# Evaluation of a sustained 7-year health education campaign on leprosy in Rufiji District, Tanzania

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*Summary* To assess the impact of a 7-year intensive health education campaign about leprosy delivered by workers of the Kindwitwi Leprosy Trust to schoolchildren and general public in Rufiji District. Knowledge, attitude and beliefs towards leprosy were measured in Rufiji and compared to neighbouring Kisarawe District as control. Lessons learned from this analysis may be useful for the planning and evaluating of health education campaigns.

Interview of schoolchildren, general public, community leaders, traditional healers and medical staff in both districts.

A stratified randomized sampling scheme was used, with stratification for urban and rural settings. A representative sample of schoolchildren, general public, community leaders, traditional healers and medical staff in Rufiji District and in the control area of Kisarawe District was interviewed. The interviews were partly structured and partly open. The results of the interviews were analysed in the context of epidemiological leprosy data from 1985 till 1995, and demographic data of both districts. Data entry and statistical analysis was done using FileMaker Pro, Stata and Excel computer packages.

We did not observe positive effects of the health education campaign on the indicators regarding early diagnosis of leprosy with less disability. Leprosy case detection was declining in both districts.

We found that the campaign had a favourable impact on the knowledge and the

attitude of schoolchildren in Rufiji District. We could demonstrate a relationship between increased knowledge of leprosy and a positive, less stigmatizing attitude. Knowledge of leprosy was better in Rufiji as compared to Kisarawe, but only among schoolchildren. We found indications that low level of education, rural residence, older age, female gender and Moslem religion were associated with stigmatizing attitudes and beliefs towards leprosy. Knowledge about leprosy reactions among medical staff interviewed was not optimal.

The exact outcome of the sustained campaign in Rufiji District was difficult to assess because no comparison could be made with the situation prior to the campaign. However, the health education campaign was associated with increased knowledge and diminished tendency to stigmatize leprosy among schoolchildren. Health education campaigns have to be sustained and have to cover a broad sector of the society in order to induce behavioural changes in the community. The focus of health education should be rural communities and schools, and pay special attention to women, religious leaders and traditional healers. Awareness of diagnosis and treatment of leprosy reactions among medical staff should be improved.

# Introduction

Health education campaigns aim to effect change of the behaviour of the receiver of the message in such a way that his or her health status improves and that as a result the disease ceases to be a public health problem. It is believed that good quality health education can influence behaviour and lifestyles and will have improve health.<sup>1,2</sup> Comprehensive health education about leprosy aims at reducing the stigma of leprosy to that patients with incident leprosy or a leprosy reaction report early to medical services, remain compliant with therapy and have a good chance of successful rehabilitation in the community. The awareness and knowledge of leprosy together with a positive attitude towards leprosy victims among individual patients, among the general public, religious and community leaders, and medical staff are necessary to fight the stigma of leprosy. However, increased knowledge does not necessarily leads to changed attitudes towards leprosy, neither among leprosy patients themselves,<sup>3</sup> nor medical staff,<sup>4</sup> nor in the community.<sup>5,6</sup>

The most effective health education activities can be considered to be those which address the above mentioned categories of people and which are continuous. Of the methods used, group education sessions in schools are considered to be more effective than mass education by media (radio/TV/newspapers) or individual education.<sup>7</sup> One of the most effective ways of transmitting knowledge is said to be educating primary schoolchildren, who take the received message home to discuss it with their parents. However, others<sup>8</sup> did not show that this mechanism played a role in the transmission of knowledge. In addition, it is shown that the education of leprosy can also adversely affect attitudes of children.<sup>8</sup>

Special attention for the health education of women, often bearing the responsibility for the health status of the family and influential in the opinion of the community, could be crucial for the success or impact of health education.<sup>9</sup> In addition, the role of traditional healers and religious leaders is important.<sup>4</sup>

Concerning the evaluation of health education, three levels can be distinguished: first the health education process, second the immediate impact on knowledge and behaviour, and third the outcome of health education in terms of better health and epidemiological indicators.<sup>10</sup> In leprosy, where many factors determine its secular epidemiological trend, like genetic predisposition, socioeconomic status, level and spread of the infection, and where epidemiological changes tend to take a long period of time, it is difficult to measure the possible outcome of health education on incidence and prevalence of leprosy, or, by approximation, the case detection and registered prevalence rates. The proportion of disabled among new cases would be a sensitive indicator for early diagnosis. Other factors which can be evaluated are the possible impact on general knowledge of leprosy and on attitudes and beliefs towards the disease among the population.

In Tanzania, health education to patients and general public attending health units is a routine task of the general medical staff, assisted by specialized tuberculosis and leprosy control coordinators at regional and district level. The various categories of medical staff are taught about leprosy during their curriculum by teachers knowledgeable about leprosy. This knowledge is refreshed by discussions on the job with the leprosy coordinators as well as during post graduate seminars. It is the task of the regional and district tuberculosis and leprosy coordinators to teach at health training institutions within their jurisdiction. They ensure that the latest policies of the government regarding tuberculosis and leprosy control are known to staff diagnosing and treating these cases. In some areas in Tanzania additional community health education activities are carried out, mostly from an existing hospital or institution specialized in leprosy care.

