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Leprosy: A Stander-By Public Health Contender in the Hard to Reach Communities along the Eastern Zone of Tanzania

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Abstract- *Background:* Leprosy is one of the neglected and poverty-related diseases in low and middle-income countries, the disease is associated with socioeconomic factors, poor knowledge of the victims to report cases and poor access to health facilities with a definitive diagnosis of the associated lesions. In most cases, patients are reluctant to report the infection earlier because of the insidious nature of the infection. Thus the study was conducted to determine the prevalence of leprosy in eastern, Tanzania.

Material and methods: A retrospective study design was undertaken by analysing the patient's biodata at Nazareth leprosy centre located in Ifakara Tanzania. The analysis was to determine the association of the disease with age, sex, location, type of lesions presented, disease detection technique and the time for reporting to the centre. The Chi-square and t-test were used to determine the association of the factors with disease causation at the p-value of 0.05.

Keywords: *nazareth ifakara, leprosy, SFUCHAS, public health, kilombero.*

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Leprosy: A Stander-By Public Health Contender in the Hard to Reach Communities along the Eastern Zone of Tanzania

Madoshi, PB [α], Karuhanga, TA [σ], Kaale [ρ], SE, Jullu, BS [ω] & Rev. Fr. Mpinge, S [¥]

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Results: 157 patient data at Nazareth leprosy centre were analysed. More males (68.2%) reported to the centre than females, where males presented with critical cases were (72.6%). Mlimba district had more people reporting to the centre (44.6%) compared to the other districts around. The diagnosis was mainly based on presented clinical signs (62.4%) without skin smear slit.

Conclusion: The findings of this study outline importance of early detection, contact tracing of the patients and their relatives and treatment of diagnosed cases, this will contribute significantly to the control of the disease in the low resource communities.

Keywords: nazareth ifakara, leprosy, SFUCHAS, public health, kilombero.

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I. Introduction

Leprosy is also known as Hansen's disease is a chronic bacterial disease caused by *Mycobacterium leprae,* Gram-negative bacilli. The disease in untreated cases affects skin, eyes and periphery nerve injury leading to the deformity of extremities (Fischer M., 2017; Job et al., 2008). It remains a significant public health problem in the developing world, mainly due to the slow-growing nature of the aetiological agents leading to the long incubation period, thus the source of infection might be difficult to determine (Panda and Padhi, 2017; Turankar et al., 2019; Wheat et al., 2014). In addition, the golden standard for diagnosing leprosy is based on slit skin smear or nerve biopsy, followed by acid-fast staining (Fine 2006; Chandranesan et al., 2018) however in poor resource leprosy centres such diagnoses have been not effective instead the diagnosis require suspicious of the index based on clinical presentation.

Leprosy is among of the neglected diseases in developing countries, it mostly affects people in poor communities (Hotez & Kamath, 2009; WHO, 1998) The World Health Organisation has reported a 2.9 new case detection in 100,000 populations with a prevalence of 0.27 per 10,000 (WHO, 2015b, 2017). In Tanzania the national strategic plan for 2015 – 2020 (NTLP, 2015); reported that leprosy prevalence remained below 1 case per 10,000 populations since 2006; however, it was 0.46 cases per 10,000 populations in 2012. The report also states that leprosy is endemic in 19 administrative districts such that the prevalence rate is above the threshold of 1 case per 10,000 populations. Globally, the strategy to end leprosy was set commence in 2016 and end in 2020. This was aimed at reducing the level of infection so that there could be less than one per million as well as alleviating permanent disabilities in particular children (WHO, 2015a). This could not be made possible without early detection of cases through surveillance, detection and initiation of medication (Freitas et al., 2016; NTLP, 2015).

The National Tuberculosis and Leprosy Programme (NTLP) in Tanzania has established some centres which could the lepers as closer as possible either as diagnostic or drug refill centres and refresher training of health workers especially leprosy

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coordinators. Despite such efforts, there are cases reported; for example, there were 2005 new cases in 2013 with children being infected (URT, 2013). As for the Grade, 2 disabilities is concerned, the national strategic reports a high disability rate of 10 – 12% among newly diagnosed patients, besides the year 2015 was aimed at reducing the grade 2 disability by 8% (URT, 2013).

The efforts to the lender the world free of leprosy prevalence are enormous. However, the reduction in the transmission and incidence of the disease is awaited. The impediment to ending the disease could be due to the fact that disease prevalence is not a comprehensive measure to end a particular disease since it is influenced by the duration of treating the disease and case identification. For a long term disease, the alternative method to present the disease is by using the rate of new cases with grade 2 disability (Alberts et al., 2011; Freitas et al., 2016; Yadav et al., 2014). The study aimed at describing the trends of the main indicators of leprosy and the rate of new cases from medical records to present and leprosy centre emergence and transmission of leprosy in eastern Tanzania.

