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Nutritional status of children in Alexandra township

Clinic-based data and a community survey

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A community-based survey of the nutritional status of children aged 12 - 23 months was conducted. A cluster sampling technique was used. The weight and height of 426 children were measured.

Compared with clinic-based growth-monitoring data, which showed that 5,5% of the children were below the 3rd percentile of weight for age, this survey revealed that 17,7% of boys and 9,3% of girls were below the 3rd percentile of weight for age. This may indicate that the health centre is not reaching those in greatest need.

In respect of height for age, 44,3% of boys and 44,1% of girls were below the 3rd percentile while less than 4% of boys and girls were below the 3rd percentile of weight for height; this indicated a high percentage of stunting but no acute malnutrition.

Growth monitoring may be an important component of a child health programme. However, unless growth is measured accurately and appropriate action implemented, growth monitoring alone is of little value.

Thus before continuing with the programme of growth monitoring, the Alexandra Health Centre should ensure that health workers are adequately trained and that appropriate interventions are implemented to reduce the risks associated with children who fail to gain weight at the expected rate. Once implemented, a regular evaluation of all aspects should be undertaken.

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In its efforts to provide comprehensive primary health care to the community of Alexandra, the Alexandra Health Centre (AHC) and University Clinic is attempting to create a model for health care for the urban poor.[1]

The AHC conducts well-baby clinics both at the health centre and as part of the Child Health Outreach Programme.[2] All children under 5 years of age are weighed and their growth monitored on Road-to-Health cards. As part of a health information system, all weights are plotted on a master card and data are summarised and reported on a monthly basis.[3]

Anthropometric data collected by the AHC are limited to the measurement of weight and have a number of biases. The degree to which routinely collected clinic-based data are representative of the nutritional status of the community is also not clear.

The object of this study, therefore, was to evaluate the nutritional status of children in Alexandra by means of a community-based survey. The survey was conducted in April 1990 on children 12 - 23 months of age at the same time as a vaccination coverage survey.[2]

Data from the health information system as well as the community survey will be presented in order to compare the survey's findings with routine clinic-based data.

Population and methods

Health information system data

All master cards used to record nutritional data at AHC's well-baby clinic (June 1989 to December 1990) were retrieved. The weight for age was analysed for each of 3 age categories.

Children are weighed with minimal clothing on a 25 kg hanging Salter scale if under 2 years of age and on bathroom scales if older than 2 years. There are no checks on the accuracy of measurement.

Community survey

The study population included all children aged 12 - 23 months. The sample consisted of 450 children and the sampling unit was a dwelling with a child in the required age group. A cluster sampling technique was used. Forty-five clusters were randomly selected from the 108 clusters defined on field research.[2] The initial dwelling in each cluster was randomly selected. Interviewers moved to the adjacent dwelling according to well-defined rules until 10 children of the required age were found.

The names of all mothers of children aged 12 - 23 months who were identified, but who were not present, were obtained from other members of the family or from neighbours, and 2 further attempts were made to interview them at their convenience. If a mother had 2 children in this age group, only the first-born child was included in the study. If the interviewer was unable to find 10 mothers with children of appropriate age in a particular cluster, the difference was not made up from another cluster.

The weight of children was measured to the nearest 0,1 kg. Children were weighed in underclothes only. Scales were checked with standard weights before the survey commenced and calibrated to zero before each child was weighed.

Length was measured to the nearest 0,1 cm with the child in the recumbent position according to standard World Health Organisation methods.[4]

The date of birth was taken from the Road-to-Health card. Where not available, the date of birth was obtained from the mother. The duration of the period of breast-feeding was also recorded.

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Twelve interviewers were selected from the AHC staff, most of them experienced in field surveys. Weights and heights were measured by 4 team leaders. A field pilot study was conducted in a cluster not selected for the survey.

A residence was assessed as an informal dwelling if the structure was not built primarily of permanent materials.