Attention towards leprosy in Rufiji, including health education, started in 1964, when the late Rev. Fr. R.G.P. Lamburn, an Anglican missionary who died in 1993, began rehabilitation of the old Kinwitwi leprosy village in Rufiji District in Tanzania, by improving feeding, clothing, housing and medical treatment. He was able to reshape the derelict village into a well-organized one with a large communal field to promote agricultural self-sufficiency. He got the help of devoted people from Tanzania and from overseas.

In 1982, the Rufiji Leprosy Trust was founded, which offered logistic support to the District Tuberculosis and Leprosy Coordinator (DTLC) and which began the intensive public information campaigns and education about the true nature of leprosy. Since 1988 this programme was extended to the islands in the river delta.

The aim was to aid the early identification of new cases by making people aware of the signs and symptoms of leprosy, and by telling them that there is effective drug therapy available. It was hoped that by increasing the knowledge, the fear and stigma of leprosy would be reduced and patients would come forward for treatment and remain active members of their own communities.

Rufiji Leprosy Trust employed a full-time Leprosy Education Officer who worked under the supervision of the DTLC and whose responsibility was to give talks in schools, adult education centres, etc., illustrated with films and slide shows. Films about leprosy and other health topics in Kiswahili language were shown in every village in the district, attracting large numbers of people. Posters, T-shirts and stickers were distributed with messages in Kiswahili and Arabic (for those only literate in Arabic of the Koran). Seminars were held for leaders of the ruling party, the Chama Cha Mapinduzi (CCM). Other seminars were conducted specifically aimed at health workers and at traditional healers. In addition a person from Kindwitwi Leprosy Village, the 'Leprosy Scout', visited villages ahead of the education team and gave the account of his life story, in order to make cultural and language barriers as small as possible.<sup>11</sup> He had a charismatic personality and ability to convince people to seek treatment for their disease.

Once yearly during World Leprosy Day, district wide singing and drama competitions

were organised amongst schools and youth groups, contributing to the message that 'Leprosy can be cured'.

This paper reports on the results of an evaluation of the impact of this health education campaign in Rufiji District in comparison to a control district (Kisarawe). The findings are related to demographic data and leprosy patient statistics of Rufiji and Kisarawe Districts from the National Tuberculosis and Leprosy Programme (NTLP) of Tanzania, covering the period 1985 to 1995.

# Materials and methods

The routine quarterly reports of the National Tuberculosis and Leprosy Programme from 1985 to 1995 were used to analyse the leprosy case notification and its trend in both districts.

Demographic data, including population size and socioeconomic status, were obtained from the 1988 census<sup>12-14</sup> data of Tanzania.

We chose to look at urban and rural communities in Rufiji and match them with similar areas in Kisarawe in a quasi-experimental case-control approach. This method of evaluation is considered suitable in such situations.<sup>15</sup> Existing differences in demographic characteristics were dealt with in the multivariate analysis, controlling for the variables concerned. The district capitals were chosen because these were the urban areas in both districts. The rural villages were chosen from a list from the population census of 1988 showing different wards and their populations. The selection was random.

Once the areas had been chosen we decided to look at all health facilities, all primary schools, all offices of the ruling party and a representative sample of the general public, i.e. individuals over 15 years of age, and traditional healers, within the boundary of the area chosen.

In July 1994, during a 2-week period a team of 10 individuals conducted the interviews in the Rufiji and Kisarawe Districts. The team consisted of health education specialists, social scientist, social workers and regional and district tuberculosis and leprosy supervisors. They were involved in pre-testing of the questionnaires in order to familiarize themselves with the topic and standardize the approach.

Pupils were randomly chosen from the school register. The aim was to have at least 100 pupils per school. In each health facility all staff involved in providing medical/nursing care including untrained staff, were interviewed. The general public was chosen at market places, hospital outpatient departments, ferry crossings, secondary schools, and even a memorial service, with the aim of getting as many people as possible over 15 years old. As many community leaders as were available in the offices were interviewed. Traditional healers were chosen in Rufiji District from the Rufiji Department of Culture and Education register of traditional healers. Unfortunately Kisarawe had no such register and few people would admit to being or using a traditional healer. We did not include registered leprosy patients in our interviews.

Knowledge, attitudes and beliefs were evaluated by interviewing schoolchildren, general public, medical staff, community leaders and traditional healers in both districts. The questionnaires were anonymous. The answers were open, but for each question a checklist in the margin assisted the interviewer to check the completeness of the answer. This later facilitated coding according to the best fit of the answers. The questionnaires were first field tested in Dar es Salaam in order to find out the duration of the interview, the completeness of

the questions, the appropriateness of the checklists and other practical aspects, and were adapted accordingly.

The questionnaire included questions about personal characteristics of the respondent like age, sex, education, profession, religion and name of the village or school.

There were questions to find out if the person remembered attending a health education seminar on leprosy and who were the organizers. Then followed questions on knowledge of leprosy and attitude and beliefs towards leprosy patients. Other questions were included for specific categories of persons interviewed.

The questions pertaining to knowledge used in the questionnaires included:

- 1 How does one contract leprosy?
- 2 What category of patients are able to spread the infection?
- 3 Can you mention the signs and symptoms of leprosy?
- 4 Is leprosy curable? If yes, how? Where would you go for treatment?
- 5 Does everyone who contracts leprosy end-up being handicapped? If not, how does one end-up being handicapped?
- 6 Do you know a relative or acquaintance who has ever suffered from leprosy?

