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Knowledge and attitudes of health workers in bouake, Cote d'ivoire on zika virus disease in the context of a global epidemic

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Since January, 2012, the Pacific region has faced a heavy burden of concurrent epidemics of dengue, chikungunya, and zika virus infections. In 2016, WHO developed a global response strategic framework to ensure that zika virus is a priority and accelerated area of public health research. This study conducted in Bouaké (Côte d'Ivoire) is part of this framework. The main objective was to assess the knowledge and attitudes of health workers working there on the zika virus disease in order to consider a better preparation and response to a possible epidemic in Côte d'Ivoire. Cross-sectional study covering the period from October 2016 to March 2017 was used here. The sampling was comprehensive and included interviews with 258 persons. Subjects were interviewed using a questionnaire edited and adapted from the CAP questionnaire developed by WHO in 2016. People with prior knowledge of the zika virus disease represented 66.3% of the health workers surveyed. Their level of knowledge was insufficient in 83.5% of cases. Their attitudes were good in 51.5% of cases. In the authors' final model, the exercise structure which was adjusted to the level of education and the corporation significantly influenced health workers' attitudes toward illness. Health workers in public settings appeared to have a better attitude compared to their private colleagues (adjusted OR = 4.88; CI: 2.37-10.03; p-value: 0.000). The zika virus disease has attracted the attention of the medical community during the 2014-2016 period. This attention, while mitigated by the West African Ebola virus epidemic, deserves to be highlighted.

Key words: Health workers-Côte d'Ivoire-knowledge-attitudes-Zika.

INTRODUCTION

Since 2012, the pacific region had faced concurent epidemics of mosquito-borne diseases including dengue, Chikungunya and Zika (Roth et al., 2014). Over 120,000 cumulative cases of these diseases have been reported (Roth et al., 2014).The term dormant virus in the form of global crisis has become a familiar narrative of the re-

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emergence of many 'dormant epidemics' (Depoux et al., 2018). This was the case with dengue in 2001, Chikunguna in 2004, or Ebola in 2014 (Depoux et al., 2018). The particularity of the zika epidemic lies in its surprisingly rapid geographical expansion (Depoux et al., 2018). It also poses an unusual threat to unaffected industrialised nations due to rapid urbanisation and globalisation (Depoux et al., 2018).The disease, although sporadically found in Africa and Asia, has been expressed in outbreaks in Micronesia (Yap Islands), French Polynesia, and Brazil in 2007, 2013, and 2015, respectively (Wu et al., 2016). Since 2015, 70 territories have provided evidence of mosquito-borne transmission of zika 1 virus disease (Mitchell, 2016). Outbreaks have been reported by 55 of them, including 48 in the Americas and the Caribbean (Mitchell, 2016). The 2015 outbreak in Brazil was accompanied by a spike in cases of congenital malformations with microcephaly (Depoux et al., 2018). Combined with the risk of the epidemic spreading (Koenig et al., 2016), the world's attention was drawn to the outbreak. The WHO declared the zika virus a public health emergency of international concern on 1 February 2016 (Koenig et al., 2016; Meltzer et al., 2016; Jang et al., 2016; Sam et al., 2016; Rocklöv et al., 2016; Gańczak, 2016; Yusuf and Hussain, 2016). In the context of diplomatic, commercial, and socio-economic exchanges, Côte d'Ivoire, like other countries, receives travellers from all continents. It is therefore at risk of contamination, even though it does not share a border with the epidemic countries.

Côte d'Ivoire, as a member state, is thus a part of the WHO's strategic framework for the global response to the Zika virus disease. Since the implementation of this strategic response framework by the WHO, the author feel it is necessary to assess the level of knowledge and attitudes of health workers on the zika virus disease, since they are in the front line in the fight against the diseases. This study was conducted in Bouaké, the second largest city in Côte d'Ivoire and also a cosmopolitan city of trade and transit for nationals of Côte d'Ivoire's neighbouring countries. The aim of this study is to consider a better preparation and response to a possible zika epidemic in Côte d'Ivoire.

MATERIALS AND METHODS

Type of study, study area and sampling.

