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Disease Importation at Nigerian Land Borders: Evidence from Nigeria

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Abstract

Cross-border spread of infectious diseases through land borders poses a global public health challenge, particularly in developing countries. However, studies documenting disease importation events at ground crossing remains unexplored. Thus, this study examined reported disease importation events and the core capacity for early disease detection at selected land borders. The study adopted a descriptive cross-sectional survey of three major land ports, including Seme, Chikanda, and Jibiya land borders, between 2024 and 2025. Structured questionnaires were administered to 203 port health officers, and the collected data were analysed descriptively and inferentially using SPSS v25. Findings revealed 10 reported disease events involving seven pathogens, including COVID-19, Ebola, Lassa fever, Cholera, Mpox, Meningococcal meningitis, and yellow fever, with Seme and Jibiya borders each accounting for 40% of the events, while Chikanda accounted for 20%. Results further indicate that while primary screening measures were available, critical response capacities were limited, particularly isolation facilities (8%) and on-site diagnostics (33%). Also, core capacity deficits, including availability of trained staff, functional equipment, and communication systems, were significantly associated with preparedness indicators ($P < 0.05$). These findings demonstrate the continued vulnerability of cross-border surveillance systems, contributing to ongoing efforts to strengthen cross-border surveillance and support the implementation of the International Health Regulations and national health security strategies.

Keywords:

Cross-border disease surveillance, Port health services, Disease importation, International health regulations, Nigeria.

1. Introduction

The international movement of people and goods across land borders continues to accelerate, bringing unprecedented economic benefits alongside intensified risks of cross-border infectious

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disease transmission. Between 2019 and 2023, approximately 1.3 billion international arrivals were recorded annually before the COVID-19 pandemic, facilitating the global spread of SARS-CoV-2, which ultimately infected over 770 million people and caused nearly 7 million deaths worldwide (WHO, 2024). The 2014–2016 Ebola Virus Disease (EVD) outbreak in West Africa, which resulted in over 28,600 confirmed cases and 11,325 deaths, was explicitly linked to cross-border movement through both air and land border crossings (WHO, 2016). These events, alongside recurring Lassa fever, cholera, and Mpox outbreaks, have repeatedly demonstrated that weaknesses in border health systems have far-reaching consequences not only for the countries directly affected but for regional and global health security.

The location of Nigeria on the map of West Africa means it plays a critical role in its network of disease communication. Due to its size and volume of trade within the West African region, Nigeria has an extensive land border, measuring some 4,047 km, with three neighbouring countries: Benin Republic (773 km), Niger (1497m), and Cameroon (1690m), while there are just 84 approved points of entry and 1400+ unknown points of entry (Oguntuase, 2024). As a result, Nigeria poses a major risk of importing other countries' diseases and is a major conduit for rapidly disseminating microbes through its large, growing population and the West African region. Established in February 2020 as its initial documented case of COVID-19 via ground crossing, Nigeria’s history also includes an Ebola outbreak that began when the virus was brought into Nigeria from Liberia through ground crossings. That outbreak resulted in 19 confirmed cases and 8 fatalities (Shuaib *et al.,* 2014). Lastly, Nigeria repeatedly experiences Lassa fever outbreaks due to disease imports that cross into the Niger Republic via the Jibiya border (WHO, 2022). In conclusion, Nigeria has continued to demonstrate vulnerability to the importation and spread of diseases through crossings.

According to the International Health Regulations (IHR, 2005), all State Parties must maintain functional core capacities at designated Points of Entry (PoE), including surveillance, detection, isolation, and referral systems that can effectively respond to public health threats. However, Nigeria's 2023 Joint External Evaluation (JEE) classified the "Points of Entry" domain as one of the weakest in Nigeria's overall IHR compliance scorecard, receiving only 2.0 out of 5.0. This indicates an extremely limited operational capacity at Nigerian land borders (WHO, 2024; NCDC & WHO, 2023). Despite the vulnerability evidence shown above, the Nigerian literature has little (if any) quantitative evidence to substantiate which diseases have been imported, through which types of border crossings, or under what capacity conditions. Qualitative disease data have been captured using focus group discussions (FGD) to complement traditional surveillance systems for disease event histories at ground crossings. This has been suggested because formal surveillance data are incomplete or non-existent (Awoonor-Williams *et al.,* 2021).

