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RESEARCH REPORTS

Perceptions of Leprosy in the Maldives: A cross-sectional study

SHEENA MOOSA[1], RAHEEMA ABDUL RAHEEM[1], SHEEZA ALI[1], SANA SALEEM[2] & RYAN SHAH RASHEED[2]

The Maldives National University[1], Health Protection Agency[2]

ABSTRACT *The aim of the study is to assess the knowledge, attitude and practices regarding leprosy. A cross sectional survey of a nationally representative sample was implemented among the resident adult population (18 years and above) across the islands of Maldives. The survey sample size estimated was 1181 and a total of 1024 respondents completed the survey accounting for a response rate of 86.7%. The questions to measure indicators of knowledge, attitude and practices regarding leprosy were adopted from existing validated instruments used for leprosy KAP studies. The findings show a low level of knowledge with a mean of 3.5 in the KAP measure, where the maximum score is eight. However, the attitude and practices score does not indicate a high level of negative attitudes and practices (below the mid-point). The mean score of EMIC-CSS is 12, slight inclination towards less negative attitudes (EMIC-CSS scale scores ranges from zero = no negative attitudes, to 30 = most negative attitudes). The mean score of SDS is 8.9 indicating moderate level of negative practices (SDS scale scores ranges from zero = no negative practices to 21 = most negative practices). As Leprosy in the Maldives is no longer a public health burden, and the disease prevalence is extremely low, it has created a situation where there is very little awareness and correct knowledge about the disease among the public as well as health care workers. The attitudes and practices from the family and community are not at alarming levels in terms of stigma and social distancing. However, the low level of knowledge raises the concern that cases may be missed and as patients may be missed as they may not seek healthcare for early diagnosis and treatment*

Keywords: Maldives, leprosy, public health, attitudes, healthcare

Leprosy is an infectious disease caused by Mycobacterium leprae, an acid-fast, rod-shaped bacillus. The disease mainly affects the skin, the peripheral nerves, the mucosa of the upper respiratory tract, and the eyes. The disease is transmitted by contact between cases of Leprosy and healthy persons; the possibility of transmission by the respiratory route is gaining ground (WHO, 2021). Leprosy is curable and treatment in the early stages can prevent disability. Leprosy control achieved dramatic success in the 1980s–1990s with the implementation of short course Multi Drug Therapy (MDT), which reduced the global prevalence of Leprosy to less than 1 in 10,000 population (Steinmann et al., 2021;WHO, 2019).

Despite the improvements in reducing the global burden of Leprosy, knowledge of Leprosy is poor across communities and there are considerable negative perceptions about Leprosy. A study in Myanmar showed that patients and family members do not have a clear knowledge of the cause of Leprosy (Myint et al.,

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1992). A more recent study with 446 participants in India showed 12.5% of the participants had adequate knowledge of Leprosy, while 22% had poor knowledge. Knowledge of the cause (answered correctly by 10% of the participants), mode of transmission (5%) and symptoms of Leprosy (16%) was found to be poor (van 't Noordende et al., 2019). Similar observations were found in Sudan, that showed knowledge about the pathological cause of Leprosy was lacking but the clinical manifestations were well recognised, and it was noted that with the introduction of multidrug therapy and health education of patients and society, many more patients are now seeking medical treatment, indicating a change in health-seeking behaviour (El Hassan et al., 2002). Kaehler et al. (2015) studied perceptions of stigma in Thailand and observed that perceived stigma was higher among older persons and those who stayed longer in the community and who had misperceptions of treatment such as it is difficult to treat. This poor knowledge is also observed to some extent among medical practitioners. A study in India of 200 medical practitioners showed 77% has good or excellent knowledge, 7% had poor knowledge of the disease and 16% had average knowledge of the disease (Bajaj et al., 2009). In this study, it was noted that in addition to improving the knowledge of the practitioners, it is important to create awareness of referral patterns and treatment regimens among all practitioners involved in the healthcare system.