The questions pertaining to attitude and belief in relation to stigma in the questionnaires were:

- 1 What sort of people usually get leprosy?
- 2 Would you play or share food with an exleprosy patient? Would you play or share food from the same plate with an exleprosy patient? If not, why?
- 3 Would you shake hands with an exleprosy patient? If not, why?
- 4 Would you rent a room in a house where you know someone has leprosy? If not, why?
- 5 Would you marry into a family which is known to have had a leprosy patient? If not, why?

Additional questions asked of medical staff:

- 1 Do you know the signs and symptoms of leprosy reactions?
- 2 Do you know the treatment of leprosy reactions?
- 3 Who is responsible for the diagnosis, treatment and care of a leprosy patient in your clinic?
- 4 Who is responsible for defaulter tracing of a leprosy patient in your clinic?

Questions to traditional healers and community leaders were not similar to the above but instead aiming to analyse their exposure to leprosy seminars and role in leprosy control, which for traditional healers included:

- 1 Do you treat leprosy?
- 2 How many patients consult you last year?
- 3 Have you noticed an increase or decrease of leprosy patients, and what could be the reason?
- 4 There is a general belief that if one breaks a traditional taboo, like eating forbidden food, one can contract leprosy. As a traditional healer what is your opinion?
- 5 Have you ever attended a seminar, workshop or meeting on modern treatment for leprosy?
- 6 What did you learn and how have you benefited from this knowledge?

Specific questions for community leaders included:

- 1 How many leprosy patients do you know in your area?
- 2 How do those suffering from leprosy treat themselves?
- 3 What would you do if someone close to you contracted leprosy?
- 4 Are you aware of any community health education programme on leprosy?
- 5 What has been your role as a leader?
- 6 How has the community benefited from this programme?
- 7 Would you say leprosy patients are now better prepared to visit modern health units than prior to the educational visits and if yes, can you explain?
- 8 Would you say the average person is now less likely to discriminate or isolate leprosy patients as a result of the educational visits?

The team interviewed a total of 1,711 people in the two districts: 1,120 schoolchildren, 534 members of the public, 96 medical staff, 47 community leaders and 17 traditional healers. The numbers of individuals interviewed and their characteristics were as shown in Table 1 and Table 2.

The answers on the questionnaires were recorded in previously defined categories. The results were entered in the computer using FileMaker Pro database programme and analysed in Excel and Stata software packages.

Group	Characteristics	Rufiji	%	Kisarawe	%
Schoolchildren	interviewed	507	(100)	613	(100)
	average age	14 years		14 years	. ,
	% female	239	47	324	53
Religion	moslem	470	93	451	74
0	christian	32	6	158	26
	other	5	1	4	1
Residence	urban	154	30	311	51
General public	interviewed	345	(100)	99	(100)
1	average age	31 years		37 years	. ,
	% female	173	50	55	56
Education	primary	141	41	52	53
	secondary	119	34	29	29
	none/other	82	23	18	18
Religion	moslem	307	89	50	51
C	christian	33	10	48	48
	other	5	1	1	1
Residence	urban	140	41	28	28
Occupation	farmer	166	48	34	34
Medical staff	interviewed	44	100	42	(100)
	average age	34 years		32 years	
	% female	30	68	29	69
Religion	moslem	31	70	19	45
-	christian	13	30	23	55
Residence	urban	28	64	25	60
Profession	clinical officer	6	14	8	19
	nurse	27	61	17	40
	other	11	25	17	40

 Table 1. Characteristics of schoolchildren, general public and medical staff interviewed in Rufiji

 and Kisarawe Districts

Group	Characteristics	Rufiji	%
Community leaders	interviewed	47	(100)
2	average age	45 years	
	% female	6	13
Education	primary	27	57
	secondary	4	9
	none/other	16	34
Religion	moslem	32	68
C	christian	12	26
	other	3	6
Residence	urban	19	40
Occupation	farmer	19	40
Traditional healers	interviewed	17	(100)
	average age	52 years	
	% female	3	18
Education	primary	5	29
	secondary	0	
	none/other	12	71
Religion	moslem	17	100
Residence	urban	9	53

 Table 2. Characteristics of community leaders and traditional healers interviewed in Rufiji District



Figure 1. Map of Tanzania and detailed map of Rufiji and Kisarawe Districts with indication of the places where the interviews were held.



Figure 2. Case notification in absolute numbers and trend in case notification from 1985 to 1995 in Rufiji and Kisarawe Districts.

# Results

DEMOGRAPHIC DATA AND PATIENT STATISTICS

Rufiji District is the southernmost district of the Coastal region of Tanzania. In 1994 Rufiji District had an estimated population of  $174,000^{12}$  and had an area of 13.3 square kilometre.<sup>13</sup> It has some 100 villages which are served by 47 dispensaries, 4 health centres and a number of health posts as well as a district hospital. It is bisected by the Rufiji river from east to west making travel in the rainy seasons from the south to the north very difficult (Figure 1). In 1994 Kisarawe District, which borders the capital of Tanzania, Dar es Salaam, had an estimated population of 219,000 and it had a surface of 6.9 square kilometre. The analysis of the most important indicators of development according to the 1988 census<sup>14</sup> showed that adult literacy was 40% and 36% in Rufiji and Kisarawe respectively. In Rufiji 6% of the rural population had access to piped water, 0.2% had electricity and 73% had a toilet, as compared to 2%, 0.3% and 85% respectively in Kisarawe.

