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Mapping of Most-At-Risk Populations (MARPs) for HIV infection in Benue State, North-central Nigeria

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ABSTRACT

Benue State has one of the highest HIV prevalence rates in Nigeria, driven by a combination of high-risk sexual behaviors and the presence of most-at-risk populations (MARPs). The mapping exercise aimed to provide accurate information on the size, location and characteristics of MARPs for HIV in key urban and semi-urban areas of the State, to help improve the scale, quality and impact of HIV prevention programs among these MARPs. A cross-sectional mapping study was conducted between April 2023 and February 2024 in ten local government areas (LGAs) of Benue State. The study utilized a two-stage approach: Level 1 involved interviews with key informants to identify hotspots, while Level 2 validated these locations. Data were managed using Microsoft Access and analyzed using descriptive statistics to estimate population sizes and distribution. The study identified 825 Female Sex Workers (FSWs) hotspots, 57 Men who have sex with men/Male Sex Workers (MSM/MSW) hotspots, and 32 IDU locations. The estimated population sizes were 10,034 FSWs, 1,018 MSM/MSWs, and 221 IDUs, with high-risk behaviors such as unprotected sex and needle sharing being prevalent. Makurdi, Gboko, and Otukpo had the highest concentrations of MARPs, with FSWs primarily operating in bars (32%) and hotels (28%), while MSM/MSWs were mostly found in home-based settings (31%). The findings highlight the urgent need for targeted HIV prevention interventions in high-prevalence LGAs, particularly focusing on harm reduction for IDUs and tailored outreach for FSWs and MSM/MSWs. The study provides evidence for policymakers to design effective, evidence-based responses to reduce HIV transmission in Benue State.

Keywords: HIV, MARP, mapping

INTRODUCTION

Benue State, as it exists today is a surviving legacy of an administrative entity that was carved out of the protectorate of northern Nigeria at the beginning of the twentieth century. The territory was initially known as Munshi Province until 1918, when the name of its dominant geographical feature, the 'River Benue', was adopted [1].

Benue State lies within the lower river Benue trough in the middle belt region of Nigeria. Its

geographic coordinates are longitude 7° 47' and 10° 0' East. Latitude 6° 25' and 8° 8' North; and shares boundaries with five other states namely: Nassarawa to the north, Taraba to the east, Cross-River to the south, Enugu to the south-west and Kogi to the west [2]. The State also shares a common boundary with the Republic of Cameroun on the south-east. Benue has a population of 4,780,389 (2006 census) and occupies a landmass of 32,518 square kilometres [2,3].

Benue State has a high HIV prevalence, with an estimated 4.8% among adults aged 15-64 years, and is considered one of Nigeria's high-risk zones for HIV [4]. In 2023 the State was ranked second with a state-wide 4.9% prevalence rate and an estimated burden of 184,745 People living with HIV (PLHIV) [4,5]. It is one of the seven states that account for 50% of estimated PLHIV. Though the prevalence of HIV/AIDS in Benue State has significantly dropped from 16.8 percent to 4.9 percent in recent years, the state persistently remains one of the high-risk zones in Nigeria [6]. Considering the fact that HIV infection sometimes takes up to 10 years before developing into full-blown AIDS, the number of infected persons in the state has been increasing in absolute numbers, even though the number of new cases may be decreasing [7,8]. The persistence of Benue State as high-risk zone is alarming and calls for strategic intervention. Generally, most- at-risk populations (MARPs) have the highest HIV prevalence high-risk zones [9]. In many cases, the prevalence among these groups can be more than twice the prevalence among the general population.[10]

Much remains to be determined with respect to the transmission dynamics in Benue State due to paucity of data on specific patterns of sexual behavioral patterns and networks in the State.

Although it is somewhat difficult to interpret the sexual structure based solely on general population surveys due to a lack of detail about sexual mixing and networking patterns and the tendency to social desirability biases in responses, there is evidence that there are higher levels of sexual behavioral risks in the general population of Benue than in Nigeria generally [11].

