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# FOOD CONSUMPTION PATTERNS SURVEY IN CHILDREN 12-108 MONTHS OF AGE: A NATIONAL SURVEY.

## PROTOCOL

### INTRODUCTION

It is generally well accepted that nutritional status, particularly of young children, serves as a general indicator of development, social upliftment and access to resources within communities at large<sup>1</sup>; sustained access to adequate food for a healthy and active life is also agreed to be a human right. Within this framework, the Department of Health has afforded, among other programmes, a high priority to the improvement of the nutritional status of children. In this regard, the South African Vitamin A Consultative Group (SAVACG) together with the Department of Health, UNICEF and Sight and Life International have documented, in 1994, a high prevalence of undernutrition and micronutrient deficiencies in a nationwide, representative study of children aged 6 to 71 months of age<sup>2</sup>; more specifically, one in four children (23%) were stunted and one in ten (9%) were underweight. One in three children (33%) had a marginal vitamin A status, a condition well known to be associated with impaired resistance to infection, decreased physical growth and increased childhood mortality<sup>3-6</sup>. Those children living in rural areas and had poorly educated mothers were the most disadvantaged. Additionally, one in ten and one in twenty children was iron depleted/deficient or severely so respectively, and one in twenty had iron deficiency anaemia<sup>2</sup>; the consequences of the latter include increased susceptibility to infections, increased fatigability, poor physical growth, reduced work and mental performance, retardation of psychomotor development and reduced learning

capacity<sup>7</sup>. In terms of potential benefits to be derived from micronutrient supplementation interventions in children, the World Bank has estimated, for instance, that vitamin A interventions are amongst the most cost-effective strategies for increased childhood survival using a measure of disability-adjusted life years (DALYs)<sup>8</sup>.

The Directorate: Nutrition of the Department of Health, within the scope of its Integrated Nutrition Programme has included the development of guidelines for a national micronutrient food fortification sub-programme as part of its strategic and operational plans. However, the formulation of a national food fortification programme requires information regarding suitable food vehicle(s) which are consumed sufficiently frequently and in sufficient quantities by the target population, and which do not pose risks for toxicity. Although such and other data have been obtained by means of national dietary surveys in other countries in the world, such as the UK for instance<sup>9</sup>, unfortunately, the available dietary studies on the nutritional status of pre and primary school children in South Africa are mostly small, localised and scientific reports on these studies focus on nutrient intake rather than on the types and quantities of foods consumed. The paucity of such relevant data has, therefore, necessitated the proposed survey.

## **AIM OF THE SURVEY**

The aim of this food consumption survey is to collect baseline information for the formulation of appropriate policy guidelines for food fortification as well as for the development of appropriate nutrition education material for children in South Africa.

## **OBJECTIVES OF THE SURVEY**

### **A. Primary Objectives:**

1. Determine usual food consumption of children aged 12-108 months in South Africa
2. Assess usual nutrient intake of 1-9 years old children in South Africa
3. Identify factors impacting on food consumption
4. Determine anthropometric status

### **B. Secondary Objectives:**

Using the baseline data obtained from the primary objectives, propose/recommend:

1. Identification of appropriate food(s) for fortification
2. Development of appropriate nutrition education material

## **METHODOLOGY**

### **Study Population**

The survey population will consist of all the children aged 12-108 months in South Africa. For this purpose a national probability sample with provincial representation will be selected using the Census 1996 information<sup>10</sup>.

## Sampling Strategy

The specifications in the Tender document for this survey prescribes that 2200 children must be included in the survey and sampled over 22 strata. However, these 22 proposed strata in the Tender document are neither distributed according to population density over the nine Provinces nor according to urban and non-urban distributions, as exemplified in Table A which has been constructed from Census `96 data<sup>10</sup>.