Despite documented vulnerabilities at Nigeria’s point of entry, evidence remains limited in critical areas: (1) systematic documentation of disease importation events at land borders, and (2) the link between core preparedness capacity and disease detection outcomes at these crossings. Though existing studies have largely focused on awareness and preparedness, with limited event-level data linking operational capacity to observed importation patterns.

Therefore, this study addresses these gaps by exploring reported events across various land crossings, their screening capacities, and factors influencing their effectiveness in disease preparedness and response, contributing empirical insights to improve core capacity preparedness along the study's borders and at wider national crossings.

2.0 Materials and Methods

2.1 Study Setting

The site of the study was selected based on its geopolitical zone in Nigeria, namely Seme border (Lagos State, South-West) – the primary formal border between Nigeria and Benin Republic; Chikande Border (Kwara State, North-Central) – an important agricultural trade border; and border Jibiya (Kano State, North-West) - a major border crossing to Niger Republic located within the endemic area for meningococcus.

2.2 Study Population and Sample

Using a structured questionnaire, we surveyed a total of 203 border health stakeholders (Port Health Officers, Environmental Health Officers, Quarantine Officers) via three locations: Seme/Lagos-Ogun (n=87), Jibiya/Kano (n=68) and Chikanda/Kwara (n=48). The sampling approach used a multi-stage method that involved purposive selection of the site, followed by systematic random sampling of those eligible for inclusion from each selected location. The qualitative portion of the study, which involved Focus Group Interviews of six to eight purposively selected participants chosen on the criteria of having three or more years of experience at the border and their involvement in screening operations (interaction), and who also had specific knowledge and or experience regarding the detection or reporting of diseases.

2.3 Data Analysis

Core preparedness capacity was assessed through the structured questionnaire across five domains: (1) availability of trained staff; (2) availability of functional equipment; (3) reliable communication systems; (4) disease-specific infrastructure; and (5) staff adequacy. Chi-square tests were used to assess the statistical significance of associations between each capacity component and preparedness levels. One-sample tests of proportions were applied to assess screening measures, including primary and secondary screening and isolation/quarantine capacity. Perceived priority categories for screening (human, animal, plant, food) were assessed using a one-sample test of proportion. Statistical significance was set at $p<0.05$. All analyses were conducted using SPSS version 25. The methods utilised to analyse this data include Fisher's exact test and the chi-square test, where appropriate. This analysis uses the same analytical framework as Eteng *et al.,* (2022) and Adepoju (2021) in analysing the relationship between preparedness capacity and health security outcomes at Nigerian border sites.

3. Results and Discussion

3.1 Imported Disease Events at Selected Nigerian Land Borders

Results of disease importation across the three borders revealed an equal distribution of disease events between Seme (4 events) and Jibiya (4 events), which reflects distinct epidemiological risk profiles rather than similar operational conditions (see Table 1). The increase in events at Seme may be due to various pathogens imported from other countries. For example, the COVID-19 outbreak found its way to Nigeria from the Benin Republic; the EVD outbreak came from Liberia; the Mpox outbreak was imported through Benin from Cameroon; and the yellow fever outbreak can be traced back to the Benin area. This is not surprising given that Seme is the most heavily trafficked commercial border in Nigeria and receives traffic from every other part of the ECOWAS region. In comparison, the outbreaks seen at Jibiya have been heavily concentrated along the Niger Republic corridor, and are reflective of the endemic diseases that affect the overall Sahel region: specifically, Lassa fever (which has been endemic in Niger and northern Nigeria), cholera (which occurs on a seasonal basis), and meningococcal meningitis (which is endemic to the so-called meningitis belt). Additionally, COVID-19 Delta (variant) infections have been appearing at Jibiya. The epidemiological characteristics of the different locations are significant for assessing how to allocate and deploy resources to meet the needs of each population: to provide effective responses to Lassa fever and meningitis at Jibiya, as well as to create capacity for a wider range of VHFs and vaccine-preventable diseases at Seme.

Chikanda's lower event count (2 events) is more likely to reflect under-detection than genuine lower disease exposure. Chikanda had the lowest total core capacity scores and is situated on the Benin Republic corridor, the same corridor responsible for four events at Seme. FGD participants at Chikanda specifically attributed the cholera event to inadequate food safety inspections, highlighting a pathway for disease importation through contaminated food commodities that is completely invisible to human-focused screening systems and therefore likely significantly undercounted. These findings are consistent with Awoonor-Williams *et al*. (2021), who documented near-zero detection yield at a northern Ghana land border crossing despite significant disease burden in the catchment area, attributing this to systematic operational gaps rather than the absence of disease.

