

# Stunting among young black children and the socio-economic and health status of their mothers/caregivers in poor areas of rural Limpopo and urban Gauteng – the NutriGro Study

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**Objectives.** To determine the prevalence and immediate and underlying causes of stunting in black children aged 12 - 24 months living in rural and urban South Africa.

**Design.** A cross-sectional survey.

**Setting.** Two poor rural villages in Limpopo and two poor urban informal settlement areas in Atteridgeville, Gauteng.

**Population.** All households with mothers/caregivers (M/Cs) of children aged 12 - 24 months in the selected areas. All households meeting the inclusion criteria in the urban areas ( $N = 380$ ) and in the two rural villages ( $N = 156$ ) were included in the sample.

**Methods.** Trained interviewers collected data using a standardised socio-demographic questionnaire. Heights and weights of M/Cs and their children were measured. Stunting was defined as a z-score less than -2 for height for age. Body mass index (BMI) values were calculated for the M/C. Data were analysed using a stepwise logistical regression analysis.

**Results.** A stunting rate of 18% was documented in the rural areas, with a difference of 8% between the two villages, and 19% in the urban areas. Statistically significant associations were found between low birth weight and stunting ( $p = 0.0073$ ). Households with stunted children were significantly larger than households with non-stunted children ( $p = 0.0156$ ). Stunted children were introduced to solid foods significantly earlier than non-stunted children ( $p = 0.0415$ ).

**Conclusions and recommendations.** Similar prevalences of stunting were found in the urban and rural areas. Of the multifactorial causes of stunting, low birth weight, early complementary feeding and large household size were significantly associated with stunting. The data collected during this phase of the NutriGro Study will be the focus for all future community-based nutrition interventions.

Chronic malnutrition (or stunting) is a major health problem among young children, accounting for more than 49% of all child deaths worldwide.<sup>1</sup> Stunting in children younger than 3 years reflects an ongoing process of failure to grow, caused by frequent bouts of infection and/or dietary deprivation over an extended period of time. Globally, 33% of children under the age of 5 are stunted (low height for age), 27% are underweight (low weight for age), and in developing countries 9% are wasted (low weight for height). In Africa, 47 million children are stunted, 35 million are underweight, and 11 million are wasted.<sup>2</sup> Many children

suffer from multiple types of malnutrition, therefore the categories given are not exclusive of each other and the numbers tend to overlap.

In South Africa the National Food Consumption Survey (NFCS)<sup>3</sup> indicated that 22% of children between the ages of 1 and 9 years were stunted. The South African Vitamin A Consultative Group (SAVACG) study documented the highest stunting rates in Northern Province/Limpopo (34%), with the lowest stunting rates in Gauteng (12%).<sup>4</sup>

According to the UNICEF conceptual framework for nutrition, immediate causes of malnutrition include dietary intake and disease. Household food security, maternal and child care and health aspects are listed as the underlying causes of malnutrition, with the basic causes being limited human capabilities, economic and organisational resources.<sup>5</sup> The risk factors for malnutrition in South Africa and developing countries in general include food security, poverty, urbanisation, family unit and cohesion, physical environment, pregnancy, breastfeeding and weaning practices, education, ignorance and psychological factors, parasitic infections and alcohol intake.<sup>6</sup> Clearly, the causes of malnutrition are complex and in South Africa they have not often been dealt with extensively in one study. To combat malnutrition these causes need to be addressed at all levels.

Poor feeding practices are strongly associated with poor nutritional status. Inadequate breastfeeding, early introduction of poor-quality complementary food and failure to encourage children to eat, detrimentally influence child health.<sup>7,8</sup> The child's access to food needs to be protected during critical stages. Families should ensure the allocation of nutrient-dense foods to the child and see to it that the child gets a fair share of the family food.<sup>9</sup>

The overall aim of the NutriGro research project of the Tshwane University of Technology was to determine the prevalence and immediate, underlying and basic causes of stunting among children aged between 12 and 24 months in poor black communities in the Gauteng and Limpopo provinces of South Africa. The specific objectives of phase 1 (Fig. 1) were: (i) to assess the socio-economic circumstances of children aged between 12 and 24 months and their mothers/caregivers (M/Cs); (ii) to determine, with appropriate anthropometry, the prevalence of stunting in these areas; and (iii) to examine the association between the characteristics of the mother and the stunting status of the child. In phase 2 the objective was to document the food intake of the child, and the care practices and food security in households with stunted and non-stunted children. This article documents the findings for part of phase 1 of the study only.

As the primary focus of the NutriGro project was on poor communities, the survey was conducted in rural villages in Northern Province/Limpopo and in urban informal settlement areas in Atteridgeville, Pretoria.

## Methods

The study was designed as a cross-sectional survey. Limpopo and Gauteng were identified as the provinces to be studied, based on stunting rates<sup>4</sup> and income data.<sup>10</sup> Sekuruwe and Molekane, two rural villages in the Western region of Limpopo, 32 km north-west of Potgietersrus/Mokopane, and two urban informal settlements, Phumolong and Concern, in Atteridgeville,

19 km east of Pretoria, were selected. In both the rural and urban areas the majority of people were living in poverty. Community meetings were held in the rural and urban areas to ensure informed collaboration. Ethical permission was obtained from the nutrition sub-directorates of the Gauteng Department of Health and the Department of Health and Welfare of Northern Province. Informed consent was obtained from all participants.

Assuming a 10% stunting rate in the urban areas and 30% in the rural areas and allowing for drop-outs, the desired sample size was estimated at 600 mother/caregiver (M/C)-child pairs (400 in the urban area and 200 in the rural area). Interviewers visited all households in both areas. All mothers with children aged between 12 and 24 months were invited to participate in the study by bringing their children to a central point on a designated day. All M/C-child pairs who reported to the research centre and who gave informed consent were enrolled into the study.

A socio-demographic questionnaire was compiled in collaboration with other specialists in the field. The following classes of variables were included: socio-economic, health and sanitation and child feeding. The age of the child was recorded from the child's Road to Health chart (where available) or birth certificate. The birth weight of the child was recorded, using only information from the Road to Health chart.

The data were collected by trained and standardised interviewers from the communities. The standardised methods of the *South African Demographic and Health Survey Interviewer's Manual* were used.<sup>11</sup> Weights and heights (mothers) and weights and lengths (children) were measured using standard measuring techniques.

The EpiInfo version 6.0 programme<sup>12</sup> was used to identify stunting among the infants. A height-for-age z-score less than -2 from the National Centre for Health Statistics (NCHS) median<sup>13</sup> was used as the cut-off point for stunting. The body mass index (BMI) of the M/Cs was calculated. A BMI  $\geq 30$  kg/m<sup>2</sup> was used to indicate obesity, while BMI  $\geq 25$  kg/m<sup>2</sup> and  $\leq 29.9$  kg/m<sup>2</sup> indicated overweight, BMI  $\leq 24.99$  kg/m<sup>2</sup> and  $\geq 18.5$  kg/m<sup>2</sup> indicated normal weight, and BMI  $\leq 18.49$  kg/m<sup>2</sup> underweight.<sup>13</sup> The SAS statistical analysis program<sup>14</sup> was used for statistical analyses. Variables that were simultaneously good predictors of stunting were identified by backwards stepwise logistic regression with stunting as the dependent variable. Odds ratios for the selected variables as well as a Hosmer and Lemeshow test were calculated.<sup>15</sup>

## Results

Data were obtained from all the M/Cs who responded, resulting in a sample of 536 mothers and children, 380 mother-child pairs in the urban area and 156 in the rural areas. As there were only 536 eligible children