

Migratory Movements and Risk Factors for Introduction of Pathogenic Agents in Border Spaces in South-East Benin

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Abstract

The border areas in southeastern Benin are very dynamic and are excellent places for regional integration. However, certain practices exposing the health of border populations to danger are noticed. First, most passengers cross borders without a minimum health check. Secondly, live animals, animal products, certain animal feeds and anything that could allow a pathogen or any other health threat to cross the border during the import or transit of such products escape mainly to the veterinary control system. The analysis of immunization data also reveals that 14.3% of foreigners in these spaces never vaccinated their children aged 0 to 5 years and only 21.4% went to the four appointments of national days. Finally, descriptive analyzes of sex workers in the area's population show the preponderance of young women of foreign origin and the population of men who have sex with men.

Keywords: Benin; health; border control; health threat; border area.

1. Introduction

The globalization of trade and the pressures of a growing human population will continue to contribute to the development of emerging animal diseases. Many of these diseases have already had a significant impact on production, trade and public health. The early detection and speed of administrative responses are the most effective weapons to limit the devastating effects. A reporting mechanism that allows countries to disseminate information in a timely and synergetic manner would greatly improve overall control of the spread of these diseases, recognizing that this must be a fast, transparent and non-transparent mechanism [1].

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The spread of diseases is often due to movements between countries of sick animals or carriers of pathogenic germs [2]. Ongoing integration with the interdependence of global markets and economic systems is driving increased trade in live animals, their products, animal feed and related products. Concomitant with faster and larger transport, increased travel and human travel, there is a significant increase in the risk of introducing "new" diseases or infections. Depending on their destination, travelers may be exposed to a number of infectious diseases; exposure is a function of the presence of infectious agents in the area where they are traveling. The risk of contamination will vary according to the purpose of the trip and the itinerary followed on site, the accommodation conditions, hygiene and sanitation and the behavior of the traveler [3]. For the purposes of the International Health Regulations, it is essential to have an effective system of veterinary control of live animals, animal products, certain animal feeds, as well as anything that could allow a pathogen or any other health threat to cross the border when importing or transiting these products. Like goods, some non-commercial goods carried by travelers in their luggage may present a high degree of risk. The data used for this research are those from the General Intelligence and Territorial Surveillance Directorate (DRGST) of the Ministry of the Interior and Public Security, and the Integrated Disease Surveillance Data of the Abidjan-Lagos Corridor Organization (ALCO). These data were supplemented by field surveys and interviews with the authorities involved in migration management, local authorities and resource persons. This article aims to examine the foundations of the dynamism of border areas and the practices likely to facilitate the introduction of pathogens or their development in these environments from the example of Kraké, which is a locality of Benin border with Nigeria. South East.

2. Materials and methods

This section describes the progress of the study and provides information on the sources of the data used, the method and tools for collection, and the method of data processing and analysis.

2.1. Sources, tools and method of data collection

The data used for this research come from the Directorate General of Intelligence and Territorial Surveillance (a Directorate under the Ministry of the Interior and Public Security) of the Ministry of Trade and Industry, and field surveys. These data were supplemented by socio-demographic surveys and interviews with authorities involved in migration management, local authorities and resource persons. The tool used to collect the information is the observation grid. It enumerates a set of essential modalities for the study of spatial dynamics. In addition, interview guides have been designed for interviews with the officials of the Beninese Agency for Integrated Border Management (ABeGIEF), the heads of the Directorate General of Intelligence and Territorial Surveillance (DRGST) and local authorities on the reasons for the dynamism of the Sèmè-Kraké border area. Data collection consisted of field raids at the targeted borders.

2.2. Data analysis method

The counting of the questionnaires was manual. The open-ended questions were categorized by taking into account the answers according to their general meaning and a code was assigned to them. The cartographic data

was processed using ArcGIS 10.3 software, which was used to create the various maps and plans. Also, satellite image downloads from the study area were made from Google Earth Pro. The geo - referencing function of Arc Gis 10.3 has been used to calibrate the image in the appropriate geographical area. The Analisis tools - Proximité-zones buffers enabled to delimit a distance of 25 km along the border line in Benin. The main localities and major markets contained in this defined area have been posted on the map on the Beninese side. At the level of the Nigerian border facade, these localities and markets were posted beyond 25 km. The information contained in the sketches has been updated and / or corrected according to data from fieldwork.

3. Results

There are many risk factors for the introduction of pathogens into border areas. Insufficient control of people and goods coupled with the behavior of certain travelers in borders are potential factors for the introduction of pathogens into border areas.

