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A PROPOSED VITAMIN A SUPPLEMENTATION PROGRAMME FOR SOUTH AFRICA – DESIGN, COVERAGE AND COST

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Background. A national survey of the micronutrient status of preschool children in South Africa established that vitamin A deficiency is a significant public health problem, requiring urgent attention. A number of immediate and long-term interventions were recommended, including the introduction of a vitamin A supplementation programme and a food fortification programme.

Objectives. The aim of the study was to assist in the development and implementation of a national vitamin A supplementation programme at primary health care facilities for mothers and children. This was achieved by determining the design, coverage and cost of a national primary health care facility vitamin A supplementation programme.

Methods. Based on an extensive review of the literature, the main components of a primary health care facility vitamin A supplementation programme were identified. The annual, recurrent costs of each of the programme components were estimated for the nine provinces in South Africa. Immunisation coverage rates were used as a proxy for estimating the coverage of the programme.

Results. The main components of the programme were identified as: promotion, training, purchase of vitamin A capsules, distribution of vitamin A capsules to primary health care facilities, distribution of capsules to the programme beneficiaries, and monitoring and evaluation. The programme would operate from primary health care facilities and would target all children between 6 and 24

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months of age and newly delivered mothers. It was estimated that the programme would cover 74% of children and 95% of postpartum women nationally. The total annual, recurrent cost of the national programme was estimated at R16.4 million. The bulk of the costs would include personnel costs, comprising 68% of the total costs. Other costs included promotion (27%), vitamin A capsules (4%) and training (1%). The cost of the programme would vary significantly by province, but the provinces' average total cost per beneficiary would be similar.

Conclusion. A primary health care facility vitamin A supplementation programme has been designed and accompanied by an estimated overall cost and coverage for implementation. The findings of the study showed that the programme would be financially feasible and would reach the majority of children under 24 months of age. It is recommended that further research be undertaken to extend the programme to the more 'hard to reach' population using other stategies such as mass immunisation campaigns.

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A 1994 national survey of South African preschool children identified one in three children as having marginal vitamin A status (i.e. a serum retinol level below 20 µg/dl).[1] Based on the World Health Organisation (WHO)'s standards,[2] the survey established that vitamin A deficiency is a significant public health problem in all provinces in South Africa. The prevalence of deficiency was highest in the Northern Province (43.5%), KwaZulu-Natal (38%), Mpumalanga (33%), North West (32%) and Eastern Cape (31.1%) (Fig. 1).[1]

Meta-analysis showed in six out of eight studies[3] that vitamin A supplementation could reduce the all-cause mortality rate by 23% among children between the ages of 6 months and 5 years. It was found that improvement in vitamin A status was more likely to impact on mortality attributed to diarrhoeal disease and measles than on mortality attributed to

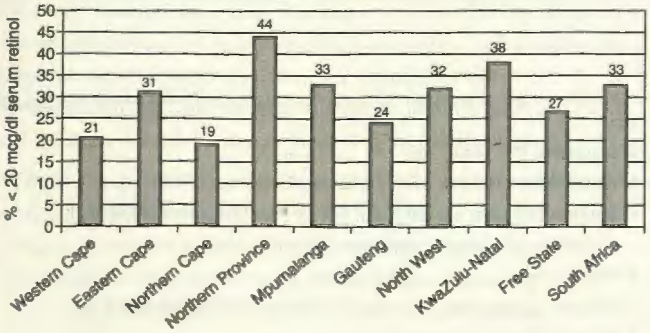

Fig. 1. Prevalence of vitamin A deficiency in children aged 6 - 71 months (SAVACG, 1995).[1]

respiratory infection or malaria.[3] It may be inferred that in South Africa, where diarrhoeal disease and measles are still important contributors to under-5 mortality and morbidity, periodic supplementation with high-dose vitamin A could improve children's vitamin A status and prevent a significant number of deaths from these diseases.

