



A Comparative Study on the Quality of Life of Leprosy Patients in Kilifi and Kwale Counties in Kenya

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Summary

BACKGROUND

Kenya at present is in the post-elimination phase of leprosy having achieved a prevalence of <1 case per 10,000 persons in 1989. In 2019 Kenya notified 163 leprosy patients, highest being in Kilifi and Kwale counties. About a quarter (26%) of the notified leprosy patients had grade 2 disability at the time of diagnosis, this being the most severe form of disability that may indicate a late diagnosis. This study aimed at assessing the quality of life of leprosy patients to guide policies and programs intended to enhance the health and well-being of leprosy patients.

MATERIALS AND METHODS

This was a case-control study conducted in Kilifi and Kwale Counties. For every leprosy index patient enrolled, two controls were identified within the same village to match the case. Descriptive statistics were used to summarise demographic and clinical variables. The World Health Organisation (WHOQOL-BREF) tool was used to measure the quality of life. The tool derived four (4) domains of physical health, psychological status, social relationship, and environmental profile. These were transformed into a scale between 0 to 100 for analysis. The F-test was used to compare mean scores in the four domains between cases and controls. The quality of life among the index cases against their controls was further analysed using conditional logistic regression models.

RESULTS

A total of 98 leprosy patients and 167 controls were evaluated for quality of life. On the perception of quality of life, leprosy patients had significantly lower mean transformed scores of 39 (SD 25) versus 49 (SD 25) $p = <0.0001$ compared to controls. Similarly, index cases had lower health satisfaction scores of 42 (SD 26) compared to controls scoring 61 (SD 27) $p = <0.001$. Overall leprosy patients had statistically significant poorer scores on physical health, psychological health, social relationships and environmental QoL domains. Differences were most remarkable in the psychological domain, with a mean transformed score of 53 (SD 20) versus 68 (SD 16) $p = <0.0001$ for controls. The overall quality of life model revealed that leprosy patients who were found to have either diabetes or hypertension enjoyed a better overall quality of life with OR of 10.98 and 1.22 respectively with a p-value <0.00001 . Patients with tuberculosis and HIV presented the poorest quality of life with ORs of 0.49 and 0.14 respectively.

CONCLUSION

The quality of life of the leprosy patients was significantly lower than that of the community controls in all the domains. Governments and communities need to prioritize rehabilitation measures such as the provision of artificial limbs, cataract surgery, and social protection disbursements to help leprosy victims improve their quality of life.



Keywords: *Quality of Life (QoL), Leprosy patients*

[*Afr. J. Health Sci.* 2022 35(3): 343 - 355]

Introduction

Globally, a total of 184,212 leprosy cases were reported in 158 countries worldwide in 2018, corresponding to a prevalence rate (PR) of 0.2 per 10,000 individuals [1]. Many countries have eliminated this disease. Kenya is in the post-elimination phase of leprosy after achieving a prevalence rate of less than 1 case per 10 000 persons in 1989, however, there remain hot spots in Kilifi, Kwale, Busia and Siaya [2]. In 2019 Kenya notified, 163 leprosy cases and the highest notifications were in Kilifi and Kwale counties[2, 3]. About a quarter (26%) of leprosy patients registered for treatment, presented with grade 2 disability at the time of diagnosis[2]. While leprosy is a medical affliction, it has devastating socioeconomic, psychological, and spiritual consequences. It is also the world's greatest cause of preventable disability[4]. Patients, unsurprisingly, have a poor quality of life (QoL) due to their low socioeconomic level, and insufficient access to health care resulting in disease progression with disabilities[5]. Poverty and stigma are exacerbated as a result. Disability takes away 30% of a leprosy patient's working life on average[6], and those with visible deformities have a worse quality of life (QoL) [7].

Quality of life (QoL) is a subjective measure of an individual's overall health and well-being based on their quality of health, comfort, and happiness. This definition considers a person's physical and mental health, social relationships, personal views, environment, and relationship to key features of their environment[8]. It is quoted as the subjective impact of an illness or injury.