3.1. *Insufficient control over people crossing the border*

In order to better control the spread of human or animal diseases, health checks are carried out at the border posts. The main purpose of health control is to prevent and control common contagious diseases along the border, in accordance with global health regulations. Travelers in need can also benefit from urgent medical assistance at borders, regardless of nationality or country of origin. In Benin, all travelers over one year of age must be vaccinated against yellow fever. Similarly vaccination against hepatitis A and typhoid fever is recommended. It is also desirable to be in order of vaccination against polio, tetanus and diphtheria. Verifications are carried out at border crossing points to ensure that people, their means of transport and the objects in their possession, can be allowed to enter the territory of Benin. To assess the effectiveness of this operation in border localities in south-eastern Benin, this work focused on the possession of health cards by travelers crossing the borders. This control of possession of vaccination cards could only be carried out at the official border posts because nothing compels passers-by to show any proof of vaccination at the level of the clandestine borders. The figure below shows the results of the vaccination card check at Sèmè and Adjarra borders.

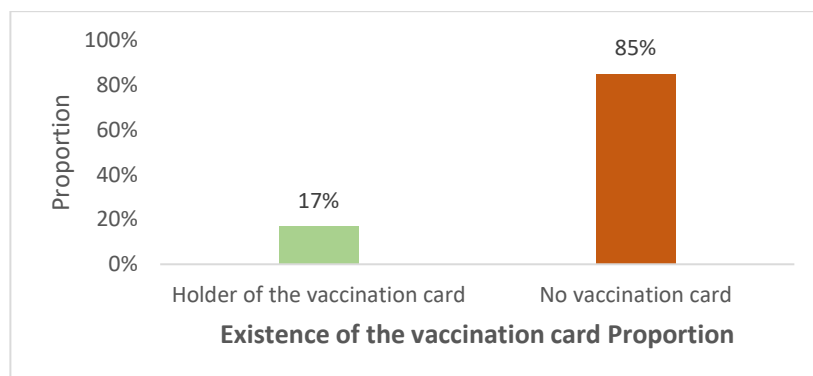


Figure 1: Vaccination Card Controlled at Sèmè and Adjarra Borders

In the analysis of Figure 1, almost all migrants cross borders in both directions without a minimum of evidence of health prevention. At the two (2) official borders, 83% of those registered during the observation period do not have a vaccination card. Only 17% hold proof of vaccination. In addition, among them, there are still about 30% who did not have their cards updated. But everyone manages to cross the border. In fact, in order to cross the border, travelers with their passport are required, in accordance with the international health regulations, to present an international vaccination card. At the border of Sèmè-Kraké, when this document is missing, the traveler must pay an amount of 500 FCFA to spend, without having received any vaccine. Passengers without passports must present valid ID or pay 1000 FCFA to pass.



Figure 9: Travelers at the Sèmè-Kraké border police checkpoint

Photo 1 shows the process of checking official documents before crossing the border. Passengers are at the entrance of checkpoints. Those who have the passport, or national ID card in addition to the current vaccination card pass in the corridor on the right. The rest, more numerous, are oriented to the left for the payment of the expenses of passage.

3.2. Difficulties related to the control of animal, vegetable and phytosanitary products

Goods transiting Benin's borders are subject to quality controls. After a physical and electronic check, samples of the goods are sent to Cotonou for further analysis. Controls are essential to ensure the safety of food products for consumers and to prevent the spread of pests or diseases in animals and plants. At the border of Kraké, a major post on the Abidjan-Lagos corridor, only three agents, namely 1 for veterinary control and 2 for phytosanitary control, ensure all controls and are present on all arrivals, with a flagrant lack means. The agents have neither a quiet room nor an acceptable office. In addition, there is a lack of cooperation between customs and health control officers, a structure that should impose sanitary control on importers.

However, the control of trucks is not systematic because of the very small staff and lack of resources. Thus, the agents intervene on the trucks, after sampling or on information supplied locally. The major problem probably lies in a significant deficit of means of these posts: number and surface of the insufficient offices; poorly located

and low-profile offices, making it difficult for operators to access, or even installed in the middle of a warehouse where trucks constantly load and unload; absence of office telephone and computer equipment; absence of means of travel to carry out checks when the unloading takes place at an external point of destination; lack of official dress, lack of distinctive sign and professional card making it possible to clearly identify the function of these agents and their authority. There is no room or cold room for the consignment of suspect products or animals, pending additional examinations, for example; this does not favor the implementation of procedures, in case of doubt, or even withdrawal or destruction. Under these conditions, there is a risk that goods will escape control and reach the populations.

On the other hand, almost all localities along the border each have at least one access road to neighboring localities in Nigeria (Figure 2). These are well-practiced routes by migrants because of their less restrictive nature. The use of two (2) wheel transport facilitates the circumvention of checkpoints.

