MRC POLICY BRIEF
FEBRUARY 2012

IS PROPHYLACTIC VITAMIN A SUPPLEMENTATION JUSTIFIED IN AREAS WHERE LIVER IS FREQUENTLY EATEN?

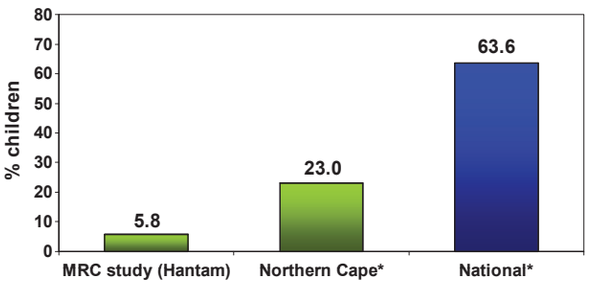
Background

Vitamin A is essential for normal vision, growth, development and immune function. Insufficient vitamin A may increase children's risk of severe or repeated infections and consequently their risk of dying. Currently vitamin A deficiency (VAD) affects an estimated 190 million preschool children in developing countries,[1] and is considered to be a public health problem where more than 15% of the under-five population present with subclinical VAD (serum retinol below 20 μg/dL).[2] In such countries, periodic high dose vitamin A supplementation (VAS) is recommended to address the problem. South Africa (SA) implemented a VAS programme in 2002, which targets preschool children. Children aged 6 to 11 months receive a single vitamin A dose of 100 000 IU, while children aged 12 to 60 months receive 200 000 IU every 6 months.

The Northern Cape Vitamin A Situation

According to the 2005 national survey[3] conducted among 1-9-year-old children, SA has a VAD prevalence of 63.6%. The prevalence in the Northern Cape (NC) is 23%, which is considerably lower than the national level (Fig 1). Despite this low VAD prevalence, the NC has the highest levels of stunting and underweight,[3] and a high under-five mortality rate (Fig 2). In addition to the findings of the national survey, two MRC studies conducted in a poor community of the Hantam district in the NC revealed a virtual absence of VAD. Baseline data from an iron fortification trial conducted in 2002 among 6-9-year-old school children showed a VAD prevalence of less than 1%, but high levels of stunting, underweight and wasting;[4] these children were not exposed to prophylactic VAS during their preschool years. A subsequent study in 2008 conducted among the preschool children from the same community showed a VAD prevalence of only 5.8%, and high levels of stunting, underweight and wasting (Fig 1 and 3).[5] Since VAD is usually associated with low socio-economic and poor anthropometric status,[1] this low prevalence of VAD does not fit in with the profile of this impoverished community. The preschool study only included children who did not receive VAS during the 6 months that preceded the study. The children's vitamin A status could therefore not have been influenced by the VAS programme. In fact, 77% of the children had not received a vitamin A supplement during the preceding 18 months, while 40% had never been exposed to vitamin A supplementation at all.[5]

Figure 1: Prevalence of VAD in SA children
Hantam district *vs* provincial and national data



* National Food Fortification Survey (2005)

Figure 2: Under-five mortality: Statistics SA 2008
Northern Cape *vs* national data

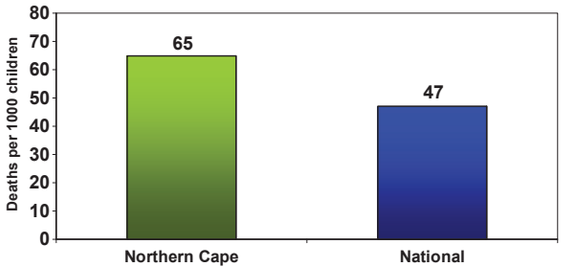
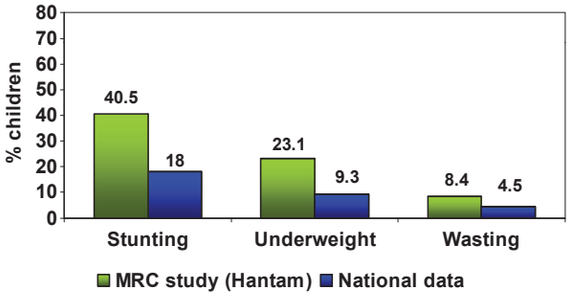