Table 1: Distribution of Reported Imported Disease Events by Border Site and Pathogen Category

Disease/pathogen	Seme	Jibiya	Chikanda	Pathogen category
COVID-19 (SARS-CoV-2)	✓ **(2)**	✓ (1)	—	Respiratory virus
Ebola Virus Disease (EVD)	✓ **(1)**	—	—	Viral haemorrhagic fever
Lassa Fever	—	✓ (1)	✓ (1): suspected)	Viral haemorrhagic fever
Cholera	—	✓ (1)	✓ **(1)**	Water/foodborne bacterial
Mpox (Monkeypox)	✓ **(1)**	—	—	Orthopoxvirus
Meningococcal Meningitis	—	✓ (1)	—	Bacterial meningitis
Yellow Fever	✓ **(1)**	—	—	Arboviral
	4 (40%)	**4 (40%)**	**2 (20%)**	

✓ = event documented at this border site. Bold = highest count for that pathogen.

3.2 Source of Importation across the borders

The universal prioritisation of human travellers for screening (100%; $p<0.001$) is epidemiologically appropriate for the disease spectrum documented in this study; all ten importation events involved human vectors (see Table 2). Although the priority of animal products (25%, $p=0.241$) and plant products (6.3%, $p=0.812$) being below the level required for statistical significance ($P=0.05$) raises concerns about the countries preparedness for longer term zoonoses (diseases originating: from an animal) and plant health (diseases originating from plants) respectively, in the future to combat threats for both of these categories of diseases which could negatively impact people's health. WHO has stated that it is increasingly focusing on combining human, animal, and environmental health into a single system or approach, referred to as "One Health," for screening and public health assessments to determine risk (WHO, 2023). African countries are at risk of animal-borne zoonoses through active cross-border livestock trade; Nigeria has significant trade with the Niger Republic (Jibiya) in cattle and goats/sheep, which may import zoonotic diseases into Nigeria. The prioritisation of animal and plant screening is lower than that of human health systems in Nigeria, as per current searches. As a result of this unpreparedness, when confronted with an emerging One Health threat in the future; pharmaceuticals were significantly prioritized (81%; $p = 0.016$) due to the prevalence of substandard and/or counterfeit medical products entering through porous Nigerian borders which

has been widely reported on in Nigerian public health literature and have not been included in typical imported disease surveillance systems (Oguntuase, 2024); and strong prioritization for food (87.5% p 0.001) can, therefore, be validated by the cholera incidents occurring in Jibiya and Chikanda with respect to transmission via food sources alone.

Table 2: One-Sample Test of Proportion for Perceived High-Risk Categories for Disease Importation Screening

Screening category	**Yes (%)**	**No (%)**	p-value	
Humans (travellers)	203 (100)	(0.0)	<0.001	Highly significant
Food items (incl. dairy, meat, foodstuffs)	178 (87.5)	25 (12.5)	<0.001	Highly significant
Meat products	134 (66.0)	69 (34.0)	0.001	Significant
Dairy products	128 (63.0)	(37.0)	0.002	Significant
Pharmaceuticals	164 (81.0)	75 (19.0)	0.016	Significant
Animal products	51 (25.0)	152 (75.0)	0.241	Not significant
Plant products	13 (6.3)	190 (93.7)	0.812	Not significant
Textiles	51 (25.0)	152 (75.0)	0.964	Not significant
Food items (incl. dairy, meat, foodstuffs)	178 (87.5)	25 (12.5)	<0.001	Highly significant

3.3 Core Capacity Gaps: From Detection to Containment

The results from chi-square testing (see Table 3) show strengths in: trained staff available (p = 0.001), functional equipment (p0.003), staff adequacy (p = 0.003), and a functioning system of communication (p = 0.014) with overall preparedness which can be quantitatively verified by FGD responses citing the existence of a border health system capable of identifying suspected cases but having difficulty confirming, containing or communicating those suspected cases. The results from the chi-square test support the 2023 JEE assessments, which indicated Nigeria received a score of 2.0 out of 5.0; suggesting that overall operational capabilities were limited in that there were no functioning emergency response teams located at approximately 62% of all Nigerian land borders as reported by Eteng *et al.*, (2022).