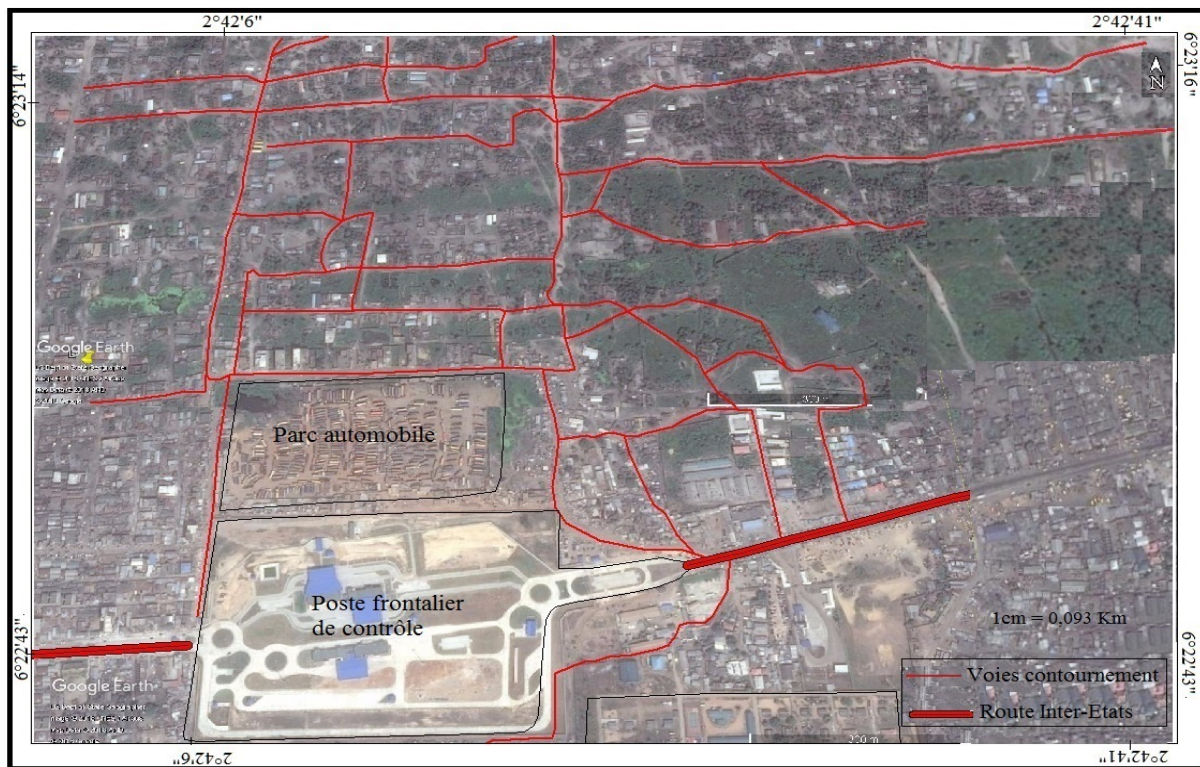


Figure 2: Map of some control circuit bypass checkpoints

The analysis in Figure 2 makes it possible to distinguish first and foremost the wealth bypass lanes typically created at a distance of approximately one (1) km from the mainline. This distance is maintained from the Nigerian territory to the Beninese territory. Secondly, smugglers normally use the Cotonou-Badagry interstate route about 0.5 km from the checkpoint before deviating, usually on the right, to find the makeshift route. Thus they arrive on the Beninese territory escaping the customs control.

3.3. Promiscuity in households

The household here refers to all the occupants of the same dwelling without these persons necessarily being

linked by family ties. The average number of people per household is six (6) with large disparities within households, as some households have up to twelve (12) people while others have only two (2) or three (3) individuals. Very small households are often those of intellectuals and civil servants. With the rapid demographic change in the area, the demand for housing has become more important. Beside this strong demand, the economic crisis due to the depreciation of the Naira has seen the purchasing power of households fall, rental costs become expensive, building land costs and building materials are constantly rising. Thus, access to quality housing is increasingly difficult. The level of promiscuity in households was identified by the variable "average number of persons per room". The size of the household was thus related to the number of rooms used by the household (Table I).

Table I: Distribution of the population by household size

Household size	Number of households	Percentage (in %)
1	3	0,78
2	5	1,30
3	18	4,69
4	25	6,51
5	92	23,96
6	120	31,25
7	52	13,54
8	37	9,64
9	7	1,82
10	15	3,91
More than 10	10	2,60
Total	384	100,00

Households with five (5) and six (6) people are the most numerous and account for more than half of the households surveyed (55.21%). These households are made up of people who know each other for the circumstance (migration). They are followed by households of seven (7) and eight (8) persons, respectfully 13.54% and 9.64%. One-person and two-person households follow each other very closely (0.78% and 1.30%), as shown in Figure 3.

