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INAUGURAL ONE HEALTH CONFERENCE

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High Prevalence of Lassa Virus in Rodents Reservoirs in Lassa Fever Endemic Communities in Southern Nigeria: Implications for Lassa virus Transmission

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Introduction

- Lassa fever **Lassa fever/ Lassa** hemorrhagic **fever** (LHF), is a zoonotic viral haemorrhagic **fever** caused by the **LASV**.

❖ Endemic in West Africa

❖ Lassa virus (LASV): ssRNA, *Arenaviridae*

❖ Natural reservoir: Rodent (*Mastomys spp.*)

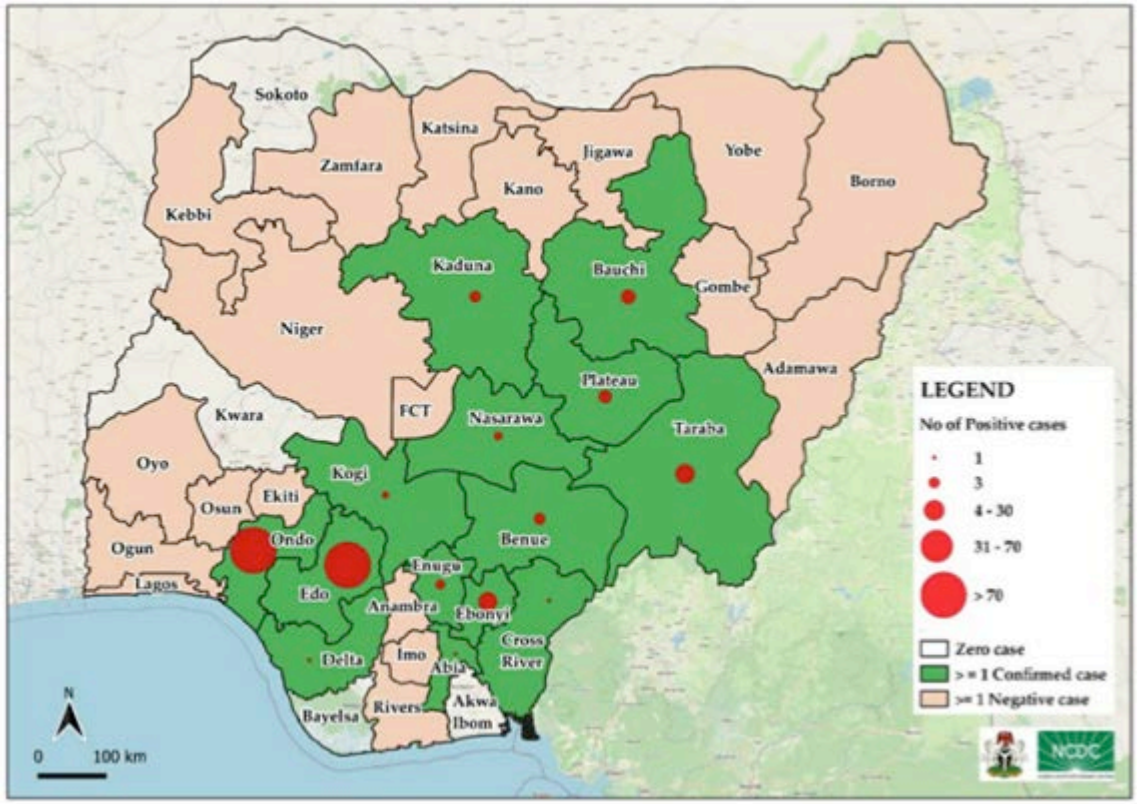
❖ Currently no approved vaccine, limited therapy.

❖ **The 2018 Nigerian LHF surge:**

- ❖ Near real-time genomic analysis revealed that transmission was sustained by an increased transmission from reservoirs. (Siddle *et al.* NEJM 2018)

- ❖ Low prevalence of LASV in rodents often reported does not correlate with evidence that most LHF cases are sustained by multiple spillovers from the rodent reservoirs to humans.

Objectives: Improve LASV diagnosis in rodents + updating their prevalence in two LF hotspots in Nigeria and understand their transmission.



