

Rickets in Bangladeshi children: a small focus or a widespread problem ?

A survey in 1997 in Chakaria sub-district near Cox's Bazar in south-east Bangladesh found that 4% of children aged 1 to 15 years had lower limb deformities due to rickets. The social, health and economic implications of this high rate of physical deformity triggered concerns about whether rickets occurs elsewhere in Bangladesh. Taking advantage of the nationwide survey sites of the Nutritional Surveillance Project (NSP), a special module was added to the NSP in October 2000 to rapidly estimate the prevalence of lower limb deformities. This bulletin describes how the survey was done and what was found.

Rickets was once a common disease in many countries but has been largely eliminated as a result of a better diet (see Box 1). Nevertheless pockets of rickets still exist, and one was recently identified in south-eastern Bangladesh: NGOs working in Chakaria sub-district near Cox's Bazar reported that many children bore the symptoms of rickets. A study undertaken in 1997 to investigate the extent of the problem in the area found that 8.6% of 900 children aged 1 - 15 years who were given a medical examination and biochemical tests had evidence of the disease, and about 4% of children had lower limb deformities.¹ With support from USAID a group of NGOs and agencies including Cornell University formed the Bangladesh Rickets Consortium to investigate the causes of rickets in Chakaria, provide treatment, and help prevent future cases. The problem in Chakaria raised the question: are there other foci of rickets in Bangladesh and, if so, could this be a sizeable public health problem with social and economic implications? The Rickets Consortium approached Helen Keller International to see if the Nutritional Surveillance Project could provide information.

Since 1990 the Nutritional Surveillance Project (NSP) of Helen Keller International and the Institute of Public Health Nutrition

has provided extensive data every two months on children's nutritional status and health, and on indicators of household food security and poverty. The widespread distribution of the NSP surveillance sites - 4 in each of the six divisions of Bangladesh - offered the potential

What is rickets and why is it rare in sunny countries?

Rickets is a disease of children in which growing bones fail to calcify properly and become bent by the weight of the body and the pull of muscles (see Figure 1). Rickets is most commonly due to a deficiency of vitamin D, an essential micronutrient obtained either from the diet or made in the body when the skin is exposed to sunlight. Because vitamin D can be made in the skin, rickets is uncommon in tropical or sub-tropical countries. When rickets does occur in sunny countries it is usually due to other causes, such as a calcium deficiency.^{2,3} Vitamin D deficiency rickets tends to be seen in very young children who have a soft and enlarged skull, swollen wrists and ankles, and are prone to respiratory tract infections. Calcium deficiency rickets tends to occur in older children who mainly have deformed bones. The rickets seen in children in Chakaria sub-district is not thought to be due to a vitamin D deficiency³, but its cause is unclear. Rickets can be treated by daily doses of vitamin D combined with calcium supplements or foods rich in calcium such as milk and small bony fish eaten whole.

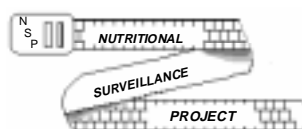


Figure 1. The poster developed by the Bangladesh Rickets Consortium used in the NSP rickets survey and reproduced with kind permission. The poster shows five typical deformities due to rickets: top row, L to R, bow legs, knock knees, and almost knock knees; bottom row, L to R, saber legs and windswept legs. The child in the bottom R picture has a leg withered by polio. Rickets typically affects both legs while polio usually only affects one.



to detect other foci of rickets, while the easily visible signs of severe lower-leg rickets made it quite easy to identify cases.

A special module was added to the NSP survey of August and September 2000 in which mothers were shown a poster of children with typical lower leg deformities caused by rickets (see Figure 1). Each mother was then asked whether any of her children aged 1 - 15 years old had similar signs of the disease or any other leg deformities. The survey methods are described in more detail in Box 2.

The findings

During this first nationwide survey of lower limb rickets in Bangladesh a total of 9,000 mothers were interviewed about 21,571 children aged 1-15 years in 24 sub-districts (*thana*), an average of about 900 children in each sub-district.