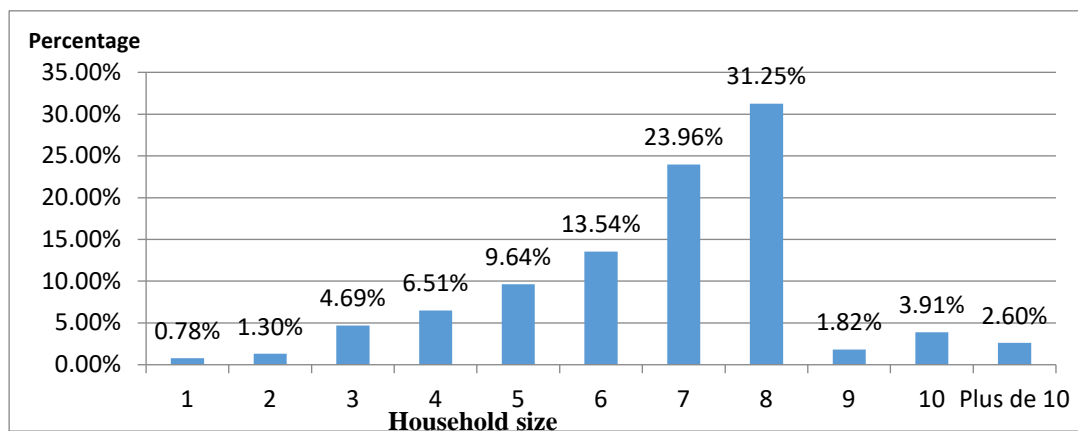


Figure 3: Distribution of the population by household size.

Households reduced- size (less than or equal to 4) are households with couples with children and represent only 13.28% of all households surveyed.

3.4. Un-respected vaccination calendar of children under 5 years

Vaccination is one of the greatest successes of medicine in the history of mankind. Many serious childhood diseases are preventable through the use of vaccines usually recommended for children. There are no effective alternatives to vaccination for protection against serious and sometimes fatal infectious diseases. In countries where most children are vaccinated, the rates of diseases such as polio, measles, mumps, rubella, diphtheria, pertussis and meningitis are lower. Field results indicate that about 53% of respondents have at least one child under the age of 5 (Figure 4).

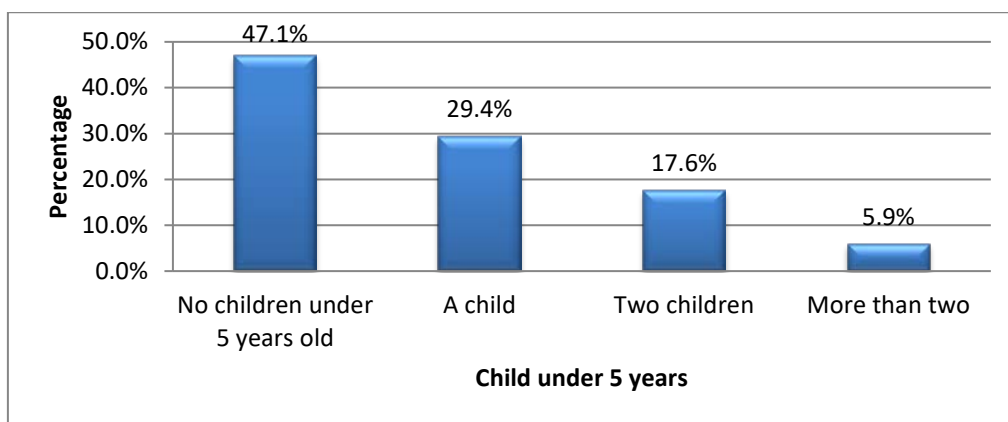


Figure 4: Partition of foreigners according to the presence of children under 5 in the household.

Figure 4 shows the partition of foreigners according to the presence of children under 5 in the household in the study area. The analysis of this figure reveals that 14.3% of respondents never vaccinated their children aged 0 to 5 years. Only 21.4% attended the four national vaccination days in 2016. Figure 5 shows the partition of foreigners according to their participation in NIDs.