Quality of life assessment is desirable to provide direction for policies and programs aimed at improving well-being [8]. These include the funding and implementation of rehabilitation for disabled leprosy patients. On

a macro level, health care access, service availability, social safety nets, and economic empowerment impact the quality of life.

While Kenya is at the leprosy post-elimination stage, and effective chemotherapy is extant and largely available, the subsequent QoL among affected Kenyan patients has not been described to our knowledge. This study was aimed at comparing the QoL of leprosy-affected persons compared with unaffected individuals living in the same community.

Materials and Methods

Study design

This was a case-control study intended to compare the quality of life of leprosy index patients matched to community controls. All index cases notified between January 2014 and December 2019 to the National TB and Leprosy program were to be enrolled, as well as two controls for each index case. Enrollment of study participants took place from July 2019 to March 2020

Settings

The study was conducted in Kilifi and Kwale counties. Both are coastal counties with leprosy hotspots [2]. Kwale county has an area of 8,267 km² with a population of 866,820, while Kilifi county covers an area of 12,540 km² and has a population of approximately 1.45 million [9].

Tourism, agriculture, and fishing comprise the predominant economic activities in both counties [10]. About 40% of the population are thought by some assessments to be living under the poverty line [11]. Prevalent tropical diseases in these counties include leprosy [3], schistosomiasis [12, 13], malaria [14] and filariasis. HIV prevalence is 2.3% and 4.2% in Kilifi and Kwale respectively [16].

Recruitment of leprosy index patients

All patients diagnosed with leprosy based on clinical evaluation or laboratory



confirmation and who entered into the leprosy treatment registers from the year 2014 to 2019 were eligible for recruitment. Study staff abstracted data from the leprosy treatment registers, including name, age, sex, residence and select health variables. Thereafter, in liaison with Community Health Volunteers (CHVs), index cases were traced to their households using the physical address and telephone contact as recorded in the treatment registers. At the household level, the study team administered the World Health Organization (WHOQOL-BREF) quality of life questionnaire with 26 items on a 5-point Likert scale after obtaining informed consent. In addition, the case history of each leprosy index case was obtained and a physical exam to identify the extent of the disease was conducted.

Recruitment of controls

For every index case, two controls were identified within the same village. They were matched by age and sex, had to be resident in the study area for at least one year, not diagnosed to have leprosy, and lacked close exposure to a case. Similarly, informed consent was obtained and the WHOQOL-BREF was administered.

Disability grading

Leprosy disability was graded according to the WHO leprosy disability grading system [17]. This classification was based on the presence of anaesthesia, visible deformity or damage and eye deformities. For hands and feet, grade 0 was defined as no anaesthesia and no visible deformity or damage; grade 1 as anaesthesia present, but no visible deformity or damage; and grade 2 as visible deformity or damage. Grade 0 for the eyes was defined as no eye problems and no evidence of visual loss, while grade 1 was eye problems due to leprosy with vision not severely affected and grade 2 was severe visual impairment and/or conditions such as lagophthalmos, iridocyclitis, corneal opacities.

The higher the grading the more severe the disability.

Data collection

Data were collected from July 2019 to March 2020 using an electronic data collection tool by trained research assistants working under the supervision of a study coordinator. A unique study identification number was assigned to each study participant. For both the leprosy index patients and the controls, data were collected on age, sex, residence by county and village, and history of chronic illnesses including tuberculosis, diabetes, hypertension, HIV infection or any other chronic illness. Study participants were asked about their overall perception of both their quality of life and their health satisfaction. The WHOQOL-BREF four domain scores of physical health, psychological health, social relationships, and environment were used to assess the quality of life for each individual. Domain scores were scaled in a positive direction (i.e., higher scores denote a higher quality of life). Facets incorporated within the domains were as follows; physical health (daily activities, reliance on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, work capacity), psychological health (body image and appearance, negative feelings, positive feelings, self-esteem, spirituality/religion / personal beliefs, thinking, learning, memory and concentration), social relationships profile (personal relationships, social support, sexual activity) and environment profile (financial resources, freedom, physical safety and security, health and social care in terms of accessibility and quality, home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation/leisure activities, physical environment (pollution/noise/traffic/climate), transport). The index case disability grading on the diagnosis of leprosy was retrieved from the treatment registers.