In 1997, as part of the Integrated Nutrition Programme,[4] a national vitamin A supplementation policy was drafted. The policy document recommended the provision of vitamin A supplements, as a preventive strategy, to children aged 6 - 24 months, to be administered at growth-monitoring or immunisation visits.[5] The policy document also recommended vitamin A supplementation to children with measles, severe malnutrition and children hospitalised with diarrhoea, which is already standard practice in many hospitals. The policy document has not been officially endorsed. Consequently, a national vitamin A supplementation programme has not yet been implemented nationally.

The purpose of this study was to take the next step in this process by presenting a programme design, coverage and cost of a national primary health care facility vitamin A supplementation programme, within the context of existing maternal and child health services. It is hoped that provision of this information will help to re-establish momentum in initiating a national vitamin A supplementation programme in South Africa.

METHODS

Design of the programme

The target population identified in the draft policy document[5] included postpartum mothers and children under 2 years of age. The first step in designing a vitamin A supplementation programme for this target population was to identify the main components and the required inputs of the programme. Based on a literature review and interviews with programme managers, policymakers, representatives from international agencies, universities and industry, the main components of the national primary health care vitamin A supplementation programme were identified. They included the following: promotion, training, purchase of vitamin A capsules (VACs), distribution of VACs to primary health care facilities (including maternity obstetric units and mobile clinics), distribution of capsules to the programme beneficiaries, and monitoring and evaluation.

In designing the programme the primary health care infrastructure (number of primary health care facilities and personnel) was taken into account. The personnel, their functions and estimated time required to implement the programme were identified at national, provincial, regional and district levels. Through interviews with provincial-level

health promotion staff a promotion strategy for the programme was designed and its costs were estimated. Personnel working in the provincial pharmaceutical services subdirectorate provided information on the storage and distribution of the capsules to primary health care facilities. A review of current health information systems was undertaken to assess the means by which to monitor the distribution of capsules and to estimate the expected coverage of the programme.

Programme coverage

Immunisation coverage rates from the South African Vitamin A Consultative Group (SAVACG) survey[1] were used as a proxy for estimating the coverage of a vitamin A supplementation programme for children under 24 months of age.[1] Coverage of postpartum women was estimated on the basis of BCG immunisation coverage rates.

Costs of a national primary health care facility vitamin A programme

The annual, recurrent costs of each of the programme components were estimated by identifying the various types, quantities and cost of all of the inputs required. These costs, together with the identification of some national level activities, formed the foundation of the national primary health care facility vitamin A supplementation programme proposed here. Costing algorithms were devised for each of the six programme components identified above, and the programme's costs were estimated for each of the country's nine provinces. The costing algorithms allow provincial cost to vary by the size of the target population, the expected coverage rates for children and postpartum mothers, and the numbers of primary health care facilities, nursing sisters, regions and districts in the province.

Personnel cost estimates were based on the proportion of time staff at primary health care facilities for mothers and children would spend on the programme in relation to their normal working hours. The number of annual births and the estimated coverage of the programme provincially were used to calculate number of capsules (100 000 IU) that would need to be purchased. The number of capsules was then multiplied by the average cost of each capsule (i.e. 10.68 cents) to derive the total cost of the capsules. Training cost estimates included cost of training materials, travel costs for both trainer and trainee, and a prorated portion of the salary of the trainer. The health promotion materials and their costs were based on the promotion costs of the 1996 measles immunisation campaign (Provincial Administration of the Western Cape Department of Health, health promotion subdirectorate – personal communication, 1997). The costs of monitoring the programme were also estimated and included in the total personnel cost estimates.

RESULTS

Programme design

At provincial level the nutrition subdirectorates would be responsible for financing the vitamin A supplementation programme. The programme would be implemented through primary health care facilities, and would be the joint responsibility of the subdirectorates of nutrition and maternal, child and women's health. The agencies responsible for each of the activities are outlined in Table I.