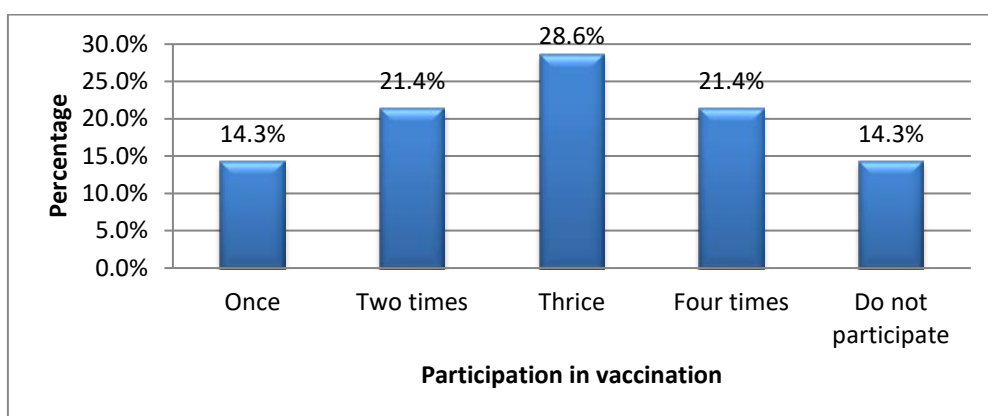


Figure 5: Partition of foreigners according to their participation in NIDs

The more migrants begin to put into their lives several years of life in the environment, the more they observe the practices of the populations of the environment in which they live. In fact, of the 21.4% who participated in all national vaccination campaigns in 2016, about 18% have a lifespan greater than or equal to 3 years in the community. The basic reasons cited by those who do not participate in these campaigns are related to information (Figure 6).

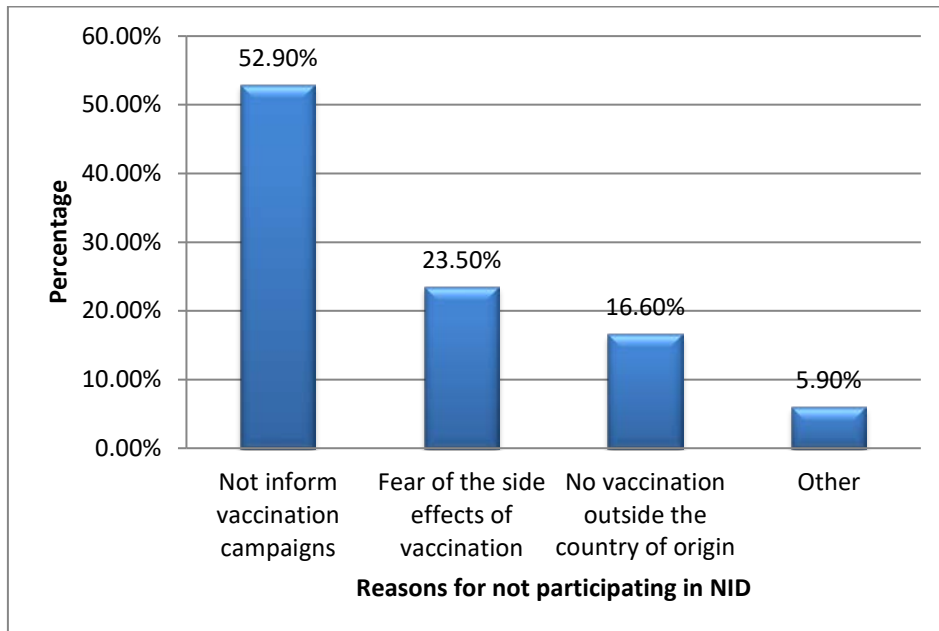


Figure 6: Reasons for not participating in NIDs

About 53% of respondents are not aware of vaccination campaigns for several reasons. Several of them spoke of availability and stability in such a busy space (Table II).

Table II: Frequency of travel to the country of origin

Frequency of travel in the year	Percentage
Several times a month	5,9%
Once a month	5,9%
Every 2-3 months	11,8%
Every 4-5 months (3 times a year)	11,8%
Every 6 months (2 times a year)	17,6%
Once a year	29,4%
Every two years	11,8%
I've never been home since I was here	5,9%

More than 80% return to their country of origin at least once a year. This combined with other reasons causes them to miss or not to respect the schedule of childhood vaccinations (Table III).

Table III: Calendar of vaccination of the children

AGE	VACCINS CORRESPONDANTS
AT BIRTH	<ul style="list-style-type: none"> • BCG • Oral polio dose 0
A 6 WEEKS of life, that is to say 1 ½ months of life	<ul style="list-style-type: none"> • Pentavalent 1st dose of combined vaccine against: <ol style="list-style-type: none"> 1- Diphtheria 2- Tetanus 3- Pertussis 4- Hepatitis B 5- Haemophilus influenzae (influenza) • Oral polio: 1st dose • PCV 13: 1st dose (against pneumococcal infections)
10 WEEKS of life (2 ½ months of life)	<ul style="list-style-type: none"> • Pentavalent 2nd dose • Oral polio 2nd dose • PCV 13 2nd dose
At 14 WEEKS of life, ie 3 ½ months of life	<ul style="list-style-type: none"> • Pentavalent 3rd dose • Oral polio 3rd dose • PCV 13 3rd dose • Injectable Polio 1 single dose
At 9 months of life	<ul style="list-style-type: none"> • Measles / Rubella Vaccine • Vaccine against yellow fever

