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Ill-health reported by schoolchildren during questionnaire surveys in Ghana, Mozambique and Tanzania

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Summary

BACKGROUND Insufficient attention has been paid to the health problems of school-age children in sub-Saharan Africa. A questionnaire administered to schoolchildren about their ill-health has been developed to identify schools in which urinary schistosomiasis occurs. The data collected during the interviews can also be used to assess other common health problems.
OBJECTIVES To analyse data collected during health questionnaires in schools to assess how schoolchildren perceive their own health, and to compare the findings between three countries in sub-Saharan Africa.
METHODS Questionnaires asking about recent health problems were administered by teachers to schoolchildren in 120 primary schools in Mozambique, 52 primary schools in Tanzania and 298 primary schools in Ghana. A total of 67 002 children aged 8–15 years took part.
RESULTS Of the 10 health problems asked about in all questionnaires, the average number reported by each child was 3.9 in Ghana, 3.4 in Mozambique and 3.1 in Tanzania. The distributions of the prevalence of each condition among schools were similar and the prevalence of all conditions showed a similar ranking. For most conditions a greater percentage of girls than boys reported each health problem.
CONCLUSIONS Schoolchildren in Ghana, Mozambique and Tanzania do not perceive themselves to be healthy. The pattern of reported health problems was similar in each country. School health questionnaires are worthy of further study and validation.

keywords school-age children, health, questionnaires, Ghana, Tanzania, Mozambique

Introduction

There are few policies and programmes to combat morbidity in school-age children in developing countries, especially when compared with programmes for infants and pre-school children, and they could be considered a neglected group (Goodburn & Ross 2000). This is mainly because there is little information about the extent and causes of ill-health among school-age children and, what information does exist, tends to have been collected during small surveys on a few children. There is also little or no published information about how school-age children perceive their own health.

Questionnaires have been recognized for some time as a means to find out about people's health problems and to provide information which can help to plan programmes (Kroeger 1983; Ross & Vaughan 1986; Barreto 1998; Mafe *et al.* 2000). A study in Bangladesh, for example showed that children aged between 2 and 9 could reliably identify their own severe or moderately severe disabilities (Zaman *et al.* 1990) while interviews with mothers in Ghana and the Philippines have been used to diagnose specific health problems in their children (Belcher *et al.* 1976; Kalter *et al.* 1991). Questionnaires have also been used to explore perceptions and attitudes to health and ill-health (Ostberg *et al.* 2001).

If the information given by children in a questionnaire is diagnostically reliable, so long as any under- or over-reporting is systematic and consistent, it could be used to identify schools where a health problem is common and where curative or preventive measures could be effectively directed. This notion has been studied and validated for urinary schistosomiasis, a focal disease caused by the blood fluke *Schistosoma haematobium* which is

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responsible for some distinctive symptoms including pain when urinating and blood visible in urine. These self-reported symptoms can be validated easily, either by testing urine for blood using a reagent strip, or by examining microscopically a filtrate of urine or some sediment. In this way the relationship between the reported prevalence of a symptom and the prevalence of infection can be established. Research in Tanzania has shown that the prevalence of symptoms of urinary schistosomiasis in schools under-reports the actual prevalence by a consistent percentage (Lengeler *et al.* 1991; Ansell *et al.* 1997) and that, in some circumstances at least, children can quite reliably diagnose their own infections when they have moderate to heavy infections (Partnership for Child Development 1999a). The 'red urine' questionnaire as it has been called, which is administered by teachers, has been validated in several African countries (Red Urine Study Group 1995; Lengeler *et al.* 2002) and has become a useful tool to identify schools where urinary schistosomiasis occurs and in which mass treatment with praziquantel is warranted (UKUMTA 1997; Partnership for Child Development 1999a). The questionnaire has also been applied in areas where intestinal schistosomiasis caused by *Schistosoma mansoni* occurs, but it has generally been found to be less sensitive and specific than for *Schistosomiasis haematobium*, and according to a review by Lengeler *et al.* (2002), still requires validation.

In the 'red urine' questionnaire children are also asked about several other common health problems with the intention of masking the main interest in urinary schistosomiasis. The information collected on the other health problems is usually not analysed or used. The present analysis uses data about the other health problems collected during questionnaire surveys for urinary schistosomiasis in primary schools in Ghana, Mozambique and Tanzania. The aim was to assess how schoolchildren perceive their own health and to compare the findings between three countries in Africa.