Statistical methods

Descriptive statistics were used to summarise demographic and clinical variables. The World Health Organisation (WHOQOL-BREF) tool was used to measure the quality of life. The tool derived four (4) domains of physical health, psychological status, social relationship, and environmental profile and was transformed into a scale between 0 to 100 for analysis. Two (2) overarching measures of overall quality of life and health satisfaction were also computed. Information on the respondent's other health conditions was collected and analysed too.

The F-test was used to compare mean scores in the four domains between cases and controls. The quality of life among the index cases against their controls was analysed using conditional logistic regression models. Leprosy index cases were matched with a varying number of controls ranging from 1 up

to a maximum of 3 with a majority having 2 controls.

Ethical approval

The study protocol was reviewed and approved by the Kenya Medical Research Institute (KEMRI) Scientific Ethics Review Unit. The approval reference was KEMRI-SERU No. 3674.

Written informed consent was obtained from each eligible participant before enrolment into the study and after a thorough explanation of the risks and benefits of participating in the study.

Results

There were 180 leprosy cases in the facility treatment registers, and 118 were traced to their households. Of these 104 were enrolled alongside 167 age and sex-matched controls. A total of 98 leprosy patients had the WHOQoL-BREF administered (Figure 1 in appendix).

Table 1:
Baseline Characteristics of Study Participants

		Leprosy patient (n = 98) Freq (%)	Control (n=167) Freq (%)
Gender	Male	61 (64)	100 (60)
	Female	35 (36)	66 (40)
	missing	2	1
Age (years) mean(SD)		52(17)	54(18)
Age categories (years)	5-18	4 (4)	3 (2)
	19-30	8 (8)	21 (12)
	31-45	22 (22)	28 (17)
	46-60	26 (27)	47 (29)
	61-75	33 (34)	49 (29)
	>75	5 (5)	18 (11)
County	Kilifi	65 (66)	129 (78)
	Kwale	33 (34)	37 (22)
Any comorbidity	Yes	21 (21)	46 (28)
	No	77 (79)	120 (72)

Table 2:
Disabilities Reported among Leprosy Patients

Site of disability N = 87		Grade 0 n(%)	Grade 1 n(%)	Grade 2 n(%)
Eyes	Right	70 (80.5)	N/A	17(19.5)
	Left	72 (82.8)	N/A	15 (17.2)
Hands	Right	44 (50.6)	5 (5.7)	38 (43.7)
	Left	42 (48.3)	4 (4.6)	41 (47.1)
Feet	Right	38(43.67)	12(13.8)	37 (42.5)
	Left	47 (54.0)	6 (6.9)	34 (39.1)



At baseline majority of leprosy index patients were male 61/98 (64%), mean age was 52 (SD 17) years and most patients were between 31-75 years (Table 1). Equally, males made up 60% of the controls and the mean age for the group was 54 (SD 18) years.

The grade 2 level disability was the most observed among the leprosy patients with 43.7% and 47.1% affected on the right and left hands respectively (Table 2).

Leprosy patients exhibited lower mean transformed scores on the perception of QoL than controls, 39 (SD 25) against 46 (SD 25), $p = 0.0001$. Similarly, the patients had lower satisfaction with health status compared to controls 42 (SD 26) against 61(SD 27) $p < 0.0001$ (Table 3). Leprosy patients had statistically significant poorer scores on all 4 domains of physical health, psychological status, social relationships, and environmental

profile. Differences were most widespread in the psychological status domain, with mean transformed scores of 52.89 (SD 20.22) versus 67.79 (SD 16.13) $p < 0.0001$ for controls (Table 3).