Leprosy in the Maldives

Leprosy cases were first detected in the country's northern and southern atolls in 1959 (HPA & WHO, 2021). Because of the unknown epidemiology at that time, the patients were isolated on two islands for treatment and care. The National Leprosy Control Programme was started in 1974 when the country was identified as a high endemic country with 96.64 per 10,000 population (MoH, 2021). With the introduction of multidrug therapy (MDT) in 1982 and the MDT coverage of 100%, a dramatic reduction in the prevalence of Leprosy was observed (Global Partnership for Zero Leprosy, 2019). By 1997, the Maldives reached a prevalence rate below 1 per 10,000 population, thereby eliminating Leprosy as a public health problem (HPA & WHO, 2021). The national program, with the support of the national referral hospital, ensures high treatment completion rates (Global Partnership for Zero Leprosy, 2019).

Although Leprosy cases have sharply declined over the years and Leprosy is no longer a public health problem in the Maldives, zero prevalence is not attained yet. Maldives continues to detect Leprosy cases and cases are being identified . For the past ten years, an average of seven new cases were reported in the Maldives where none of the new cases had Grade 2 Disabilities (G2D cases). These cases include locals from endemic islands and imported cases among foreign migrant workers. Maldives has a large foreign migrant workforce which calls for health policies to address migrant health to be in place. Planning interventions for the zero-Leprosy programme in the Maldives demands attention to migrant health policies since a number of countries where migrants come to the Maldives are from India and Bangladesh where the prevalence of Leprosy is higher in comparison to the Maldives (WHO, 2016). A Framework for Zero Leprosy in the Maldives was launched in 2019 with a target of 100 Leprosy free islands by 2023 (HPA et al., 2019).

As the country embarks on the road to zero leprosy , there is a scarcity of information on the perceptions of the public on Leprosy. This paper presents the findings of a nation-wide survey on knowledge, attitude and practices regarding Leprosy.

Methods

A cross-sectional survey of a nationally representative sample was implemented among the resident adult population (18 years and above) across the Maldives islands. As the Leprosy prevalence in the country is low to allow for the selection of islands that have experienced Leprosy burden, a two-stage sampling was used. The first stage included clustering islands into two; one with islands that had a history of Leprosy case over the last 10 years and one without a Leprosy case over this period. Islands from each cluster were selected at random. The second stage involved the selection of households from each island using the household listing and systematic random sampling. The first encountered adult in the household is interviewed for the survey.

The sample sizes for the respondents were determined using a statistical approach with a 95% confidence interval and 5% error and allowed for a 20% non-response. The sample size considered the resident population of 18 years and above, and the geographic disparity. The resident population according to NBS (2021) is 439,727.The survey sample size estimated was 1181 and a total of 1024 respondents completed the survey accounting for a response rate of 86.7%.

The material for the study was a questionnaire with internationally validated scales to measure the knowledge, attitudes, and practices on Leprosy together with locally relevant demographic information. The questions to measure indicators of knowledge, attitude and practices regarding Leprosy were adopted from existing validated instruments used for Leprosy KAP studies. KAP measure of eight items (van 't Noordende et al., 2019) to measure knowledge; the Explanatory Model Interview Catalogue Community Stigma Scale (EMIC-CSS) with 15 items (Rensen et al., 2010; Weiss et al., 1992) for attitudes and practices; the Social Distance Scale (SDS) of seven items (de Groot et al., 2020; Peters et al., 2014) for practices.

For the analysis, scores were produced and categorised for knowledge attitudes and practices. The mean scores for the knowledge attitude and practices are presented by the demographic variables.

The knowledge score is calculated using the KAP measure of eight items by giving each item a score of one with the selection of the correct answer. In multiple answer selection items, a correct answer is defined when the respondent has not selected an incorrect answer. The score was produced with the sum of the scores with a maximum score of eight (van 't Noordende, 2019).

The scoring for attitudes was produced by giving scores to each response option (0=no, 1=possibly, and 2=yes) and calculating the sum of the 15 items of the EMIC-CSS. The scores range from zero (no negative attitudes) to 30 (most negative attitudes) (van 't Noordende, 2021).