Methods

The questionnaire surveys were undertaken by Save the Children, USA, in Gaza Province in Mozambique and by the Partnership for Child Development in Tanga Region in Tanzania and in Volta Region in Ghana, between 1994 and 1999. The questionnaires were administered in order to identify schools where urinary schistosomiasis occurred and were validated using reagent strips to detect blood in urine in both Tanzania and Mozambique (results not reported here). Mass treatment with praziquantel was then given according to WHO recommendations (Montresor *et al.* 1998). The questionnaires used in each country were based on the one developed by Lengeler *et al.* (1991) in Tanzania but did not use a separate list of 'diseases' and 'symptoms', simply a list of common 'health problems', which included urinary schistosomiasis and blood in urine. The questionnaires were adapted in each country to list common health problems that were known by local schoolchildren in the area where the survey was to be done. Seventeen questions were listed in the Mozambique questionnaire, 19 in Ghana, and 15 in Tanzania. Ten health problems were common to the questionnaires used in all three countries: malaria, headache, cough, stomach ache, vomiting, diarrhoea, toothache, eye infection, ear infection and blood in urine. Four health problems were common to the questionnaires used in Tanzania and Mozambique only: schistosomiasis, lice, jiggers and a wound or cut. These health problems were chosen because they were well known to children, such as malaria, cough and stomach ache; because they had clear symptoms, such as diarrhoea, vomiting and blood in urine; because they affected specific parts of the body such as the eyes, ears, or teeth; or because they were easily identified, such as jiggers and a cut or wound.

The questionnaire was provided to teachers in each country with written instructions about how it should be administered and how questions should be asked. In Mozambique the questionnaire was administered in Portuguese and in Ghana in English, both the national languages; if these languages were not well understood, especially by younger children, then the teacher translated them into the local language or dialect. In Tanzania the questionnaire was administered in Kiswahili, the national language. Each teacher was instructed to interview each child individually and in private, and to ask whether the child had experienced each of the listed health problems within the last 4 weeks in Ghana and Tanzania, and within the last 2 weeks in Mozambique. The answer to each question was recorded as a tick (✔) for 'Yes', a circle (○) for 'No', and a dash (–) for 'Don't know'. A circle was used to denote 'No'' rather than a cross (×) because of the need to allow teachers to correct answers clearly.

All the data were single entered into a computer using EpiInfo versions 5 and 6 (Dean *et al.* 1994) for all children interviewed in Mozambique, for all children in a randomly selected sample of 15% schools in three Districts in Tanzania, and for children in all primary schools in three Districts in Ghana who returned questionnaires. The prevalence of 'Yes' answers for each health problem was calculated for each school and for all children in each country, and stratified by age and sex. The arbitrary minimum sample size for the smallest

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category for analysis was 50 children. Data were analysed using EpiInfo version 6 and SPSS for Windows version 9.0 (SPSS, Inc., Chicago, IL, USA). Chi-square tests were used to test the statistical significance of differences in proportions.

Results

Data were analysed for a total of 67 002 children aged 8–15 years enrolled in 120 primary schools in Mozambique ($n = 37\ 713$ children), 52 primary schools in Tanzania ($n = 9184$) and 298 primary schools in Ghana ($n = 20\ 105$).

In Ghana, Mozambique and Tanzania 97.3%, 93.7% and 91.4% of children, respectively, had reported having at least one health problem in the previous 2–4 weeks. Of the 10 health problems that were common to all three questionnaires the percentages of children who reported at least one problem were 94.2%, 91.1% and 88.8%, respectively. Figure 1 shows the percentage of children in each country who reported between none and all of the 10 health problems that were common to all three countries. Many children reported having more than one health problem. Of the 10 health problems asked about in all questionnaires, the average number reported by each child was 3.9 in Ghana, 3.4 in Mozambique and 3.1 in Tanzania.

Figure 2 shows the distributions of the prevalence in schools of six reported health problems. The distributions were largely similar in shape for each problem. The distributions of the prevalence of blood in urine and diarrhoea were both skewed to the right, patterns which are consistent with either focal or epidemic infections. The distribution in Tanzania and Mozambique of jiggers, an infection with the flea *Tunga penetrans*, was similar (not shown), and ranged from 1 to 67% in Tanzania (mean 20%) and from 0 to 97% in Mozambique (mean 36%). The prevalence of reported headache and vomiting tended towards normality with vomiting showing a very wide range, especially in Ghana. The distribution of the prevalence of problems with eyes and teeth was again very similar between countries: a normal distribution with a mostly small proportion of children reporting each problem in most schools.