In comparing the domain scores between females and males, there was not much difference in the domain scores for physical health, psychological health, and environmental profile for leprosy patients; the scores against females versus males were 52 versus 52, 54 versus 53 and 50 versus 49 respectively for these 3 domains (Table 4).

The females in both study arms had much lower scores compared to the males in the social relationships domain; 61 against 64 for females and males respectively in the leprosy patients while 64 versus 72 in the control group for females and males respectively (Table 4).

Table 3:
Mean Transformed Scores by QoL Domains for the Leprosy Patients and the Controls

QoL domain	Leprosy patients		Controls		p-value
	Mean transformed domain score (SD)		Mean transformed domain score (SD)		
Perception on QoL	39 (25)		46 (25)		<0.0001
Satisfaction with health status	42 (26)		61(27)		<0.0001
Physical health	51.90 (12.87)		57.13 (11.76)		0.001
Psychological	52.89 (20.22)		67.79 (16.13)		<0.0001
Social relationships	62.50 (21.52)		68.81 (18.25)		0.012
Environment	49.56 (16.51)		57.80 (14.95)		<0.0001

Table 4:
Mean Transformed Quality of Life Scores by Gender and by Presence or Absence of Comorbidity

QoL domain	Leprosy patients		Controls	
	<u>Gender</u>		<u>Gender</u>	
	Female	Male	Female	Male
Physical health	52 (14)	52 (13)	56 (12)	58 (12)
Psychological	54 (22)	53 (19)	66 (18)	69 (15)
Social relationships	61(23)	64 (21)	64 (19)	72 (17)
Environment	50 (16)	49 (17)	56 (16)	59(14.00)
	<u>Comorbidity</u>		<u>Comorbidity</u>	
	Comorbidity present	No comorbidity	Comorbidity present	No comorbidity
Physical health	49 (13)	53 (13)	54 (13)	59 (11)
Psychological	49 (20)	54 (20)	57 (18)	73 (13)
Social relationships	63 (20)	63 (22)	62 (18)	72 (17)
Environment	48 (11)	50 (18)	51 (14)	61 (14)



We assessed the transformed mean scores concerning comorbidity and individuals with comorbidity had lower mean scores compared to those without comorbidity in both study arms (Table 4). There was an exception to this in the social relationships domain of the leprosy patients as there was not much of a difference whether one had comorbidity or not 63 (SD 20) against 63 (SD 22) respectively (Table 4).

Ordinal logistic regression

The overall quality of life

The overall quality of life was better in the controls as compared to the index cases whose OR was 0.96 (p-value <0.00001). The overall quality of life model was adjusted for

age, gender, and other medical conditions. The index cases who were found to have either diabetes or hypertension enjoyed a better overall quality of life with OR of 10.98 and 1.22 respectively with a p-value <0.00001. Tuberculosis and HIV presented the poorest quality of life among the index cases with OR of 0.49 and 0.14, respectively. More than one comorbidity further reduced the quality of life for the index cases with the OR dropping from 0.72 to 0.62. However, males and the older ages enjoyed marginally a better quality of life than the females and younger ages with OR of 1.013 and 1.001 respectively among the index cases (Table 5).

