REDRESS - District sampling

Lucas Sempe & Yan Ding

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0.1 Introduction

For many people with severe stigmatising skin diseases, lack of access to health and social services results in significant physical and psycho-social consequences, complex treatment journeys, and catastrophic socio-economic impacts. Our research aims to reduce illness, stigma, social exclusion and poverty caused by severe stigmatising skin diseases (SSSDs) in Liberia. Improving fair access to services is an important cornerstone of universal health coverage (UHC) (the provision of key health services to everyone, regardless of socio-economic status, disability or gender, for example) and in attaining the Sustainable Development Goals. UHC requires action beyond single disease programmes and approaches to ensure that no one is left behind. Integrated health system approaches to managing skin diseases have been proposed as a key solution to these challenges.

Liberia is one of the first countries in the world to develop a national integrated approach to managing SSSDs. This means managing diseases with signs on the skin (e.g. lymphatic filariasis, leprosy, Buruli ulcer, yaws and onchocerciasis), through a combined approach at the local level. However, there is limited evidence about patient knowledge, priorities and experiences and the equity and effectiveness of the current approach.

REDRESS will develop new knowledge with regional and global relevance on affordable, timely, appropriate and improved treatment strategies that also reduce stigma and address other social issues for affected vulnerable populations. Our project has been co-developed between researchers, patients and programme implementers at the request of the Liberian NTD programme and directly responds to priority health needs, detailed in the country's 'Investment Plan for Building a Resilient Health System.'

REDRESS will seek to adopt an action research study, a before-after study design with control groups, through a health systems process evaluation which adopts mixed quantitative and qualitative methods to monitor and evaluate the impact of the REDRESS case management plus intervention bundle. The evaluation will seek to evaluate changes within the REDRESS intervention counties (Lofa, Grand Gedeh, Margibi) compared with the no REDRESS counties (Bomi, Nimba, Sinoe, Cape Mount).

Primary data for the evaluation will be carried out within the REDRESS intervention counties only (Lofa, Grand Gedeh, Margibi). A selection of routine data will be collected across all these seven counties as part of the evaluation.

For each of the intervention counties, we will purposively identify two districts. Once we choose the two districts, we sample all facilities per that district.

The purpose of this document is to suggest a sampling strategy at the district level for the collection of primary data in the three intervention counties (Lofa, Grand Gedeh, Margibi).

0.2 District level sampling criteria

We suggest the combination of following criteria to select the districts:

- Districts within each county contrast in terms of urban vs. rural characteristics;
- Districts with the presence of diverse types of health providers (private, not for profit, government only);
- Districts with larger number of SSSD cases registered in 2019 and 2020 (the most recent data) to increase as much statistical power as possible, understanding that the SSSDs prevalence is relatively low in population .

0.3 Prevalence

The severe stigmatising skin diseases that we are focused on in REDRESS are neglected tropical skin infections that can cause significant illness to an affected person through lack of treatment or prevention and often result in morbidity and disability. Several Neglected Tropical Diseases (NTDs) present in the skin including destructive skin ulcers and elephantiasis. These diseases contribute to the global burden of Severe Stigmatising Skin Diseases (SSSDs) and constitute one of the top 10 causes of disability worldwide. Stigma associated with these diseases can lead to social exclusion and psychological distress.

Considering there is are relatively low number of SSSDs, we review evidence of prevalence of the diseases in recent years. Simpson et al. (2019) did a systematic review of **Buruli ulcer** prevalence worldwide. Prevalence estimates within study areas ranged from 3.2 (95% CI 3.1-3.3) cases per 10000 population in Côte d'Ivoire to 26.9 [95% CI 23.5-30.7] cases per 10,000 population in Benin. There was evidence of Buruli ulcer in 32 countries and consensus on presence in 12.

Timothy et al. (2021) conducted a population-based cross-sectional integrated survey for skin NTDs (Buruli ulcer, leprosy, lymphatic filariasis-associated morbidity, and yaws) during June-October 2018 in Maryland County, Liberia (census population 165,456). The find confirmed endemicity and autochthonous transmission of **yaws** in Liberia after a population-based, community-led burden estimation of 24 cases, 2.6 [95% CI 1.4-3.9] cases/10,000 population). Aside from 1 case in a 32-year-old person, all confirmed cases were in persons <18 years of age, most of whom were male.

