Effect on neonatal tetanus mortality after a culturally-based health promotion programme

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The Maasai have high rates of death from neonatal tetanus, partly due to their custom of packing the umbilical stump with cow dung. We report on the effect of a simple health promotion programme, designed in consultation with the local community and carried out by local women. After introduction of the programme in 1981, neonatal (<6 weeks of age) tetanus rates fell sharply, and by 1988 annual death rates had dropped to 0·75 (range 0–3) per 1000 births in the intervention areas compared with 82 (74–93) per 1000 in control areas.

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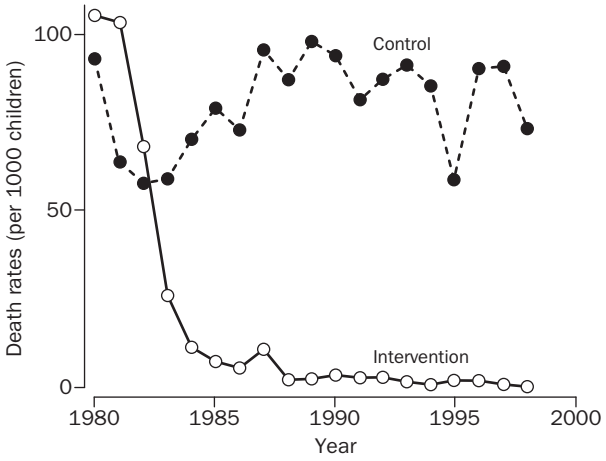
Each year between 400 000 and a million deaths in newborn babies are caused by neonatal tetanus, 80% of which occur in Africa and South-East Asia.[1] Birthing practices can increase the risk of tetanus in neonates.[2] The Maasai people of sub-Saharan Africa traditionally apply cow dung to the umbilical stump to underline the close connection between the Maasai way of life and the tending of cattle. The Maasai do not regard cow dung as offensive; it is also used to anoint the heads of the sick, and in rituals marking rites of passage. Maasai children have the equivalent of snowball fights with cow dung.

We did the study between 1980 and 1999 in nine areas of rural Kenya and Tanzania inhabited by Maasai people. Five areas received health promotion interventions aimed at reducing neonatal morbidity, while four areas were controls. Intervention and control areas were similar in their environmental, socioeconomic, and cultural characteristics. All had similar high rates of neonatal tetanus and high total infant mortality at baseline assessment in 1980. Areas received either culturally-integrated neonatal tetanus prevention programmes (intervention group) or standard access to ministry of health care (controls).

In intervention areas health promotion was delivered by locally recruited traditional birth attendants, whose responsibilities included peer group education, prenatal monitoring, delivery, postpartum follow-up, and referral where necessary. Training emphasised the use of clean water instead of dung compound on the freshly cut umbilical cord. When clean water was not available, milk was to be used. This substitution was proposed by community spiritual leaders after extensive discussions with health workers. The significance of the substitution is that the Maasai believe that cows originally came from water. Water is therefore the origin of all their cows and, therefore, of all their wealth. Recognising that clean water would not always be available, milk was considered an adequate substitute.

We gave traditional birth attendants individual packs for each birth, which contained a sterile blade for cutting the cord, sterile umbilical clamp, sterile thread, and surgical spirit. Kits were returned after a single use. No maternal immunisation was carried out in intervention or control areas because of lack of resources.

We defined neonatal tetanus using the traditional Maasai definition: death within the first 6 weeks of life accompanied by blackening and swelling of the umbilical stump, usually accompanied by fever and convulsions, refusal to eat and crying. (The use of 6 rather than 4 weeks was necessary as a substantial proportion of deaths occur after the first month.) We extracted data for the control areas retrospectively from ministry of health records.



Death rates from neonatal tetanus during the study period

There were 88 471 births in the control areas and 29 689 in the intervention areas over the period of the study. Annual birth rates rose over the study period, from 6325 to 9920 in intervention areas and from 15 996 to 22 864 in control areas.

After introduction of the programme, neonatal tetanus rates fell sharply, and by 1988 death rates had dropped to 0·75 (range 0–3) per 1000 births in the intervention areas compared to 82 (74–93) per 1000 in control areas. Death rates in intervention communities did not rise again between 1988 and 1999. One control area (Loita) showed falling death rates initially, but later reverted to the original level. In this area the spiritual leader (Loibon) had advocated the change in the birthing practice, but there was no ongoing health promotion by traditional birth attendants. With his death in 1987 the changed practice appears to have reverted, with a concomitant return to the high tetanus mortality seen at baseline.

Total mortality rates in children aged less than 6 weeks fell from 307 to 50 per 1000 in intervention areas, while they went from 233 to 294 in the control area over the same period.

Vaccination is seen as a cornerstone of the prevention of neonatal tetanus. The efficacy of such programmes is severely limited, however, by low patient compliance.[3,4] Furthermore, in poorer countries neither the staff nor the resources are available to implement such immunisation programmes. Umbilical cord care, however, can greatly reduce the risk of development of neonatal sepsis.

The use of a culturally-integrated approach to birth attendant education resulted in a dramatic lowering of neonatal tetanus rates in the absence of vaccination in an area of very high mortality. The reduction took place in the context of a large overall reduction in neonatal mortality.

Our health promotion programme allowed the identification of the cultural significance of birthing rituals; negotiation of culturally-acceptable alternatives; involved community leaders in defining and promoting the changes in rituals; and used traditional birth attendants, working in their own communities, to maintain the changed behaviour.