Table 5:
Overall Quality of Life Model

Variable	coefficient	OR	se(coef)	Z	p-value
Model 1					
Overall.QoL	-0.0381	0.963	0.00854	-4.46	<0.00001
Model 2					
Overall.QoL	-0.0388	0.962	0.00866	-4.48	7.30E-06
(Diabetes_Code)1	2.3962	10.981	1.279	1.87	<0.00001
Model 3					
Overall.QoL	-0.0381	0.963	0.00854	-4.461	8.20E-06
(Hypertension_Code)1	0.1977	1.219	0.47275	0.418	<0.00001
Model 4					
Overall.QoL	-0.0382	0.963	0.00854	-4.475	7.60E-06
(Tuberculosis_Code)1	-0.7124	0.49	1.50117	-0.475	<0.00001
Model 5					
Overall.QoL	-0.0399	0.961	0.00879	-4.54	5.60E-06
(HIV_Code)1	-1.9558	0.141	1.13609	-1.72	<0.00001
Model 6					
Overall.QoL	-0.0376	0.963	0.00857	-4.388	1.10E-05
(Other Chronic illnesses_Code)1	-0.498	0.608	0.57066	-0.873	3.80E-01
Model 7					
Overall.QoL	-0.0378	0.963	0.0086	-4.402	1.10E-05
(With one comorbidity)	-0.3351	0.715	0.4234	-0.791	<0.00001
(With more than one comorbidity)	-0.4802	0.619	0.8978	-0.535	<0.00001
Model 8					
Overall.QoL	-0.0382	0.963	0.00859	-4.444	8.80E-06
(Comorbidity_Pres_Abs)1	-0.3194	0.727	0.40196	-0.795	4.30E-01
Model 9					
Overall.QoL	-0.0387	0.962	0.00871	-4.448	8.70E-06
(Gender_Code)Male	0.0126	1.013	0.85572	0.0147	<0.00001
Model 10					
Overall.QoL	-0.03869	0.962	0.00868	-4.4552	8.40E-06
Age	0.00132	1.001	0.0233	0.0568	<0.00001



Health satisfaction

Health satisfaction was better among controls in comparison to the leprosy patients who had an OR of 0.946 ($p < 0.00001$) (Table 5). Patients with any one of the conditions; diabetes, hypertension or tuberculosis were more likely to have a better perception of health satisfaction with ORs of 11.325, 1.225 and 1.769 respectively (Table 6).

Quality of life domains

We analysed the domains as individual models (Table 7). All the domains of physical health, psychological health, social relationships, and environment were likely to be poor among the leprosy patients and these were statistically significant (Table 7).

Table 6:
Health Satisfaction Models

Variable	coefficient	OR	se(coef)	Z	p-value
Model 1					
Health.satisfaction	-0.0556	0.946	0.0102	-5.43	<0.00001
Model 2					
Health.satisfaction	-0.0572	0.944	0.0106	-5.38	7.50E-08
(Diabetes_Code)1	2.427	11.325	1.2109	2	<0.00001
Model 3					
Health.satisfaction	-0.0557	0.946	0.0103	-5.421	5.90E-08
(Hypertension_Code)1	0.2033	1.225	0.5	0.407	<0.00001
Model 4					
Health.satisfaction	-0.0564	0.945	0.0105	-5.355	8.60E-08
(Tuberculosis_Code)1	0.5703	1.769	1.2701	0.449	<0.00001
Model 5					
Health.satisfaction	-0.0583	0.9434	0.0107	-5.42	5.80E-08
(HIV_Code)1	-2.5238	0.0802	1.3388	-1.89	<0.00001
Model 6					
Health.satisfaction	-0.0576	0.944	0.0105	-5.48	4.40E-08
(otherChronic_Code)1	-1.2868	0.276	0.6921	-1.86	<0.00001
Model 7					
Overall.QoL	-0.0378	0.963	0.0086	-4.402	1.10E-05
(Comorbidity_Agregate)1	-0.3351	0.715	0.4234	-0.791	<0.00001
(Comorbidity_Agregate)2	-0.4802	0.619	0.8978	-0.535	<0.00001
Model 8					
Health.satisfaction	-0.0562	0.945	0.0102	-5.5	3.90E-08
(Comorbidity_Pres_Abs)1	-0.6952	0.499	0.4837	-1.44	<0.00001
Model 9					
Health.satisfaction	-0.0579	0.944	0.0107	-5.401	6.60E-08
(Gender_Code)Male	-0.5288	0.589	1.0426	-0.507	<0.00001
Model 10					
Health.satisfaction	-0.0582	0.943	0.0109	-5.356	8.50E-08
Age	0.0141	1.014	0.0288	0.489	<0.00001