Figure 3 shows for boys and girls in each country the percentage who reported each of the 10 common health problems ranked according to the frequency of problems reported by children in Ghana. Figure 3 shows that the rank of health problems was similar in each country: headache, cough and stomach ache were the three most commonly reported conditions and were all ranked in the same order. Vomiting and malaria were reported by about 30–50% of children in all countries but were ranked fourth and fifth in Ghana compared with fifth and fourth in Mozambique and Tanzania. All other conditions were reported by about 20% of children.

Figure 3 also shows that except for blood in urine and diarrhoea in all countries, and for toothache in Ghana, a greater percentage of girls than boys reported all other health problems. Blood in urine, a symptom of urinary schistosomiasis, was reported by 20–21% of boys compared with 9–13% of girls.

Four health problems showed a statistically significant decline in prevalence with age in all three countries: headache, cough, vomiting and diarrhoea. Figure 4 shows as an example, the prevalence by age of reported vomiting, which showed the steepest decline and statistically strongest association.

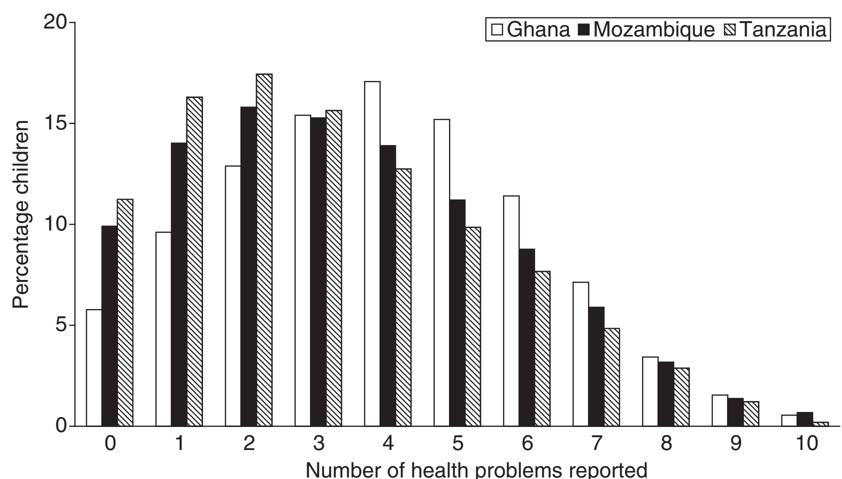

Figure 1 The number of reported health problems experienced in the last 2 weeks by school children in Ghana ($n = 20\ 105$) and Tanzania (9194), and in the last 4 weeks by children in Mozambique ($n = 37\ 713$).