3.5. Risk behavior in border areas

During the period of July 2017 to March 2018, 12,505 people benefited from HIV / AIDS and STI prevention programs (defined service package) of the Abidjan-Lagos Corridor. These are mainly migrants (travelers, inter-state traders, etc.), truck drivers (drivers, apprentices, drivers), sex workers and local girls / women aged 14 and over. This operation has detected targets among homosexuals, sex workers and HIV-positive people who

develop risky behaviors among the population.

The awareness of the border populations is regularly made by peer educators in the border areas of intervention of the Abidjan-Lagos Corridor program. During the period of July 2017 to March 2018, peer educators were deployed in the field to conduct this outreach activity. These activities targeted MSM, sex workers, truck drivers, migrants, dressed bodies and youth at the border crossing, as well as critical points at the Sèmè-Kraké border (Table IV). It is an initiative of the Communicable Disease Control Program of the Abidjan Lagos Corridor Organization. These outreach sessions took place through individual interviews and group talks.

Table IV: Partition of people affected by outreach activities.

Target populations who have benefited from HIV prevention programs	Rovers (drivers, apprentices, drivers)	Migrants (travelers, inter-state traders, etc.)	Sex workers	Young girls/women aged 14 and over	Total
Men	7653	990	0	0	8643
Women	0	2010	178	1674	3862
Total	7653	3000	178	1674	12505

During the nine (9) months, four (4) categories of people were targeted and sensitized. Outreach activities reached 12505 individuals during the reference period, 31% of them women and 69% men. At the project target group level, we have 24% migrants, 14% sex workers and 61% truckers. These mass sensitizations were intended to reach target groups and also the resident populations in terms of key HIV and STI prevention messages.

The counseling and testing activities enabled the detection of 150,029 persons, of whom 42% were migrants, 19% were sex workers and 15% were truck drivers. About 1% of these people were positive. This rate is 1.2% for migrants and 1.1% for the resident population. In the other target groups, a rate of less than 1% is observed (0.8% for female sex workers, 0.4% for MSM and 0.6% for truck drivers). The low rate of positivity among sex workers can be explained by the difficult access of this population to screening services despite their high exposure to infection.

With regard to origin, 18% of those screened come from Côte d'Ivoire, 22% from Ghana, 22% from Togo, 21% from Benin and 17% from Nigeria. However, 51% of those screened positive come from Togo, more than half of the HIV positives. In terms of prevalence, there is a prevalence of 2.1% in Togo (roughly equal to the national prevalence) against less than 1% in other countries.

The sex trade in the area is divided into two sectors. The so-called legal professionals undergo periodic medical surveillance during which an HIV test is requested. On the other hand, illegal professionals remain hidden and difficult to reach because of stigma and social discrimination. They therefore contribute, with their clients, to the

spread of the virus since they do not benefit from prevention programs intended for them.

Descriptive analyzes of the sex worker population in the area show a preponderance of Togolese (49%), followed by Nigerians (30%), Beninese (12%), Ghanaians (7%) and Ivorians (2%). The people concerned were between 15 and 50 years old for an average age of 24 years. The majority was single (80%). In addition, 34.4% of respondents were out of school, while 29.1% had attended primary school and 33.6% had high school (2.5% had higher education).

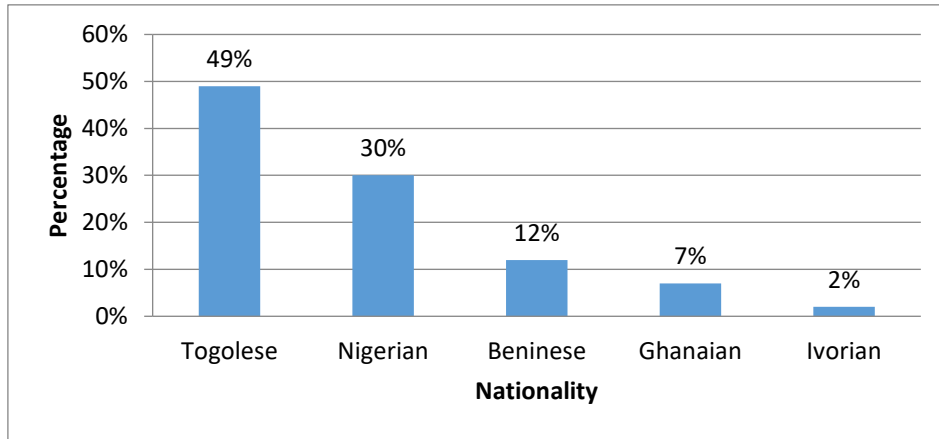


Figure 7: Distribution of sex workers according to their origin

Figure 7 shows the distribution of female sex workers present in Kraké according to their origin. An analysis of this figure shows a high proportion of women of foreign origins who find themselves on the border of Kraké for the exercise of the sex profession. The large number of sex workers of Togolese (49%) and Nigerian (30%) origin can be explained in part by Benin's proximity to these two countries. New infections are recorded every quarter (Figure 8)