This is a cross-sectional study of health workers in health establishments (public and private) attached to the regional health directorate of the Gbêkê region, of which the city of Bouaké is the capital. This study was conducted from October 2016 to March 2017. With a population in 2014 estimated at 680694 (Institut National de la Statistique de Côte d'Ivoire, 2014), Bouaké is the second most populous commune in Côte d'Ivoire. The study population consisted of health workers working in the commune of Bouaké. A health worker was either a doctor, a nurse, a midwife or a nurse's aide. According to the National Health Development Plan (PNDS) 2016-2020 (Ministère de la Santé et de l'Hygiène Publique(MSHP) de Côte d'Ivoire, 2016), the number of health professionals in the Gbèkè health region was estimated at 474 (65 doctors, 284 nurses and 125 midwives). As the data for health care assistants was not available, the authors proceeded with an exhaustive sampling.

Questionnaire

Data collection was done with a printed questionnaire. This questionnaire was based on the bank of KAP questions related to the Zika virus and its suspected complications provided by the WHO in 2016 (World Health Organisation, 2016). The questionnaire was administrated directly. A two-day pilot survey of ten health workers was used to adapt and finalise the questionnaire. Verbal consent was obtained from the health workers before each interview. As well as signed agreement of the health authorities of the city of Bouaké.

Knowledge and attitude analysis plan

Data were entered and analysed using SPSS 20.0. A descriptive analysis was carried out on the entire study population. This description covered socio-demographic data, knowledge and attitudes of each respondent towards the Zika virus disease.The socio-demographic data were age, gender, education level, corporation, marital status and practice structure. It is true that the health worker's knowledge of a disease concerns the signs, modes of transmission and prevention, etc., but in the context of epidemiological surveillance, the authors are bound to recognise the suspected case and notify it. Thus,for the multivariate analysis, only the variables on knowledge of a suspected case and notification of the case were retained as independent variables.

A suspected case of Zika virus disease was defined as a person with fever and at least one of the following signs or symptoms:-arthralgia ;-arthritis ;-conjunctivitis(non-purulent /or hyoeremia)-skin rash. And an epidemiological link including the notion of a recent trip of less than 3 weeks to a country where the disease is rife. Thus, any health worker who knew the definition of a suspect case was considered to have good knowledge and any worker who would report a suspect case was considered to have a good attitude towards the disease.

Quantitative variables with a skewed distribution were expressed as median and interquartile range. Categorical variables were expressed as number and percentage. The chi-square test was used for univariate analysis. The relationship between the dependent variable and the explanatory variables was determined by logistic regression.

Factors with a p_value <0.05 in univariate analysis were selected for multiple regression. Results with a $p<0.05$ were considered significant.

Ethical considerations

Under the survey practice act, the authors have protected the confidentiality of the information provided by respondents. The identification codes of the individuals were scrupulously respected in order to anonymise the respondents.Respondent's participation was voluntary and obtained after informed consent and verbal agreement. There was no pressure to participate in the study.

Administratives authorisations

The field survey required authorisation from the Gbêkê Regional Health Directorate.

Table 1. Sociodemographic characteristics of health workers in Bouaké, Côte d'Ivoire, October 2016 to March 2017.

Variable		Work force	%	Median	IIQ
Age (N=258)	20-30	70	27.1	35.5	30-43
	31-36	69	26.7		
	37-43	57	22.1		
	44-77	62	24		
Sex (N=258)	Male	120	46.5		
	Female	138	53.5		
Marital status (N=258)	No in couple	92	35.7		
	in couple	166	64.3		
Study level (N=258)	Primary/secondary	117	45.3		
	Higher	141	54.7		
Corporation (N=258)	Medical	40	15.5		
	Paramedics	218	84.5		
Exercise structure (N=258)	Public	111	43		
	Private	147	57		

Source: Field survey

RESULTS

Description of the study sample

Among the 258 health workers, there were 40 doctors (33.7%) and 218 people (84.5%) from the paramedical profession. The paramedical profession included nurses (90 or 34.9%), midwives (30 or 11.6%) and care assistants (98 or 38%). The median age of the surveyed health professionals was 35.5 years with an interquartile range of 30 to 43 years. Ages ranged from 20 years (minimum value) to 77 years (maximum value). The authors sample consisted of 120 men and 138 women, giving a sex ratio (M/W) of 0.87.The distribution of health workers according to practice structure revealed that the private sector was the most represented (57%).The marital status mainly of couples (married and cohabiting) at 64.3% (Table 1).