**Table A**  
**The Population of South Africa (`96 Census),**  
**adjusted for undercount.**

| Province  | Population size in thousands |           |       | %NonU |
|-----------|------------------------------|-----------|-------|-------|
|           | Urban                        | Non-Urban | Total |       |
| KwaZulu   | 3341                         | 4331      | 7672  | 56.5% |
| Gauteng   | 6911                         | 260       | 7171  | 3.6%  |
| EastCape  | 2188                         | 3677      | 5865  | 62.7% |
| NorthProv | 490                          | 3638      | 4128  | 88.1% |
| WestCape  | 3703                         | 415       | 4118  | 10.1% |
| NorthWest | 1060                         | 1983      | 3043  | 65.2% |
| MpumaL    | 1014                         | 1632      | 2646  | 61.7% |
| FreeState | 1718                         | 752       | 2470  | 30.4% |
| NorthCape | 535                          | 211       | 746   | 28.3% |
| Total     | 20960                        | 16899     | 37859 | 44.6% |

It can be seen from Table A that the population size **and** the percentage of non-urban areas varies considerably for the nine Provinces. If the sample needs to be representative of the households in South Africa, which is considered to be essential in terms of providing nationally representative data, then one cannot proceed with a “stratified sample consisting of one hundred children each from both urban and non-urban areas of the nine provinces,

except for the Northern and Eastern Cape Provinces where exactly double the number will be included”, as is stated in the Tender document. The necessity for a national representative sample is especially true, if the recommendations to be made from the collected data must be valid for the full demographic diversity of South Africa and for the influence it may have on the sample estimate of the frequency of food consumption.

It is therefore proposed that a self-weighting sample is drawn which will adapt itself for the population size of the nine Provinces stratified for the urban and non-urban sections as well as for provincial and national representation. The proposed sample size is provided in the Table 1 (Option A).

**Table 1 (to be read in conjunction with Table 1 , Appendix 1)****Proposed self-weighting minimum sample size per Province**

|             | Sample Size<br>for<br>Urban areas | Sample Size<br>for<br>Non-Urban<br>areas |
|-------------|-----------------------------------|--|
| KwaZulu     | 194                               | 252                                      |
| Gauteng     | 402                               | 15                                       |
| EastCape    | 127                               | 214                                      |
| NorthProv   | 28                                | 211                                      |
| WestCape    | 215                               | 24                                       |
| NorthWest   | 62                                | 115                                      |
| MpumaL      | 59                                | 95                                       |
| FreeState   | 100                               | 44                                       |
| NorthCape   | 31                                | 12                                       |
|             |                                   |  |
| Total       | 1218                              | 982                                      |
| Grand Total | 2200 children                     |  |

In order to be more efficient in the drawing of the sample, an approach based on clusters demarcated by the Enumerator Areas (EA's) as defined by the Central Statistical Service (CSS) for the 1996-Census will be taken. According to the CSS, South Africa was divided into approximately 86 000 EA's and each of the EA's consists of about 100 to 250 households. The target age group for this study is 12-108 months and, therefore, households with children in this age interval, will be used as the sampling unit.

The 86 000 EA's will be separated into subgroups with respect to Provinces and whether they were classified as urban or non-urban. After separation there will be 18 lists of EA's, nine for urban and nine for non-urban areas. Within each list a random sample of EA's will be drawn, a number sufficient for the sampling plan chosen and proportional to the population distribution.

The number of EA's in each of these subgroups will be proportional to the proposed sample size (Table 2). The number of sample points per EA will be approximately 20 households. The number of EA's in the urban Gauteng, for example, will be equal to 20 (402/20 rounded down).

A "Just-in-time" (JIT) sampling frame is proposed and will be constructed by recording the family structure of the household as well as noting who is absent in the family, the age and gender of every child living in the randomly selected household. In the event that the household consists by more than one dwelling, one dwelling per household will be selected randomly by using random numbers. Every "second" household will be visited in a spatially random sequence of the sampling process.

A detailed description of the sampling plan is provided in Appendix 1.

The inclusion of an adequate sample size for nutrient analysis (Option B) will require that a minimum of 50 children is sampled in each urban and non-urban EA. This will require a defined amount of oversampling (Table 2).