Even less is known about the size and characteristics of the MARPs, and the data are not consistent. The size of the FSW population has been estimated to be as high as 5.1% of adult women, though the definition used for that estimation was broad, including "transactional sex" in addition to more formal sex work [12]. The proportion of males who are clients of FSWs is similarly difficult to determine from existing data. Self-reported data collected in population-based surveys, which is prone to social desirability bias [13], indicated that 7.7% of men had ever paid for sex. Notwithstanding uncertainty about the size of the sex work network, there is evidence that FSWs are at particularly high risk with one survey finding an HIV prevalence of 65% among FSWs in Makurdi [4]. The large difference in HIV prevalence between FSWs and women in the general population provided strong evidence for a substantial female sex work network [4]. Data is lacking on the size of other MARPs, including IDU and higher risk MSM, and HIV prevalence in these populations in Benue is unknown.

Developing effective HIV prevention strategies requires an understanding of local epidemic dynamics to ensure targeted interventions. Many current programmes adopt a uniform approach, which may not adequately address the unique risks of different MARP groups [4]. This study provides essential data to inform resource allocation and intervention design, ensuring that prevention efforts are strategically placed to maximise impact and reduce HIV transmission in Benue State.

MATERIALS AND METHODS

Study area

Benue State, located in north-central Nigeria, has a population of approximately 4.78 million. The study covered ten local government areas (LGAs), including Makurdi, Otukpo, and Gboko, known for high HIV prevalence. The selection of these

locations was based on existing HIV epidemiological data and their urban and semi-urban characteristics, which facilitate MARP activities. Data were collected in urban and semi-urban towns where MARPs are concentrated. These included locations such as bars, hotels, brothels, and public spaces where high-risk behaviours occur. The Geographical coverage of mapping LGAs and Towns are shown in Table 1.

Table 1: Geographic coverage of mapping (Study sites) LGAs and Towns where the study was carried out

LGAs	Towns
Makurdi	Makurdi
Gboko	Gboko
Katsina-Ala	Katsina-Ala
Otukpo	Otukpo
Tarka	Annune
Vandekya	Vandekya, Ihugh
Kwande	Adikpo
Katsina-Ala	Zaki-Biam
Gwer-East	Aliade
Okpokwu	Okpoga

Ethical considerations

Nigeria's National Prevention Technical Working Group (NPTWG) in collaboration with the technical team of the University of Manitoba developed the study protocol. The study protocol was approved NACA and Benue State Ministry of Health, who subsequently wrote letters of authorization for fieldwork.

Study population
Defining Most-At-Risk Populations

The populations were defined as follows:
Female Sex Workers (FSWs): Women who engage in sexual activity in exchange for money or benefits, operating in various settings such as streets, bars, hotels, and brothels.

Men Who Have Sex with Men (MSM) and **Male Sex Workers (MSWs):** Men who engage in sexual activities with other men, regardless of sexual identity. MSWs are individuals who sell sex for money or material benefits. These groups were mapped based on locations where they cruise for partners, such as home-based settings, public areas, and bars.
Injecting Drug Users (IDUs): Individuals who inject drugs for non-therapeutic purposes. The study focused on current injectors, excluding former users. IDUs were mapped to determine locations where drug use and needle sharing occur, with an emphasis on harm reduction strategies.

Sampling Technique

A two-stage mapping approach was employed. Level 1 involved interviews with key informants, such as taxi drivers and bar owners, to identify hotspots. Level 2 involved direct validation interviews with MARPs at these locations to confirm their existence and population estimates.

Data Management, Processing and Analysis

Data collected were checked for completeness, accuracy, and consistency before entry into a Microsoft Access database. Cleaning and standardisation were conducted to eliminate duplicates and ensure accurate spot counts. Descriptive statistics were used to generate population estimates, and the average of minimum and maximum estimates was calculated for each MARP group. Data analysis was conducted at the national level, with technical support from relevant institutions. The data analysis was conducted at a national level and led by NACA with technical support from the University of Manitoba technical team. Findings were presented using tables, figures, and GIS-based mapping for spatial representation of MARP distribution.

RESULTS
Profile of Key Informants

In total, 1844 key informants were interviewed in Benue State. Table 2 shows that the largest numbers of key informants were interviewed in

Makurdi (260), Vandekya (256), Gboko (249), and Otukpo (243). The least was in Okpokwu (94). Out of the total of 1844 KIs examined in Benue State, 55% of the KIs had attained secondary education and 22% tertiary education. Only 3% did not disclose their educational level. 76% of KIs were males while 24% were females. The type of KIs was diverse, ranging from 29% Taxi/Okada riders to a meagre 2% Watchman/security staff. (Table 3).