Table 7:
The Domains of QoL Models

Variable	coefficient	OR	se(coef)	Z	p-value
Model 1 Physical health_Transformed	-0.0545	0.947	0.015	-3.62	0.00029
Model 2 Psychological health_Transformed	-0.0794	0.924	0.014	-5.67	<0.00001
Model 3 Social relationship_Transformed	-0.0318	0.969	0.00862	-3.69	0.00023
Model 4 Environment_Transformed	-0.0631	0.939	0.0135	-4.69	<0.00001



Discussion

The study revealed that the overall WHOQoL-100 mean transformed scores of leprosy patients were significantly lower than that of the community controls in all the domains. This finding may be an indication of the extent and nature of the debilitation of leprosy patients in Kwale and Kilifi counties who may be more disadvantaged in society because of physical disabilities, stigma, and discrimination. Nevertheless, this contrasts with a study conducted in India [18] where there was no significant difference found in social relationships and environmental domains between the two groups. The India study was conducted in a leprosy rehabilitation centre where patients were socially and vocationally rehabilitated. This may minimise the effects of socio-environmental factors over QoL of leprosy patients compared to a patient in Kilifi and Kwale who had no access to rehabilitation programs.

Impact of leprosy on quality of life

Our findings are consistent with multiple studies [19-22] that have shown that the disease and the related physical disabilities pre-dispose to psychological, economic, and social problems which harm QoL. While the availability of multidrug therapy successfully treats leprosy, individuals still develop disabilities resulting in further stigma and discrimination. The study area could be uniquely adverse for geographic, genetic, socioeconomic, or cultural reasons that could result in the distinct leprosy caseload observed. The quality of life among the index cases against their controls was analysed using conditional logistic regression models that adjusted for age, gender, and comorbidities. We still observed dismal QoL scores among leprosy patients in all four domains. We consider this to be evidence of the non-negligible harmful impact of this disease on these individuals.

The study found that leprosy patients with either diabetes or hypertension enjoyed a better overall quality of life and were more likely to have a better perception of health satisfaction. There is a possibility that these patients with these chronic conditions could be having good health-seeking behaviour that is related to their positive perception of the supportive roles of the healthcare providers they visit, their perception of good quality of service and the knowledge they have concerning complications of their health conditions. Studies have revealed that these attributes contribute to better QoL [23,24].

On the contrary, tuberculosis and HIV as comorbid conditions presented the poorest quality of life among leprosy patients, many factors could contribute to this including stigma from self and the community. Studies have reported that persons living with these conditions experience stigma that makes them withdraw from social relationships to minimize potential discrimination [25,26]. This leads to social isolation and reduced opportunities for social support and thus they score lower in quality of life.

This study indicated that males enjoyed marginally a better quality of life than females, this finding is unlike what Geetha A. *et al* found in India that women with leprosy had higher quality of life [27]. A possible attribute to this finding could be that the women in this community are not as economically empowered as the men reducing their access to health care and other basic utilities.

Our study results demonstrate that while patients may be registered with national leprosy treatment programs, and receiving treatment, additional measures are required to address their residual feelings of low QoL. These include among others, prioritizing access to rehabilitation programs.



Physical health

The profile of physical disability of the leprosy patients in this study showed various physical disabilities affecting the limbs and the eyes. Impairment of QoL in leprosy patients with physical disabilities has been associated with the stigma and discrimination faced by these patients [28,29] and is worse in those with severe disability of grade two [7]. The impact of the disabilities on the patients varies depending on how incapacitated individuals become. This may result in patients who are economically not productive because of various factors including limited mobility, discomfort, inability to work and the reduced possibility of employment. The physical disability among the leprosy patients in this study may have influenced QoL.

