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A community-based growth monitoring model to complement facility-based nutrition and health practices in a semi-urban community in South Africa

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Objective. To assess the feasibility of a community-based growth monitoring model in alleviating the shortcomings in health and nutrition surveillance of preschool-aged children as practised by the health services.

Method. Baseline community and health facility practice surveys and interactive workshops with the community were conducted before the study. Eleven women were trained to drive the community-based growth monitoring project. Health facility practice information was collected before and after establishment of the community-based growth monitoring system.

Results. The health facility practice reached 12 - 26% of the preschool population per month compared with 70 - 100% per 3-week session in the community-based growth monitoring system. The community-based growth monitoring system increased growth monitoring coverage of preschool children by more than 60%. Attendance of preschool children aged 12 months and older varied between 10% and 14% at the health facility practice compared with 80 - 100% in the community-based growth monitoring system. This made the system more conducive for monitoring and targeting of malnourished children for health and nutrition interventions.

Conclusion. The community-based growth monitoring model demonstrated that community participation and mobilisation can increase preschool child growth monitoring coverage extensively and contribute to improved health and nutrition surveillance.

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Inadequacies in preschool child growth monitoring (GM) coverage at health facility practices (HFPs) have been described in several studies.[1,2] Maternal perceptions of HFPs, and service providers emphasising a curative approach are key factors influencing health care coverage of the preschool child. In the absence of disease or clinical symptoms, mothers regard the childhood immunisation schedule as the main reason for visiting the HFP. The curative approach emphasised by the HFP fosters the perception among people that health care equals curative care, which is a fallacy.[3] Health care is often associated with 'the provision of doctors, drugs, ambulances and hospitals', while preventive measures are less appreciated.[3] After primary completion of the childhood immunisation schedule at 9 months, GM and preschool attendance decline drastically at HFPs. HFPs are biased in favour of children between 0 and 24 months of age, and do not assess height-for-age.[2]

Underweight, which peaks after 18 months, and stunting are often not detected because of sporadic attendance and poor GM at HFPs.[1,2,4,5] Strategies such as GM and growth promotion, oral rehydration therapy, breast-feeding, food supplementation and education of women to promote and strengthen the health facility-based nutrition component, are therefore seriously compromised.[5-8]

A community-based growth monitoring (CBGM) system in rural areas with inadequate health services appears to be a viable cost-effective option for monitoring growth, nutritional status and health of children.[9] To determine whether such a model could also be implemented in an urban setting with established health systems, required further investigation. An opportunity to pursue this issue arose when the Child Welfare Society requested assistance from the Nutritional Intervention Research Unit (NIRU) of the Medical Research Council (MRC), because of perceived problems of malnutrition among preschool children in towns on the west coast, South Africa. Langebaan was selected as a suitable community that could be researched to identify possible causal factors for the suspected nutritional situation. The purpose of this study was to determine whether a CBGM model could be established in an urban setting to alleviate shortcomings of the local HFP in terms of health and nutrition surveillance of preschool children.

Materials and methods

Study design

To develop the CBGM model a cross-sectional baseline survey was done and the results were used in conjunction with the community's perceptions of priority needs. The baseline survey comprising community-based and health facility-based components, was conducted to assess preschool children's nutritional status, nutrition and health practices and maternal perceptions of nutrition, while the CBGM model was the action component that developed after analysis of the baseline survey data presented at a ZOPP (Ziel Orientierte Projekt Planung or objective oriented project planning) workshop.[10] The baseline survey and the CBGM model will be discussed simultaneously to illustrate the impact of the model.

Study population

The study population consisted of ± 250 children aged 0 - 72 months and their mothers, living in Langebaan, a small urban town on the west coast of the Western Cape, 136 km from Cape Town. It has a population of approximately 4 000 people, and a preschool population of ± 350 children. Children were identified for the project using registrations from the HFP, the community survey and birth records. The annual birth rate is approximately 45 - 50 births and the prevalence of low birth weight (less than 2 500 g) remains at between 17% and 22%. Most inhabitants earn their living through fishing and have a low income. The town is also a big tourist attraction. A small, richer group in the town generates income mainly through accommodating tourists in holiday homes or guesthouses.

Community baseline survey

The survey was conducted over 7 months.

Questionnaires

Eleven women from the local community were trained by staff of the Nutritional Intervention Research Unit (NIRU) of the Medical Research Council (MRC) to administer questionnaires to determine caregivers' perceptions on disease, nutrition and health practices. The information was obtained from parents or guardians of preschool children during house-to-house visits. Breast-feeding information was obtained in a separate study.