Reporting Period	Suspected cases	Confirmed cases	Probable cases	Deaths (Confirmed cases)	Case Fatality Ratio (CFR)	States and LGAs affected (Confirmed cases)
Current week (week 28)	70	5	0	0	0.0%	State(s): 2 LGA(s): 3
2021 Cumulative (week 1-28)	2437	330	3	67	20.3%	State(s): 14 LGA(s): 58

Figure 1: Summary of cumulative LF Cases from week 1 to week 28, ending on 18th July, 2021 (Source: NCDC)

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Materials and Methods

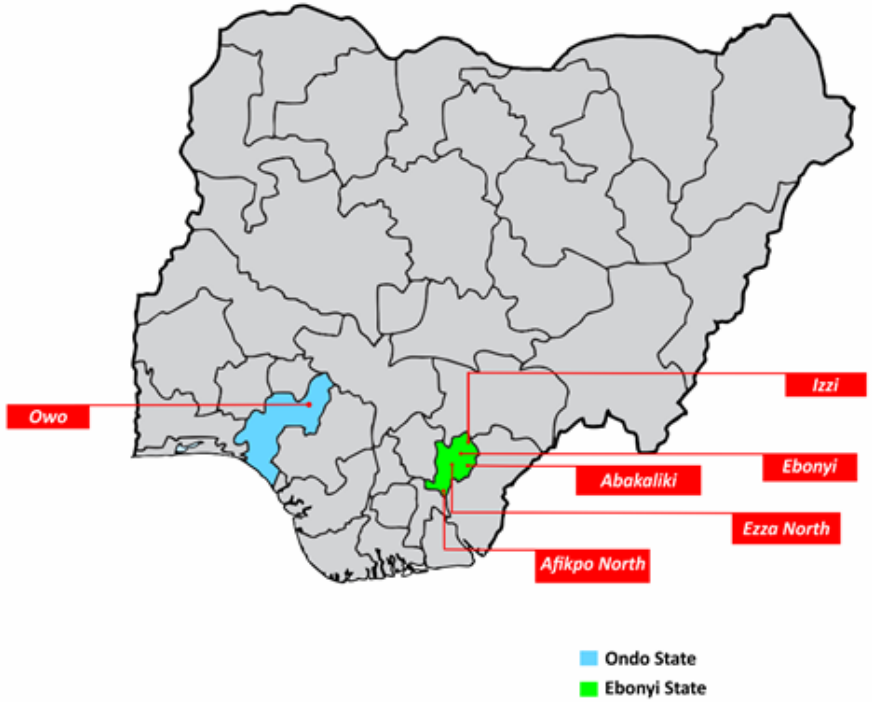
❖**Study area** = Ebonyi and Ondo states

❖**Rodent trapping**: The use of Sherman live-capture traps baited with white oats/garri, groundnut paste and dried fish.

❖Rodents trapped in homes and fields

❖ **Sample collection**: 942 rodents were captured between October 2018-February 2020 in Ebonyi State (531) and between August-October 2019 in Ondo State (411).

for LASV detection by RT-qPCR using blood and tissues (brain, heart, lung, liver, spleen, kidney ,intestine, bone marrow, testis and, embryo).



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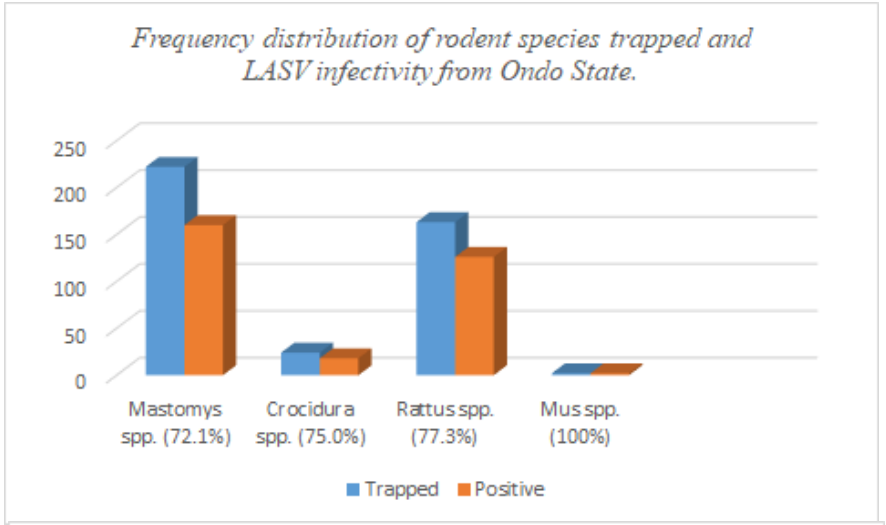
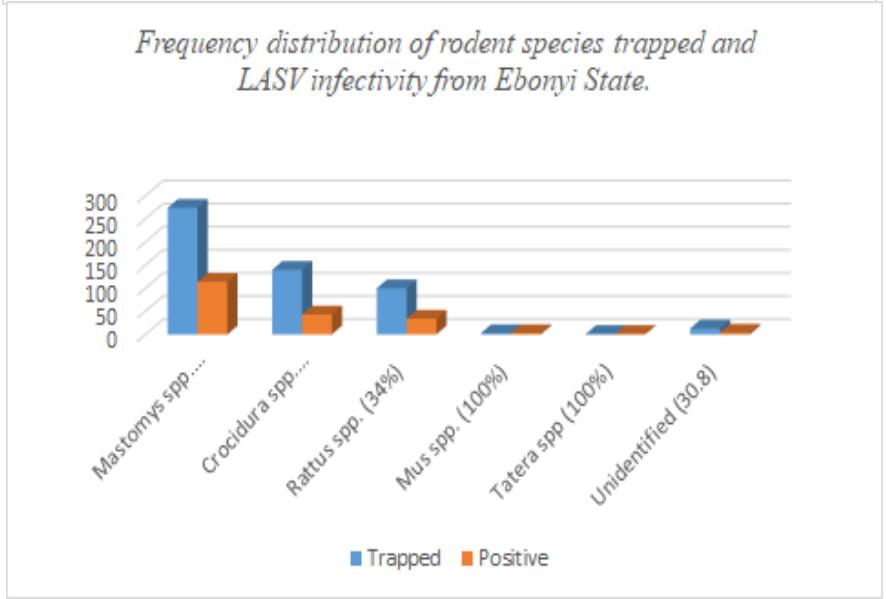
Results and discussion

