

Determinants of the nutritional status of children in a rural African setting: The case of Chobe District, Botswana

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Abstract

Variations in interdistrict nutritional status have puzzled both social policy makers and health workers in Botswana. A total of 643 households and 898 pre-school children were surveyed to determine factors that are associated with the nutritional status of children below the age of five years in the north-western District of Chobe. Except for those in remote and difficult-to-reach places, all households with a pre-school child were selected for the study. The results showed that the nutritional status of the pre-school children had a strong positive correlation with access to a latrine ($r = 0.52$) and ownership of cattle ($r = 0.27$). Age was negatively correlated with the child's nutritional status ($r = -0.02$).

Introduction

Botswana has shown impressive improvements in the nutritional status of children below the age of five years. The prevalence of undernutrition declined from 25% in 1985 to about 13% in 1996. However, the western districts, which include Chobe District, have consistently performed poorly in almost all basic health and nutrition indicators. Unlike the other poor and remote desert areas of Gantsi and Kgalagadi, Chobe is endowed with rich natural resources and is one of the attractive destinations for tourists in Botswana. The district also has the highest annual rainfall in the country.

The contradictions between the rich resources and the poor health and nutritional status of children under five years of age in Chobe are a concern to district and central level health workers. Hence there is a need to study some of the underlying factors associated with child undernutrition in this district. The survey was part of a food and nutrition security project supported

through a collaborative agreement between the National Institute of Development Research and Documentation (NIRD) of the University of Botswana and the Centre for Development and the Environment (SUM) of the University of Oslo. A similar study was conducted in Letlhakeng District. This paper presents findings on the association between selected variables and the nutritional status of children under five years of age.

Materials and methods

This cross-sectorial study covered eight villages and one "village town" in the north-western District of Chobe. Non-village settlements (areas with less than 500 inhabitants) were excluded from the study. These areas include the underserved and difficult-to-reach places mainly inhabited by the Basarwa (San) people, who are among the poorest in Botswana. For convenience, all households with a pre-school child were selected for the study. A total of 643 households and 898 children under five years of age were surveyed during the study period. According to the 1991 census, 14,126 people lived in Chobe.

Data collection

Structured interviews were conducted using pre-tested questionnaires administered to heads of households. Information was collected on the demographic characteristics of household members and socio-economic factors. Child-related data, such as breastfeeding, child feeding, nutritional status, and sanitary conditions, were also collected. Five female national service participants (Tirelo Sechaba) associated with the National Institute of Development Research and Documentation were used as field assistants. They were trained in basic interviewing techniques and in taking weight measurements. Translations of questions into Setswana, the local language, were agreed upon to ensure consistency.

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Anthropometric data

Weight measurements were taken from all children below the age of five years using the Salter hanging scale. Older children who could not fit into the weighing pants were allowed to hang from the scale by their hands. Weight-for-age was used as the main indicator to assess the nutritional status of pre-school children using the National Centre for Health Statistics (NCHS) reference standards. Weight measurements were taken to the nearest 0.1 kg.

Local health workers were informed about the research activities. The respondents were also made aware that the weighing that was taking place was not a substitute for monthly growth monitoring conducted at the health facilities. Before the resumption of the field study, district and local authorities were informed about the study and its objectives.

Timing

Data were collected during June and July 1993, the harvest season. The crop that year was good in comparison with that of the previous year, a drought year. There were occasional outbreaks of malaria before and during the data collection period. At least two of the five field assistants were also affected. For women, who are the main caretakers, the harvest season is one of the busiest periods of the year. Although the food security situation is usually good during harvesting, child care tends to suffer.

Analysis

Data processing was performed on an IBM computer at the National Institute of Research, using the EPI Info (version 5) computer software package. Multivariate analysis was performed to determine independent variables that significantly affected the nutritional status of pre-school children, with weight-for-age as the dependent variable.

Results

Nutritional status

The results in table 1 show that young children up to the age of 10 months have a better nutritional status than older children. By the age of three years, a child in Chobe is more than twice as likely to be underweight as a 10-month-old. The results of the regression analysis further reveal that there is a negative association between age and the nutritional status of the child.

Ethnicity

The main inhabitants of Chobe are the Basubiya, although the Batawana are politically dominant. The Banabjwa, Basarwa (San), and other groups also live in the District. As shown in table 2, ethnicity plays a very important role in the nutrition situation in Chobe. There are significant differences in nutritional status among the main ethnic groups. The percentage of undernutrition ranged from 9% among members of "other" ethnic groups to 30% among the Basarwa children. The rest of the ethnic groups are within the same range (average, 17%) with no significant differences among them.