Anthropometry

The women's training also involved anthropometry and GM. Children were weighed with minimal clothing on an electronic load cell scale to the nearest 0.05 kg, and height and length were measured to the nearest 0.1 cm using wooden measuring boards. Recumbent length for children under 2 years old, and measurements in the standing position for children 2 years and older were obtained.[11,12]

A calibrated 10 kg weight was used to assess the accuracy of the scales before GM sessions.

A member of the research team randomly selected children for cross-checking. Anthropometric information was used to calculate *z*-scores using Epi-Info version 6.04.

Health facility practices survey

The survey comprising preschool children attending the HFP was conducted over 12 months. The HFP survey ran

concurrently with the CBGM model for the last 5 months of the year. Information on preschool child attendance, disease prevalence and health and nutrition practices was obtained from the professional nurse as part of the information routinely collected at the HFP.

The information was recorded on structured sheets specially drawn up by the researcher. Mother's reason for visiting the HFP, procedures performed, group or individual health education topics and outcomes of visit were recorded for each child. Client status such as visitor, first or follow-up visit, was also indicated. Food supplementation data were obtained from a register held at the HFP and growth plotting practices were observed from children's road-to-health cards (RTHCs). Information was calculated monthly by listing items according to a coding system.

ZOPP workshop and the establishment of the CBGM model

The ZOPP workshop was facilitated by the NIRU as the process allows maximum involvement, and an equal opportunity for all participants to determine priority needs and to participate in the planning and implementation of an intervention project. The workshop participants comprised stakeholders from the Departments of Health and Education, the local municipality, non-governmental organisations, health committees, women's committees, reconstruction and development programme committees, and NIRU staff. Information collected during the baseline survey was used as a starting point and combined with the participant's information to construct a problem tree, and to develop a causal and objective model. This process pre-empted the establishment of the CBGM model.

Women who were originally trained to do anthropometry and GM for the baseline community survey, volunteered to manage the CBGM system. Five health stations to serve as a facility for preschool CBGM were volunteered by representatives of a church, school, crèches, the municipality and individual families in the community.

An appointment system was used to accommodate mothers in geographical areas nearest to the CBGM points to ensure effective functioning. Appointments were confirmed 1 week before the GM sessions. GM was performed 4-monthly, while nutritionally at-risk children detected during the GM sessions were monitored more than once a month and referred to the HFP for further management. Information was collected and entered into a separate folder for each child. A simplified growth chart was used for documentation, plotting and interpretation of weight to avoid interfering with the RTHC used at the HFP. Nutritional risk criteria at the CBGM included weight and height below the 3rd percentile (scale of reference at the HFP), low birth weight, growth faltering, incomplete immunisation schedule identified from the RTHC, complaints from mothers of a child being sick or chronically ill, and suspected problems of child neglect or abuse. The infrastructure of the CBGM system allowed for additional activities such as nutrition and health education, biochemical and parasitological analysis, management of iron deficiency and worm infection, and blanket deworming of preschool children, which will be reported separately.

Results

Community baseline survey

Maternal reasons for visiting the HFP

Sixty-three per cent of mothers indicated that visiting the HFP after completion of the immunisation schedule was only necessary if the child was sick, while 17% said they would attend for general assessments, information, or weighing children, and 20% did not deem it necessary at all.

Breast-feeding practices

Seventy-nine per cent of the mothers initiated breast-feeding, but none of the infants was exclusively breast-fed. Formula feeding was introduced soon after birth and solids from 0.5 -1.3 months of age.

Food supplementation

Maternal perceptions on food supplementation were not assessed.

GM practices and anthropometry

Z-scores below –2 standard deviations (SD) of the National Centre for Health Statistics reference median indicated stunting prevalence rates of 13%, underweight 7% and wasting 2.2%. Although 60% of the mothers could recognise a downward growth curve and associated it with a problem or the child being sick, 81% of the mothers were not familiar with the concept of GM.

HFP survey

Mothers' reasons for visiting the HFP

Weighing of children was the most important reason for visiting the HFP (41%) and peaked in the 0 - 23-month-old group. Ill health was the second most important reason (31%), and peaked in the 12 - 23-month-old group. Childhood immunisation was the third most important reason (23%), and exceeded ill health only during the first 12 months. Only 5% of the parents mentioned health assessments, screenings for tuberculosis, or general health information as primary reasons for visiting the HFP. From 48 months, 6 out of 8 children visit the HFP mainly due to ill health. These findings are biased in favour of mothers whose infants were in the 0 - 12-month-age group (70%).