The leprosy case notification data<sup>16</sup> of Rufiji and Kisarawe Districts from 1985 to 1995 are as shown in Figure 2. In Rufiji more new cases were detected than in Kisarawe, even more so when related to the population size. The average case detection rate per 10,000 population was 2·4 in Rufiji and 1·3 in Kisarawe. The fluctuation in the annual case notification was highest in Rufiji District and showed a high peak in 1987 when the health education campaign started. Both districts show a downward trend of similar magnitude (4% to 6% average) in case notification. The cumulative leprosy case notification data of Rufiji and Kisarawe Districts from 1985 to 1995 showed that in Rufiji district 409 new cases were diagnosed out of whom 10% were children below the age of 15 and out of whom 33% had a disability grade 1 or 2. In comparison, during the same period in Kisarawe District 291 new cases were diagnosed out of whom 7% were children below the age of 15 and out of whom 35% had a disability grade 1 or 2. In Rufiji there were slightly more children (not significant) and more disabled patients among the newly detected (p < 0.001). There were no significant changes in the proportions of disabled and children below 15 years among the new cases detected over the years and notably no decrease in the proportion of disabled. The treatment results of multibacillary and paucibacillary patients were very favourable, with cure and treatment completed rates of over 90% in both districts, which had remained approximately constant over the years since 1985.

# RESULTS OF INTERVIEWS

# Schoolchildren

In total 1,120 pupils were interviewed from 13 different schools, 7 schools from Rufiji and 6 from Kisarawe District. The average number of pupils interviewed per school was 86, which was 16% of the registered enrolment of 7,015 pupils, ranging from 7% to 88% between different schools. The mean age of the interviewed pupils was 14–15 years for all schools, ranging from 5 to 23 years. The male:female ratio among the interviewed children was the same in all schools. The two groups of schoolchildren were different in religion and residence, with more christians and pupils of urban setting in the Kisarawe sample. The most significant findings were that the 74% of pupils from schools in Rufiji reported to have had visitors in school talking about leprosy, compared to 3% in Kisarawe. Among the Rufiji pupils, 17% (88/507) reported to have been absent during such talks. Inclusion or exclusion of these absentees in the analysis did not significantly influence the outcome between Rufiji and Kisarawe Districts.

Questions pertaining to knowledge of schoolchildren (Table 3) Knowledge of one or more signs and symptoms of leprosy was present among 90% of the Rufiji and 74% of the Kisarawe pupils. In Rufiji, 57% of the pupils were aware that leprosy can lead to skin lesions and disabilities, while in Kisarawe only 35% thought of this combination. The knowledge of this combination was regarded as more complete. The remainder mentioned either skin lesions or disabilities as signs and symptoms of leprosy. Both in Rufiji and Kisarawe 59% of the pupils knew how one contracts leprosy.

In Rufiji 75% of the pupils thought that leprosy is a curable disease versus 52% in

Knowledge of schoolchildren	Rufiji N	( <i>N</i> = 480) %	Kisarawe N	(N = 584) %	р
Knows one or more signs and symptoms of leprosy.	431	90	435	74	0.000
Knows proper mechanism of transmission by infection and close contact.	275	57	346	<sup>59</sup> }	0.000
Mentions stigmatizing way of contracting leprosy (taboo, curse, sins, etc.).	16	3	42	7 🕽	- 500
Knows leprosy is curable with chemotherapy. Thinks leprosy cannot be cured.	362 103	75 21	302 266	$\left\{\begin{array}{c} 52\\ 46\end{array}\right\}$	0.000
Every leprosy patient ends up being handicapped.	274	57	343	59	0.368
Only unrecognized patients not going for treatment will become disabled.	164	34	157	27	0.017

Table 3. Knowledge of schoolchildren on aspects of leprosy in Rufi ji as compared to Kisarawe District

Attitudes and beliefs of schoolchildren	Rufiji N	( <i>N</i> = 480) %	Kisarawe N	( <i>N</i> = 584) %	р
Willing to play or share food with a schoolmate who is a leprosy victim.	181	38	145	25	0.000
Advise a schoolmate with signs and symptoms suspect for leprosy to go to a modern health facility.	393	82	491	84	0.345
Does not mention a stigmatizing way of which person is likely to get leprosy (taboo, curse, sins, family, etc.).	316	66	360	62	0.212

Table 4. Attitudes and beliefs of schoolchildren in Rut	ì ji co	mpared t	o Kisarawe
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Kisarawe, and answers regarding treatment were similar in both districts: either by modern medicine (96%) or by traditional medicine (4%).

In Rufiji 57% and in Kisarawe 59% of the pupils thought that leprosy inevitably leads to disabilities and in Rufiji 34% of the pupils thought that this was due to unrecognised disease and late or no treatment, versus 27% of the pupils in Kisarawe.

Questions pertaining to attitude and beliefs of schoolchildren (Table 4) In Rufiji the children were more willing to play or share food with a schoolmate having leprosy than in Kisarawe, although this willingness was generally low: 38% and 21% in Rufiji and Kisarawe, respectively.