Repeatability checks were performed on 1 mother and child, randomly selected from each of the 45 clusters. A repeatability coefficient (twice the standard deviation of the mean difference between 2 repeat measurements) was calculated to assess agreement of continuous data.[5,6]

Because of the cluster sampling method a bootstrap procedure was used to establish confidence intervals and to identify variables associated with nutritional status.[7] Gender-specific WHO reference standards were used.[8] All data were analysed on the SAS statistical package (SAS Institute, Cary, NC).

Results

Health information system data

Data were available for 24 489 patient contacts: 68,1% were less than 12 months old, 23,8% were 12 - 23 months old and 8,1% were over 23 months of age. The weight profile for each age group is presented in Table I.

Table I. Distribution of children attending well-baby clinics according to weight for age by age group (%)

	Age (months)			
Percentile	< 12	12 - 23	> 23	All ages
> 97	12,8	3,5	1,9	9,0
3 - 97	84,7	91,0	93,2	87,0
< 3	2,5	5,5	4,9	4,0

Data from the community survey

A total of 426 children was examined. In 4 clusters, less than 10 children in the required age group were identified. Five interviews had to be excluded: in 2 cases the full birth date was not known and in 3 cases the age of the child was not within the required range. Thus the denominator for the study was 421 children.

The Kappa statistic for the repeatability study comparing answers to questions put to mothers on the period of breast-feeding was 0,8 (95% CI 0,6 - 1,0) and on the assessment of type of dwelling 0,9 (95% CI 0,7 - 1,0). The repeatability coefficient for weights was 1 500 g (mean + 2 SD = 600 g, mean – 2 SD = 900 g) and 12 cm (mean + 2 SD = 7 cm, mean – 2 SD = –5 cm) for heights.

Thirty-two per cent of dwellings were informal and 51% of the children were boys.

Mothers or guardians produced Road-to-Health cards for 88% of children (82% of mothers from informal dwellings and 92% from formal dwellings).

Three per cent of mothers reported that they had never breast-fed their babies, 17% breast-fed for less than 3 months, 9% breast-fed for 4 - 11 months while 71% reported that they breast-fed for more than 12 months. Forty-four per cent of mothers were still breast-feeding their babies.

Table II summarises the distribution of children below the 3rd percentile of weight and height for age and weight for height.

Table II. The distribution of children in the community survey below the 3rd percentile (%)

	Gender		95% confidence intervals
Weight for age	Boys	17,7	(12,5; 23,1)
	Girls	9,3	(5,3; 12,9)
Height for age	Boys	44,3	(37,5; 51,3)
	Girls	44,1	(38,8; 49,9)
Weight for height	Boys	3,5	(1,2; 7,0)
	Girls	3,9	(1,6; 6,9)

Significantly more children from informal dwellings (79,2%; 95% CI 71,7 - 84,8) had weights below the 50th percentile for age than those from formal dwellings (67,6%; 95% CI 64,4 - 70,8).

Similarly 53,2% (95% CI 46,6 - 59,2) of children from informal dwellings and 39,5% (95% CI 36,3 - 42,9) from formal dwellings had heights below the 3rd percentile for age. There was no significant difference in respect of weight for height.

When children who were no longer breast-fed were compared with children who were still breast-fed, 78,0% (95% CI 72,4 - 81,9) as opposed to 65,3% (95% CI 61,6 - 68,6) had weights below the 50th percentile for age. There was no significant difference when comparing height for age or weight for height.

Discussion

The health information system data have a number of biases. The data are biased in favour of children under 12 months of age (68% of attenders). A percentage of the data will be duplicated as no distinction was made between first and repeat attenders. Other possible biases relate to measurement errors, rounding off of decimal points and the lack of regular calibration of scales.[9] Children (especially infants) are often not completely undressed, particularly on cold days, as weight assessment is generally done in the open.

A limitation of the community survey is the narrow age group. However, the health information system data suggest that the highest prevalence of children with weights below the 3rd percentile is in this age group.