Breast-feeding practices

HFP information regarding breast-feeding practices was inconsistently recorded. Individual breast-feeding counselling of mothers was indicated mainly if the mother experienced problems with her breasts or with breast-feeding. Exclusive breast-feeding practices were not indicated.

Protein energy malnutrition scheme food supplement at the HFP

Results indicated that only 21 out of 36 preschool children (58%) with weight below the 3rd percentile and growth faltering were entered in the PEM scheme register before, and a further 11 after, referral from the CBGM system. Of the 32 children entered in the 1996 PEM scheme register, 37.5% received the food supplement more than once, while 62.5% received it only once. The results also indicated that only 12.5% received the food supplement at uninterrupted monthly intervals for ± 3 consecutive months, while 87.5% received less than four food supplements at intervals varying from 2 to 10 months.

GM practices

A growth chart study of 51 randomly selected RTHCs indicated an average of 5 weight plots between 0 and 6 months (1 or no plot per month), 2 plots between 7 and 12 months, 1 plot between 13 and 24 months and 1 or no plots per year after the age of 24 months. Height was mainly measured at birth and height plotting was not required on the RTHC.

Preschool child coverage at the HFP

Age-specific attendance for preschool children after the age of 12 months varied between 0 and 10, 1 and 8, and 2 and 6 per month over the respective months and attendance in the 0 - 12-month age group tended to decline over the 4-monthly intervals as the year proceeded (Table I). The preschool attendance of 12 - 26% per month was constant throughout the year. Average monthly attendance was ± 17% (Fig. 1).

Table I. Age-specific coverage of preschool children at the HFP (April, August, December 1996, Langebaan)

Age category (months)	Average number of children in age category	Number of chidren attending the HFP		
		April 1996*	August 1996	December 1996†
0 - 12	57	57	37	23
13 - 24	56	10	8	6
25 - 36	56	4	5	3
37 - 48	57	10	5	4
49 - 60	42	3	4	0
61 - 72	54	3	3	4
72+	17	0	1	2

* Best attendance pattern.
† Worst attendance pattern.

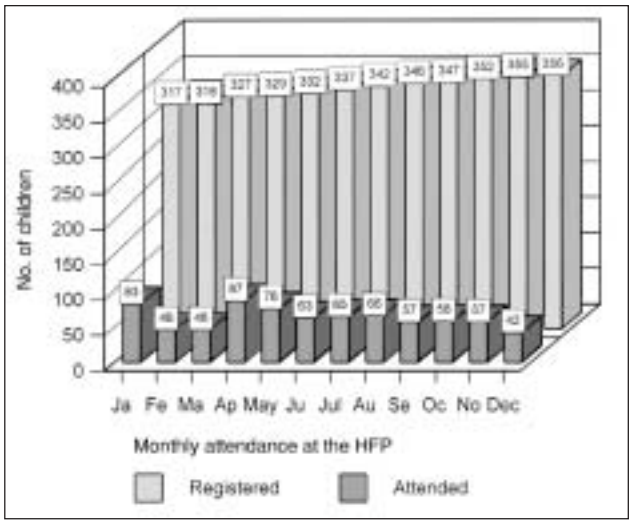

Fig. 1. Coverage of preschool children at the health facility practice (January - December 1996 Langebaan).

The ZOPP workshop and the CBGM model

The establishment of the CBGM system that was pre-empted by the ZOPP workshop resulted in sustained GM and health and nutrition surveillance of preschool children. The model complemented the existing HFP while primary health care was managed in the usual way by nursing staff under the governance of the local authority. Although the CBGM system approach was research-orientated, while the HFP was service-orientated, these findings could serve to enhance policy decisions.

Coverage of preschool children in the CBGM system

Preschool coverage in the CBGM system varied between 71% and 100%, sustaining a high average coverage of 80 - 85% over a period of 3 years (Fig. 2). Age-specific attendance after the age of 12 months varied between 17 and 37 children per session in the CBGM system compared with 1 - 8 children per month at the HFP (Fig. 3).