Psychological health

The prevalence of psychiatric disorders among leprosy patients is 52.4% and 53.29% in studies done in Ethiopia and Kenya respectively [19, 20]. These studies found that psychiatric morbidity was positively correlated with a physical disability. All leprosy patients enrolled in this study were first identified from the treatment registers, indicating they had been diagnosed and started on treatment, nevertheless, their QoL was lower. This may be explained by the findings of Ogden *et al* who reported that deformities and disabilities resulting from leprosy lead to deterioration in the functional capacity and psychological state of mind of patients throughout their lives [30]. Another explanation as reported by Senturk and Sagduyu [31] is that the community's negative feelings and discriminative attitudes towards leprosy patients affect their mental wellness.

Social relationships

It was expected that leprosy would impact the social relationships of patients living with leprosy in the community. Indeed, studies show discrimination is rife which intensifies social and economic isolation [32,33]. Unlike patients institutionalized in a

leprosarium, patients living among their families in communities could have a different subjective measure of QoL. In our study, we found that living in the community was also adverse to their social wellbeing.

Environmental profile

Since leprosy affects the poor and marginalized [34 – 36], the levels of poverty in this community are an important consideration. Many persons (about 40%) of them lived under the poverty line [11]. There is a further possibility that most of the leprosy patients belonged to an even lower socioeconomic stratum compared to controls. In these cases, leprosy could dispose to poverty by reducing agency and access to employment opportunities or it could also be a predisposing factor. The study design did not permit further elucidation of this relationship in greater detail.

Study strengths

The use of the World Health Organisation WHOQoLBREF standardized validated tool in this study makes our data more comparable across continents and diverse settings. While the co-morbidity data collected is additional information that is scarcely reported in most studies.

Study limitations

Of all the leprosy index patients registered for treatment only 66% were traced, the remainder may have had more severe disease and died of complications, or they may have moved out of the study area in search of health care or other opportunities. They might have had different characteristics from those enrolled. Further, due to COVID-19 pandemic control measures, it was not viable to continue recruitment and tracing efforts. This may have caused some survivor bias in our results. However, this only further strengthens our case for rehabilitation measures for these patients. This study did not establish the health-seeking behaviour and socioeconomic determinants among the leprosy patients and



controls that affect QoL. This limits conclusions on attributes to QoL. Although the study was designed to enrol 2 controls for every index leprosy patient, this was not achieved fully because of the non-availability of matches in the community.

Conclusions and Recommendations

This study has shown that leprosy patients reported lower quality of life in their physical, social, psychological, and environmental health domains. Governments and communities need to prioritize rehabilitation interventions that may include the provision of artificial limbs, cataract surgery, and social protection disbursements to improve the livelihood of leprosy patients.

Acknowledgements

The authors are thankful to the Kenya Medical Research Institute (KEMRI) for funding this study through the KEMRI internal research grant and for allowing this study to be implemented. We acknowledge and appreciate the Kenya National Tuberculosis, Leprosy and Lung Disease Program and the county governments of Kwale and Kilifi for their support which enabled the implementation of the fieldwork. We are grateful to all the field staff and all the study participants.

Authors' contributions

All authors were involved from the inception, design, data collection, analysis, interpretation, drafting and editing of the manuscript for final submission. All the authors agree with the content of the manuscript and approve the final version of the manuscript.