Figure 2 shows that cases of lower limb rickets were reported in 13 of 24 sub-districts and other leg deformities were reported in 15 of 24 sub-districts.

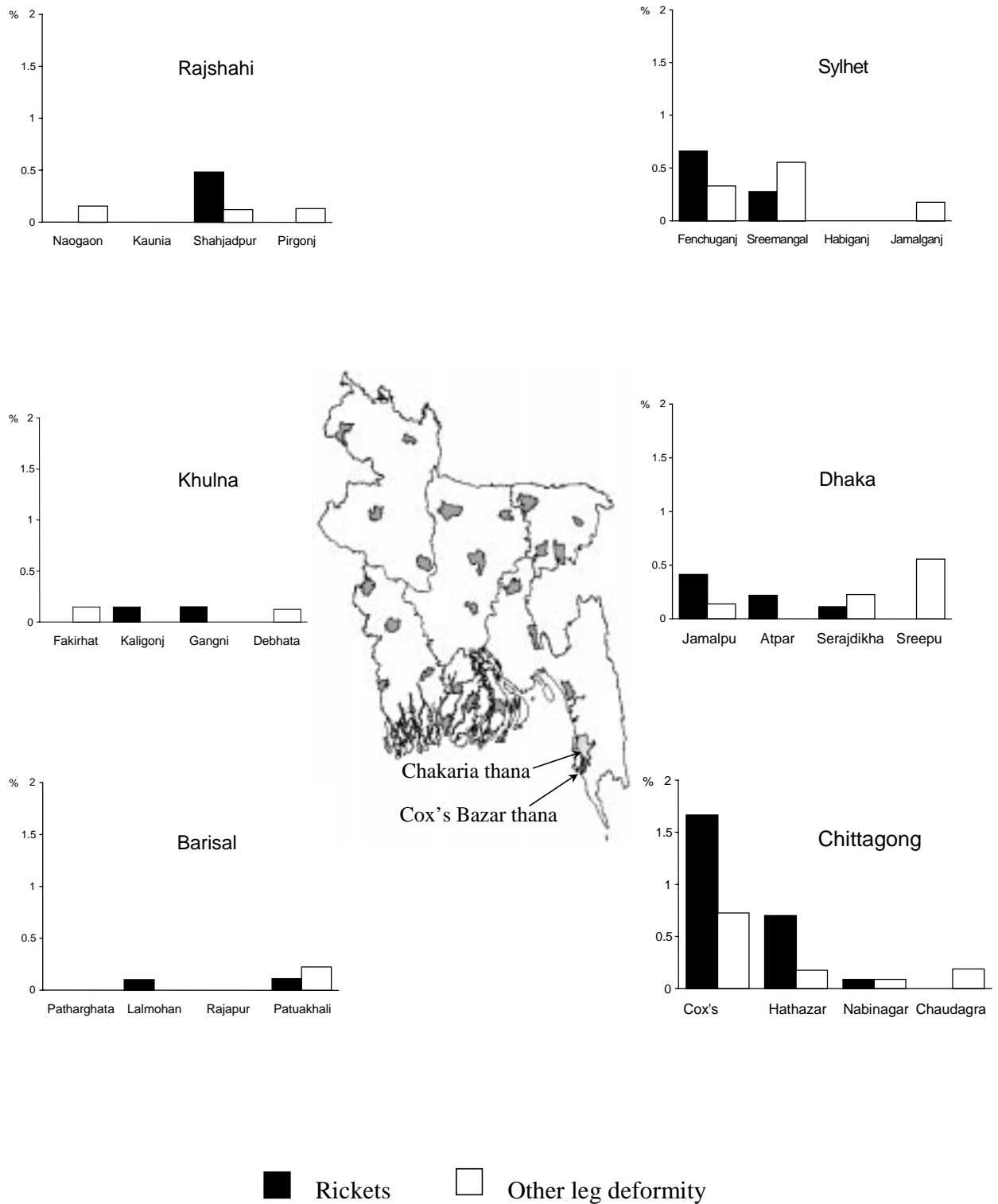
Fifty-six children were reported to have lower limb rickets, a prevalence of 0.26% (95% confidence intervals: 0.18% - 0.31%) and 39 children had other leg deformities, 0.18% of the sample (95% CI: 0.12% to 0.23%). Among the 8,941 children aged 1 - 5 years who were examined specifically by the NSP field workers, 24 had evidence of lower limb rickets giving a prevalence in this age group of 0.28% (95% CI: 0.18% - 0.43%). There were no statistically significant differences in the proportions of girls and boys with lower limb deformities or by age among children less than 5 years old.