Table I. A primary health care facility vitamin A supplementation programme – inputs and agencies responsible

Inputs	Agencies responsible
Training	Human resources development Academic institutions Health services
Promotion	Health promotion directorates and subdirectorates
Purchase and distribution of capsules to facilities	Pharmaceutical services subdirectorate
Distribution of capsules to programme beneficiaries	Professional nurses at primary health care facilities
Monitoring and evaluation	Nutrition and maternal, child and women's health directorates and subdirectorates

Initiation of the programme would be accompanied by initial training. Training would be provided to one nurse working in each of the primary health care facilities in the province. Training would consist of a 1-day workshop in each region, dedicated exclusively to vitamin A, and would include a session on how to organise, administer and implement a VAC distribution programme at primary health care facilities.

Training materials would be based on a Department of Health-commissioned, vitamin A brochure developed specifically for health workers.[6] In addition, a set of training materials would be made available to each district in the different provinces. Training on vitamin A supplementation would be integrated into the existing training infrastructure, and would be provided through an integrated maternal and child health training package for nurses. Following the initial 'start up' training, vitamin A would be integrated into the annual refresher training sessions, and would be the focus of an estimated 10% of these annual 1-day sessions.

The vitamin A promotional activities would be most intensive during the 'start up' phase of the programme, with annual ongoing promotional activities thereafter. Promotional activities would include community newspaper advertisements, posters, and community radio talk shows. In

addition, each primary health care facility would be given 500 pamphlets on vitamin A to distribute to its clientele. VACs (100 000 IU) would be distributed by the programme.[5] A local supplier was identified. Capsules would be distributed by the provincial medical depots along with the essential drugs, which are currently delivered on a regular basis to all local primary health care facilities. Capsules would be distributed to children (6 - 24 months) during immunisation visits at 9 and 18 months, followed by a dose at 24 months, as part of growth monitoring within an integrated maternal and child health service. Postpartum women would be given two capsules, each containing 100 000 IU, within 4 weeks of delivery. The personnel inputs were identified for the nutrition and maternal, child and women's health subdirectorates at provincial, regional and district levels and for the type and number of personnel. Personnel costs were calculated on the basis of staff salaries and per cent time, which varied from 1% to 15%, needed to implement the programme.

The administration of vitamin A supplements to children would be recorded on their Road-to-Health cards. For postpartum women, supplements would be recorded on their health or delivery cards. Information would be collected at primary health care facilities on the number of children who received supplements at 9, 18 and 24 months of age. This information would be reported and analysed in the same way that immunisation coverage data are reported and analysed.

Coverage and cost of a national primary health care facility vitamin A supplementation programme

Based on national immunisation coverage rates, it is estimated that the programme will cover 74% of children aged between 6 and 24 months nationwide, with individual provincial coverage rates ranging between 58% and 85%. Based on BCG immunisation coverage rates, 95% of postpartum women will be covered by the programme (Table II).

Based on discussions with officials of the provincial pharmaceutical services, it was determined that the incremental costs of transporting VACs would be zero, i.e. the distribution of VACs could be accommodated within the existing drug and medical supplies delivery schedules without requiring additional distributions.

Annual, recurrent promotion costs were estimated as the sum of the cost of providing 500 vitamin A pamphlets per primary health care facility and R1.50 per member of the target population for all other promotional materials and activities (most importantly newspaper advertisements and radio spots).

Annual recurrent training costs were estimated as the prorated (10%) share of the annual refresher training of one representative of each primary health care facility, including the annual cost of printing and providing manuals and guidelines.

It is estimated that the total annual cost of the capsules for mothers and children will be R769 254. The total costs nationally for the other inputs of the programme include personnel (R11 099 450), promotion (R4 362 098) and training (R180 702). The total annual, recurrent costs of the national programme will be R16.4 million (Fig. 2). The individual provincial costs disaggregated by major activities and inputs, and the cost per beneficiary are presented in Table III. Total costs will consist overwhelmingly of personnel costs making up 68% of all national costs, with promotion accounting for 27%, VACs 4% and training 1%. Total costs of the programme will vary significantly by province, but the provinces' average total cost per beneficiary will be fairly similar. Variation in the total cost of the programme by province is primarily due to variation in the number of primary health care facilities, which, in turn, is related to the size of the province's population. In general, the larger the population of a province, the more primary health care facilities it has and the more personnel who are involved in distributing VACs and other administrative aspects of the programme.