Sex of head of household

Table 3 shows that children from female-headed households were 1.5 times more likely to be underweight than those from male-headed households ($p < .016$). Women

TABLE 1. Percentage of undernourished children (< -2 SD of reference weight-for-age) according to age group

| Age (mo) | % undernourished children |
|----------|---------------------------|
| 0-10 | 7.9 |
| 11-23 | 19.8 |
| 24-35 | 20.3 |
| 36-47 | 15.7 |
| 48+ | 20.0 |
| Total | 16.7 |

TABLE 2. Percentage of undernourished children (< -2 SD of reference weight-for-age) according to ethnicity

| Ethnicity | % of total sample | % undernourished children |
|-----------|-------------------|---------------------------|
| Basubiya | 46 | 16 |
| Batawana | 19 | 16 |
| Basarwa | 30 | 30 |
| Banabjwa | 20 | 20 |
| Others | 16 | 9 |

TABLE 3. Percentage of undernourished children (< -2 SD of reference weight-for-age) according to the sex of the head of the household

| Sex of head | % of total sample | % undernourished children ^a |
|-------------|-------------------|--|
| Female | 49 | 20 |
| Male | 51 | 14 |
| Total | 100 | 17 |

a. $p < .016$.

constitute the bulk of people living in poverty in Botswana.

Educational level of head of household

Table 4 shows that 23% of children from households headed by a person with no education were underweight, as compared with 15% and 12% of children from households headed by a person with some primary or secondary education, respectively ($p < .0019$). Education is often associated with higher socio-economic status.

Presence of a latrine

An estimated 58% of the children lived in households with latrines. Of those who had no latrine, 28% were underweight, as compared with 25% of children from households with a latrine.

Other factors

The study also considered possible associations of the nutritional status of children under five with the number of people in the household and the number and sex of the working adults in the household. The results showed no significant relation ($p < .276$) between the size of the household and the nutritional status of the children. Ownership of cattle was found to be more important ($p < .015$) in determining the nutritional status of the children. This suggests that the asset base of

TABLE 4. Percentage of undernourished children (< -2 SD of reference weight-for-age) according to the educational level of the head of the household

| Education of head | % of total sample | % undernourished children ^a |
|-------------------|-------------------|--|
| None | 32 | 23 |
| Primary | 49 | 15 |
| Secondary | 18 | 12 |
| Post-secondary | 1 | 0 |

a. $p < 0.0019$.

a household is more important than its size. However, the family size structure can have a positive effect on child nutrition in some instances [1].

A multiple regression model was run to determine the most important factors that affect the nutritional status of pre-school children. Variables considered included ownership of cattle, educational level of the head of the household, presence of a latrine, sex of the head of the household, and age of the child. Table 5 shows a relatively strong positive correlation between nutritional status and the presence of a latrine, followed by ownership of cattle. Age has a negative association with nutritional status: older children are more likely to be underweight than younger children.

Children from households with one or more working adults were less likely to be underweight (table 6).

Conclusions and discussion

Data from the survey revealed that poor nutrition mainly affects children between the ages of one and three years. The results confirm findings from previous surveys. One of the studies showed that the prevalence of moderate and severe forms of malnutrition was high in children aged 13 to 36 months [2]. A study that looked at the relationship between maternal use of time and children's health and nutritional status found that at two years of age, toddlers begin to receive less intensive care, freeing the principal caretakers, mostly mothers, for economic activities [1]. Participation of the principal caretakers in economic activities outside the household could have a negative effect on child nutrition, depending on the age of the child. Another study, in the Rukwa region of western Tanzania, reported that women spent less time cooking and feeding their children during the peak labour seasons [3]. Although the Chobe study was carried out in a high-activity season, the findings from Rukwa are relevant to this study.

Children in female-headed households were more likely to be malnourished than those in households with a male head. Ownership of cattle was positively associated with better child nutrition. Cattle are the most

TABLE 5. Variables affecting nutritional status of children under five years old

| Variable | B | 95% CI | | SE |
|--|------------|-----------|-----------|----------|
| | | Lower | Upper | |
| Ownership of cattle | 0.2700719 | 0.083527 | 0.456617 | 0.95176 |
| Educational level of head of household | 0.1072027 | -0.033098 | 0.247504 | 0.071582 |
| Presence of a latrine | 0.5197920 | 0.315638 | 0.723946 | 0.104160 |
| Sex of head of household | 0.1500735 | -0.037895 | 0.338042 | 0.095902 |
| Age of child | -0.0242134 | -0.029894 | -0.018533 | 0.002898 |

TABLE 6. Percentage of undernourished children (< -2 SD of reference weight-for-age) according to the number of working adults in the household

| No. of working adults | % undernourished children |
|-----------------------|---------------------------|
| 0 | 23 |
| 1 | 20 |
| 2 | 17 |
| 3 | 13 |

a. $\chi^2 = 3.67$; $p = .30$.

important economic asset in Botswana, in the same way that land ownership is critical in the Medak District of Andhra Pradesh, India [2]. Since women in Botswana generally have a poor asset base, malnutrition is most likely to affect children from female-headed households. The results of the multiple regression model showed an even stronger correlation between the pres-

ence of a latrine and the nutritional status of pre-school children. However, households with better socio-economic status are also likely to have latrines.

The educational background of the head of the household had an important influence on child nutrition in Chobe. This is in line with the findings from a study of selected low-income urban areas in Tanzania that showed that mothers with secondary education were about 2.2 and 3.4 times more likely to have adequately nourished normal children than those with 5 to 8 and 0 to 4 years of schooling, respectively [4]. Educational attainment is generally associated with improved socio-economic status.

Improvement of the socio-economic status of the principal child caretakers, who are mostly mothers, could go a long way towards improving the nutritional status of children. However, any intervention that seeks to improve income levels, particularly those of female-headed households, is likely to have a beneficial effect on child health and nutrition.

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