The majority of children (over 80%) in both districts would refer a leprosy suspect to modern health services.

Approximately the same proportion of children in Rufiji and Kisarawe districts thought that anybody could contract leprosy, 66% and 62% respectively, only 9% and 11% respectively thought that leprosy was related to sinful behaviour, eating forbidden food or witchcraft. The remaining 27% and 28% did not know how one contracts leprosy.

Attitude and beliefs associated with knowledge of schoolchildren Multivariate analysis,

Knowledge of general public	Rufiji N	( <i>N</i> = 345) %	Kisarawe N	(N = 99) %	р
Knows one or more signs and symptoms of leprosy.	273	79	81	82	0.773
Knows proper mechanism of transmission by infection and close contact.	72	21	23	23	0.004
Mentions stigmatizing way of contracting leprosy (taboo, curse, sins, etc.).	135	39	54	55 🕽	
Knows leprosy is spread by untreated leprosy patients.	124	36	59	<sup>60</sup>	0.000
Mentions stigmatizing way of spreading leprosy.	46	13	14	14 <b>)</b>	
Knows leprosy is curable with chemotherapy. Thinks leprosy cannot be cured.	299 20	87 6	90 8	$\left. \begin{smallmatrix} 91\\8 \end{smallmatrix} \right\}$	0.07

Table 5. Knowledge of general public on aspects of leprosy in Rufiji as compared to Kisarawe District

adjusting for age, sex showed that children willing to play or share food with a schoolmate with leprosy were less likely to come from Kisarawe (OR = 0.6, 95% confidence intervals 0.5-0.8), were belonging to the older age groups (OR = 1.6, 95% confidence intervals 1.1-2.2) and knew that leprosy is curable (OR = 1.6, 95% confidence intervals 1.1-2.2), but were less likely to know how leprosy is contracted (OR = 0.7, 95% confidence intervals (0.5-0.9)).

Mentioning stigmatising predisposition to get leprosy was associated with moslem religion (OR = 1·3, 95% confidence intervals 1·1–1·6), with lack of knowledge of signs and symptoms (OR = 0·7, 95% confidence intervals 0·5–0·99), how leprosy is contracted (OR = 2·5, 95% confidence intervals 1·1–5·7), and with lack of knowledge that leprosy is curable (OR = 0·3, 95% confidence intervals 0·2–0·5). There was however no difference between the two districts.

# General public

The characteristics of the people interviewed in the two districts were similar except regarding religion, residence and profession.

In Rufiji 29% (97/340) of those interviewed remembered having attended a seminar or meeting on leprosy and in Kisarawe District this proportion was 4% (4/97) and all of them could indicate that Rufiji Leprosy Trust were the organizers of such seminars. Both in Rufiji and in Kisarawe the respondents indicated that 18% of them had a relative or acquaintance with leprosy, and this was higher among the rural population (21%) than among people from urban settings (12%).

Questions pertaining to knowledge of the general public (Table 5) Interviewees of the two districts did not show any significant differences between responses to the questions about signs and symptoms, way of contracting the disease, which category of patient is infectious and whether leprosy is curable. Approximately 80% of the people in both districts could mention one or more signs and symptoms. The fact that leprosy can be spread in the community by infection and through close contact with a leprosy patient was known by 21% in Rufiji and 23% in Kisarawe. Breaking a taboo, sinful behaviour, curse from God, hereditary, etc. was given by 39% in Rufiji and 55% in Kisarawe as reason of spread of leprosy, the difference being statistically significant. The proportion knowing that untreated leprosy patients can spread the disease was significantly different between Rufiji (36%) and Kisarawe (60%). The knowledge on curability of leprosy with chemotherapy was generally high, and was not significantly higher in Kisarawe (91%) than in Rufiji (87%).

Attitudes and beliefs in general public	Rufiji N	( <i>N</i> = 345) %	Kisarawe N	(N = 99) %	р
Willing to shake hands with exleprosy patient.	157	46	45	45	0.992
Willing to share food from the same plate with and exleprosy patient.	137	40	44	44	0.178
Does not mention a stigmatizing way of which person is likely to get leprosy (taboo, curse, sins, family, etc.).	252	73	65	66	0.025

Table 6. Attitudes and beliefs of general public in Rufiji compared to Kisarawe

Analysis of knowledge of signs and symptoms of leprosy, adjusting for attendance of a leprosy seminar, having a relative or acquaintance with leprosy, age, sex, urban or rural residence, religion and level of education, showed that only knowledge on leprosy transmission was higher in Kisarawe district (OR = 2.4, 95% confidence interval 1.4-4.3). No other differences were found between the districts. The determinants for good knowledge about leprosy were older age and higher educational level. Having a relative or acquaintance with leprosy was not associated with better knowledge of leprosy, nor was attendance at a seminar or meeting on leprosy.

Questions related to attitude and beliefs among general public (Table 6) Questions about stigmatizing attitude and behaviour, like sharing food from the same plate or shaking hands with a patient and which type of people are likely to get leprosy, were not answered in a significantly different way between Rufiji and Kisarawe Districts. In both districts on average 40% to 45% of the people were willing to shake hands and to share food from the same plate. A difference existed between answers to the question which person can get leprosy: 73% in Rufiji and 65% in Kisarawe thought that anyone could contract leprosy, and in Rufiji 18% and in Kisarawe 30% associated stigmatizing beliefs with contracting leprosy.

