

REDRESS - District sampling

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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.'

The purpose of this document is set the guidelines and suggest a sampling strategy for the implementation and evaluation of the REDRESS project.

The study of the intervention and the evaluation will collect primary data exclusively in the three treatment counties: **Lofa** for *Study A*, and **GrandGedeh** and **Margibi** for *Study B*.

There is an agreement between partners to select two districts of each county, which will allow to capture geographical and socio-economic diversity.

0.2 Criteria

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

- Urban/rural density in order to reflect different health and social dynamics;
- Larger number of health clinics in order to have a larger pool of potential health facilities to survey;
- Districts with larger number of SSSD cases registered in 2019 and 2020, understanding that prevalence is relatively low in population and there is a need to capture a significant number of observations to gain as much as statistical power as possible.

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 a 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. 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
	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

	Margibi	G. Gedeh	Lofa	National Annual Total
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 prevalence.

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
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
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
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 (3rd and 1st), among the largest share of population covered (1st and 3rd, respectively) 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 portions¹, although we could not find official information the boundaries.

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## engine is used and not 'xelatex' or 'lualatex'. You can avoid this warning
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## compatible engine by defining 'latex_engine: xelatex' in the YAML header of the
## R Markdown document.
```

¹<https://allafrica.com/stories/201509281614.html>

Table 3: District: Lofa

County	District	# Health Facilities	Population covered	# SSSD cases 2020	# SSSD cases 2019
Lofa	Foya District	11	93,450	45	81
Lofa	Kolahun District	12	73,690	12	15
Lofa	Quardu Gboni	2	15,928	0	1
Lofa	Salayea District	10	30,968	21	5
Lofa	Vahun District	1	22,399	5	3
Lofa	Voinjama District	15	78,959	16	49
Lofa	Zorzor District	9	39,710	13	9

Table 4 shows 4 districts in Margibi County. We find three potential districts. First, the Kakata District, where the capital is located and it is the most populated and with the largest number of health facilities - although there were only 1 SSSD in 2019. Second, the Mambah-Kaba District, which is second in number of health facilities and first in number of cases. Finally, the Firestone District appears as a candidate due to the larger relative population and the highest number of registered cases in 2020.

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## compatible engine by defining 'latex_engine: xelatex' in the YAML header of the
## R Markdown document.
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Table 4: District: Margibi

County	District	# Health Facilities	Population covered	# SSSD cases 2020	# SSSD cases 2019
Margibi	Firestone District	8	87,066	12	0
Margibi	Gibi District	6	34,786	0	2
Margibi	Kakata District	25	98,969	0	1
Margibi	Mambah-Kaba District	16	48,561	10	8

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 has the largest pool of health facilities (6) among the remaining districts.

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## by using the 'set_flextable_defaults(fonts_ignore=TRUE)' command or use a
## compatible engine by defining 'latex_engine: xelatex' in the YAML header of the
## R Markdown document.
```

Table 5: District: Grand Gedeh

County	District	# Health Facilities	Population covered	# SSDD cases 2020	# SSDD cases 2019
Grand Gedeh	B’Hai District	2	5,982	0	0
Grand Gedeh	Cavalla District	6	21,553	0	2
Grand Gedeh	Gbao District	4	19,663	0	1
Grand Gedeh	Konobo District	2	38,339	0	0
Grand Gedeh	Putu District	3	24,483	0	0
Grand Gedeh	Tchien District	7	39,555	32	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.

References

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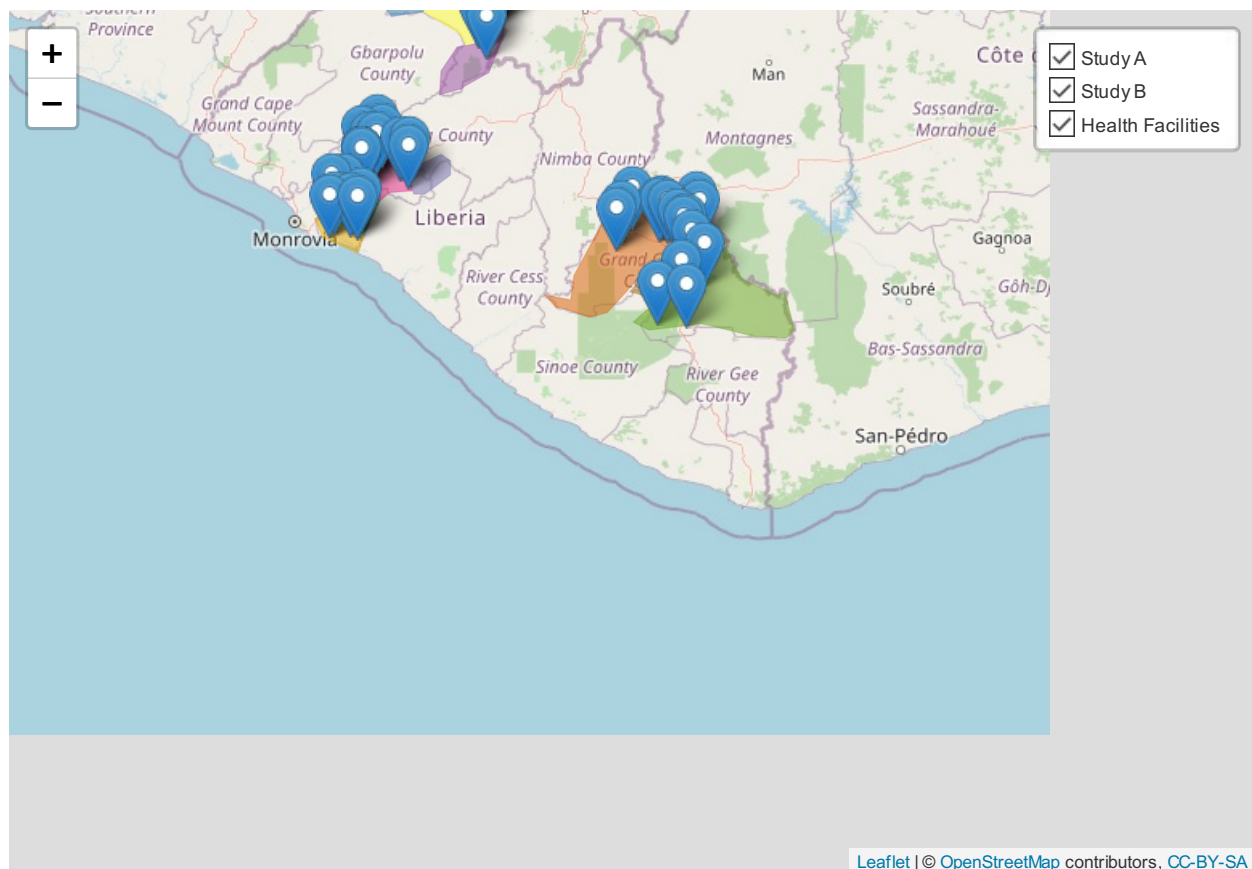


Figure 1: Map with intervention Districts and health facilities

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