For scoring practices, the SDS score was produced as the sum of the seven items producing scores that range from zero (no negative practices) to 21 (most negative practices) (van 't Noordende et al., 2021). The SDS scale response selected is

further defined as 0=definitely willing, 1=probably willing, 2=probably not willing, and 3=definitely not willing.

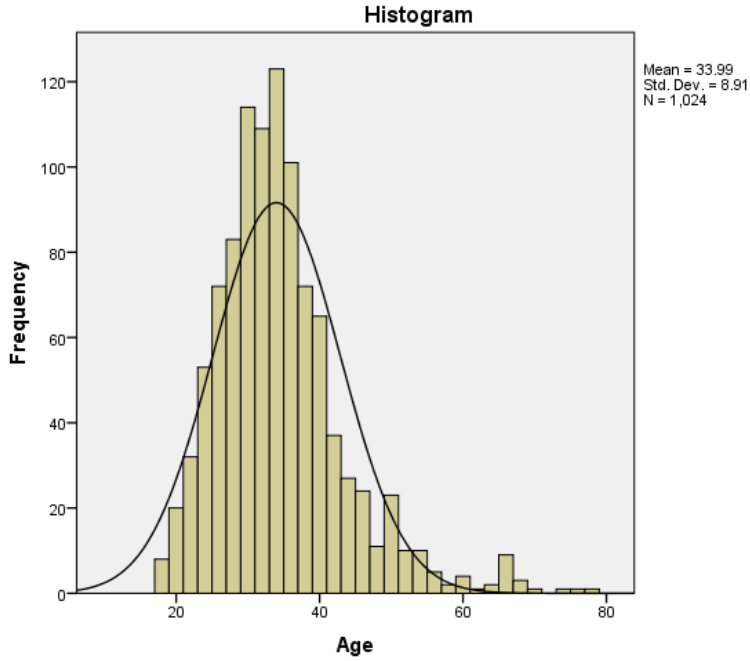
The reliability of the scales was tested with Cronbach's alpha which showed moderate reliability for the KAP measure of knowledge and high reliability for EMIC-CSS and SDS measures of attitude and practices (See Table 1).

Table 1

Reliability of scales used

Scale	Cronbach's Alpha	n
Knowledge (KAP)	.648	8
Attitude (EMIC-CSS)	.872	15
Practices (SDS) modified	.914	7

Findings



The sample was normally distributed, and the respondents were 18-78 years, with a mean age of 34 years (see Figure 1). A cross-sectional survey of a nationally repres

Figure 1. Age distribution of the survey sample.

Two third of the respondents were women (65.5%) and a third were men (34.5%) with 5% expatriates. The survey respondents included 79 healthcare workers (7.6%) and 945 people (92.4%) from the public across the country. Most of the respondents were from the Northern atolls (24%) region while the respondents were more or less equally distributed across other regions ranging

from 13% to 18% .

The majority of the respondents (54%) had completed education beyond higher secondary with either a university foundation, vocational skills, undergraduate or postgraduate degree. Less than 1% of the respondents reported being illiterate, 6.5% with basic literacy, 7.3% with primary education and 30.8% with secondary or higher secondary education.

The income status of the respondents show that 13% were not earning any income and 8.7% earned less than MVR5,000 (see Table 5). The majority (72.3%) of the respondents earned MVR5000-20,000 and 6.1% earned above MVR20,000.

Table 2 presents the mean score of knowledge, attitude, and practices. The level of knowledge is low with a mean of 3.5 in the KAP measure, where the maximum score is eight. The low level of awareness also emerged consistently in the qualitative interviews across policymakers, managers, healthcare workers, patients and their families.

However, the attitude and practices score does not indicate a high level of negative attitudes and practices. The mean score of EMIC-CSS is 12, slight inclination towards less negative attitudes (EMIC-CSS scale scores range from zero = no negative attitudes to 30 = most negative attitudes). The mean score of SDS is 8.9 indicating a moderate level of negative practices (SDS scale scores range fromm zero = no negative practices to 21 = most negative practices).

