An anthropometric survey of the nutritional status of Black preschool children in the Dias Divisional Council area, May 1981

J. D. KRYNAUW, R. J. FINCHAM, J. P. KOTZE

Summary

The nutritional status of 1468 Black preschool children in a rural Eastern Cape area was assessed anthropometrically in order to provide the Department of Health and Welfare with a critical evaluation of the effectiveness of its subsidized skimmed milk powder scheme for local authorities in combating kwashiorkor, to indicate factors which influence nutritional levels, and perhaps to provide a sound theoretical and empirical foundation for future health strategies. Weight and height for age (using the norms of the National Center for Health Statistics (NCHS)), weight for height, and triceps and subscapular skinfold thicknesses were used as criteria for assessing nutritional status. Stated age and certified age groups were assessed separately. Depending upon the sex and stated/certified age, the percentages of children falling under the third percentile ranged from 11.1% to 37.0% for NCHS norms and from 10.9% to 15.7% for skinfold thicknesses. Together with an urban assessment undertaken in December 1982 the survey may indicate where local problems will occur.

The Department of Health and Welfare-subsidized skimmed milk powder scheme to combat kwashiorkor has been in operation for many years. A child brought to any local authority clinic and found to be under the third percentile of the Department of Health and Welfare-subsidized skimmed milk powder scheme for local authorities in combating kwashiorkor is given skimmed milk powder; only 563 kg was used for 116 children of all races found to be under the third percentile. The total population of the Port Elizabeth municipal area is estimated at 250 000 Blacks and 120 000 Coloureds, and that of the area, which comprises 9147 km², is essentially rural with a Black population of 80 749 and an estimated preschool population of 16 200. The population is mainly employed on farms producing dairy cattle, goats, sheep, fruit (e.g. pineapples), chicory, maize and wheat.

Health services in the area include 12 settled clinics and 13 mobile clinics operated by the Dias Divisional Council which provide curative, child health, preventive, family-planning and dental services. Two large provincial regional hospitals in Port Elizabeth and Grahamstown serve the area, and additional hospitals treat infectious and mental diseases.

Subjects and methods

The survey was carried out during May 1981. It was planned by a special committee invited by the regional office of the Department of Health and Welfare. Six teams, each comprising four staff members of the department, mainly qualified nursing sisters of whom at least one was Xhosa-speaking, conducted the field-work. All teams were instructed in the use of the measuring instruments, and in the use of a questionnaire, compiled by the Institute of Social and Economic Research at Rhodes University in association with the Department, designed to assess various characteristics and the socio-economic status of the households.

The Dias Divisional Council provided sectional (grid) maps of the area. A stratified random sampling procedure was employed after the area had been divided into its respective magisterial districts.

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Five anthropometric measurements were taken during the survey, but only weight, height (recumbent or standing, depending on age), and triceps and subscapular skinfold thickness were included in the assessment since upper arm circumference was regarded as being inappropriate.

Detecto balances were used to measure weight. For children under the age of 2 years a portable measuring board was used to obtain recumbent length; this was built according to a model described by the Food and Nutrition Board of the National Research Council (Assembly of Life Sciences), Washington, DC (March 1974). The Harpenden caliper, a very accurate and sensitive instrument, was used for measurements of skinfold thickness and applied as demonstrated by Tanner and Whitehouse and Keet al.

Of the indicators chosen, weight is the simplest anthropometric measurement of growth and nutrition. Weight for age (indicating short-term nutritional status and wasting in severe cases) and height for age remain key indicators of nutritional status. Waterlow et al. recommend the use of height for age (indication of long-term nutritional status or stunted growth) and weight for height as primary indicators. Weight correlated with height can be employed to detect both under- and over-nutrition.

The assessment of nutritional status based on age is difficult without accurate indications of age. It is therefore logical to include age-independent measures, e.g. skinfold thickness and weight for height, the results of which can be compared with the results for subjects for whom the certified age is available. Although weight for height can conceal undernourishment, it is a possible measure of present nutritional status where age data are unreliable and is probably independent of ethnic group. Skinfold thickness can also be used as a reliable, objective measure of suboptimal nutrition and early protein energy malnutrition in group surveys; this has a further advantage that standard values vary by less than 2 mm between the ages of 1 and 5 years, so that exact age is less important.

Although clinics use the third percentile of the Boston standards as a reference for children at risk, it was decided to apply the norms of the National Center for Health Statistics (NCHS) percentiles for the purpose of the survey. Hamill et al. document the methodology employed to establish the NCHS norms, which represent a wider cross-section of USA population standards as a reference for children at risk, it was decided to apply the norms of the National Center for Health Statistics (NCHS) percentiles for the purpose of the survey. Hamill et al. document the methodology employed to establish the NCHS norms, which represent a wider cross-section of USA population standards as a reference for children at risk, it was decided to apply the norms of the National Center for Health Statistics (NCHS) percentiles for the purpose of the survey.