**Table 2 (to be read in conjunction with Table 2 , Appendix 1)****Proposed self-weighting sample size per Province to accommodate the 24-hour dietary recall**

|             | Sample Size<br>for<br>Urban areas | Sample Size<br>for<br>Non-Urban<br>areas |
|-------------|-----------------------------------|--|
| KwaZulu     | 200                               | 260                                      |
| Gauteng     | 400                               | 60                                       |
| EastCape    | 120                               | 220                                      |
| NorthProv   | 60                                | 220                                      |
| WestCape    | 220                               | 60                                       |
| NorthWest   | 60                                | 120                                      |
| Mpumal      | 60                                | 100                                      |
| FreeState   | 100                               | 60                                       |
| NorthCape   | 60                                | 60                                       |
|             |                                   |  |
| Total       | 1280                              | 1160                                     |
| Grand Total | 2440 children                     |  |

In order to accommodate the Tender requirement for high risk populations (Option C) within the proposed framework of a nationally representative sample, an additional oversampling will be required (Table 3).

**Table 3 (to be read in conjunction with Table 3 , Appendix 1)****Proposed self-weighting sample size per Province to accommodate 24-hour dietary recall and the requirements for high risk populations**

|                    | Sample Size for Urban areas | Sample Size for Non-Urban areas |
|--------------------|-----------------------------|---------------------------------|
| KwaZulu            | 260                         | 320                             |
| Gauteng            | 500                         | 80                              |
| EastCape           | 160                         | 280                             |
| NorthProv          | 80                          | 280                             |
| WestCape           | 280                         | 80                              |
| NorthWest          | 80                          | 160                             |
| MpumaL             | 80                          | 120                             |
| FreeState          | 120                         | 80                              |
| NorthCape          | 80                          | 80                              |
|                    |                             |                                 |
| <b>Total</b>       | <b>1640</b>                 | <b>1480</b>                     |
| <b>Grand Total</b> | <b>3120 children</b>        |                                 |

**SURVEY COMPONENTS**

It is proposed that the aims of the survey will be met by the following questionnaires/procedures:

**A. Quantified food frequency questionnaire which will reflect:**

1. Variation for individuals
2. Seasonality
3. Specified time period (6 months or a year)

**B. 24-hour dietary recall which will reflect:**

1. Variance between different groups of subjects
2. Ethnicity

**C. Household food inventory for:**

1. Cross checking dietary data
2. Providing information on packaging, brands and related details

The questionnaire will include information on the following aspects:

1. Food items consumed
2. Brand names
3. Size of food items bought
4. Place of purchase, frequency
5. Source of food (bought/home produced/gifts)
6. Cost of food items bought

**D. Factors affecting food consumption:**

Data will be collected on the following aspects:

***Factors impacting on food consumption***

- source of drinking water
- kitchen equipment (to include storage facilities)
- kitchen facilities / equipment / storage facilities
- sources of energy for food preparation
- transport to and distance from shops/shopping centres

***Factors to be included under dietary intake***

- procurement (bought, home grown, borrowed)
- land availability / livestock
- food taboos
- disease
- prices of food
- nutrient supplementation / feeding schemes
- socialisation at meals (who does child eat with)
- is this diet typical (if not, why not)

***Factors to be included under socio-demographic profile***

- recent death (exclusion criteria)
- income / employment (food for work)
- income patterns
- socio-economic status
- area of residence
- religion
- household size / composition
- education/literacy (mother)
- type of housing
- sanitation facilities
- Radio/TV/newspapers/magazines
- head of the household

**E. Hunger Scale:**

This scale is a direct measure of individual household food security. The standardised Cornell/Radimer scale will be adapted to the requirements of the present study.

**OTHER QUESTIONNAIRES/PROCEDURES**

**F. Sociodemographic questionnaire:**

- ethnicity
- (See section D of the document)

**G. Anthropometry:**

- Weight
- Height
- Mid Upper Arm Circumference
- Head circumference (0-3 year olds)

**H. Nutrient analysis:**

The South African Food Composition Tables<sup>11</sup> will be used to analyse the intake of all nutrients therein and within the known limitation of the Tables. Additional reference sources for

indigenous edible plants will be used to provide more specific detail on these specific items.