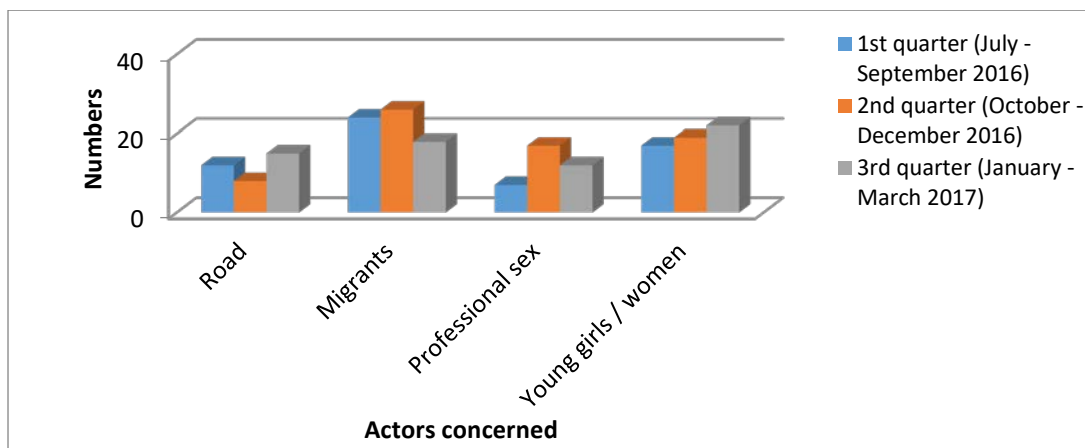


Figure 8: New cases of infection recorded in nine months

Figure 8 shows the evolution of new cases of STI / HIV / AIDS infection at the Kraké border. These data relate only to the targets recruited for the circumstance. The analysis of the figure shows that the problem and the new

cases are added every day. The population of men who have sex with men (MSM) is particularly marked by stigma and discrimination, even in the health care setting. The vulnerability of MSM is greatly increased by the criminalization of homosexuality in all countries of the region.

4. Discussion

4.1. Factors affecting epidemiological risk in border areas

From the results of this research, it appears that almost all migrants cross borders in both directions without a minimum of evidence of health prevention. At the two (2) official borders, 83% of those registered during the observation period do not have a vaccination card. Failing to submit an up-to-date international vaccination card, the passenger must pay the vaccination fees. These results corroborate those of [4] on the distant existence of corruption in the borders. But this practice has evolved nowadays. [4], following some practices had argued that border crossings have become a source of corruption for security agents. These results confirm those of [5,6] on the International Health Regulations. In a similar study of corruption in some border regions, notably with Nigeria as in Kraké (Benin), [7] reached the same conclusion that the klebees are organized into "local security brigades" in place by the administrative authorities and the local development association to help customs officers to control multiple lines of fraud. In a context where freedom of movement from one country to another is not yet recognized and border services users rarely have the vital records necessary to be identified, screening officers erect parallel standards to the official regulations. Thus, the lack of identity documents or vaccination cards is replaced by a "lump sum fine", which ranges from 500 FCFA (for nationals) to 1500 FCFA (for non-nationals of the country opposite). .

This practice of ransomery observed at the border posts is contrary to the goal of vaccination, which is to prevent the introduction of a risk related to the health of populations in the country of destination. The scale of international travel in the modern world offers extraordinary opportunities for the international transmission of diseases. The consequences of global trade include the potential emergence of food-borne diseases or contaminated goods. Although measures to curb the spread of border diseases remain an important element of the Regulations, there is every indication that early action at source is the most effective means of providing maximum protection against the international spread of disease. One of the objectives of the IHR (2005) is to limit unnecessary restrictions to international travel and trade by specifying, in real time, the appropriate public health measures to address the assessed risks. During public health emergencies of international concern or in relation to specific risks to public health, measures affecting travel may be recommended to prevent the international spread of diseases. Travelers may be required by States to provide health information, basic examinations and vaccination documents.