Table 2: Number of the Key Informants (KI) Interviewed by LGAs, Benue State, Nigeria, 2024

LGA	Number of KI Interviews	Percentages (%)
GBOKO	249	13.5
GWER-EAST	132	7.2
KATSINA-ALA	242	13.1
KWANDE	127	6.9
MAKURDI	260	14.1
OKPOKWU	94	5.1
OTUKPO	243	13.1
TAKAR	122	6.6
UKUM	119	6.5
VANDEKYA	256	13.9
Total	1844	100

Table 3: Distribution of key informants by characteristics of KIs, Benue State, Nigeria 2024

Characteristics	Percentage
Education Level	
Primary	15%
Secondary/Vocational	55%
Tertiary	22%
None	5%
Did not Disclose	3%
Sex	
Male	76%
Female	24%
Type of KI	
Taxi/Okada riders	29%
Local food vendors	8%
Watchman/security staff	2%
Bar worker/staff/owner/patrons	3%
Petty shop owner	7%
Service providers	3%
Gov/law enforcement officials	5%
Others	44%
No. of KI	**1844**

Female Sex Workers (FSWs)

A total of 825 FSW hotspots were identified, with an estimated 10,034 FSWs. The highest concentrations were in Makurdi (140 spots), Gboko (119), and Vandekya (109). FSWs operated mainly in bars (32%), hotels (28%), and public spaces (19%). Figure 1 presents the distribution of FSW hotspots across the LGAs

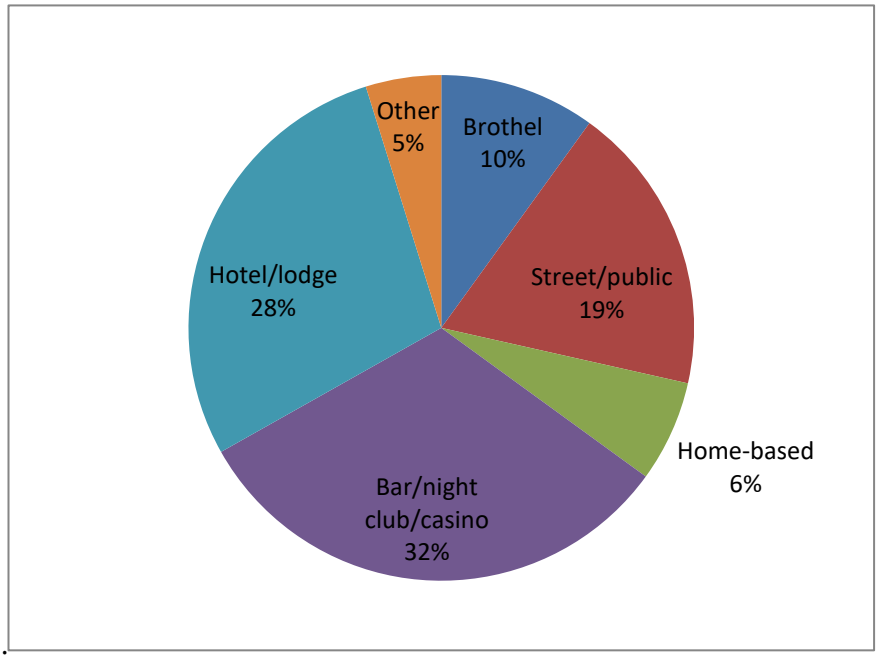

Figure 1: Percent distribution of FSWs by type of spot, Benue State, Nigeria, 2024

Men Who Have Sex with Men (MSM)/Male Sex Workers (MSWs)

Fifty-seven MSM/MSW hotspots were mapped, with an estimated 1,018 individuals. Makurdi (19 spots) and Gboko (11 spots) had the highest numbers (Table 4). About 28% of MSWs and 28% of other MSM were found in streets and other public places. Very few MSW were found in hotels/lodges. However, 31% of MSW were found in homes (Figure 2).