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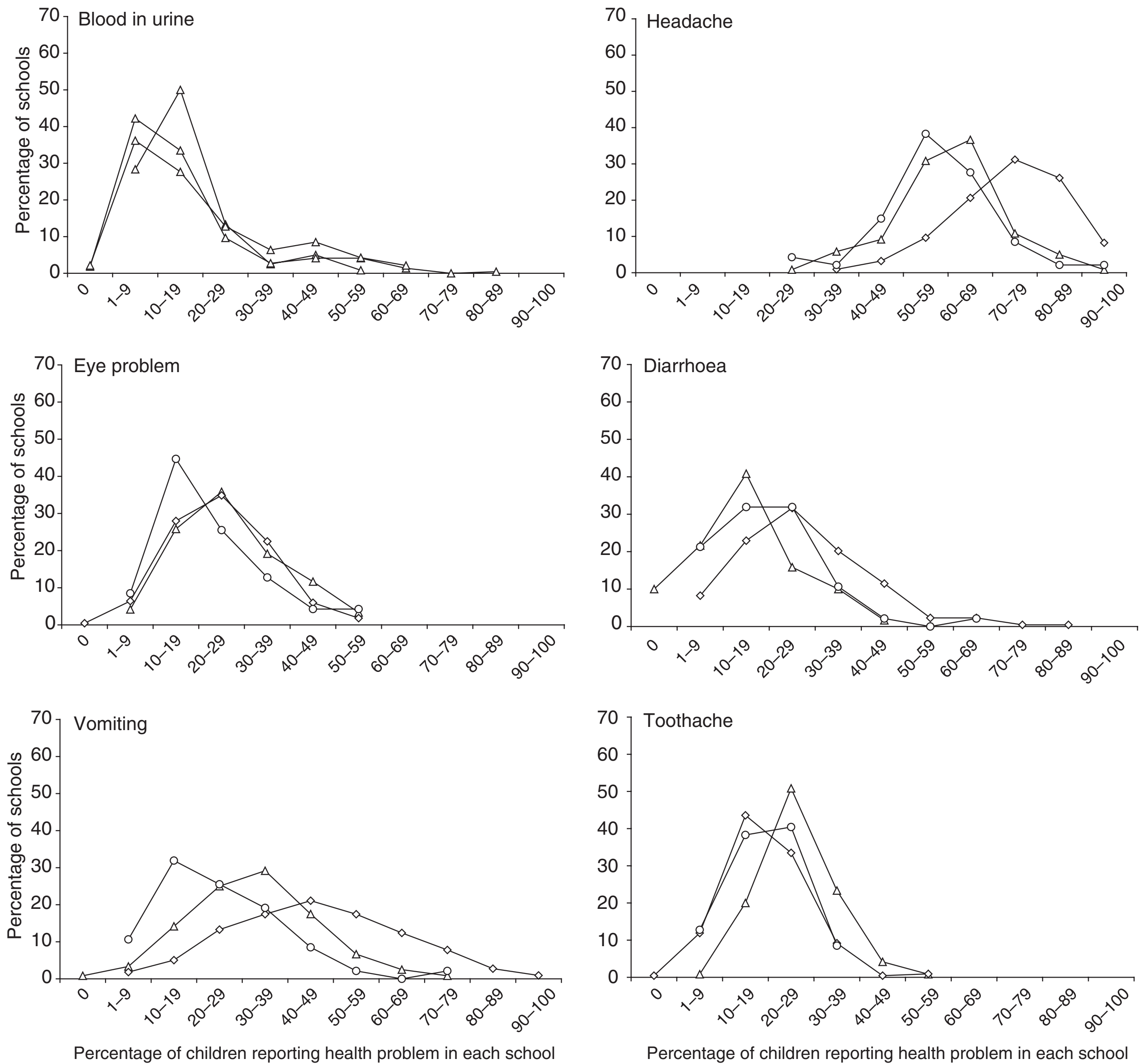

Figure 2 The distribution of the prevalence of six health problems reported by children in schools in Ghana (○: $n = 298$), Mozambique (△: $n = 120$) and Tanzania (□: $n = 52$).

Discussion

Schoolchildren in Ghana, Mozambique and Tanzania were asked whether they had experienced 10 common health problems within the last 2–4 weeks. On average children reported between three and four health problems, and 89–94% reported at least one. It seems that children in sub-Saharan Africa do not perceive themselves to be healthy, which is unsurprising given that a disproportionately large burden of all disease occurs in this region (World Bank 1993). The pattern of reported health problems was remarkably similar between three countries in both East and West Africa: the distributions in all countries of the prevalence of conditions in schools were similar (Figure 2); the prevalence of all conditions showed a similar ranking (Figure 3); for all conditions except vomiting, the difference between the highest and lowest percentage was on average 20% of