Table II. Immunisation coverage (12 - 23 months) indicating potential vitamin A coverage by province (SAVACG, 1995)

Area	% BCG and vitamin A dose for mothers	% DTP 3 and vitamin A dose at 6 months for infants	% Measles and vitamin A dose at 9 months for infants	% Fully immunised and proxy for vitamin A dose after 12 months
South Africa	95.2	80.6	84.5	74.0
Northern Cape	98.2	87.0	88.6	80.6
Western Cape	98.2	85.7	95.2	80.4
Eastern Cape	92.1	70.2	71.6	58.0
KwaZulu-Natal	94,2	73.1	86.0	70.7
Mpumalanga	93.8	84.2	78.6	73.8
Northern Province	96.1	89.7	91.5	84.4
Gauteng	98.4	88.8	89.3	85.1
North West	96.6	86.4	87.7	87.7
Free State	96.2	80.6	82.9	82.9

Table III. Vitamin A supplementation programme total annual recurrent cost by province

Activity or input	Western Cape	Eastern Cape	Northern Cape	Gauteng	Northern Province	North West	Mpumalanga	KwaZulu-Natal	Free State	Nation-wide
Training	21 156	30 357	9 879	34 438	15 177	14 426	14 640	22 767	17 862	180 702
Vitamin A capsules (Rands)	66 998	123 982	14 129	138 873	109 829	77 243	52 267	164 400	21 534	769 254
Personnel (Rands)	982 494	1 720 763	277 364	1 921 949	1 451 176	1 088 995	758 465	2 204 206	694 040	11 099 452
Promotion (Rands)	436 470	842 985	90 495	791 520	427 170	364 598	266 730	880 185	261 945	4 362 098
Total costs (Rands)	1 507 117	2 718 087	391 867	2 886 780	2 003 352	1 545 261	1 092 102	3 271 558	995 381	16 411 505
Annual beneficiaries (*N*)										
Children < 2 yrs	181 192	306 153	37 082	365 721	225 389	187 145	117 482	381 298	108 186	1 909 648
New mothers	89 000	201 138	20 179	196 800	235 445	129 806	99 272	297 534	87 879	1 357 053
Total	270 192	507 291	57 261	562 521	460 834	316 951	216 754	678 832	196 065	3 266 701
Total cost per beneficiary (Rands)	5.6	5.4	6.8	5.1	4.3	4.9	5.0	4.8	5.1	5.0

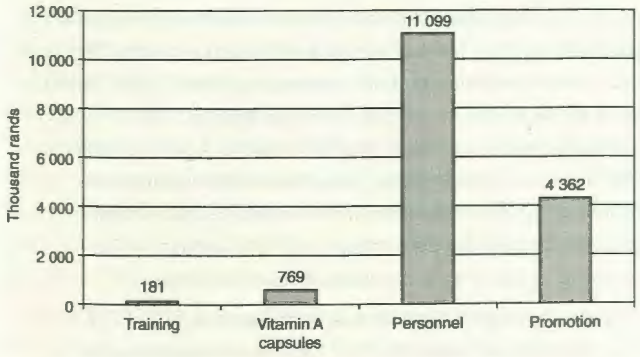

Fig. 2. Composition of the national vitamin A programme's recurrent costs.

Discussion

The national vitamin A supplementation policy does not provide criteria for targeting children likely to be at risk of vitamin A deficiency. Given the high prevalence of the problem in most of the provinces, this may prove to be difficult for primary health workers. Concerns have been raised with regard to high-dose vitamin A increasing the risk of diarrhoeal diseases and respiratory infections. However, as outlined in the report by Beaton et *al.*,[3] there does not appear to be consistent evidence for this effect and major credence should not be given to a few reports on the negative impact of vitamin A administration.

