarkets and to a much lesser extent in small shops. HH income would appear to be a decisive factor in the consumption and procurement of foods.

Discussion

Food Procurement and Inventory

Although a variety of approaches are needed to improve the nutritional status of a community, the data from this section of the present survey pertains mainly to the area of food security (macro- and micronutrient security) and related factors. In this regard, the FPHIQ data collected at the HH level, apart from supporting the findings of the other dietary methodologies employed, it also gives further information about the basic family foods as well as HH food procurement, availability and, by inference, consumption.

In terms of the methodology employed in the present survey, it is generally accepted that a variety of methods are available at the HH level to investigate the HH food supply and availability for economic and nutritional analysis. Each method provides information on different aspects of the subject under consideration. The methods used in the present survey were not the conventional food accounting and inventory ones that are commonly used[4], but were rather chosen to allow for the gathering of information within the constraints of the population studied. More specifically and due to the low

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level of literacy of the survey population, it was not possible to use the traditional food accounting methods, in which the housewife records all foods procured, namely, all foods purchased and all foods brought into the house, over a stipulated period of time. Moreover and because of the purchasing patterns of the population in the country where many food items are procured on a monthly basis, in order to have obtained more extensive data it would have meant that such records would have had to be kept for at least a month. The attendant financial implications made such a choice unaffordable.

The usefulness of the HH inventory is that it is considered as an objective measure of food items present in the home. This allows for a relatively independent check on the food items reported to have been procured by the family and consumed by the child in other dietary methodologies such as the 24-H-RQ or QFFQ, which rely largely on the memory of the individual volunteering the information. By contrast, the HH inventory itemises the food items and drinks in the house and is, therefore, not subject to recall errors. Indeed, the HH food inventory is rather analogous to the 24-H-RQ in the sense that both methodologies give a record of food at a particular point in time, whereas the procurement and QFFQ both define patterns of food use over time. The former measurements, therefore, give an estimate of what food is available or eaten at a particular time, whereas the latter indicate the total range of foods available or eaten over a period of time and usually yield higher estimates. One would, therefore, expect that the food procurement and the QFFQ would give similar results, as would the HH inventory and the 24-H-RQ. The data shown in Tables 7.121 - 7.124 regarding the food items found in the house and consumed by the child as well as food items procured and consumed by the child shows this to be the case in the present survey. It needs, however, to be borne in mind that the food procurement and HH inventory data refer to the HH and the QFFQ and the 24-H-RQ refer to the child.

Food Security

Food security has been defined as the availability of sufficient food at all times for all people in order to ensure an active and healthy life. Sufficient food

refers to both quantity and quality needed for good health[6]. It is also important to note that the term 'Nutrition Security' is also used[6], and is defined as the appropriate quantity and combination of inputs such as food, nutrition and health services, as well as the caretaker's time needed to ensure an active and healthy life at all times for all people. Nutrition security may be measured using anthropometric data[6]. In terms of the present survey, food security may be quantified in a number of ways including individual dietary intake as measured by the 24-H-RQ, the QFFQ, the Hunger Scale Questionnaire [(HSQ); Chapter 8 of this report] and the data described in this chapter on food procurement and the HH inventory. All the data from these methodologies are mutually and largely supportive of the presence of food insecurity at HH level in South Africa. Furthermore, it has been proposed[6] that amongst other simple measures such as the number of meals eaten daily, the frequency of foods consumed as well as the number of foods consumed may also be a useful indicator of HH food security. On the basis of the latter parameter, HH food insecurity would appear to be high in the lower income HHs on account of the low number of food items found in the HH as determined by the food inventory, and consumed by the child as determined by the 24-H-RQ (Table 7.121). It is also interesting to note that the area of residence (urban/rural) appeared to have little effect on the mean number of food items in the HH and eaten by the child in the lower income HHs. However, higher income HHs in the formal urban areas had a greater number of food items in the house. The geographical location in terms of Province seems to affect the number of food items in the house in both lower and higher income HHs. Similar effects of income and geographical location are shown by the number of food items procured by the HH, and the number of foods reported to be consumed by the child in the QFFQ (Table 7.122). In general, there is good agreement between the two methods. When one bears in mind that the major source for food procurement is purchasing, it would appear that in addition to HH income, the commercial and transport infrastructure also impact on food security as indicated by the number of foods procured, available in the house and consumed by the child.