## **QUALITY CONTROL**

All questionnaires will be tested for validity and reliability; apart from the inbuilt cross checking of the information to be obtained from and between the questionnaires, those questionnaires pertaining to food intake, as appropriate, will be validated against the weighed food record method. The questionnaires will also be tested for repeatability, and additionally the information in the questionnaires will be obtained by a second (different) interviewer in every tenth household. All fieldwork will be supervised at all times by team leaders and provincial co-ordinators as appropriate.

## **PILOT STUDY**

A pilot study will be conducted in three of the nine Provinces, which will be randomly selected. The purpose of the pilot study will be to test the questionnaires as well as the logistics of conducting the survey. Any problems encountered or refinements identified for the questionnaires will be addressed prior to the implementation of the survey proper.

## **NATIONAL CO-ORDINATION AND TRAINING**

A national and nine Provincial co-ordinators will be appointed to organise and manage the field work. The framework of co-ordination and training will be similar to that employed for national survey conducted by the SAVACG. Essentially, the task of the co-ordinators will include the provision of on-going support for the survey in their Province and to be available to solve problems

as they may occur. The co-ordinators will be trained and standardised and will in turn also recruit and train fieldworkers. The training will include anthropometric measurements, interviewing techniques, fieldwork procedures, purpose of questionnaires and data to be collected as well as quality control procedures. The co-ordinators and fieldworkers will include students of dietetics/nutrition, dietitians, nutritionists, nurses, community health workers and members of the public so as to comply with the Tender specifications regarding the RDP principles. With regard to the latter, participants will be encouraged to register for postgraduate degrees when appropriate.

## **ETHICAL ISSUES**

The protocol for the survey will be approved by one or all the Ethics Committee(s) of the nine participating Universities. A written consent form will be obtained from each participant's next of kin as appropriate, who will be informed of the purpose of the study, the confidentiality of the information that will be provided as well as the participant's right to refuse or terminate participation at any time during the interview. A letter of introduction of the fieldworker will also be obtained from the Department of Health which will confirm the bona fides of the fieldworker.

## **DATA PROCESSING AND ANALYSIS**

All data will be recorded on prescribed data collection forms. All the original data coding forms will be kept centrally at the University of Stellenbosch. The data will be entered on a database programme, doubly entered and cross checked. A team of dietitians will be responsible for the standardisation of all

recipes prior to coding. The data will be scrutinised for outlying values for data cleaning purposes and other logical inconsistencies.

A preliminary analysis of descriptive statistics will be performed with the aim of providing the initial estimates of the major findings to the Department of Health.

The data will be the property of the Department of Health as per Tender specifications, The data will, however, be available for publication in reputable scientific journals with the prior permission of the department of Health.

## REFERENCES

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  10. Census '96: Preliminary Estimates of the Size of the Population of South Africa; Central Statistics. June 1997.
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## APPENDIX 1

### SAMPLING PLAN

#### First Stage: Selection of Clusters

A random sample of the EA's representing the clusters in the 18 "Provinces and urban non-urban" combinations will be provided by the Central Statistical Services (CSS) (Table 1; Option A)

**Table 1**

**Proposed minimum number of random EA's to be selected per Province**

|             | Number of EA's for Urban areas | Number of EA's for Non-Urban areas |
|-------------|--------------------------------|------------------------------------|
| KwaZulu     | 10                             | 13                                 |
| Gauteng     | 20                             | 1                                  |
| EastCape    | 6                              | 11                                 |
| NorthProv   | 1                              | 11                                 |
| WestCape    | 11                             | 1                                  |
| NorthWest   | 3                              | 6                                  |
| MpumaL      | 3                              | 5                                  |
| FreeState   | 5                              | 2                                  |
| NorthCape   | 2                              | 1                                  |
|             |                                |                                    |
| Total       | 61                             | 51                                 |
| Grand Total | 112                            |                                    |