Table 2

Mean scores of knowledge attitudes and practices

Scales	Mean	SD	Max score
Knowledge (KAP)	3.5	1.9	8
Attitude (EMIC-CSS)	12.0	6.9	30
Practices (SDS)	8.9	5.8	21

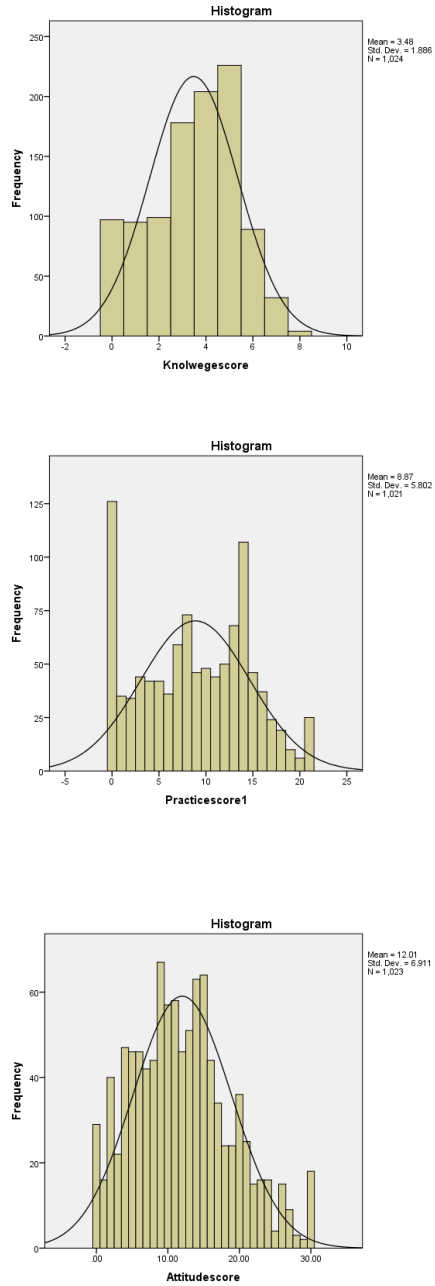
Table 3 shows the percentage of respondents who answered the Knowledge questions correctly. The respondents scored lowest on the mode of transmission of Leprosy. Very few (8.2%) of the respondents gave the correct answer for the mode of transmission of the disease. Only 11.7% of the respondents answered the question on early symptoms of the disease correctly. The majority (73.4%) of the respondents either thought that Leprosy was contagious while the patient is on treatment, or they do not know whether the disease is contagious or not while on treatment.

Table 3

Percentage of respondents who answered knowledge questions correctly

Knowledge questions	Percentage of respondents (correct answers in bold font)
1. What are the early symptoms of Leprosy	
Itching	22.1
Blisters	20.3
Skin patches and Loss of sensation	**11.7**
Rash	26.7

Cough	14.3
Don't know/Other	4.9
2.What causes Leprosy	
Bacteria	**48.8**
Virus	19.7
Unclean environment	3.1
Impure blood	2.2
Hereditary	6.5
Don't know/Other	19.6
3.How do you get Leprosy	
Skin contact	34.0
Sharing plates, brush	35.8
Insets	4.8
By soil	0.3
By air	**8.2**
Don't know/Other	16.8
4.Can Leprosy be treated?	
Can be treated	**72.6**
Cannot be treated	11.9
Don't know/Other	15.5
5.What kind of treatment is available for Leprosy?	
Medicines	**59.0**
Surgery	7.1
Hijaama	26.0
Dhivehi beys/herbal medicine	37.5
Don't know/Other	29.4
6.When is Leprosy contagious?	
Not contagious when on treatment	**26.3**
Contagious when on treatment	46.1
Don't know/Other	27.6
7.Can you prevent disabilities from Leprosy	
Cannot be prevented	18.8
Can be prevented	**58.7**
Don't know/Other	22.5
8.How long does the disease (Leprosy) last?	
Leprosy is temporary	**63.3**
Leprosy is permanent	17.2
Don't know/Other	19.5



A: Knowege (KAP)
B: Attitude (EMIC-CSS)
C: Practice (SDS)

Figure 2. Distribution of scores on the measures of knowledge, attitude and practices

The mean score for knowledge does not show considerable differences by demographic characteristics of age group, sex, nationality or locality of residence (see Table 4). The mean knowledge level is slightly higher among health care workers compared to the public (4.9 compared to 3.4 respectively), the respondents in the upper-income bracket (mean knowledge score of 4.7 among those with income >30,000) followed by the respondent with postgraduate or higher degree education (mean knowledge score of 4.7) compared to the mean score of 3.5.