Attitude and beliefs associated with knowledge of general public Multivariate analysis with attitude as the dependent variable and having attended a seminar, having a relative or acquaintance with leprosy, knowledge of leprosy, age, sex, residence, religion and level of education as the independent variables, showed that willingness to shake hands was significantly associated with knowledge that leprosy is an infectious disease (OR = 1.7, 95% confidence interval 1.1-2.8), with urban residence (OR = 2.4, 95% confidence interval 1.4-4.0), with younger age (OR = 0.97, 95% confidence interval 0.96-0.99) and with not following the moslem religion (OR = 0.5, 95% confidence interval 0.3-0.9). There was no difference between the districts.

The willingness to share food from the same plate was significantly associated with better knowledge of signs and symptoms of leprosy (OR = 2.5, 95% confidence interval 1.3-5.0) and of the infectiousness of leprosy (OR = 2.1, 95% confidence interval 1.2-3.5), with younger age (OR = 0.97, 95% confidence interval 0.96-0.99) and with not following the moslem religion (OR = 0.4, 95% confidence interval 0.2-0.9). There was no relationship with residence in either district.

Stigmatizing belief about contracting leprosy was significantly associated with knowledge of the infectiousness (OR = 2.0, 95% confidence interval 1.1-3.6), female gender (OR = 0.8, 95% confidence interval 0.6-0.9) and lack of primary education (OR = 0.4, 95% confidence interval 0.2-0.9). There was no difference between districts.

In neither district could positive or negative attitudes and beliefs be shown to be

Knowledge of medical staff	Rufiji N	( <i>N</i> = 44) %	Kisarawe N	( <i>N</i> = 42) %	р
Knowing the treatment of leprosy with MDT	22	50	6	14	0.001
Knowing the signs and symptoms of a leprosy reaction	22	50	9	21	0.011
Knowing the treatment of a leprosy reaction with prednisolone.	11	25	13	31	0.708

Table 7. Knowledge of medical staff of leprosy in Rufiji compared to Kisarawe

associated with attendance at leprosy seminar, having a relative or acquaintance with leprosy and knowing that leprosy can be cured.

# Medical staff

Clinical Officers (Medical Assistants and Rural Medical Aides), Nurses and subordinate staff were interviewed at 2 hospitals and 4 different peripheral health units in Rufiji and Kisarawe Districts. Their characteristics were comparable and differed only in religion, reflecting the overall situation in both districts.

*Questions pertaining to knowledge of medical staff (Table 7)* Among the medical staff in Rufiji 32% (14/44) said to have an acquaintance or relative with leprosy compared to 57% (24/42) in Kisarawe.

The proportion of medical staff with knowledge of signs and symptoms of leprosy and the mode of transmission was high among staff in both districts, being 98% and 100% respectively. The transmission of leprosy by infection was properly known by 80% (30/44) of the staff in Rufiji and 69% (29/42) in Kisarawe, the difference not being statistically significant.

The proportion of the staff who knew that leprosy can be treated with multi drug treatment (MDT) in Rufiji was 50% (22/44) and in Kisarawe 14% (6/42). The difference was most pronounced among clinical officers and the subordinate staff, and was highly statistically significant.

Only 50% (22/44) of the Rufiji and 21% (9/42) of the Kisarawe medical staff knew the signs and symptoms of severe leprosy reactions. The difference was mostly attributable to better knowledge among the subordinate staff interviewed in Rufiji district.

The proportion of staff who knew that a severe reversal reaction should be treated with prednisolone was 25% in Rufiji and 31% in Kisarawe district, the difference not being statistically significant, except among the nurses, in favour of Kisarawe district.

Questions pertaining to attitude and beliefs of medical staff (Table 8) The proportion of staff giving an affirmative answer to the questions whether they would marry in a family with leprosy, share food from the same plate and shake hands with an ex leprosy patient, were not statistically different between Rufiji and Kisarawe, except for shaking hands with leprosy patients, in favour of Kisarawe.

Attitude and beliefs associated with knowledge of medical staff Multivariate analysis of an association between positive attitude and beliefs and the knowledge of leprosy and leprosy

Attitudes and beliefs of medical staff	Rufiji N	(N = 44) %	Kisarawe N	(N = 41)* %	р
Willing to shake hands with exleprosy patient	35	80	37	90	0.038
Willing to share food from the same plate with an exleprosy patient	26	59	31	76	0.063
Willing to marry from a family with a leprosy patient	22	50	28	68	0.06

Table 8. Attitude and beliefs of medical staff in Rufiji compared to Kisarawe

\* one individual not evaluated.

reactions, controlling for sex, age, profession, residence, religion and having a relative or acquaintance with leprosy in, showed no statistically significant difference between the districts to exist, except just significantly in the willingness to share food with a leprosy patient, in favour of Kisarawe district (OR =  $5 \cdot 5$ , 95% confidence intervals  $1 \cdot 0 - 29 \cdot 7$ ).