II. Material and Methods

a) Study area

This work utilised reliable clinical records stored at Nazareth leprosy Centre (NLC) in Morogoro, Tanzania. NLC is a non for profit centre under the Catholic Diocese of Ifakara located in Ifakara Township where it serves all leprosy cases along the Kilombero valley basin. It is one of the leprosy centres which serve leprosy patients not only along the Kilombero valley but as well to other regions in the east and central Tanzania. The centre provides a diagnosis of the newly reported patients, treatment of patients with deformities and drug refill.

b) Study design and population

A retrospective observational study was carried to determine the prevalence and risk factors of acquiring new infections of leprosy using medical records. The study population existed of all leprosy patients diagnosed and registered in the period of January 2018 to March 2021.

c) Case definition

A person is defined to be infected with *M. leprae* and being ill if he/she presents one or more features as well as who has not completed a full course of treatment following being positively diagnosed. The features are several but may include: Painless skin ulcers, skin lesions of hypopigmented macules, skin nodules and where possible detection of acid-fast-bacilli in the silt skin smears (WHO, 1998). Furthermore, the grading at the centre is done based on whether it is paucibacillary (PB) or Multibacillary (MB) or visible deformity on hands and or legs and visual impairment as described by WHO (2015) and (Brandsma & Van Brakel, 2003).

d) Mode of patient identification

The centre receives patients from those who voluntarily report, contact tracing or surveys and referred cases from other health facilities within the districts, region or outside the region. Most of those reported voluntarily to the centre had tried to get treatment in other health facilities but their efforts were in vain.

e) Data analysis

The patient biodata which was stored in hard copies were entered into Microsoft Excel and SPSS version 20 was used to analyse the data. The information were presented as descriptive statistics to determine the frequencies and distribution of different factors such as age, year, location, time, prior health centres attended, relapsing or non-relapsing and gender. An independent t-test was used to infer the statistical significance.

III. Results and Discussion

The study analysed patient biodata at Nazareth leprosy centre located in Ifakara, Morogoro, Tanzania. The medical records were assessed where information such as the location of the patient, age, disease history, diagnostic measures, and number of clinics attended before and treatment regime was undertaken. The results in Table 1 show that most of the patients were above 35 years 107 (68.2%) and males were mostly affected 114 (72.6%), they were mostly coming from Mlimba district 70 (44.6%), have primary education 129 (82.2%) and they are farmers 133 (84.7%)

Table 2 shows information related to the disease; the results reveal that there were 68 (43.3%) in 2020, in most cases the diagnosis is done based on clinical signs presented by the patients 98 (62.4%) such that no biopsy was collected. The patients also attend several clinics before the definitive diagnosis is reached 67 (42.7%), most of the patients are diagnosed after more than one year 62 (39.5%) and most of them fail to attend clinics for various reasons 85 (54.1%).

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Table 2: Disease information of the patients attending at NLC

Patient Factor	Category	Distribution (n, %)
Year of data recording	Jan - Dec, 2018	16 (10.2)
	Jan - Dec, 2019	64 (40.8)
	Jan - Dec, 2020	68 (43.3)
	March, 2021	09 (5.7)
Diagnostic technique used	Clinical signs	98 (62.4)
	Silt skin smear microscopy	34 (21.7)
	Both clinical signs & microscopy	25 (15.9)
Laboratory results after diagnosis	Paucibacillary	25 (15.9)
	Multibacillary	33 (21.0)
	No biopsy collected	99 (63.1)
Number of Clinic priory attended	Only one clinic	45 (28.7)
	Only two clinics	45 (28.7)
	Several clinics attended	67 (42.7)
Time taken for a definitive leprosy diagnosis	Within 6 months	55 (35.0)
	Within a year	40 (25.5)
	More than 1 year	62 (39.5)
Frequency of attending clinic	Only once	85 (54.1)
	Regularly	72 (45.9)
Number of deformity or skin lesion	Multiple deformities	32 (20.4)
	Single deformity	41 (26.1)
	Senseless hyperpigmented skin lesion only	84 (53.5)

Table 3 shows results of the patient information when compared with respect to the type of deformities among patients. It was noted that males had more deformities than females, Mlimba district had more patients with multiple deformities 17 (11.0%) as compared to other places, patients under 15 years mostly reported the cases when the primary leprosy lesion appears (skin hyperpigmentation) while most of the deformities were reported more on patients with an age range of 36 years and above

Table 3: Types of deformities with respect to gender, location and age of the patients