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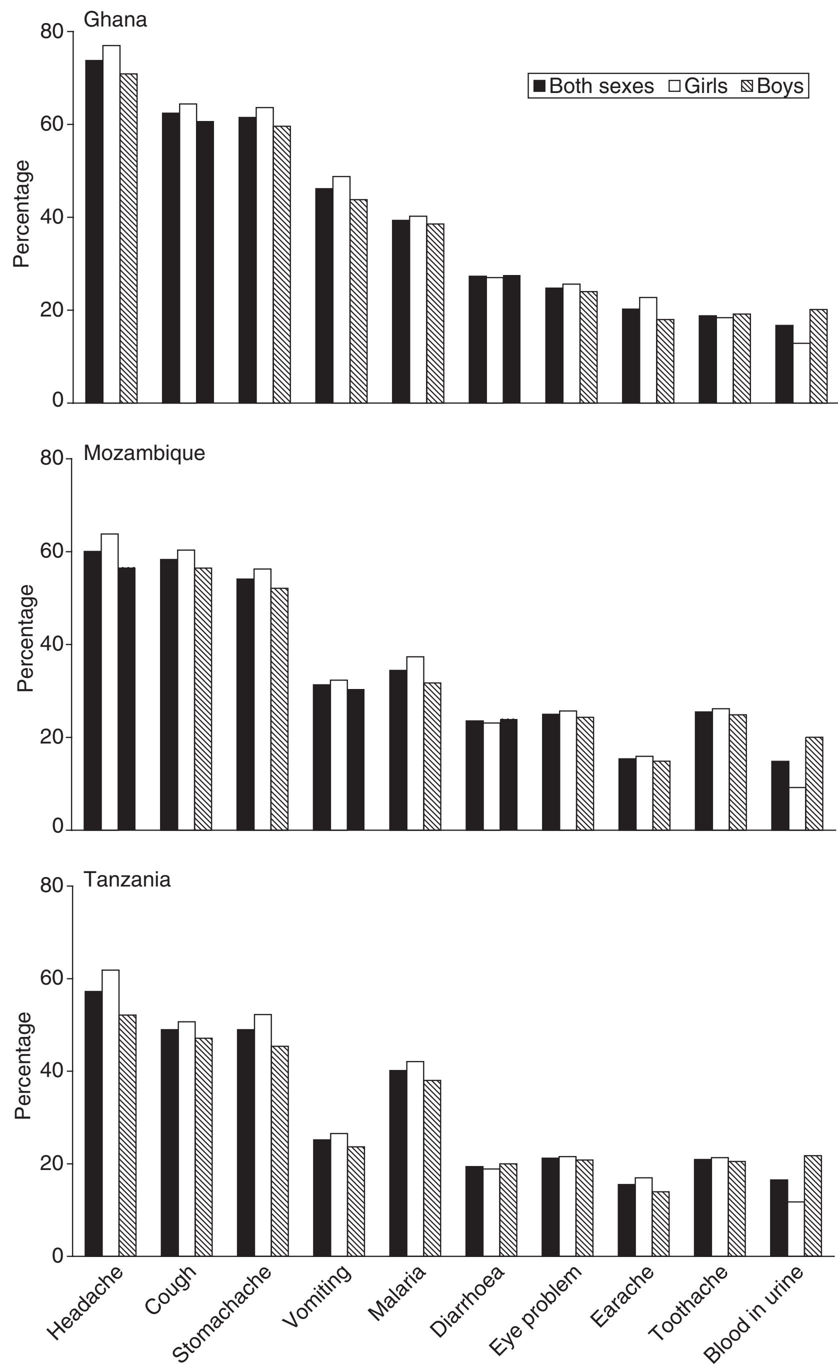

Figure 3 The percentage of boys and girls who reported specific health problems in Ghana (n = 20 105), Mozambique (n = 37 713) and Tanzania (n = 9194).

the maximum, indicating a fairly narrow range in prevalence for a particular condition between countries (Figure 3); and finally, for most conditions a greater percentage of girls than boys reported each health problem (Figure 3).

The number of problems reported by children in Mozambique might have been underestimated because a 2-week recall period was used compared with 4 weeks in Ghana and Tanzania. As most of the health problems enquired about were acute and short-lived rather than

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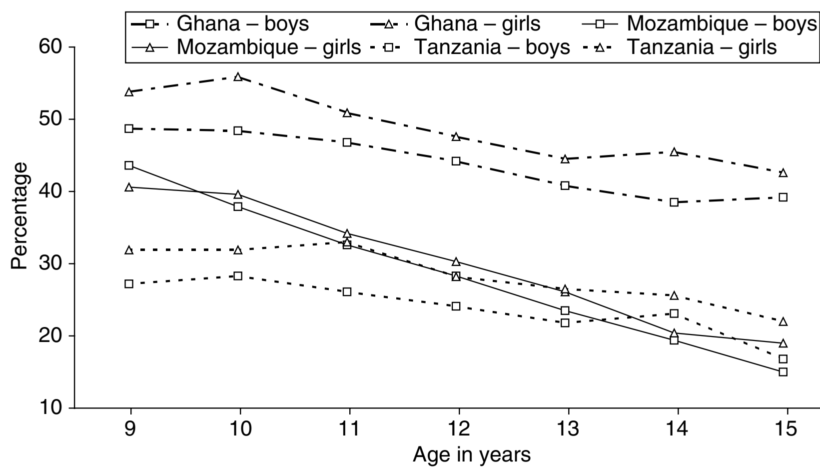