Figure 3: Anthropometric status of SA preschool children
Hantam district *vs* national data



KEY POINTS

- Liver is an excellent source of preformed vitamin A
- Only 40-50g of sheep liver twice a month is sufficient to meet the vitamin A requirement of the preschool child
- Vitamin A supplementation (VAS) may not be necessary in areas where liver is frequently eaten
- Indiscriminate application of VAS i.e., in areas where it is not needed, may incur undue cost and strain on human resources, which could be better directed at addressing other nutritional problems, such as stunting and underweight
- Possible harmful effects of VAS in children with adequate vitamin A status should also be taken into account
- It is important to identify and locate the pockets in SA where liver is frequently eaten
- Multi-sectorial collaboration to reassess the VAS policy is needed

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Liver as a natural "*vitamin A supplement*"

In poverty stricken communities, peoples' vulnerability in terms of child care and access to essential resources, including food, is increased. Despite this, the vitamin A status of children in the Hantam district is adequate. Sheep farming is a main industry in the area, with abattoir activities taking place on a daily basis. Liver and organ meat are frequently available and are sold at an affordable price at various community outlets. The sheep farming industry therefore contributes considerably to the household food of this poor community. An assessment of their liver eating patterns revealed that liver was eaten in 98% of households and by 89% of preschool children.[5] As many as 87% of the households ate liver at least once a month, while 30% reported eating liver once a week or more. Liver was introduced into the child's diet at a median age of 18 months, while 45% have been eating liver from the age of 12 months or younger. There was a significant inverse correlation between the educational level of the mother and the frequency of liver consumption, suggesting that those most vulnerable to VAD eat liver more often and thus unknowingly engage in eating habits that protect them against VAD.

Liver is a highly concentrated, but often undervalued, source of preformed vitamin A. Sheep liver contains 7800 μg RE per 100g.[6] The estimated average daily requirement (EAR) for children aged 1-3 and 4-8 years is only 210 and 275 μg RE, respectively.[7] This means that liver does not have to be eaten in great amounts or even every day. Only 20-25g of liver once a week or one 40-50g portion twice a month would be sufficient to meet the vitamin A requirement of the preschool child.

The liver eating patterns in this community have therefore created a mechanism by which VAD, a global nutritional problem, is spontaneously addressed through local practices, which makes additional vitamin A in the form of high dose capsules unnecessary. The children's vitamin A status is further enhanced by the fact that 93% were being breastfed or had been breastfed in the past by mothers who frequently consume liver and are likely to have adequate vitamin A stores; the median duration of breastfeeding was 18 months.

Concerns about Vitamin A supplementation in "*liver eating*" communities

- Although VAS is known to reduce all-cause mortality in VAD children,[8] the effect of regular high dose VAS in vitamin A sufficient children is not known.
- There are indications that VAS may increase respiratory tract infections in vitamin A sufficient children.[9]
- The high levels of stunting and underweight in this community is a concern and suggest that the children are likely to be deficient in various nutrients, other than vitamin A. Providing vitamin A capsules to these children may create a perception that their nutritional needs are being attended to, and may impede other more needed interventions. While the VAS programme in SA is gaining momentum, even in populations where it is not needed, interventions to address stunting and underweight seem to be stagnating, and need to be intensified, especially in those areas where high levels of stunting and underweight are prevalent.

Concluding remarks

The unusually low prevalence of VAD documented in the Hantam area of the Northern Cape Province pose a new challenge for the need for prophylactic VAS in areas where liver is frequently eaten. Unknown to this community and many officials, liver intake in the Hantam area contributes substantially to the children's adequate vitamin A status, and is an excellent example of how primary health care can be accomplished at community level. The frequent intake of liver is probably not restricted to the Hantam area, as sheep farming is a major activity in most of the dry NC. An extensive survey, covering the entire NC province, is currently underway to establish how many of these "liver eating" pockets exist, and where they are located. The virtual absence of VAD in the Hantam area in the same country where high VAD levels also exist, is a reflection of SA's cultural diversity. This highlights the complexity of formulating a policy that will address the varying needs of all of SA's people. For this, multi-sectorial collaboration, which includes researchers and other key role players, is needed.

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