Table 3

Mean knowledge, attitude and practice by demogrpahic and socio-economic characteristics

Variable		Knowledge		Attitude		Practice	
		Mean	SD	Mean	SD	Mean	SD
Age	35 and younger	3.3	1.9	11.7	6.5	8.9	5.7
	36 and older	3.9	1.8	12.6	7.6	8.7	5.9
	Total	3.5	1.9	12.0	6.9	8.9	5.8
Sex	Male	3.3	1.9	12.2	7.6	9.0	6.2
	Female	3.6	1.9	11.9	6.5	8.8	5.6
	Total	3.5	1.9	12.0	6.9	8.9	5.8
Nationality	Local	3.4	1.9	11.8	6.8	8.8	5.8
	Expatriate	4.5	1.5	16.5	6.7	9.8	5.9
	Total	3.5	1.9	12.0	6.9	8.9	5.8
Health care worker	Other work/ profession	3.4	1.9	11.6	6.8	8.9	5.8
	Health care worker	4.9	1.5	17.2	6.2	8.6	6.0
	Total	3.5	1.9	12.0	6.9	8.9	5.8
Locality	North	3.3	1.9	10.8	5.8	9.2	5.6
	North Central	3.3	1.8	11.4	6.8	7.8	6.2
	Central	3.7	1.7	12.5	6.4	8.4	5.7
	GMA	3.3	2.0	11.9	6.8	9.0	5.8
	South Central	3.6	1.9	11.1	6.6	8.6	5.7
	South	3.8	1.8	16.0	8.6	10.5	5.7
	Total	3.5	1.9	12.0	6.9	8.9	5.8
Income	No income	2.9	2.0	11.1	6.2	9.6	6.0
	<5000	3.3	1.7	12.8	6.6	11.2	5.5
	10,000-5,0001	3.5	1.9	12.1	7.1	8.5	5.7

	20,000-10,001	3.5	1.9	11.6	6.9	8.5	5.8
	30,000-20,001	4.3	1.6	14.5	6.8	9.0	5.8
	>30,000	4.7	2.2	15.5	7.1	6.9	5.3
	Total	3.5	1.9	12.0	6.9	8.9	5.8
Education	Illiterate	2.0	2.0	18.9	5.6	15.0	4.4
	basic literacy	3.1	2.0	14.3	8.3	10.6	5.5
	Primary (7-1)	3.7	1.6	14.4	8.1	8.8	5.8
	Secondary/ Higher secondary(12-8)	3.1	1.9	11.3	6.4	8.7	5.7
	Foundation, vocational	3.7	1.8	11.2	6.3	8.6	5.9
	Degree	3.6	2.0	12.2	7.0	9.2	5.9
	Masters or higher degree	4.1	1.8	12.1	7.2	7.8	5.7
	Total	3.5	1.9	12.0	6.9	8.9	5.8

The mean attitude score also does not show marked variation by demographic characteristics including age group, sex, nationality, locality or even education (see Table 4). The attitudes were more negative among health care workers compared to the public (mean attitude score of 17.2 compared to 11.6 respectively), and the attitudes were also more negative among the higher income bracket (mean score of 14.5 among those earning 20,000 to 30,000 and 15.4 in the income bracket >30,000) compared to the overall mean attitude score of 12.