Should a nutrient analysis form part of the survey as previously recommended, then it is an essential requirement that at least a minimum of 50 children are included in each of the 18 combinations in order to obtain a reasonable nutrient intake estimate from the 24-hour dietary recall. In order to

achieve this aim, an oversampling with respect to clusters (Table 2; Option B) will be necessary in those areas that are likely to have less than 50 children for the proposed sample (Table 1)

**Table 2**

**Proposed number of random EA's to be selected per Province to accommodate the 24-hour dietary recall**

|             | Number of EA's for Urban areas | Number of EA's for Non-Urban areas |
|-------------|--------------------------------|------------------------------------|
| KwaZulu     | 10                             | 13                                 |
| Gauteng     | 20                             | 3*                                 |
| EastCape    | 6                              | 11                                 |
| NorthProv   | 3*                             | 11                                 |
| WestCape    | 11                             | 3*                                 |
| NorthWest   | 3*                             | 6                                  |
| MpumaL      | 3*                             | 5                                  |
| FreeState   | 5                              | 3*                                 |
| NorthCape   | 3*                             | 3*                                 |
|             |                                |                                    |
| Total       | 64                             | 58                                 |
| Grand Total | 122                            |                                    |

\*In these areas the number of EA's has been purposefully increased in order to provide a sample size of at least 50 children so as to satisfy the requirement of having a sufficiently large number of children from whom a 24-hour dietary recall will be obtained.

In order to satisfy the Tender specifications pertaining to the emphasis that needs to be given to the areas with high risk populations, it will be requested from CSS to provide us with an **additional** 50% selection of EA's from which replacements (25% of the total EA's, i.e 25% of the 122 EA's shown in Table

2) will be selected, and studied, according to preset criteria with regard to poverty (Table 3; Option C).

**Table 3**

**Proposed number of random EA's to be selected per Province to accommodate the 24-hour recall and the requirements for high risk populations**

|                    | Number of EA's for Urban areas | Number of EA's for Non-Urban areas |
|--------------------|--------------------------------|------------------------------------|
| KwaZulu            | 13                             | 16                                 |
| Gauteng            | 25                             | 4                                  |
| EastCape           | 8                              | 14                                 |
| NorthProv          | 4                              | 14                                 |
| WestCape           | 14                             | 4                                  |
| NorthWest          | 4                              | 8                                  |
| MpumaL             | 4                              | 6                                  |
| FreeState          | 6                              | 4                                  |
| NorthCape          | 4                              | 4                                  |
|                    |                                |                                    |
| <b>Total</b>       | <b>82</b>                      | <b>74</b>                          |
| <b>Grand Total</b> | <b>156</b>                     |                                    |

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## **Second Stage: Selection of Households**

From the maps of the EA's that will be provided from the CSS, a random starting visiting point will be selected. A "Just-in-time" (JIT) sampling frame is proposed and will be constructed by recording the family structure of the household as well as noting who is absent in the family, the age and gender of every child living in the randomly selected household. One dwelling chosen randomly using random numbers will be selected for the survey in the event that one household has more than one dwellings. Every "second" household will be visited in a spatially random sequence of the sampling process. Those households with children in the prescribed age interval will be included in the survey.

A sufficient number of dwellings will be included in the JIT-sampling frame so that the required number of children per cluster will be selected. In order to compensate for "non-responders" an excess of 10 households per EA will be recorded.

## **Third Stage: Selection of children**

From the JIT sampling frame, children will be selected using random tables. One child per household will be included in the survey. If the selected child is in the house at the time the first visit, the child will be included in the survey immediately. In cases where the selected child is not available at the time of the first visit but the child still resides in the household, a follow up visit will be arranged in order to include the selected child in the survey. In the event of the second visit being unsuccessful, the child will be recorded as a "non-response" and a replacement child will be drawn from the JIT sampling frame to be included in the survey.

**Sampling Weights**

The proposed sample will result in oversampling in order to accommodate the requirement for the 24-hour recall. A down-weighting procedure will be adopted for the analysis of the data from the oversampled EA's in order to obtain national estimates.

The adaptation of the sample for the areas with high risk populations will result in a similar oversampling which will be also down-weighted in order to obtain national estimates.