Nurses and subordinate staff were less likely to shake hands (OR = 0.0, 95% confidence intervals 0.00–0.1). The willingness to marry in a family with leprosy was associated with lack of knowledge of the signs and symptoms (OR = 0.1, 95% confidence intervals 0.02–0.6), but was associated with knowledge of the treatment of reversal reactions of leprosy (OR = 4.4, 95% confidence intervals 1.2–2.9).

*Perception of responsibilities of medical staff in leprosy control* In Rufiji 68% (30/44) of the staff felt that the diagnosis and treatment of and care for leprosy patients is the sole responsibility of the DTLC, compared to 31% (13/42) in Kisarawe. But this difference did not exist between the person in-charge of the units (Clinical Officers). 75% of the staff in Rufiji and 66% in Kisrawe felt that the DTLC was the only person to do the defaulter tracing of leprosy patients, the difference not being statistically significant.

# Community leaders

Out of a total of 47, only 4 community leaders could be interviewed in Kisarawe District, making comparison between the two districts unfeasible. From the leaders interviewed in Rufiji 64% knew one or more leprosy patients within their jurisdiction. Seven-four per cent of them were aware of the health education campaigns from Kindwitwi and mostly so because they had been contacted first. Many of them played an active role in the campaign by conveying the message, making home-visits and referring patients in need. The majority (93%) believed that the campaign has increased the knowledge of leprosy and the availability of effective modern treatment. Out of them, the majority of the leaders (83%) thought that the main effect on community members of the campaign has been to increase knowledge about leprosy and modern treatment, and 17% thought that only reduction of fear and stigma was most important. However, 46% of them believed that reduction of fear is the most important mechanism to reduce discrimination or isolation of leprosy patients. They were not asked any specific questions concerning their knowledge, attitudes and beliefs about leprosy.

# Traditional healers

Out of the 17 traditional healers interviewed only one could be interviewed in Kisarawe District due to the lack of a centralized registration of traditional healers in Kisarawe. Therefore comparison between the two districts is not feasible. Less than half (41%) of the interviewed healers stated that they treat leprosy. They were consulted by 81 leprosy patients during the past year and claimed to have cured 60 of them (74%). This claim could not be verified. They believed that leprosy is decreasing and gave the availability of effective modern treatment as the reason (80%). A minority (20%) felt that also traditional treatment (in combination with modern medicines) contributed to the decrease. On the other hand, 94% of them agreed that breaking a traditional taboo can cause leprosy. Out of the traditional healers interviewed, only 47% had attended a seminar or meeting on leprosy where they learned about good results of modern treatment and the necessity for referral of patients. No other more specific questions concerning their knowledge, attitudes and beliefs about leprosy were asked.

# Discussion

The socioeconomic status of the people of the two districts is very similar, according the national census data. Nevertheless, Kisarawe district is in easy reach of Dar es Salaam, while Rufiji is much farther away and partly separated by the Rufiji river, which is difficult to cross in the rainy seasons. In Rufiji district leprosy is a bigger problem than in Kisarawe district. The higher case notification and higher proportion of disabled among new cases denote that in Rufiji cases are detected in a more advanced stage of the disease than in Kisarawe. A possible explanation could be that the appeal of the activities of the Rufiji Leprosy Trust and the presence of a charismatic person like the late Rev. Fr. Lamburn, attracted (disabled) leprosy patients from neighbouring districts, including Kisarawe. The high fluctuation in the case detection in Rufiji was probably a result of availability of clothing and supplementary food at Rufiji as well as health education activities. Nevertheless, both Rufiji and Kisarawe Districts showed largely similar downward trends in annual case detection of leprosy, as well as a very favourable compliance of leprosy patients to treatment. It is worrying that no downward trend could be observed in the proportion of disabled and children below 15 years among new cases diagnosed.

The results of the interviews show that people in Rufi ji District have had more exposure to health education seminars and meetings than in Kisarawe, and that they remembered well that these were organized by Kindwitwi Leprosy Trust.

We are aware of the difficulties concerning getting a real true picture of one's attitudes and beliefs using interviews. In-depth interviews with a more extensive questionnaire and with more than one control question would be more appropriate for this purpose. Observation would be even more valid. Nevertheless, for the purpose of comparison we have categorized the many different answers given into a few prevailing attitudes and beliefs.

Among schoolchildren, the overall knowledge of leprosy and the place to go for treatment was high and was higher in Rufiji than in Kisarawe. However, knowledge about mechanisms of becoming disabled was low in both districts. The attitude and beliefs of the schoolchildren were low in both districts, especially the willingness to play or share food with a leprosy victim, but were better in Rufiji than the Kisarawe. These differences can be attributable to exposure to health education.

The effect of health education was less clear among the general public. Knowledge of leprosy was high in both districts. It appeared that attending seminars on leprosy in Rufiji District has not directly increased the knowledge on mode of transmission of leprosy as compared to Kisarawe. In addition, increased knowledge of parents attributable to having their children exposed to health education at school, as is shown to exist in some studies,<sup>5</sup> apparently did not have much influence, reflecting similar findings in other studies.<sup>8</sup> The peculiar finding that Kisarawe general public scored so much higher in knowledge of spreading of leprosy by untreated leprosy patients is difficult to explain, but fits the general impression that knowledge of leprosy was slightly higher in Kisarawe. This question also served as a control for the stigmatizing answer of how one contracts leprosy. However, we were not informed of the levels of knowledge before the campaign in Rufiji and could therefore not measure a change over time. Neither were we aware of any differential exposure of the population of Kisarawe to any other health education about leprosy by multimedia (radio, TV or newspaper), or the influence of living close to Dar es Salaam. Stigmatizing attitude and beliefs were prevalent in both districts and were associated with lack of knowledge of leprosy, lower education level, female gender, rural residence, older age group and Moslem religion.