In comparative terms, adults in the USA consume, on average, 16 foods over one day, 31 foods over 3 days and 64 foods over 15 days[14].   Other studies have reported the consumption of 35 foods over 3 days and 89 foods over 4 days[14]. Although it should be pointed out that the food consumption data of the present survey pertain to children, the data nevertheless indicate a far lower number of foods eaten by children in low income HHs, a finding that was consistent in both the urban as well as the rural areas. The data on the food items procured and consumed by the child (Tables 7.123 - 7.124) also shows good agreement between the findings of the Food Procurement and QFFQ as well as between the HH inventory and the 24-H-RQ. For all four methods, the most frequent food items consumed were maize and white sugar. The description of the foods available in the home and the foods in the HH inventory indicates that children in low income HHs have a monotonous diet reliant on cereals with little dietary variety, since animal foods, legumes, fruits and vegetables were infrequently available. In this regard, discussions of food security often concentrate primarily on energy, which, although essential, it should not detract attention from the very important role of the protein quality and the micronutrient content of the diet. In examining the HH inventory data in terms of the quality of the diet, it would appear that food insecurity also pertains to micronutrients, since it is not possible to provide sufficient micronutrients to meet the requirements of the children from the top six food items most frequently present in the low income homes, namely maize, white sugar, salt, tea, whole milk and fat (hard margarine/cooking fat). This conclusion is corroborated by the low micronutrient intake as obtained by the 24-H-RQ and the QFFQ. Dietary diversification would, therefore, appear to be very important in the South African context.

It is also of interest that the great majority of the foods most commonly eaten by children (as measured by the 24-H-RQ and the QFFQ) are procured by purchase. Subsistence agriculture, therefore, would not appear to make a large contribution to the supply of these foods in most HHs. These results are important, as there was no national data previously on the contribution of home agricultural produce to HH food consumption in South Africa. Previous studies in parts of the country have yielded mixed results. In the Northern

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Province, for instance, HH food production has been reported to be greater than HH food consumption in some districts, whereas in other districts the reverse was the case[12], and in KwaZulu/Natal many HHs in rural areas were net buyers of maize[13]. In this regard, there needs to be a more detailed analysis of the data of the present survey regarding the relationship between crop production, livestock ownership and food consumption.

Food Fortification Vehicle(s)

The data from this survey confirms the need for and the appropriateness of a policy for food fortification, which would improve the nutritional status of South African children. A low intake of micronutrients would appear to be very common. Furthermore, the low variety of foods available in the low income HHs would imply that the normal diet does not provide a sufficient intake of a number of micronutrients to meet the daily requirements of the child population of the survey. The data of the present survey make it possible to select a suitable food fortification vehicle(s). For this purpose, several criteria have been described[5] and include the following:

- The food vehicle should be consumed by a large proportion of a given population, especially those segments of the population that are considered to be at the greatest risk of the micronutrient deficiencies
- Little day to day and inter-individual variation should occur in the amount of the food vehicle consumed, in order to ensure that the micronutrient intakes remain within a safe range
- The food vehicle should be centrally processed and it should be possible for the micronutrients to be added under controlled conditions and at a minimum cost
- The food marketing and distribution channels should be such that the delivery of the fortified food to consumers can be monitored.

Maize meal would be a suitable food vehicle for micronutrient fortification, since 94% of the HHs stated that they used maize. This was also the food item that had been consumed most frequently (78%) by children in the 24 hours preceding the survey. Data from the QFFQ, which gives a better

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indication of habitual intake, also indicates that 94% of children normally consume maize meal as part of their diet. The use of maize meal in the home was further verified by the fact that maize was listed in 84% of the HHs in which a HH inventory was administered. Indeed, there was little difference between lower and higher income HHs in terms of maize being present in the HH inventory (83% and 88% respectively), but more children in the lower income homes ate maize (84% compared to 58%), (Table 7.124). In addition, in South Africa, almost 95% of HHs purchased maize and only a small proportion of HHs (5.4%) used domestically milled maize. This also means that micronutrient fortification of maize by the food industry will facilitate an increased micronutrient intake in the great majority of HHs. However, it should be borne in mind that although only a small proportion of HHs nationally used domestically milled maize, there were exceptions to this pattern. In certain areas of the country, notably the Eastern Cape and the North West Province constituted a significant minority with 15% and 17% of HHs respectively using domestically milled maize. In this regard, in the Eastern Cape most of the domestically milled maize is produced by the HHs themselves and, therefore, would not be practical to fortify. In contrast, in the North West Province of the HHs (17%) that used domestically milled maize, almost all them purchased it. This maize could, therefore, be possibly fortified, although a considerably greater effort would be required than the one to be made by the large-scale industrial producers. The maize meal which is procured as part of pay, Free State (17%) and Northern Cape (9%), would not appear to be a significant problem in relation to food fortification, since this maize appears to be processed by the food industry rather than being domestically milled. Importantly, the data on the frequency of purchase of the maize meal also suggests that there is a steady turnover of the maize meal in the HHs, and that maize is not generally stored for long periods in the home.

The procurement patterns of sugar would indicate that this food item would also lend itself to micronutrient fortification, since 93% of the HHs surveyed indicated that they used sugar, and sugar was frequently consumed in both lower and higher income HHs (75% and 81% respectively), (Table 7.124). Almost all (99%) of these HHs procured their sugar by purchase. There was

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also a steady turnover of sugar in the HH. Another finding in favour of sugar fortification would be the significantly fewer brands on the market. The latter would certainly make monitoring of the fortification process considerably easier. However, although sugar is not a perishable item, of the 96% of HHs, which indicated that they used sugar, sugar was only recorded in 73% of HHs in the HH inventory. This would suggest that the sugar purchased might not always last from one shopping occasion to the next.