Table 3: Core Capacity Assessment Across the Three Border

	Lagos		Kano		Kwara			
Capacity elements	**F**	**%**	**F**	**%**	**F**	**%**	**Total**	**%**
Trained Staff	33	37.9	26	38.8	19	38.8	78	**38.4**
Functional Equipment	41	47.1	32	47.8	25	51.0	98	**48.3**
Reliable Communication Systems	53	60.9	40	59.7	30	61.2	123	**60.6**
Disease-Specific Infrastructure	49	56.3	37	55.2	28	57.1	114	**56.2**
Staff Adequacy	54	62.1	41	61.2	30	61.2	125	**61.6**
Disease Events	**—**	**4**	**—**	**4**	**—**	**2**	**—**	**10**

Total Number of Diseases / Importation: the total number of diseases imported equals the total number of documented disease events (as documented by FGDs) at each border site. The number of respondents that yes to the core capacity data will provide a count for every state/site category. Lagos = Seme Border, Kano = Jibiya Border, Kwara = Chikanda Border.

Similarly, the 8% of total capacity available for isolation facilities is the most critical limitation noted in this research. Every event involving the importation of items mentioned in the FGDs was required to be referred to a health facility capable of handling those items immediately, and FGDs reported issues of delays, lack of appropriate transportation methods, and the risk of disease transmission in transit. Adepoju's (2021) research indicated that only 42% of border screening facilities in southwestern Nigeria could isolate imported items. The IHR (2005) Core Capacity 9 explicitly requires that designated points of entry have functional isolation/quarantine capacity; the 8% figure indicates that this requirement is met at fewer than one in ten sites at the studied borders.

The near-significant association for disease-specific infrastructure ($p = 0.052$) deserves particular attention (see Table 4). While it does not meet conventional statistical significance, a p-value of 0.052 in a sample of 203 respondents suggests a genuine but underpowered relationship that is likely to reach significance with larger sample sizes or more granular site-level analysis. Given that disease-specific infrastructure is the direct interface between a detected case and a confirmed, contained case, investment in this domain may yield disproportionate returns for national efforts to prevent disease importation.

Table 4: Chi-Square statistical test of Association between Core Capacity Components

Core Capacity Component	df	p-value	Interpretation
Training received (trained staff available)	2	<0.001	Highly significant strongest predictor of preparedness
Equipment availability	2	<0.003	Significant equipment gaps constrain detection and response
Staff adequacy	2	<0.003	Significantly adequate staffing enables consistent screening coverage
Communication systems	2	<0.014	Significant real-time reporting links detection to response
Disease-specific infrastructure	2	0.052	Near significant — isolation/quarantine infrastructure trends toward significance

Conclusion

This document includes the first-ever systematic, multi-site FGDs to identify imported disease events at Nigerian land border sites, plus a quantitative assessment of perceived screening priorities, screening capacity/ability, site-based core preparedness capacity, and the relationship between capacity gaps and resulting disease detection outcomes. A total of 10 import disease events were recorded over a 5-year period at three border sites; Seme and Jibiya accounted for 40% of these events, while Seme, Niger Republic, and Benin Republic split the remaining 60% into 3 separate categories. The primary documented means of importation is human travellers; however, there is no statistically significant priority given to animal and plant products as vectors of importation, representing a large gap in One Health preparedness for these commodities. Core capacity gaps are not only administrative gaps but are demonstrated by the FGD "hands on" accounts from these ten respective events as evidenced through compromised detection, confirmation and containment chains necessary for successful border health security: critical isolation facility availability (8.0%), inadequate trained personnel to manage disease outbreaks (38.4%) and absence of on-site diagnostics/testing resources necessary to support outbreak management activities (30%) were all identified.

These findings highlight the need to strengthen preparedness capacity at land borders through targeted investment in workforce development, infrastructure and communication systems.

However, the study makes a significant contribution; the findings should be interpreted carefully due to cross-sectional data and limited documented events. Further studies could incorporate longitudinal data and broader geographic coverage to provide a holistic picture of cross-border disease in Nigeria and wider West African regions.

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Conflict of Interest

All authors declare no conflict of interest.

Ethical Approval

Ethical approval was obtained from the appropriate institutional ethics review committee. Written permission was secured from the Ministry of Health and the Port Health Services Department. Informed consent was obtained from all participants, including FGD participants; audio recordings were used exclusively for transcription purposes.

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