Table 4: Number of active MSMs spots by LGAs, Benue State, Nigeria, 2024

LGAs	Towns	No. of spots
GBOKO	GBOKO	11
GWER-EAST	ALIADE	4
KWANDE	ADIKPO	4
MAKURDI	MAKURDI	19
OKPOKWU	OKPOGA	5
OTUKPO	OTUKPO	7
TARKA	WANNUNE	3
UKUM	ZAKI-BIAM	1
VANDEKYA	VANDEKYA	3
	IHUGH	0
	Total	57

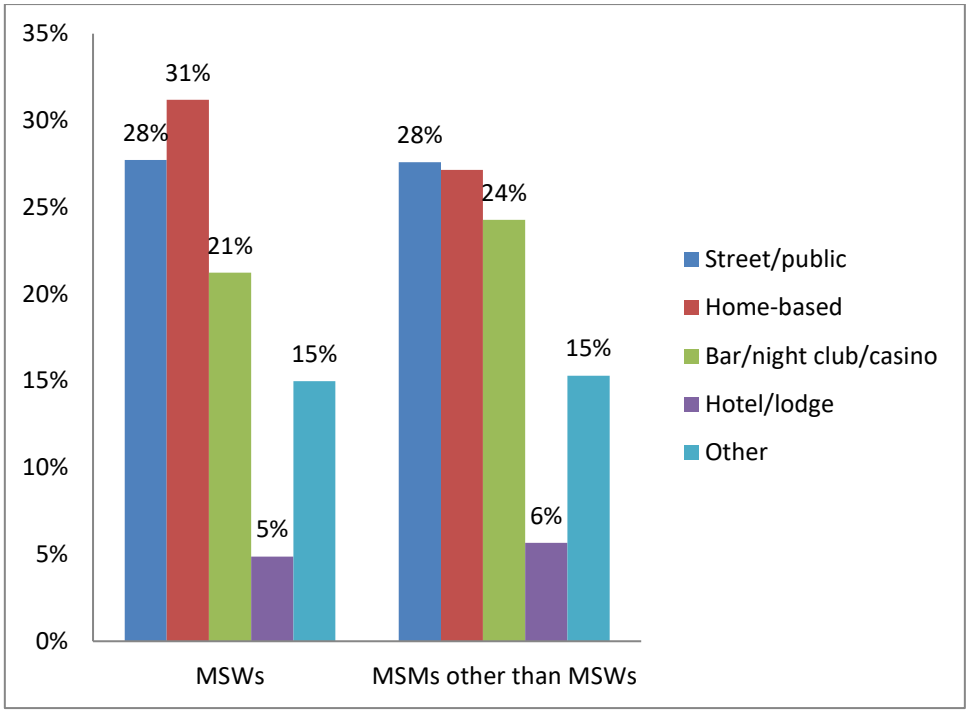

Figure 2: Distribution of MSW and MSM spot types, Benue State, Nigeria, 2024

Injecting Drug Users

A total of 32 spots where Injecting Drug Users (IDUs) spend time were identified in 7 LGAs in Benue State, and the distribution by LGA is presented in Table 5. The majority of IDU spots are in Makurdi and Gwer East, and one was found in Kwande and Ukum each. No IDU spots were identified in the other LGAs. there was a big range in the proportion of IDUs reporting sharing needles in the different LGAs. On average, 96% reported sharing needles. A greater than average proportion of IDUs reported sharing needles in Kwande (100%), Makurdi (100%), Otukpo (100%) and Gwer- East (97%). Ukum had the lowest proportion (86%) of IDUs sharing needles in the state (Figure 3).

Table 5: Number of active IDU spots by LGA, Benue State, Nigeria, 2024

LGAs	Number of spots
GWER-EAST	6
KWANDE	1
MAKURDI	15
OTUKPO	3
TARKA	3
UKUM	1
VANDEKYA	3
Total	32