Cromwell et al. (2020) estimate a posterior probability that the prevalence of **lymphatic filariasis** by immunochromatographic test as of 2018 was unlikely to be below 1% in Ghana, Liberia, northern Democratic Republic of the Congo, and Côte d'Ivoire. WHO (2021) reports 109 new cases of **leprosis** (registered prevalence) in Liberia in 2019. Finally, Melchers et al. (2021) estimate a prevalence lower than <0.05% for **onchocerciasis** in Liberia.

Data from the Ministry of Health (MoH) of Liberia also provides additional insights. Table 1 shows the number of cases from the selected diseases from 2017 to 2019 in our three intervention counties. We observe that years 2017 and 2018 show a larger number of reported cases, where leprosis, buruli ulcer and lymphatic filariasis show the higher number of cases at country level. It is worth noticing that at county level, the highest single value found is 42 cases of buruli ulcer in Lofa in 2017.

Table 1: Number of cases in selected counties and national level by SSSDs - 2017 to 2019

		Margibi	G. Gedeh	Lofa	National Annual Total
2017	LEPR	0	12	0	164
	BU	20	9	42	202
	HY	3	0	0	122

		Margibi	G. Gedeh	Lofa	National Annual Total
	LY	4	1	9	223
	YAWS	0	0	0	0
2018	LEPR	1	2	3	189
	BU	29	4	21	324
	HY	0	0	6	25
	LY	0	0	11	64
	YAWS	0	0	0	19
2019	LEPR	2	4	1	62
	BU	3	2	20	129
	HY	0	0	0	0
	LY	0	0	1	18
	YAWS	0	0	5	28

Table 2 shows the computation of the incidence of new cases by 10,000 inhabitants. This suggests, if compared to the previously aforementioned prevalence/incidence data a potential combination of under-reporting and low prevelance.

Table 2: Incidence by 10,000 inhabitants in selected counties and national level by SSSDs - 2017 to 2019

		Margibi	G. Gedeh	Lofa	National Annual Total
2017	LEPR	0.00	0.02	0.00	0.33
	BU	0.04	0.02	0.08	0.40
	HY	0.01	0.00	0.00	0.24
	LY	0.01	0.00	0.02	0.45
	YAWS	0.00	0.00	0.00	0.00
2018	LEPR	0.00	0.00	0.01	0.38
	BU	0.06	0.01	0.04	0.65
	HY	0.00	0.00	0.01	0.05
	LY	0.00	0.00	0.02	0.13
	YAWS	0.00	0.00	0.00	0.04
2019	LEPR	0.00	0.01	0.00	0.12
	BU	0.01	0.00	0.04	0.26
	HY	0.00	0.00	0.00	0.00
	LY	0.00	0.00	0.00	0.04
	YAWS	0.00	0.00	0.01	0.06

0.4 Sample proposal

In the following tables, we present summary statistics for the three intervention counties. In each case, we argue in favour of selecting certain districts based on the aforementioned criteria.

Table 3 shows 7 districts in Lofa County, where we identify two potential districts: Foya and Voinjama (where the County capital is located) are the ones with larger number of health facilities covering those of government and private for profit (3rd and 1st), among the largest share of population covered (1st and 3rd, respectively), one urban and another of a mixture of urban and rural characterizes, and the largest number of SSSD cases identified in 2019 and 2020 (1st and 2nd, respectively).

An alternative could be the Kolahum District. However, we found news that suggest the district has been partitioned into smaller portions[1], although we could no find official information the boundaries.

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[1] https://allafrica.com/stories/201509281614.html

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Table 3: District: Lofa

County	District	Type	# Health Facilities	Population covered	# SSSD cases 2020	# SSSD cases 2019
Lofa	Foya District	Government	9	70,571	43	77
Lofa	Foya District	Private for profit	2	22,879	2	4
Lofa	Kolahun District	Government	11	72,649	4	14
Lofa	Kolahun District	Private for profit	1	1,041	8	1
Lofa	Quardu Gboni	Government	2	15,928	0	1
Lofa	Salayea District	Government	9	30,968	21	5
Lofa	Salayea District	Private for profit	1	0	0	0
Lofa	Vahun District	Government	1	22,399	5	3
Lofa	Voinjama District	Government	14	73,876	16	38
Lofa	Voinjama District	Private for profit	1	5,083	0	11
Lofa	Zorzor District	Government	8	32,738	5	8
Lofa	Zorzor District	Private not for profit	1	6,972	8	1

Table 4 shows 4 districts in Margibi County. We find three potential districts. First, the Kakata District, urban with rural area, and it is the most populated and with the mix of government, private for profit and other types of health facilities and largest number of health facilities - although there where only 1 SSSD in 2019. Second, the Mambah-Kaba District, urban with rural area, a mix of health facility types with the second largest number of health facilities and first in number of cases. Finally, the Firestone District, urban area, appears as a candidate due to the larger relative population, a mix of health facility types, and the highest number of registered cases in 2020.