The anthropometric measurements fell into two subgroups: age-dependent — in which weight and height for age were recorded, and age-independent — in which weight for height and skinfold measurements were recorded.

Certified and stated age groups were further subdivided. In some cases clinic cards were presented and appeared to be comparatively accurate. Table I presents a summary of results according to various anthropometric criteria. The differences in the totals for each category were not considered to be serious since this survey was not intended to be a research exercise but merely an indicator to the Department of the general situation.

The discrepancy between the total number of measurements used (1,203) and the survey total (1,468) in the height-for-age category can be accounted for by the exclusion of entries of height made in the questionnaire column set aside for recumbent length for children older than 2 years. Only children aged 2 years and older were subjected to the skinfold measurements.

In the weight-for-age assessment a greater discrepancy in the number and percentage falling under the third percentile occurs between stated and certified age for males than for females.

Table II illustrates the weight-for-certified-age assessment of males in different magisterial districts, showing a variation in the percentages falling under the third percentile, from 9.8% in the Alexandria district to 20.0% in the Bathurst district. The actual numbers, however, are small, not more than 10 in any one district.

### Results

A total of 1,024 questionnaires was completed, giving information on 1,468 children (50.7% male and 49.3% female) and the households from which they came.

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### Table I. Summary of the Assessment of Nutritional Status

<table>
<thead>
<tr>
<th>No. of boys</th>
<th>Under 3rd percentile</th>
<th>No.</th>
<th>%</th>
<th>No. of girls</th>
<th>Under 3rd percentile</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight-for-age category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight/age stated</td>
<td>517</td>
<td>90</td>
<td>17.4</td>
<td>477</td>
<td>74</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>Weight/certificate age</td>
<td>267</td>
<td>34</td>
<td>12.7</td>
<td>273</td>
<td>49</td>
<td>17.9</td>
<td></td>
</tr>
<tr>
<td><strong>Height-for-age category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recumbent height/age stated</td>
<td>134</td>
<td>43</td>
<td>32.1</td>
<td>151</td>
<td>35</td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>Recumbent height/certificate age</td>
<td>73</td>
<td>27</td>
<td>37.0</td>
<td>89</td>
<td>21</td>
<td>23.6</td>
<td></td>
</tr>
<tr>
<td>Stature/age stated</td>
<td>272</td>
<td>61</td>
<td>22.4</td>
<td>240</td>
<td>64</td>
<td>26.7</td>
<td></td>
</tr>
<tr>
<td>Stature/certificate age</td>
<td>127</td>
<td>33</td>
<td>26.0</td>
<td>117</td>
<td>27</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td><strong>Weight-for-height category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight/recumbent height</td>
<td>308</td>
<td>65</td>
<td>21.1</td>
<td>316</td>
<td>76</td>
<td>24.1</td>
<td></td>
</tr>
<tr>
<td>Weight/stature</td>
<td>349</td>
<td>48</td>
<td>13.8</td>
<td>332</td>
<td>37</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>Triceps skinfold thickness</td>
<td>182</td>
<td>25</td>
<td>13.7</td>
<td>177</td>
<td>26</td>
<td>14.7</td>
<td></td>
</tr>
<tr>
<td>Subscapular skinfold thickness</td>
<td>183</td>
<td>20</td>
<td>10.9</td>
<td>178</td>
<td>28</td>
<td>15.7</td>
<td></td>
</tr>
</tbody>
</table>

1. Total = 1534 — reason for excess is duplication of information on age in stated age and certificate age categories.
2. Reason for lower totals is exclusion of incorrect information given in the recumbent height and stature categories.
3. Inaccurate measurements due to difficulty in controlling children were excluded.
under 24 months of age appear to be weight-for-height development or health plans. International the children
WEIGHT-FOR- greater risk, irrespective of sex.
growth standard as valid, although there is some use for international reference values; another states that standard weight-for-age charts do not take into account differences in body composition and variations in height which may be due inter alia to genetic influences. Others claim that differences in height and weight between children of different ethnic background are relatively small. We agree, however, that in view of the general trend towards accepting the NCHS as standard reference the differing schools of thought would not influence our purpose. It was not our intention to compare the nutritional status of the children in this survey with those in other African countries.

The survey shows that about one-fifth of the children were in an unsatisfactory nutritional status, with a comparatively higher percentage in the under-2-year-old group. Although these children appeared healthy they should be regarded as undernourished, and at risk of developing kwashiorkor.