Factor	Category	Type of deformity		
		Multiple types (n, %)	Single type (n, %)	Skin hyperpigmentation only (n, %)
Gender	Male	23 (15)	30 (19)	61 (39)
	Female	9 (6)	11 (7)	23 (15)
Location	Ifakara	0 (0.0)	0 (0.0)	1 (1.0)
	Mlimba	17 (11.0)	18 (11.0)	35 (22.0)
	Kisaki	9 (6.0)	12 (8.0)	20 (13.0)
	Kilosa	5 (3.0)	7 (4.0)	17 (11.0)
	Other places	1 (1.0)	4 (3.0)	11 (7.0)
Age	Below 15 years	0 (0.0)	0 (0.0)	4 (3.0)
	15 – 35 years	7 (4.0)	19 (12.0)	20 (13.0)
	36 years and more	25 (16.0)	22 (14.0)	60 (38.0)

Table 4 shows the indicators of acquiring *M. leprae* infection with respect to location; it was shown that the Mlimba district had a high proportion of indicators of leprosy. These included new cases (17.5),

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case detection rate (1.0/10,000 population), the proportion of female (0.3) and male (5.0) patients and the proportion of new cases presenting grade 2 lesions (7.0). Notably, the new cases and cases of patients presenting with grade 2 deformities were detected in all places.

Table 4: Indicators of leprosy of patients reporting or referred at NLC, Ifakara

Leprosy indicators of patients at NLC, Ifakara	Location				
	Ifakara	Mlimba	Kisaki	Kilosa	Other places
New cases detection (average cases in 4 years)	0.3	17.5	10.5	7.5	4.0
The New Case Detection Rate per 100,000 population	0.0	3.0	1.0	1.0	0.0
The proportion of children below 15 year old per year (n = 4)	30%	70%	0.0	0.0	0.0
The number of proportion Female patients per year in percentage (n = 43)	0.0	30%	40%	10%	10%
The number of proportion Male patients per year in percentage (n = 114)	0.0	60%	30%	20%	10%
The Multibacillary proportion of new cases in percentage (n = 33)	0.0	50%	30%	1.0%	1.0%
The proportion of new cases presenting patients with grade 2 disabilities (10%)	0.1	7.0	4.1	2.9	1.6

Leprosy in Tanzania is going down as reported by the national data, it has been pointed that in 2020 a total 1,208 new leprosy cases in the country with annual notification rate (case detection rate) of 2.6/100,000 (*http://.www.ntlp.go.tz/leprosy/leprosy-burden*). However, based on our data which were consecutively collected for three years from one of the leprosy centres in Tanzania. It can be generally stated that leprosy is has been dealt accordingly national wide; although the efforts made seem not eliminated the disease; the data presented in this study, it is either the disease is re-emerging or the pathogen has gained other pathogenic traits to cause infection while evading the prescribed drugs. In addition, the study has shown that there are new cases with grade 2 disabilities and the existence of hotspots for leprosy infection.

The occurrence of the hotspot for leprosy has been also reported by other researchers; Freitas et al., (2016) observed an increase in the incidence of leprosy in some local hotspots when with communities to diagnose leprosy in Brazil. (Aceng et al., 2019) analysed leprosy data in Uganda described that leprosy cases were clusters more in the Northern region. However, the authors commented that the endemicity of leprosy could result in establishing better health-seeking behaviour and case identification by training more health workers in highly endemic spots. (Joshua et al., 2008) worked on data collected in different health facilities in South India commented that leprosy in endemic areas is dealt with by spatially clustering the cases; this allows understanding the variation of the disease over space and time.

Our findings have also shown that leprosy is active even in children of less than 15 which is one of the good indicators of active leprosy transmission (Bandeira et al., 2019; Liu et al., 2018; Narang & Kumar, 2019). This finding has also been reported in Zambia whereby data of nearly 20 years (1991 – 2020) showed that there was active transmission among children; the scenario was also associated with late diagnosis as well as detection bias (Kapata et al., 2012). Msyamboza et al., (2012) carried a community camp-based study on the prevalence of leprosy in Malawi and 24.3% of the patients were children under the age of 15 years. A study by Bandeira et al., (2019) in Brazil reported 33.3% infection in 34 children below 15 years; the authors also quantified that those children had even Grade 2 deformities. Based on these studies it can be learnt that children might be the most vulnerable group to M. *leprae* infection due to the low incompetent immune system, interfamilial and intra-familial contacts (Narang & Kumar, 2019). The authors as well commented that the skills for diagnosing and managing leprosy are diminishing resulting in patients developing grade 2 deformities. Thus our findings envisage that for all efforts undertaken for leprosy elimination, new approaches are required under field condition to break the chain of transmission as well as prevention of new infections in children.