As a result, the length of stay of trucks in border localities is still significant. The average waiting time of trucks observed is tent six (36) hours for the period from July 2016 to March 2017. The cross analysis of the residence time of truck drivers (drivers, apprentices, drivers) in the spaces and the development of risk behaviors on the health of populations was carried out. Similarly, the descriptive analyzes carried out on the population of sex workers in the area show a preponderance of Togolese (49%), followed by Nigerians (30%), Ghanaian (12%) and Beninese (7%). and Ivorians (2%). The people concerned were between 15 and 50 years old for an average

age of 24 years. In analysis, there is a large proportion of women of foreign origin who find themselves at the border for the exercise of the sex profession. The labor force in the transport sector, migrant workers and communities in border areas are particularly vulnerable to HIV / AIDS. Migrations lead to social and cultural uprooting, expose to occasional sexual encounters, and lead to prostitution or the use of the services of sex workers. These sexual behaviors expose these people to a high risk of acquiring and transmitting diseases. These results corroborate those of [5,8].

The work of Atta & al, (2013) reached the same conclusion as the daily movements of merchants and transporters as well as the registration of newcomers put the border merchant localities in an uncomfortable situation. They are an area potentially at risk for pandemic diseases such as AIDS and sexually transmitted infections. The 2006 UNAIDS epidemic report confirms a prevalence rate of 4.7% in the border population. The research of [9,10] corroborates this opinion. At the crossing points, dams-markets are developing which become centers for the development of prostitution and the multiplication of occasional encounters. The behaviors of the various players in the trade have contributed to the spread of viruses. The infectious risks concern the migrant population itself but also the host populations, these two populations being able to play depending on the case either the role of "issuer" of the risk or that of "receiver".

4.2. Migratory movements: promiscuity and health of populations of border areas in south-east Benin

The results of this study show the contribution of migration in the population dynamics of border areas in south-eastern Benin. Indeed, all forms of individual migration (labor migration, marriage, entrusted children, etc.) significantly affect the size and structure of households. As many departures are noted within a household, as many arrivals are recorded in another or the creation of a new one. Thus, we note in the border areas of south-east Benin, that the population growth and the migratory currents that it has partly driven have caused a densification of these spaces. Households with seven (7) and eight (8) people are the most numerous and account for more than half of the households surveyed (55.21%). These households are made up of people who know each other for the circumstance (migration). These results confirm those obtained by the OECD [11]. In relation to the phenomenon of migration, the mobile person and the migrant are susceptible to contracting these diseases. In the "Health and Migration" issue, they can be identified as the most vulnerable individuals. In fact, mobility is first and foremost a factor that puts people in contact and thus promotes the transmission of diseases. Secondly, it is a growth factor in urban areas, favoring the promiscuity and rapid expansion of epidemics. Thus, while more than 60% of Africans do not have sufficient health coverage, particularly in water and sanitation, the West African region characterized by intense migratory movements, welcomed in 2000 nearly 42% of African international migrants, the majority of whom are workers [12].

5. Conclusion

The globalization of trade and the expression of borders have not diminished the proximity exchanges between the national peripheries of Benin and its neighboring countries. This article aims to study the dynamism of the Sèmè-Kraké border area and the factors of introduction of pathogenic agents in this environment.

The results obtained at the end of this work show that Sèmè-Kraké's dynamism is partly stimulated by its geographical position. The position with Nigeria, the most populous country in Africa with which it shares a long border, promotes the dynamism of trade both at the national periphery and in the interior. The existence of very strong and dynamic social links between the ethnic groups living on both sides of the border separating Benin from its neighbors are factors of regional integration that make the border communities in southeastern Benin dynamic. Moreover, economic activities, based on the existence of a few markets of subregional importance, on the hydrographic advantages and on the dynamism of a people sporting trade, influence the vitality of this space. This important place of commercial space in the south-east of Benin, is a space open to the passage of the trucks coming from all the countries of the Corridor Abidjan-Lagos

However, insufficient control of people and goods coupled with the behavior of certain travelers in the borders are potential factors for the introduction of pathogens into this environment. Indeed, almost all travelers cross borders in both directions without a minimum of evidence of health prevention. Animal control devices are failing.

In the context of national capacity development, the International Health Regulations (2005) require States Parties to pay particular attention to their entry points in order to avoid or slow down the spread of a potential public health threat, while avoiding unnecessary barriers to trafficking and international trade (Article 2 of the 2005 IHR). Any point (port or airport, land border) open to international traffic is considered as an entry point and must therefore have minimum continuous surveillance capabilities and actions to deal with health risks that can be spread through the means transport. Sanitary controls must be carried out at border posts in order to prevent and control contagious diseases, to better control the spread of human and animal diseases along the borders.

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