The mean practice score shows slightly different picture with no observable difference between healthcare workers and the public (Table 4). The mean score for practices was more negative among lower income groups (mean practice score of 11.2 in the income groups of <MVR5,000) and those with lower education status (mean practice score of 15 among those who are illiterate and 10.6 among those with basic literacy) in comparison to overall mean practice score of 8.9. In the mean practice no marked differences were observed by age group and sex, but expatriates had a more negative mean score compared to locals (mean practice score of 9.8 compared to 8.9 respectively).

Discussion

The mean score for knowledge was found to be low in this study. These include knowledge about understanding the symptoms of the disease and how the disease is transmitted. Only a small percentage of people were aware that the disease is not contagious while on treatment. These findings are similar to other studies conducted in nonendemic areas of the world. In a study conducted in North-Western Italy, which is a nonendemic area, knowledge status (KS) among health professionals was unsatisfying (59.7% correct answers), and 91.2% of them acknowledged Leprosy as a severe disease, but only 42.2% identified Leprosy as highly communicable (Ricco et al., 2020). Similarly, in a cross-sectional study of

2344 participants (46% from India, 54% from Indonesia) knowledge levels were low in both countries: 88% of the participants in India and 90% of the participants in Indonesia had inadequate knowledge of Leprosy (van't Noordende et al., 2019). According to van't Noordende et al. (2019), in both countries, the cause, mode of transmission, early symptoms and contagiousness of Leprosy were the least known, and treatment and treatability of Leprosy were the best known. Similar to the Maldives, in India and Indonesia, health workers had the highest Leprosy knowledge levels (van't Noordende et al., 2019). The findings from the current study in the Maldives are thus consistent with the findings from other countries suggesting there is a need to implement programmes to increase knowledge of Leprosy, its mode of transmission, prevention and treatment.

Significant knowledge gaps and the high levels of misconceptions collectively affect early diagnosis and management of incident cases and it has been suggested that improving knowledge and creating awareness including those of service providers are likely to improve case detection and treatment success (Ricco et al., 2020). This also requires empowering healthcare workers and their perceptions as well. To improve health workers' perceptions, interventions should focus on Leprosy training for health workers, and should be designed in partnership with persons affected, addressing beliefs and fears that impact attitudes (Haverkort & van't Noordende, 2022).

Other studies have shown that low knowledge scores are associated with higher stigma and lower scores in practices (Haverkort & van't Noordende, 2022; Wijeratne & Østbye, 2017). Compared with the seven studies mentioned in the review done by Haverkort & van't Noordende (2022), the current study has a much lower knowledge score. The review indicated that people were afraid of being infected by Leprosy and have local beliefs and misconceptions. Despite the low knowledge, the attitudes and practices in the current study are inclined towards the positive of the scale indicating the level of stigma is not very severe but moderate. This is somewhat different compared with studies conducted in India and Indonesia which has higher stigma levels (a mean score of up to 17.4 on the EMIC-CSS) (van't Noordende et al., 2019). The situation in the Maldives, thus, presents an opportunity for further improving the attitudes and practices towards Leprosy cases through programmes aimed at reducing stigma and creating behaviour change. This is of particular importance as the country embarks on the road to zero Leprosy.

Conclusion

Leprosy in the Maldives is no longer a public health problem and the disease prevalence has been below 1 per 10,000 population for decades. This has created a situation where there is very little awareness and correct knowledge about the disease among the public as well as healthcare workers. The attitudes and practices of the family and community are not at alarming levels in terms of stigma and social distancing, yet there is some concern that cases may be missed and concerns about early diagnosis and treatment compliance. Increasing awareness of the public and patients, through and provision of accurate information from healthcare providers is needed to further reduce the stigma and social distancing practices.

The lack of awareness of the disease situation among healthcare providers and

centralized provision of treatment affects treatment compliance and patients' trust in treatment. There is a need for regular training for medical practitioners and public health workers on the national guidelines and protocols for screening, reporting, and treatment using Directly Observed Treatment Short-course (DOTS). More engagement of the healthcare workers in improving the knowledge of the patients and community is necessary to achieve the target of zero Leprosy in 100 islands by 2023 target that the country has set.

Declaration and Acknowledgements

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The researchers declare no conflict of interest.
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