Our findings have shown that the number of males who reported to the health facilities for further diagnosis was high as compared to females. This scenario has also been found by other researchers: (Liu et al., 2018) in China assessed the difference of gender in leprosy detection, the authors concluded that more

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females were detected. Ramos et al., (2012) worked on leprosy gender differentiation and concluded that most of the patients recruited in their study females were relatively younger than male participants. Globally, leprosy distribution between males and females has a ratio of 2:1 meaning that there are more men with leprosy as compared to their female counterparts. The disease in the poor resource communities has been associated with (i) socio-economic; Nery et al., (2019) reported that individuals living in high poverty had a risk of leprosy incidence five-to-eight times greater than other individuals, (ii) pathogen's long incubation period (2 – 12) years hinders the effort of the World Health Organisation (WHO) to eliminate the disease and (iii) gaps on knowledge with respect to individual susceptibility to infection and disease development in newly affected patients (Rodrigues & Lockwood, 2011). However, there is no commonly identified socio-economic determinant that has been precisely described to cause leprosy transmission in such vulnerable and marginalised communities (Houweling et al., 2016).

In this study most of the patients who reported to the leprosy centre and started taking the medication were male. This could be speculated using different approaches; firstly male patients are more mobile than female patients who are tailored with house works and children bearing than men. Secondly, the disease affects more men in the respective areas due to their general behaviour in most African societies, such that males regularly intermingle with different people during their economic activities as compared to females, and thirdly the bacteria *M. leprae* might be gender-related, that is affecting more males than females. The results have also shown that most of the affected individuals who reported the clinical signs were peasant, this is probably conceding with the economic activities of such population as described by (Nery et al., 2019). Surprisingly more cases were from the Mlimba district; this could be hardly explained since the rationale for the spatial inequality on the distribution of the disease in the hyperendemic pockets within a country is untold (Ploemacher et al., 2020). Thus it is an area of interesting research to quantify the association of a disease occurrence with geographical factors associated.

Apparently, it is true that leprosy incidences are reported to be falling, however, the detection rate of the new case is dramatically low in most of the health facilities, as result most patients report to health facilities after noticing single or multiple disabilities. This could either be associated mainly with late reporting to respective leprosy centres, failure to monitor cases or the knowledge of health workers to diagnose leprosy is lacking. This situation has also been reported by Freitas et al., (2016) who were working on aggregated municipalities in Brazil. Aceng et al., (2019) established the knowledge and skills of health care providers even in highly endemic areas is limited; in such a situation the diagnosis is based only on multibacillary cases and observed disability among patients. Furthermore, the authors mentioned that the lack of such skills has led to a decrease in data collection coverage. The findings by Msyamboza et al. (2012) working on community camp-based in Malawi also supported the use of cohort analysis in patients with leprosy.

IV. Study Limitation

The study reproducibility might be limited with the fact that it used secondary data, which by considering leprosy and the living conditions of people in hard to reach communities it might lead to underreporting of the disease due to the insidious nature of the disease. Leprosy is associated with a long incubation period, the complexity of the transmission chain, asymptomatic state and that its diagnosis requires specific skills, training and experience of the one making the diagnosis (Limeira et al., 2013; Meima et al., 2004). On contrary, the presentation of patients with grade 2 disabilities could just be the significance of using secondary data as it is expected that underreporting can be seldom done as the signs are evident, the authors also recommend contact tracing of patient relatives.

V. Conclusion

Leprosy is now regarded by different communities as a disease of the past, despite the new cases being diagnosed in different locations. However the scenario is alarming especially in resource limited communities, thus the disease is re-emerging at a relatively high rate than anticipated. It can be concluded that the laxity to provide appropriate public health education and awareness creation shall worsen the situation in populations at risk. Therefore efforts are required by both the government and general public to work in tandem to provide public health, early diagnosis and appropriate treatment of the population at risk.

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Table 1: Demographic parameters of patients with leprosy

Patient Factor	Category	Distribution (n, %)
Age	Under15 years	04 (2.5)
	15-35 years	46 (29.3)
	Above36 years	107 (68.2)
Gender	Male	114 (72.6)
	Female	43 (27.4)
Location	Ifakara Township	01 (0.6)
	Mlimba district	70 (44.6)
	Kisaki	41 (26.1)
	Kilosa district	29 (18.5)
	Other places	16 (10.2)
Education level	Primary education	129 (82.2)
	Secondary education	25 (15.9)
	Trained or graduates	03 (1.9)
Occupation	Peasant	133 (84.7)
	Employed	20 (12.7)
	School age	04 (2.5)

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