The definition of neonatal tetanus was based on Maasai rather than WHO criteria, which could have resulted in some misclassification, but use of locally comprehensible health constructs is an important part of health promotion. The fact that total mortality was in parallel with tetanus mortality argues against misclassification being responsible for the observed changes. Mull and colleagues reported similar success with a culturally sensitive health promotion programme in Pakistan.[5]

Our results underline the importance of cultural factors in health promotion, but also point to the improvements in health that can be brought about by simple behavioural changes.

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Exposure to ultraviolet radiation: association with susceptibility and age at presentation with prostate cancer

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A positive association between latitude and prostate cancer mortality has been interpreted to indicate that ultraviolet radiation (UVR) protects against development of this cancer. We aimed to examine this hypothesis. We compared exposure between 210 cases and 155 controls. Childhood sunburn (odds ratio 0·18, 95% CI 0·08–0·38), regular foreign holidays (0·41, 0·25–0·68), sunbathing score (0·83, 0·76–0·89), and low exposure to UVR (3·03, 1·59–5·78) were associated with development of prostate cancer. Furthermore, cases with low UVR exposure developed cancer at a younger median age (67·7 years, IQR 61·5–74·6) than cases with higher exposure (72·1 years, 67·5–76·4); p=0·006. These findings are compatible with UVR having a protective role against prostate cancer.

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Sporadic prostate cancer is a leading cause of cancer death.[1,2] Factors that affect prostate cancer susceptibility and mortality are poorly defined, although environmental factors, including latitude, are implicated. This association with latitude has been interpreted to indicate that ultraviolet radiation (UVR) protects against prostate cancer.[1]

We have examined this hypothesis by studying 210 patients with sporadic prostate cancer and 155 patients with benign prostatic hypertrophy. We obtained ethics committee approval and written informed consent from patients. We recruited white northern-European people who were not related to one another from the North Staffordshire Hospital, UK between October, 1999 and May, 2000. We attempted to recruit all patients with histological evidence of prostatic adenocarcinoma or, if histological results were unavailable, with a malignant prostate gland on digital rectal examination, positive bone-scan results, and prostatic specific antigen concentration more than 30 ng/ml (age-related reference range 0–6·5 ng/ml). During the study, 217 patients with prostate cancer were seen in urology clinics, and seven did not fulfil our inclusion criteria. Out of the remaining 210 patients, histological evidence of prostate cancer was available for 190.

Patients with benign prostatic hypertrophy were chosen as controls. We attempted to recruit all patients with histological evidence of this condition or, if histology was unavailable, with prostatic specific antigen concentration in serum in the appropriate reference range and benign results on digital rectal examination. We identified 167 patients with benign prostatic hypertrophy, but 12 were excluded because their prostatic specific antigen concentration rose above the reference range in follow-up. Histological evidence was available for 123 patients. More than 85% of cases and controls who attended hospital during the study were asked to participate. Two patients with benign prostatic hypertrophy refused consent. We used logistic regression analysis to obtain odds ratios of having prostate cancer with various UVR exposure levels. Because mean age at diagnosis in cases (70·6 years, SD 7·3) was greater ($p<0·0001$) than in controls (67·0 years, 7·9), we included age at diagnosis in all models. We used a validated questionnaire to study UVR exposure (table) and attempted to eliminate potential bias by allowing self-administration.[3,4] About 25% of participants needed help to complete the questionnaire. Accordingly, the interviewer (CJL) used a neutral script to guide the questions. Questionnaires with a closed-answer design similar to ours are commonly validated for blinded and non-blinded investigators and for self-administered use, especially when a set script is followed by the interviewer.

The table shows cumulative lifetime exposure to UVR in cases (355 weeks) and controls (393 weeks). Sun exposure was estimated from weekday and weekend activity, and, thus, measures occupational and recreational exposure. UVR exposure had a significantly protective effect on cancer risk (table). The table also shows the proportions of cases and controls in each quartile of exposure. Comparison of the

	BPH	Cancer	Odds ratio (95% CI)	p
Chronic exposure				
Mean weeks cumulative exposure (SD)	393 (201)	355 (194)	0·998 (0·997–0·999)*	0·006
Lowest exposure quartile (%)	18·7	29·0	3·03 (1·59–5·78)	0·008
25–50% exposure quartile (%)	24·5	25·2	1·51 (0·83–2·76)	0·182
50–75% exposure quartile (%)	27·1	22·9	1·18 (0·65–2·16)	0·588
Highest exposure quartile (%)	29·7	22·9	1·00	
Living abroad in sunny country for >6 months (%)	32·9	31·0	0·71 (0·45–1·14)	0·161
Acute exposure				
Positive childhood sunburn (%)	21·9	4·3	0·18 (0·08–0·38)	0·0001
Mean sunbathing score (SD)	7·7 (2·8)	6·2 (2·8)	0·83 (0·76–0·89)†	0·0001
History of regular foreign holidays (%)	34·8	17·1	0·41 (0·25–0·68)	0·005
Mean weeks foreign holiday/year (SD)	1·05 (1·7)	0·56 (1·8)	0·85 (0·74–0·98)*	0·030

BPH=benign prostatic hypertrophy. Odds ratio derived from logistic regression analysis including age at diagnosis. *Per week. †Per unit score.

Exposure to UV light derived from questionnaire responses