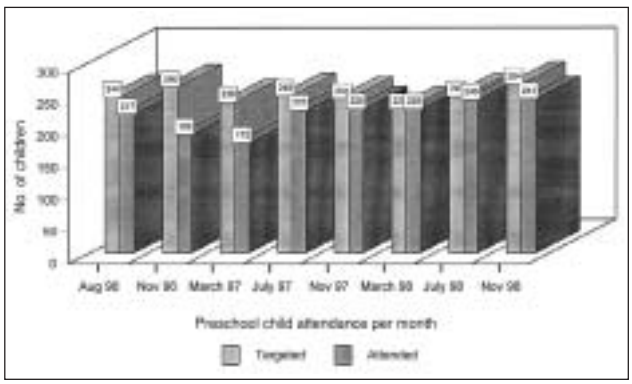

Fig. 2. Coverage of preschool children in the CBGM system (August 1996 - November 1998).

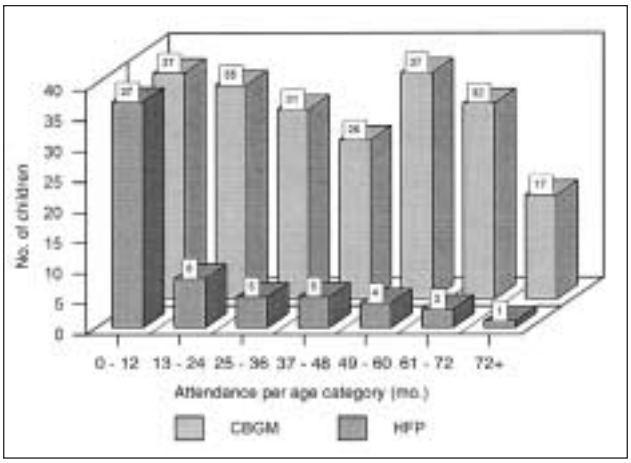

Fig. 3. Comparison of age-specific attendance at the HFP and in the CBGM system (August 1996).

GM practices and anthropometry (November 1996, November 1997 and November 1998)

The CBGM system was successful in nutrition surveillance of preschool children as reflected by the results. Average *z*-scores of children aged 0 - 12 months for November 1996, 1997 and 1998, revealed height-for-age of –1.2 SD, –0.8 SD, and –1.1 SD and weight-for-age of –0.4 SD, –0.3 SD, and –0.1 SD. Weight-for-age *z*-scores deteriorated further after 18 months, while height-for-age *z*-scores for preschool children older than 12 months remained the same. Average height- and weight-for-age *z*-scores remained consistently below the reference median. Annual low birth weight prevalence rates varied between 17% and 22%. Stunting prevalence rates among the preschool population varied between 14% and 15%, underweight 5 - 7%, and wasting 0.5 - 1%.

Discussion

Impact of the HFP on nutrition and health care

The prevailing low preschool attendance and low priority given to preventive health care should not be allowed as they influence health practices negatively. The CBGM system using women from the community has strengthened preventive health practices and should therefore not be seen as an obstacle, but rather as a mechanism to improve comprehensive health care delivery. The increased prevalence of tuberculosis and HIV infection limits the capacity of nursing staff at the HFP, which signals a need for such models to enhance social development, improve nutrition and health care delivery and reduce disease recurrence.[3, 8,13,14]

Sporadic preschool attendance at the HFP

Nursing staff emphasising curative care and the mothers' wrong perceptions of the HFPs contribute largely to sporadic preschool visits, which impact negatively on childhood nutrition and health as well as health care practices. This results in the HFPs missing the majority of mothers shortly after weaning is initiated, and the child's risk of malnutrition and infectious diseases increasing.

HFP and GM practices

Irregular and inaccurate measuring of weight and height and poor plotting and interpretation of children's weight at the HFPs is a reality.[1,2,5,15,16] This results in under-detection of retarded growth and underweight. Weighing a child without plotting is often regarded as synonymous with GM, while failing to plot weight deprives nursing staff of the opportunity to promote child growth and development.[17,18] Lack of height assessments deprives stunted children from being targeted for appropriate interventions. Discontinuous GM of preschool children hampers detection and targeting of nutritionally at-risk children, and therefore control of malnutrition and infectious diseases.

Food and iron supplementation and breast-feeding at the HFP

The PEM scheme register revealed that the HFP could not successfully detect, target and monitor nutritionally at-risk preschool children. More than 40% of preschool children with growth faltering were not detected and targeted for food supplementation before referral from the CBGM system. The number of children who received less than four food supplements in 12 months at intervals varying from 2 to 10 months, reflected a failure rate of 87.5%. Failure of 62.5% of the mothers to return for follow up reflect the low priority of the PEM scheme programme at the HFP.