Figure 2 shows that the highest prevalence of lower limb rickets among children aged 1 - 15 years was reported in Cox's Bazar sub-district (23/1381 or 1.66%), which lies next to Chakaria, and in Hathazari (8/1143 or 0.70%), which lies about 50 km north of Chakaria sub-district. In both of these sub-districts the prevalence of reported lower limb rickets was significantly higher than the overall prevalence of 0.26%. There were, however, a significant number

NSP sampling and data collection

The NSP collects nutrition, health and socio-economic data every two months from samples of households in 24 sub-districts throughout Bangladesh in collaboration with local NGOs. In each survey 9,000 randomly selected households are visited, 1,500 in each of the six divisions of Bangladesh, and 375 in each sub-district. In the survey of August and September 2000, the mother of the young child selected for study in each household was shown a poster developed by the Rickets Consortium of color photographs of several typical forms of lower limb rickets (see Figure 1). The mother was asked whether any of her children aged 1 - 15 years old had such a condition and any child aged 1 - 5 years was examined by the specially trained NSP fieldworkers. Children with other leg deformities, such as polio, were also recorded. As this poster focused only on severe lower-limb rickets the survey missed children with other symptoms of rickets such as deformed arms, and did not detect mild cases of the disease. It was also not possible to examine all reported cases, although the field workers saw all children less than 5 years old age during the interview. Because of this there may have been some children with rickets who were not reported by their mothers, and some children with reported rickets who did not have the disease. Nevertheless the data collected by the NSP in each sub-district can be considered to give an indication of whether or not rickets is a public health problem in the area.

Figure 2. A map of the six divisions of Bangladesh showing the 24 NSP sub-districts (shaded areas) and bar charts of the percentage of children aged 1 - 15 years old with lower limb rickets and other leg deformities in each of the six divisions by sub-district.



of other leg deformities reported in children in Cox's Bazar sub-district (10/1381 or 0.72%) compared with the overall prevalence of 0.18% suggesting that there is over-reporting, perhaps because of the heightened awareness of the problem of rickets in the area. Nevertheless there was still a significant difference between the prevalence of reported lower limb rickets and of other leg deformities in Cox's Bazar sub-district, indicating that there is a public health problem due to rickets in the area.

It is hard to draw definite conclusions about whether there are other foci of rickets in Bangladesh. But if the overall prevalence of reported rickets of 0.26% is taken to be the basis against which all sub-districts are compared, then the prevalence of reported rickets is significantly higher than this in Cox's Bazar and Hathazari sub-districts, as expected. The prevalence of lower limb deformities reported in Fenchuganj sub-district of Sylhet of 0.66% was also significantly higher than the overall prevalence ($P = 0.02$). Whether this represents another focus is hard to say, but it may be worthwhile investigating. No other sites of the disease were conclusively found, nevertheless it is possible that they may exist in the sub-districts that lie between the NSP surveillance sites (see Figure 2), especially if they are as localized as the focus in Chakaria.

Conclusions and recommendations

- The focus of rickets in south-eastern Bangladesh around Chakaria sub-district was confirmed.
- No evidence was found that rickets is a widespread or common public health problem in Bangladesh but it is possible that at least one other focus of rickets may exist and may be worthwhile investigating.
- This survey provides an example of how the Nutritional Surveillance Project can easily add modules to rapidly collect special information from a sample of 9,000 rural households to help answer questions of medical, nutritional or economic importance.
- Other NGOs could be recruited to extend the survey into areas not covered by the NSP and identify other foci of the disease.

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