Because nutritional status is interrelated with environmental, social and cultural factors, the questionnaire employed also examined the socio-economic status of the households. The main issues were: (a) household size (8.3 persons per dwelling consisting of 2.9 rooms); (b) educational level of parents and/or respondents (nearly 60% of the mothers had some form of primary education as opposed to 45% of the fathers, but education did not seem to be a significant variable and mothers with no formal education often had better-nourished children; (c) breast-feeding — average length of breast-feeding was 14.8 months (information received from 826 respondents); (d) the degree of family cohesion (56.2% of fathers were home and employed and 2.8% home and unemployed compared with 36.1% and 50.1% of the mothers respectively, while 22.4% of the fathers and 4.6% of the mothers had deserted their families); (e) household income (low, but usually supplemented by rations); and (f) access to medical care facilities. Generally the picture is one of stable family units.

Few respondents knew of the subsidized skimmed milk powder scheme although 913 (89.2%) of the respondents stated that the children attended clinics regularly. The respondents did not state how often this occurred. The clinic staff would also not necessarily have informed a respondent that the milk powder scheme is functioning satisfactorily. If figure of 90% attendance is correct and a comparison is drawn with the 20% prevalence of undernutrition by NCHS standards, one would have to infer that the attendance rate was irregular. Some respondents might even view a single visit to the clinic as ‘regular’. This inference is subject to the assumption that the subsidized skimmed milk powder scheme is functioning satisfactorily.

**Recommendations**

There are several ways in which the nutritional status of these children can be improved. Certain questions have to be asked: Is effective use being made of the scheme at clinics? Do the mothers receive accompanying education on general nutrition? Do all...
mothers give the milk powder to the child for whom it is intended? Has the mother been motivated to be part of the scheme?

Apart from the physical and financial aspects, community development is also dependent on community involvement, via welfare organizations as well as through self-help. Specific self-help projects can be launched on an organized basis with the assistance of trained staff. The household members should be advised how income could best be employed for obtaining nutritious foods. Self-help projects could well reduce abuse of alcohol which often leads to child neglect.

The Department has no legal authority to undertake or subsidize feeding schemes. (The subsidized scheme is not a feeding scheme but a form of treatment of potential kwashiorkor sufferers.) Co-ordination between local authority services and those of welfare organizations which participate in feeding schemes is imperative. In this way children in need of supplementary feeding can be more easily identified. The family can also benefit; often if the child is undernourished the rest of the family will be as well.

Ideally there should be more frequent domiciliary visiting by the staff, in order to reach the ignorant or apathetic members of the community. Where this is not always possible community involvement is again particularly important. A back-up unit could monitor the social and economic conditions in the household of an at-risk or kwashiorkor patient, providing assistance, discussing problems with mothers and if necessary advising where supplementary feeds are obtainable.

More regular use of the existing clinic services must be encouraged. Regular attenders should motivate their friends and neighbours.

The survey has stressed that particular attention should be paid to the under-2-year-old child. All clinics are equipped to do so, since child health is one of the main functions of their services.

Conclusion

In this rural area the problem is mainly that of undernutrition rather than frank malnutrition and overt clinical kwashiorkor. Those children falling under the third percentile must, however, be considered as potential sufferers from kwashiorkor as has been the policy in the past. Biochemical investigations will provide a more definite picture but do not warrant the expense.

We have created a survey instrument which can, for example, help us to look at the socio-economic aspects of communities. A larger survey will include Black urban areas in Port Elizabeth, Grahamstown, Port Alfred/Bathurst, Alexandria and Aixedale (December 1982).

We have the means for a monitoring process — basically an early-warning system of imminent malnutrition — but it requires greater clinic involvement, making use of the charts kept of children's visits to monitor growth rates. The ideal should be a surveillance system where ongoing information can be provided by random surveys repeated annually or biennially. Surveillance is not an isolated activity, but goes hand in hand with the formulation and execution of policy; and feedback from surveillance schemes is therefore imperative.

Golden has recently postulated that dietary protein deficiency alone is not responsible for the development of oedema in kwashiorkor, but that dietary energy intake and other components such as potassium together with factors necessary for its retention also play a role. This may well require a re-evaluation of the prevention of kwashiorkor.

We thank the Director-General, Department of Health and Welfare, for permission to present this report, all our colleagues who assisted and advised, the Divisional Council of Dias for permission to conduct the survey and for assistance, the Provincial Hospital, Port Elizabeth, for constructing the portable measuring boards, the members of the planning committee and the team members who participated in this survey.

A grant was accorded to the Institute of Social and Economic Research at Rhodes University by the Human Sciences Research Council for its participation in drawing the stratified random sample, compiling the questionnaire on socio-economic factors and computerizing the results.

REFERENCES