Figure 4 The percentage of boys and girls in Ghana, Tanzania and Mozambique who reported having vomited within the last 2–4 weeks by age in years.

chronic and long term, this could also add to the underestimation of children's health problems in Mozambique. There is a need for studies to evaluate the reliability of recall over different periods, perhaps by comparing recall in the last 24 h with recall over the previous weeks to see if the prevalence of conditions is proportional. Studies have shown that reporting error may be related to the length of the recall period and the severity of the disease (Alam *et al.* 1989; Ramakrishnan *et al.* 1999).

The reported health problems need to be validated because children in each country may have different perceptions and knowledge of illnesses, which may affect how they report it. A comparison of problems reported by people in Ghana during a health questionnaire followed by a clinical examination found that malaria, diarrhoea and chronic conditions were under-reported (Belcher *et al.* 1976). Yet even if children were correctly reporting health problems that they had experienced recently, they may over-report because of the 'concertina effect' in which people report ill-health experienced over a longer recall period than asked about. The only reported health problem in the questionnaire that has been validated by an objective diagnosis is 'blood in urine', a condition mostly caused by infections with *S. haematobium*, although other causes may become apparent when the prevalence is low, especially among girls (Hall & Fentiman 1999).

Although validation of reported illnesses would shed light on the scale and severity of the health problems, the very fact that children have such poor perceptions of their health implies a need to assess the notion of the healthy schoolchild, to examine in more depth the health of this age-group, and develop school-based health services.

The fact that children assemble in schools provides an obvious opportunity to develop simple screening methods, such as for eye problems (Wedner *et al.* 2000), and then deliver health services within an existing infrastructure. There is growing experience of school-based health services: teachers in Ghana and Tanzania have been shown to be able to treat their pupils for intestinal worms and urinary schistosomiasis (Partnership for Child Development 1999b; Guyatt *et al.* 2001); teachers in Mali have effectively given weekly iron tablets to schoolchildren (Hall *et al.* 2002); and in Tanzania and Malawi teachers have been shown to be able to make a presumptive diagnosis of malaria and provide treatment (Magnussen *et al.* 2001; Pasha *et al.* 2003). A questionnaire is a quick, easy and inexpensive method to assess schoolchildren's health, while the involvement of school staff and pupils is likely to improve community awareness of ill-health, an essential first step in the development of school health programmes.

The data presented here show that schoolchildren in Ghana, Mozambique and Tanzania do not perceive themselves to be healthy, and that the pattern of reported health problems was similar in each country. The findings stress the need for greater efforts to improve the health and sense of well-being of older children and adolescents. Questionnaires administered by teachers could also provide more than just information about the distribution of urinary schistosomiasis and are worthy of further study and validation for other common self-reported health problems.

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References

Alam N, Henry FJ & Rahaman MM (1989) Reporting errors in one-week diarrhoea recall surveys: experience from a prospective study in rural Bangladesh. *International Journal of Epidemiology* **18**, 697–700.

Ansell J, Guyatt H, Hall A *et al.* (1997) The reliability of self-reported blood in urine and schistosomiasis as indicators of *Schistosoma haematobium* infection in school children: a study in Muheza District, Tanzania. *Tropical Medicine and International Health* **2**, 1180–1189.

Barreto ML (1998) Questionnaire approach to diagnosis in developing countries. *The Lancet* **352**, 1164–1165.

Belcher DW, Neumann AK, Wurapa FK & Lourie IM (1976) Comparison of morbidity interviews with a health examination survey in rural Africa. *American Journal of Tropical Medicine and Hygiene* **25**, 751–758.

Dean AG, Dean AJ, Coulombier D *et al.* (1994) *Epi Info: a Word Processing, Database, and Statistics Program for Epidemiology on Microcomputers*. Centers for Disease Control and Prevention, Atlanta, GA.

Goodburn EA & Ross DA (2000) Young people's health in developing countries: a neglected problem and opportunity. *Health Policy and Planning* **15**, 137–144.

Guyatt HL, Brooker S, Hall A, Kihamia CK & Bundy DAP (2001) Evaluation of efficacy of school-based anthelmintic treatments against anaemia in children in the United Republic of Tanzania. *Bulletin of the World Health Organization* **79**, 695–703.