- Capture success:
  - Ondo State -18.6%
  - Ebonyi State 5.8% (difference not statistically significant)

- in Ondo State:4 small rodent species identified (*Mastomys* spp, *Rattus* spp, *Crocidura* spp, and *Mus* spp)
- Ebonyi State: 5 small rodent species (*Mastomys* spp. *Crocidura* spp, *Rattus* spp, *Mus* spp, and *Tatera* spp) identified

- **53.6%** LASV prevalence in Rodents – detected in at least one tissue (**505/942**).
  - All rodent species trapped were LASV positive
  - Site-specific prevalence - **37.5% at Abakaliki- 74.5% at Owo**
  - **Rattus spp. (77.3%**) in Owo (Ondo State); *Mastomys* spp (**41.6%)** in Ebonyi
  - LASV detected in all tissues tested (spleen, kidney, testes and embryo are most frequently positive) Plasma being the least in both states





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Results

- LASV detected in all tissues tested (spleen, kidney, testes and embryo are most frequently positive)
- Plasma being the least in both states

Table 1: LASV positivity from rodent tissues in Ebonyi and Ondo States

Location	Organs	Rodents tested	Rodents positive	Proportion	Percentage (%)
Ondo	Kidney	408	220	0.539	53.9
	Spleen	406	226	0.556	55.7
	Liver	95	37	0.389	39
	Intestine	96	34	0.354	35
	Lungs	96	35	0.365	36.5
	Embryo	24	10	0.417	41.7
	Testes	83	43	0.518	51.8
	Brain	34	6	0.176	17.7
	Bone marrow	27	5	0.185	18.5
	Plasma	121	18	0.149	14.9
Ebonyi	Kidney	508	123	0.242	24.2
	Spleen	465	98	0.211	21.1
	Liver	92	14	0.15	15.2
	Intestine	92	11	0.119	12
	Lungs	103	13	0.126	12.6
	Embryo	45	13	0.289	28.9
	Testes	101	34	0.336	33.7
	Brain	71	14	0.197	19.7
	Bone marrow	32	6	0.187	18.8
	Plasma	53	3	0.057	5.7

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Discussion/conclusion

- High LASV in rodents → May serve as triggers of LF epidemics with high seasonal incidences
- First direct detection of LASV in *Tatera* spp. And all rodents captured → the complexity of the infection dynamics with interspecies transmission that maintains the relatively high risk of zoonotic spill-over events in high risk communities
- Lassa virus in kidney, intestine, embryo and testes → LASV is maintained among rodents through vertical, horizontal and transmission by coitus → fuel epizootic rodent outbreaks in endemic communities in Nigeria.
- Lassa virus the brain → cross the blood-brain barrier could cause neurological signs and hearing lost seen in the latter stage of the disease in humans
- To standardize a comprehensive rodent surveillance protocols for determining zoonotic risks of LF in affected communities, plasma is the least appropriate sample for LASV diagnosis in small rodents in Nigeria.
- Highly affected communities have greater prevalence of affected rodents and more diverse rodent species infected.

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THANK YOU

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