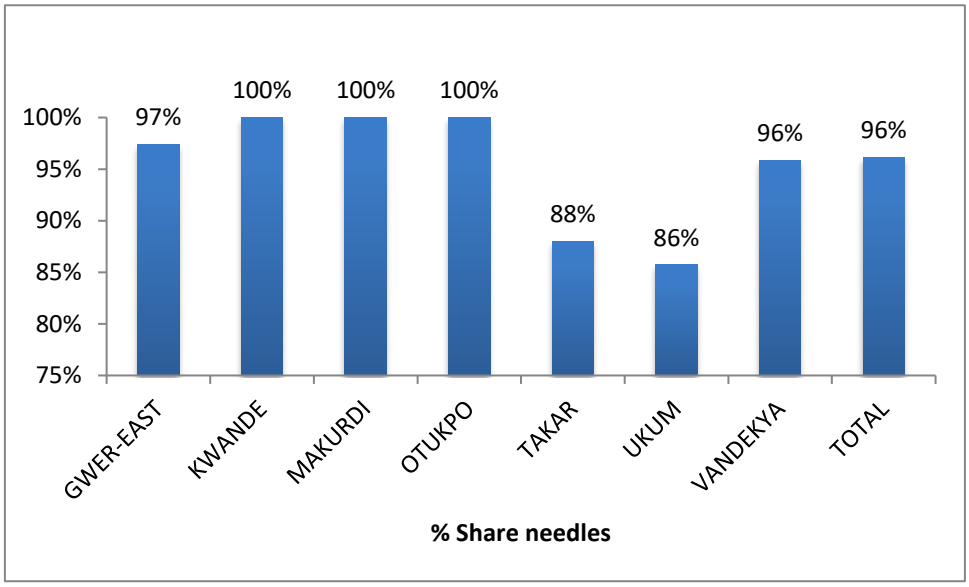

Figure 3: Estimated Proportion of IDUs in each LGA who reported sharing needles Benue State Nigeria, 2024

DISCUSSION

Findings from this study revealed that MARPs are widely distributed across Benue State, with Makurdi, Gboko Vandeikya, Kwande and Otukpo LGAs accounting for 67% of the hot spots. These same LGAs (Makurdi, Gboko Vandeikya, Kwande, Otukpo) have the highest FSW estimates in the State and together constitute about 61% of the total FSW estimate in the State. Therefore, these five LGAs should be prioritized during roll out of the HIV prevention programme for FSWs given that they account for a majority of the FSW population in the State, indicating that HIV prevention programmes should prioritise these locations. Furthermore, the data showed that majority of FSWs in the State are based in bars, hotels, and street/public places. These findings concord with previous findings[14,15] that showed similar results. Overall, this highlights the importance of targeted interventions at these venues. Similarly, MSM/MSWs were primarily found in home-based settings, which calls for discreet outreach strategies. These agree with other findings by Baral *et al.*[16] and Kenyan National STI/AIDS Control Programme (NASCOP) and National Aids Control Council (NACC) 2014 report.[17]

Overall, 81.7% of the IDUs were found to be sharing needles with a majority of them located in Makurdi and Gwer East LGAs. This is similar to the report by Lausevic *et al.*[18] who reported high prevalence of needle sharing amongst its study participants which was attributed to the fact that they could obtain sterile injecting equipment when they needed. This underscores the need for harm reduction initiatives, including needle exchange programmes. These programmes are safe and vastly effective in reducing HIV transmission and are a critical component of a comprehensive, integrated approach to addressing HIV transmission in IDUs [19,20]. Additionally, the correlation between high MARP populations and high HIV prevalence in LGAs such as Makurdi, Otukpo, and Vandeikya suggests that MARP interventions could have a broader impact on the general population.

The study also identified other vulnerable populations, particularly those seeking sexual partners at FSW venues. Implementing HIV prevention services in these venues could extend intervention reach. Furthermore, data from rural areas indicate that all zones have HIV-infected individuals, with significant HIV/TB-related mortality. This suggests the need for community-based interventions that address rural populations.

Conclusion

This study provides a critical assessment of MARPs in Benue State, identifying high-risk locations and population sizes. The findings highlight the urgent need for targeted HIV prevention interventions in high-prevalence LGAs, particularly Makurdi, Gboko, and Otukpo. Future programmes should prioritise outreach efforts in bars, hotels, and public spaces, focusing on harm reduction strategies for IDUs and tailored interventions for FSWs and MSM/MSWs. These insights will support policymakers in designing effective, evidence-based responses to curb HIV transmission in Benue State. Additionally, continued monitoring and updated mapping are necessary to track changes in MARP distribution and effectiveness of interventions.

Limitations of study

One limitation of the study was potential underreporting due to stigma associated with MSM and IDU behaviours, which may have led to conservative estimates. Future research should incorporate behavioural and biological surveillance to complement mapping data.

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