Based on the immunisation coverage rate of children under 2 years old (as estimated in the SAVACG survey), it is estimated that a national primary health care facility vitamin A supplementation programme will achieve a 74% national coverage rate of the under-2 population.[1] However, programme coverage for children under 1 year of age would be greater than 80%, given the current measles immunisation coverage rate of 84.5% nationally, resulting in adequate vitamin A being provided to a large proportion of the target group. There is, however, concern about giving the first vitamin A dose only at 9 months, if the programme is linked with the Expanded Programme on Immunisation (EPI).[5] The WHO [7] recommends administering the first dose of vitamin A at 4 - 6 months and if this dose of vitamin A is included, it could result in mortality reduction, an increase in the number of lives saved and increased health care cost savings. While the programme design focuses specifically on under-2s, opportunities should be created for distributing capsules to children between 24 and 71 months as well.[8]

Linking the national vitamin A supplementation programme with the EPI programme and making it function as part of a comprehensive maternal and child health service, is desirable because doing so would ensure the programme's sustainability and improve its efficiency (i.e. reduce its costs).[8,9] Taking into account the value of all the necessary inputs, the total cost of the national programme has been estimated at R16.4 million. It is important to note, however, that the bulk of the annual, recurrent costs of the programme are personnel costs. Given that vitamin A supplementation will not entail recruiting any additional staff and will become one of the nutrition-related activities of an integrated, comprehensive maternal and child health service, personnel costs are already being paid for by the provinces. As such, the additional direct outlays that the national vitamin A supplementation programme would annually require would be only R5.3 million (R16.4 million – R11.099 million), making the implementation of a national vitamin A supplementation programme a financially feasible and attractive public health policy option for South Africa.

It is not known to what extent the vitamin A supplementation programme will cover the vitamin A-deficient population. It is also not known whether or not special efforts will be made to reach those not covered by the primary health

care facility vitamin A supplementation programme, or what the cost of any such efforts might be. Use of other EPI strategies such as mass immunisation campaigns, need investigation as vehicles for getting vitamin A out to the 'hard-to-reach' population. It is likely, however, that an outreach programme would substantially increase the overall costs of the vitamin A supplementation programme. Whether or not these additional costs would be regarded as worthwhile in terms of the morbidity and mortality they might be expected to avert, is an important albeit independent policy issue.

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LATEX ALLERGY AT GROOTE SCHUUR HOSPITAL — PREVALENCE, CLINICAL FEATURES AND OUTCOME

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Background. The incidence of latex allergy is increasing worldwide but there is very little information available on the clinical outcome for affected individuals.

Objective. To determine the prevalence of latex allergy at Groote Schuur Hospital, a large teaching hospital in Cape Town, and to study the outcome for affected individuals.

Method. Using a questionnaire, we screened 2 316 hospital workers for the presence of work-related symptoms. Workers who were symptomatic had Immunocap RAST (CAP RAST) or skin-prick tests to confirm latex sensitivity. Latex-avoidance measures were implemented in positive subjects. One hundred symptomatic, sensitised individuals were followed up 3 months after intervention to assess their clinical status. A further cohort of 25 individuals with ongoing nasal symptoms were studied in detail.

Results. Latex sensitisation was confirmed in 182 of 717 symptomatic workers (25.3%). Sensitised symptomatic workers were significantly more likely to have had a previous history of urticaria ($P = < 0.001$), oral allergy syndrome ($P = < 0.001$), or allergic conjunctivitis ($P = 0.001$), but not hay fever, perennial rhinitis, eczema or insect allergies. Latex sensitisation occurred among all classes of health care workers. Ocular and cutaneous symptoms were significantly associated with positive latex sensitisation ($P = < 0.001$). After latex intervention, ocular symptoms ($P = < 0.001$), skin rashes ($P = < 0.001$) and wheezing ($P = 0.001$) reduced significantly. Nasal symptoms did not improve. Undiagnosed and untreated underlying allergies to common aero-allergens were present in the majority of latex-sensitised patients with ongoing nasal symptomatology.

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