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Table 4: District: Margibi

County	District	Type	# Health Facilities	Population covered	# SSSD cases 2020	# SSSD cases 2019
Margibi	Firestone District	Concession	2	65,013	0	0
Margibi	Firestone District	Government	3	9,160	0	0
Margibi	Firestone District	Private for profit	2	0	0	0
Margibi	Firestone District	Private not for profit	1	12,893	12	0
Margibi	Gibi District	Concession	1	7,708	0	0
Margibi	Gibi District	Government	4	27,078	0	2
Margibi	Gibi District	Private for profit	1	0	0	0
Margibi	Kakata District	Government	13	80,300	0	1
Margibi	Kakata District	Private for profit	9	18,669	0	0
Margibi	Kakata District		3	0	0	0
Margibi	Mambah-Kaba District	Government	7	48,561	8	6
Margibi	Mambah-Kaba District	Private for profit	7	0	2	2
Margibi	Mambah-Kaba District		2	0	0	0

Table 5 presents districts from the Grand Gedeh county, where the Tchien district appears as the best candidate in terms of higher population, health facilities and SSSD cases identified in 2020. The other districts do not show very relevant differences in terms of population and SSDD cases. Based on that, we suggest choosing the Cavalla District as it is a rural area and it has the largest pool of health facilities (6) among the remaining districts.

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Table 5: District: Grand Gedeh

County	District	Type	# Health Facilities	Population covered	# SSSD cases 2020	# SSSD cases 2019
Grand Gedeh	B'Hai District	Government	2	5,982	0	0
Grand Gedeh	Cavalla District	Government	6	21,553	0	2
Grand Gedeh	Gbao District	Government	4	19,663	0	1
Grand Gedeh	Konobo District	Government	2	38,339	0	0
Grand Gedeh	Putu District	Government	3	24,483	0	0
Grand Gedeh	Tchien District	Government	5	27,655	32	0
Grand Gedeh	Tchien District	Private for profit	2	11,900	0	0

0.5 Map

The following map presents 89 Health Facilities mapped by USAID in 2014/2015, that where matched to the database REDRESS received. There are 40 additional Health Facilities in the REDRESS database (n=139) that could not be geolocated.

Map witn intervention Districs and health facilities

References

Cromwell, Elizabeth A, Chris A Schmidt, Kevin T Kwong, David M Pigott, Denise Mupfasoni, Gautam Biswas, Shreya Shirude, et al. 2020. "The Global Distribution of Lymphatic Filariasis, 2000–18: A Geospatial Analysis." *The Lancet Global Health* 8 (9): e1186–94. https://doi.org/10.1016/s2214-109x(20)30286-2.

Melchers, Natalie V. S. Vinkeles, Wilma A. Stolk, Welmoed van Loon, Belén Pedrique, Roel Bakker, Michele E. Murdoch, Sake J. de Vlas, and Luc E. Coffeng. 2021. "The Burden of Skin Disease and Eye Disease Due to Onchocerciasis in Countries Formerly Under the African Programme for Onchocerciasis Control Mandate for 1990, 2020, and 2030." *PLOS Neglected Tropical Diseases* 15 (7): e0009604. https://doi.org/10.1371/journal.pntd.0009604.

Simpson, Hope, Kebede Deribe, Earnest Njih Tabah, Adebayo Peters, Issaka Maman, Michael Frimpong, Edwin Ampadu, et al. 2019. "Mapping the Global Distribution of Buruli Ulcer: A Systematic Review with Evidence Consensus." *The Lancet Global Health* 7 (7): e912–22. https://doi.org/10.1016/s2214-109x(19)30171-8.

Timothy, Joseph W. S., Mathew A. Beale, Emerson Rogers, Zeela Zaizay, Katherine E. Halliday, Tarnue Mulbah, Romeo K. Giddings, et al. 2021. "Epidemiologic and Genomic Reidentification of Yaws, Liberia." *Emerging Infectious Diseases* 27 (4): 1123–32. https://doi.org/10.3201/eid2704.204442.

WHO. 2021. "Global Leprosy (Hansen Disease) Update, 2019: Time to Step-up Prevention Initiatives." https://www.who.int/publications-detail-redirect/who-wer9536.