The poor inter-observer reliability, especially with regard to height, is a cause for concern. The measurement of height of children 12 - 23 months of age is a difficult procedure, particularly under adverse conditions such as in informal settlements. The exercise has to be done in the open and even with reassurance and calming, the child is excited and irritable and has to be restrained while the height is measured. In the younger child weight is more prone to change, depending on whether it is measured before or after meals or if the child has passed urine or stool.

Both data sets confirm the clinical experience at AHC that severe protein energy malnutrition is rare in Alexandra. However, the percentage of underweight children was significant and an extremely high percentage of children was

stunted. The results are similar to those from other communities in the Cape[10,11] and Oukasie.[12]

A higher percentage of boys had weights below the 3rd percentile for age but this differential was not observed with regard to height for age and weight for height.

The lower prevalence of children 12 - 23 months of age below the 3rd percentile of weight for age at the well-baby clinic (5,5%) than in the community survey (13,8%) may indicate that services are not reaching those in greatest need. Data recently collected at AHC's paediatric outpatients' department suggest that 15% of children 12 - 23 months of age have weights below the 3rd percentile, a better reflection of the community data.

Forty-four per cent of children were below the 3rd percentile of height for age, indicating that children are nutritionally stunted. Stunting is accepted as a reliable indicator of chronic malnutrition[13] and reflects the effects of socio-economic and environmental factors on growth; it is particularly alarming at this early age. A 1981 review of nutritional studies by Moosa and Coovadia[14] suggests a 30 - 60% range of chronic malnutrition in South Africa. A study in Khayelitsha showed a consistently high degree of stunting in all age groups, including 46,2% in the 12 - 23-month group.[10]

Exposure to poor environmental conditions, with higher rates of infection, and the effects of socio-economic factors may explain the association between nutritional status and residence in an informal dwelling.[15,16] A large number of children in informal dwellings are recent immigrants from rural areas and their nutritional status may reflect conditions in the areas from which they came. A limitation of this study is the lack of information on length of stay in Alexandra.

Implications for programme development

Severe protein energy malnutrition is unlikely to be a major direct cause of mortality in Alexandra. However, the health information system data for the paediatric outpatients' department and casualty underline the fact that much paediatric morbidity is associated with low weight for age.

A second major and equally important concern is the extremely high prevalence of stunting. The consequences of chronic malnutrition are usually not addressed as these effects are difficult to assess in terms of mortality and morbidity. The evidence shows that stunting does have a major medium- and long-term impact on the quality of life of children and adults,[17,18] and points to the need for programmes that address this problem.

Reasons for the differences between the routinely collected clinic data and those from the community survey must be examined.

Whom do the well-baby clinics serve? If an intervention programme was introduced would it reach those in greatest need? An evaluation to determine who attends the services and how to attract those in greatest need is being conducted at present.

Is growth monitoring adequately performed at well-baby clinics? A number of studies have shown that weights are measured inaccurately and that the plotting and interpretation are inadequate.[9,19,20] An evaluation of these functions is essential.

In order to address the problem of stunting, height should also be measured as part of the growth-monitoring programme. However, even with extensive training, height is difficult to measure accurately in children under 2 years of age.

What action should be taken if a child who fails to gain weight at the expected rate is identified? The causes of growth faltering are complex and the answers are often oversimplified.[19] However, unless appropriate action is taken, growth monitoring alone is of little value.

Growth monitoring may be an important component of a child health programme but before continuing with the programme, the AHC should ensure that: (*i*) health workers are adequately trained to measure, plot and interpret weights accurately; (*ii*) appropriate interventions are implemented to reduce the risks associated with children who fail to gain weight at the expected rate; and (*iii*) once implemented, a regular evaluation of all aspects is performed.

In addition the AHC should continue to conduct community-based nutrition surveys as routine clinic-based data may not reflect the true nutritional status of the community.

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