Despite well-planned nutrition strategies, the prevalence of low birth weight remains high (20%), and exclusive breast-feeding practices and iron deficiency among preschool children in Langebaan remain a problem.[7,8,13,19,20] Iron requirements for low-birth-weight infants (less than 2.5 kg) or infants born before 37 weeks are increased, and iron supplementation from the age of 6 weeks is therefore recommended.[21] Guidelines to support these recommendations and criteria that are effective in targeting high-risk pregnant mothers for food and/or iron supplementation need to be communicated clearly for effective implementation of nutrition programmes at the HFPs.[7,8,13,20,22]

Nutrition programmes at the HFPs which include the PEM scheme, have functioned poorly during the past decade and are largely attributed to poor GM and promotion and sporadic preschool coverage for GM.[6,7,8,13,20] The HFPs can potentially reach all preschool parents during their infants' first 9 months of life to promote nutrition and health through accurate GM as this is part of routine health practice. Despite this, GM and nutrition practices remain unsatisfactory.[23,24] Berg's questioning of operational nutritionists and academics for golden

opportunities lost, misdirected efforts, and ignoring local needs and preferences, is therefore justified.[24]

The ZOPP workshop and impact of the CBGM model on nutrition and health care

The ZOPP workshop demonstrated that attitudes such as health professionals claiming the monopoly on health knowledge and management could be eliminated through acknowledgement, involvement and joint commitment by health professionals, the community and stakeholders in programme planning from the initial stage.[14] Alternative solutions for priority needs identified could be debated and accepted collectively. The NIRU staff of the MRC facilitated the establishment of the CBGM system, while the community committed itself to addressing priority needs and providing venues to serve as additional health stations for GM and important interventions. Training of women to drive the process facilitated transfer of knowledge and skills to the community; this allowed inadequacies related to GM, health and nutrition surveillance to be addressed, and facilitated 4-monthly deworming of children 2 years and older. This complemented the HFP in preventive care delivery.

Although three women could comfortably operate the CBGM system, training an additional eight ensured continuity and future benefits to the community. The sustained CBGM contributed to the achievement of national health objectives as it encompasses the principle of community participation, an essential element for the transformation of health services in South Africa.[8] In this way, the model demonstrated that the perceptions of passive recipients of health care could be changed.[3]

The CBGM model and GM practices

The HFP survey ran concurrently with the CBGM model for the last 5 months of the year and demonstrated differences in GM practices and preschool child coverage for GM between the two systems before and after establishment of the model. The 4-monthly GM improved the average coverage of preschool children by more than 60%. It also improved the detection and targeting of nutritionally at-risk and malnourished preschool children by more than 40%.

This system improved health and nutrition surveillance of the preschool population and indicated that infants were nutritionally compromised before their birth as reflected by the high prevalence rate of low birth weight, and mean height-for-age *z*-scores below the reference median from birth. It is believed that stunting reflects serious problems associated with poor environmental and socioeconomic factors, repeated exposure to adverse conditions and chronic malnutrition in populations. Height assessment, which is neglected, should therefore receive more priority. [2,11]

Briend and Bari[25] believe that mothers who recognise abnormal growth might be prompted to take action to prevent their child's death. The positive effect of the CBGM system in growth promotion, as measured by the increased number of mothers who reported for GM, is encouraging.

Advantages of the CBGM model

The CBGM model is not a blueprint, but can be recommended for alleviating shortcomings of HFPs in urban areas. It has the capacity for large-scale implementation, monitoring, follow-up and evaluation of programmes on a sustained basis, viz. nutrition surveillance, and vitamin A, iron and food supplementation. It provides accurate and representative data on nutritional status and ensures comprehensive detection and targeting of high-risk groups for intervention. The cost of appointing three women on a part-time basis three times a year varied from R8 000 to R10 000 (10 days), while exposure to medico-legal risks or impingement on physical resources was minimal.

Although proposals for iron supplementation, screening, and free deworming at HFPs have not yet been implemented either regionally or nationally, the model has successfully facilitated screening and management of iron deficiency and mass deworming.[20,26,27] Mass deworming was found to be of immediate benefit in high-risk populations for the effective prevention of worm infections and the harmful effects of *Trichuris*-dysentery syndrome on growth in children.[27-30]

Overcrowding, poverty and malnutrition that precipitate disease are often obscured in well-serviced urban areas with the requisite health facilities. Enlisting complementary systems such as the CBGM model could potentially reduce the epidemic proportions of tuberculosis and HIV infections and the high prevalence of low birth weight in disadvantaged urban communities.