Knowledge/attitude	District	School children	General public	Study <sup>6</sup> %	Study <sup>5</sup> %
Knowing signs and symptoms of leprosy	Rufiji Kisarawe	90% 74%	79% 82%	64	50-64
Knowing mode of transmission	Rufiji Kisarawe	57% 59%	21% 23%	48	
Knowing leprosy is curable	Rufiji Kisarawe	75% 29%	87% 91%	48	
Willing to share food with a leprosy victim	Rufiji Kisarawe	38% 25%	40% 44%	2-6	1-23

Table 9. Comparison of level of knowledge and attitude towards leprosy of Rufi ji, Kisarawe and two studies in India

Good knowledge and positive attitudes among the public could not be shown to be associated with having attended a leprosy seminar or having a relative or acquaintance with leprosy.

Compared with data from studies in India<sup>5,17</sup> and in Tanzania<sup>7,18</sup> the level of knowledge and attitude found in both Rufiji and Kisarawe can be considered similar or better. In Table 9 an overview of the findings about knowledge and attitude in this study is presented, compared to the findings in two other studies in India.<sup>5</sup>

Among medical staff knowledge of signs and symptoms and mode of transmission of leprosy was high, which reflects results found in staff in another African country.<sup>4</sup> Knowledge about MDT and the diagnosis of leprosy reactions was higher among staff of Rufiji compared to Kisarawe District. The knowledge of treatment of reactions with prednisolone was generally low and not different between the two districts. Attitudes and beliefs among health workers were generally positive, and higher than among schoolchildren and general public. Although no uniform relationship of attitude and beliefs with (lack of) knowledge of leprosy was found, some respondents' lack of knowledge on how to treat a leprosy reaction was associated with a stigmatizing attitude. In both districts, better knowledge among medical staff about the details of leprosy (treatment and reactions) seemed to be associated with stigmatizing attitude. This is a peculiar finding for which we have no explanation other than mentioned in literature, that increased knowledge not necessarily leads to better attitude.<sup>5,6</sup> A majority of the medical staff in both districts thought that working with leprosy patients is the responsibility of the DTLC only. In Rufiji district less responsibility for leprosy control was perceived to be given to the general staff, while at the same time they were more knowledgeable in diagnosing reactions and treating leprosy patients with MDT, and were less stigmatizing towards the patients.

Most community leaders stated that the health education campaign had increased the knowledge of leprosy in the community, but few mentioned that it had achieved much to reduce the fear and the stigma of leprosy. They were therefore well aware of the actual situation, as found by this evaluation.

The traditional healers perceived the leprosy problem to be decreasing, resulting from decreasing consultations by leprosy patients or suspects. They were therefore sensitive to the trend of leprosy casefinding in their districts. They had a very high level of stigmatizing beliefs themselves, but nevertheless were aware of the potential of modern treatment. Their claim of treating a substantial number of leprosy patients was not further verified. It would be worth-while to get more details on their approach to and treatment of leprosy, in order to have more

specific messages for them and better utilize their influence. Traditional healers and community leaders were not asked the same questions as the general public. This omission made further comparison with the general public, and more detailed (multivariate) analysis, impossible.

We did not interview registered leprosy patients to find out whether health education activities contributed to their early recognition of signs and symptoms of the disease and a decision to go early for modern treatment. This knowledge would have contributed much to the analysis of effectiveness of health education.

# Conclusion

We could not compare our findings with levels of knowledge and attitudes prior to the health education campaign, which would have been preferable. However, comparing the two districts with and without a sustained leprosy health education campaign, we found that the campaign has had a favourable impact on the knowledge and the attitude of schoolchildren in Rufiji District. Among them we could demonstrate a relationship between increased knowledge of leprosy and a positive, less stigmatizing attitude.

We found indications that low level of education, rural residence, older age, female gender and Moslem religion were all associated with stigmatizing attitudes and beliefs towards leprosy.

Medical staff knew how to diagnose and treat leprosy, but few were confident in the diagnosis and treatment of leprosy reactions. Among them, lack of knowledge of diagnosis of leprosy and treatment of leprosy reactions was associated with stigmatizing attitudes. Also the epidemiological indicators show a high level of and little downward trend in the proportion disabled among newly-diagnosed cases. We could not establish a causal relationship between health education and increasing numbers of new leprosy cases diagnosed in early stages of disease. Fluctuating levels of case detection were probably also associated with availability of food and clothing supplements at Rufiji, in combination with health education outreach work by the Rufiji Leprosy Trust team.

We recommend that future health education activities focus on rural communities and schools and that women should be fully represented in the audience. It is advisable to continue to involve community and religious leaders and pay special attention to the traditional healers and further explore their current wisdom and expertise. Medical staff should be fully aware of leprosy treatment and leprosy reactions. Evaluation of outcome of health education campaigns can only complete when also leprosy patients themselves are included.

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