Similarly, the data on wheat flour and bread indicate that the fortification of these products would also be a suitable option. These products are consumed by a very significant proportion of the population, and they are primarily (>95%) purchased. Additionally, the milling industry (wheat and maize) comprises a relatively small number of large and medium millers who "control" approximately 96% of the market (corresponding estimate for maize is 93%), apart from the considerable experience in food fortification it has mastered over the years.

The final choice of a vehicle(s) for food fortification would depend on a number of factors. The coverage of the population as estimated by the data from both the food procurement and the HH inventory data indicate that singly or in combination maize meal, sugar, bread and wheat flour would be the most suitable vehicles. However, before making such a final decision, other factors would need to be considered such as a comparison of the cost of the fortification for different food vehicles. It might for instance be prudent to choose a food vehicle that is already being fortified with micronutrients, a choice that would decrease the start up capital costs for the purchase of the necessary equipment by the food industry. It would also be useful to consider which food vehicles are being chosen for micronutrient fortification in surrounding countries in order to achieve regional harmonization of trade requirements.

Nutrition Education

Nutrition education plays an important role in improving food and nutrition security.   The fortification of foods, therefore, should it be implemented, will

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need to be accompanied by a nutrition education programme involving all relevant sectors including the public, policy makers, the food industry and health professionals. Such a programme should be based on data from this and other national surveys and should explain the widespread nature of micronutrient deficiencies/inadequate dietary intake and their effects on health in general, economic productivity and the educational development of children. Similarly, agricultural, income generating and other efforts to improve food security and dietary diversification should all include a nutrition education component. With regard to the nutrition education of the public at large, South Africa is in the process of developing Food Based Dietary Guidelines, which have been preliminarily formulated[10] on the basis of the main public health problems in the country and the evaluation of dietary factors related to these problems, in line with the agreed international principles[11]. In South Africa, the main public health problems with a nutritional basis relate both to undernutrition, as seen clearly from the low dietary intakes of children in this survey, as well as to overnutrition, as documented in this survey particularly in the urban areas and by the increasing prevalence of the chronic diseases of lifestyle. The preliminary food based dietary guidelines, which have been developed on this basis[10] for children aged 5 years and older and for adults are as follows:

- Enjoy a variety of foods
- Be active
- Make starchy foods the basis of most meals
- Eat plenty of fruits and vegetables every day
- Eat legumes regularly
- Foods of animal origin can be eaten every day
- Use fat sparingly
- Use salt sparingly
- Drink lots of clean, safe water
- If you drink alcohol, drink sensibly
- Eat healthier snacks

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One of the key features of the Food Based Dietary Guidelines is that it should include foods that are affordable and widely consumed[11] . A major concern in the South African context, however, which is borne out by the data from the present survey, concerns the feasibility of South Africans living in poor socio-economic conditions being able to implement these guidelines. Certainly, the HH inventory data of the present survey indicates a very low number of food items present in such HHs, thus making it very difficult for the members of these HHs to enjoy a variety of foods.   Furthermore, the amount of money spent on food is evidently low in many HHs, nationally 24% and 20% of HHs spent respectively R 0 - 50 and R 51 - 100 per week. The latter also relates to poverty, with 33% and 25% of the present survey's sample having a monthly HH income of R 100 - 500 and R 501 –1000 respectively. Four percent of HHs reported a zero income. In lower income EA HHs, starchy foods were widely available, but the micronutrient-rich fruits, vegetables, legumes and animal foods were not. Therefore, an improvement in HH food security is a necessary prerequisite for implementation of these guidelines. In addition, intensive education is required to ensure that the available resources in the HH are distributed prudently in order to ensure that children are fed the necessary micronutrient-rich foods, when available. This is particularly important for younger children, and, in the context of the low number of foods available in the HH in a resource poor environment, the importance of breastfeeding for the provision of an adequate diet for infants cannot be overemphasized.

A number of key principles for nutrition education have been elucidated[15] and any nutrition education programme should include a comprehensive and systematic approach for conceptualization of the importance of nutrition for optimal health, the acquisition of the support of policy-makers and health care workers in the implementation and evaluation of the programme, and the use of a multimedia approach including face-to-face communication and other traditional communication methods. In this regard, the data from this survey indicate that half of the HHs surveyed had both radio and TV. As such, it would be important to use these media for nutrition education. However,

nutrition educators have also emphasized the importance of combining these approaches with those of participatory, non-didactic methods of education. It is also important to note that successful nutrition education programmes have been found to be more effective, when professional communicators and nutritionists work jointly in achieving the aims of such programmes.

In conclusion, the data on the dietary intake as well as food procurement and consumption as obtained in the present survey by four different methodologies are mutually and largely supportive of each other and indicate that South African children are, in general, prone to several micronutrient deficiencies against a background of low incomes, unemployment and poverty.

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