Conclusion

Considering the results of studies done in Alexandra, the Eastern Cape, Eersterust and KwaZulu-Natal, one would assume that the situation in Langebaan is not unique, but could be indicative of a countrywide situation. The 3-year evaluation of the CBGM model in Langebaan has demonstrated that shortcomings in terms of health and nutrition surveillance could be eliminated and the HFP could be complemented with guidance and minimal supervision. This is necessary for improving the quality of health care of South Africans in disadvantaged communities.

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CONTINUING PROFESSIONAL DEVELOPMENT ACTIVITY FOR DIETITIANS

SAJCN CPD activity No 23 – December 2003

You can obtain 3 CPD points for reading the article: **"A community-based growth monitoring model to complement facility-based nutrition and health practices in a semi-urban community in South Africa"** and answering the accompanying questions.
This article has been accredited for CPD points for dietitians. (Ref number: DT 04/3/002/12)

HOW TO EARN YOUR CPD POINTS

1. Check your name and HPCSA number.
2. Read the article and answer all the questions.
3. Indicate your answers to the questions by coloring the appropriate block(s) in the cut-out section at the end of this questionnaire.
4. You will earn 3 CPD points if you answer more than 75% of the questions correctly. If you score between 60-75% 2 points will be allocated. A score of less than 60% will not earn you any CPD points.
5. Make a photocopy for your own records in case your form is lost in the mail.
6. Send the cut-out answer form **by mail,** NOT BY FAX to: SASPEN Secretariat, SAJCN CPD activity **No 23,** c/o Department of Human Nutrition, PO Box 19063, Tygerberg, 7505 to ***reach the office not later than 5 March 2004.*** Answer sheets received after this date will not be processed.

PLEASE ANSWER ALL THE QUESTIONS

(There is only **ONE** correct answer per question.)

1. The community-based growth monitoring (CBGM) system reached 70-100% of preschool children for growth monitoring (GM).
   [a] True
   [b] False

2. Preschool children's clinic attendance increase after the age of 9 months.
   [a] True
   [b] False

3. The community-based growth monitoring (CBGM) system increased preschool coverage by more than 60%.
   [a] True
   [b] False

4. Underweight tends to peak:
   [a] after 6-months
   [b] after 18-months
   [c] after 3 years

5. The recumbent position is used to measure:
   [a] children under 2-years-old
   [b] children up to 6-months-old
   [c] children over 2-years-old

6. Which of the following was used as risk criteria in the community-based system?
   [a] weight-for-age < 97th percentile
   [b] weight-for-age > 3rd percentile
   [c] weight-for-age < 3rd percentile

7. After completion of the immunising schedule, most mothers visit the health facility:
   [a] for weighing of the child
   [b] because the child is sick

8. Mothers associated a downward growth curve with a problem or a child being sick.
   [a] True
   [b] False

9. Most mothers understand the concept of growth monitoring.
   [a] True
   [b] False

10. What percentage of children received food supplements for 3 consecutive months?
    [a] 37.5%
    [b] 87.5%
    [c] 12.5%

11. The community-based growth monitoring (CBGM) system replaced existing growth monitoring (GM) practices:
    [a] True
    [b] False

12. What activity was successfully facilitated through the community-based growth monitoring (CBGM) system?
    [a] treatment of tuberculosis
    [b] mass deworming

✂ Cut along the dotted lines and send to: SASPEN Secretariat, SAJCN CPD activity **No 23,** c/o Department of Human Nutrition, PO Box 19063, Tygerberg, 7505 to ***reach the office not later than 5 March 2004***

HPCSA number: DT |__|__|__|__|__|__|__|

Surname as registered with HPCSA: _____ Initials: _____

Postal address: _____

_____ Code: _____

Full member of ADSA: |__| yes |__| no If yes, which branch do you belong to? _____

Full member of SASPEN: |__| yes |__| no Full member of NSSA: |__| yes |__| no

"A community-based growth monitoring model to complement facility-based nutrition and health practices in a semi-urban community in South Africa"

SE Schoeman, MA Dhansay, JE Fincham, E Kunneke, AJS Benadé

Please color the appropriate block for each question

(e.g. if the answer to question 1 is a: 1) a ■ b)

1) [a] [b]	2) [a] [b]	3) [a] [b]	4) [a] [b] [c]
5) [a] [b] [c]	6) [a] [b] [c]	7) [a] [b]	8) [a] [b]
9) [a] [b]	10) [a] [b] [c]	11) [a] [b]	12) [a] [b]