Hall A & Fentiman A (1999) Blood in the urine of adolescent girls in an area of Ghana with a low prevalence of *Schistosoma haematobium*. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **93**, 411–412.

Hall A, Roschnik N, Ouattara F *et al.* (2002) A randomised trial in Mali of the effectiveness of weekly iron supplements given by teachers on the haemoglobin concentrations of schoolchildren. *Public Health Nutrition* **5**, 413–418.

Kalter HD, Gray RH, Black RE & Gultiano SA (1991) Validation of the diagnosis of childhood morbidity using maternal health interviews. *International Journal of Epidemiology* **20**, 193–198.

Kroeger A (1983) Health interview surveys in developing countries: a review of the methods and results. *International Journal of Epidemiology* **12**, 465–481.

Lengeler C, Kilima P, Mshinda H *et al.* (1991) Rapid, low-cost, two-step method to screen for urinary schistosomiasis at the district level: the Kilosa experience. *Bulletin of the World Health Organization* **69**, 179–189.

Lengeler C, Utzinger J & Tanner M (2002) Questionnaires for rapid screening of schistosomiasis in sub-Saharan Africa. *Bulletin of the World Health Organization* **80**, 235–242.

Mafe MA, von Stamm T, Utzinger J & N'Goran EK (2000) Control of urinary schistosomiasis: an investigation into the effective use of questionnaires to identify high-risk communities and individuals in Niger State, Nigeria. *Tropical Medicine and International Health* **5**, 53–63.

Magnussen P, Ndawi B, Sheshe AK, Byskov J & Mbwana K (2001) Malaria diagnosis and treatment administered by teachers in primary schools in Tanzania. *Tropical Medicine and International Health* **6**, 273–279.

Montresor A, Crompton DWT, Bundy DAP, Hall A & Savioli L (1998) *Guidelines for the Evaluation of Soil-Transmitted Helminthiasis and Schistosomiasis at Community Level*. (WHO/CTD/SIP/98.1) WHO, Geneva.

Ostberg AL, Halling A & Lindblad U (2001) A gender perspective of self-perceived oral health in adolescents: associations with attitudes and behaviours. *Community Dental Health* **18**, 110–116.

Pasha O, Del Rosso J, Mukaka M & Marsh D (2003) The effect of providing fansidar (sulfadoxine-pyrimethamine) in schools on mortality in school-age children in Malawi. *The Lancet* **361**, 577–578.

Partnership for Child Development (1999a) Self-diagnosis as a possible basis for treating urinary schistosomiasis: a study of schoolchildren in a rural area of the United Republic of Tanzania. *Bulletin of the World Health Organization* **77**, 477–483.

Partnership for Child Development (1999b) The cost of large-scale school health programmes which deliver anthelmintics to children in Ghana and Tanzania. *Acta Tropica* **73**, 183–204.

Ramakrishnan R, Rao TV, Sundaramoorthy L & Joshua V (1999) Magnitude of recall bias in the estimation of immunization coverage and its determinants. *Indian Pediatrics* **36**, 881–885.

Red Urine Study Group (1995) *Identification of High-Risk Communities for Schistosomiasis in Africa; a Multi-Country Study*. (Social and Economic Research Projects report no.15) Special Program for Research and Training in Tropical Diseases. WHO, Geneva.

Ross DA & Vaughan JP (1986) Health interview surveys in developing countries: a methodological review. *Studies in Family Planning* **17**, 78–94.

UKUMTA (1997) *The Self-reported Health Problems of Primary School Children in Tanga Region Assessed Using a Questionnaire Administered by Teachers, with Particular Concern for Schistosomiasis*. UKUMTA Report Series No. 6. Dar es Salaam, Tanzania.

Wedner SH, Roas DA, Baliar R, Kaji L & Foster A (2000) Prevalence of eye diseases in primary school children in a rural area of Tanzania. *British Journal of Ophthalmology* **84**, 1291–1297.

World Bank (1993) *World Development Report 1993. Investing in Health*. Oxford University Press for the World Bank, Oxford.

Zaman SS, Khan NZ, Islam S *et al.* (1990) Validity of the 'ten questions' for screening serious childhood disability: results from urban Bangladesh. *International Journal of Epidemiology* **19**, 613–620.

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