Source of funding

KEMRI Internal Research Grant

Conflict of interest

The authors declare no conflict of interest

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Data Availability Statement

Data are available on request from KEMRI

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Appendix

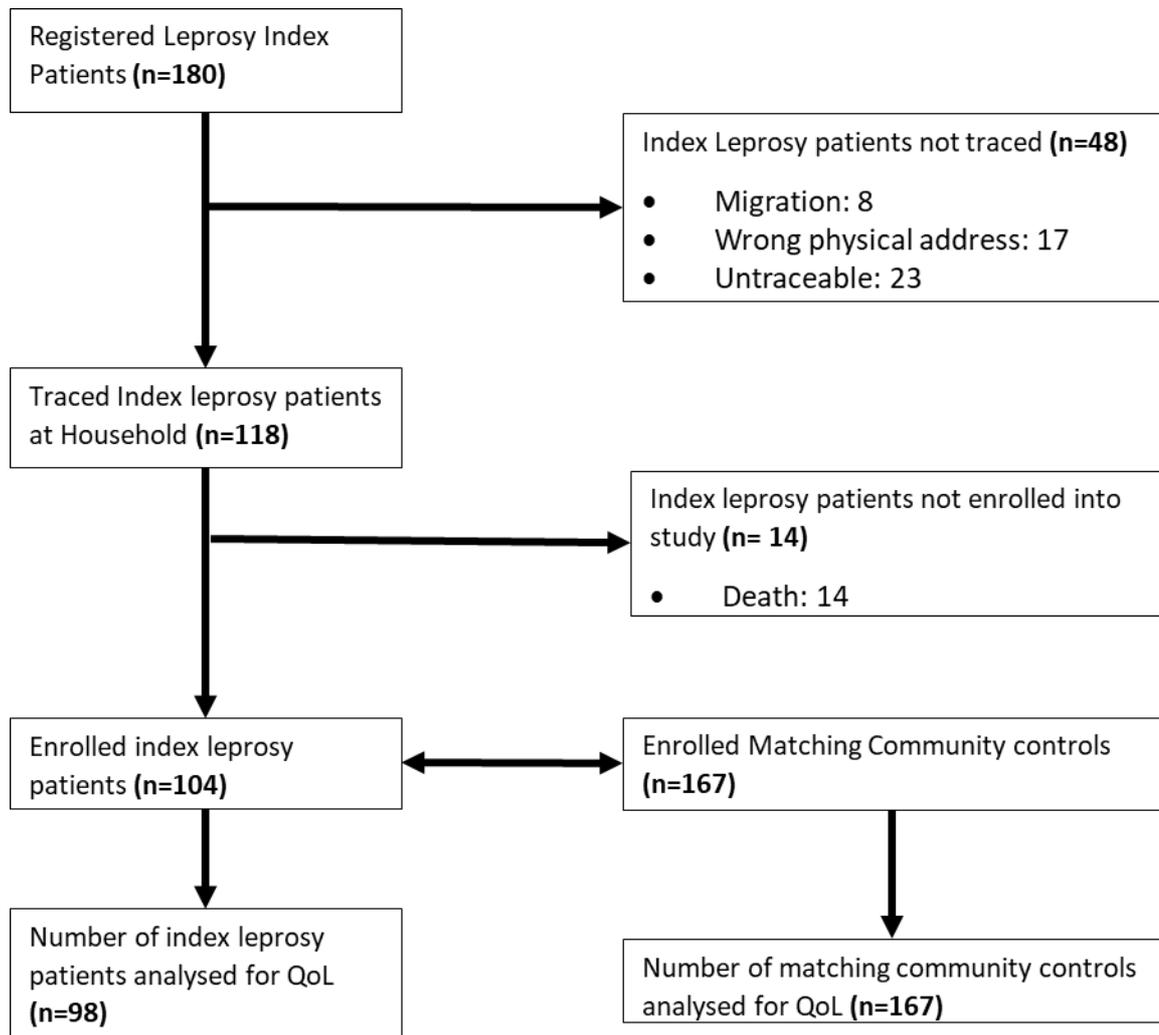


Figure 1:
Study Flow Chart

Some leprosy index cases enrolled had incomplete WHO QoL records that could not be analysed thus only 98 were analysed and not 104

We anticipated that each index would at least match two controls. A majority (62) of the indexes were matched to two controls; 34 had 1 control; and three had three controls thus 167 controls were enrolled