Knowledge-attitudes

Health workers who had heard of Zika virus disease at the time of the study represented 66.3% of all respondents. In 98,8% of cases, they had heard about it less than three years before and had been informed mainly by television (85.4%) and radio (17.1%). Health workers reported a vector origin, transmissible nature and not always symptomatic nature to the Zika virus disease in 76%; 81.9 and 49.1% of cases respectively. Transmission by an infected mosquito bite was reported in 56.7% of cases. Brazil as an affected country was reported in 57.4% of cases. Any suspected case of Zika virus disease in the workplace would be reported by 51.5% of health workers. Health workers had insufficient knowledge about the disease in 83.0% of cases and a poor attitude in 48.5% of cases (Table 2).

Relationship between dependent and independent variables

At the α=5% threshold, univariate analysis noted that knowledge of the suspected Zika virus disease case among health workers in the city of Bouaké was statistically associated with only one factor, the corporation (OR=5.27;CI:2.25-12.33;p-value=0.000). Attitude (notification or non-notification) to a suspected case of Zika virus disease was statistically associated with three factors (p≤5% in all three cases): level of education, corporation and type of practice facility.After adjustment, only the type of health facility was statistically associated with the attitudes of health workers, with a good attitude of public health workers 4.8 times higher

Table 2. Distribution of subjects according to their knowledge and attitudes.

Knowledge-attitudes		Work force	%
Already heard (N=258)	Yes	171	66.3
	No	87	33.7
Since When? (N=171)	Less than 3 years	169	98.8
	More than 3 years	1	0.6
	Do not remember	1	0.6
Information channel (N=171)	Television	146	85.4
	Radio	29	17.1
Vector-borne disease (N=171)	Yes	130	76
	No	4	2.3
	Do not know	37	21.6
Potential victim (N=171)	Everyone	156	91.2
High severity (N=171)	Pregnant women	99	57.9
Always symptomatic (N=171)	yes	35	20.5
	No	84	49.1
	Do not know	52	30.4
Communicable disease (N=171)	Yes	140	81.9
	No	6	3.5
	Do not know	25	14.6
Transmission path (N=171)	Mosquito bite	97	56.7
Country affected (N=141)	Brazil	81	57.4
Know the signs of the disease	Yes	29	17.0
	No	142	83.0
Notify a suspect case at work (N=171)	Yes	88	51.5
	No	83	48.5

Source: Field survey

than that of their private colleagues (Tables 3 and 4).

DISCUSSION

Current study found that women more than men could be explained by the midwifery profession, which is exclusively reserved for women, whereas the other professions are practised by people of both sexes. Midwives represented 11.6% of the total population. Katler et al. (2017), in the USA, a study including health workers and community members, found a female predominance (76.2%). Samuel et al. (2018), in USA at the community level also found a predominance of women (77%). Prue et al. (2017), in USA, found a predominance of women (54%) among community members surveyed. Based on data provided by the PNDS 2016-2020 (Ministère de la Santé et de l'Hygiène Publique(MSHP) de Côte d'Ivoire, 2016), the authors interviewed 61.5% of doctors; 31.7% of nurses and 24% of midwives practicing in the Gbêkê region. The median age of the subjects in this study was 35.5 years with an interquartile range of 30 to 43 years, a minimum of 20 years and a maximum of 77 years. These figures reflect the youth of their population. The youth of the study population is a reflection of the youth of the population in developing countries. According to the PNDS 2016-2020 [14], about 66.67% of Ivorians are under 25 years old. Samuel et al. (2018) found an average age of 33 years. Higher education was the most represented (54.7%).This

Table 3. Factors associated with knowledge of signs of Zika virus disease by health workers in the city of Bouaké.

Variable	Knowledge of suspect case definition		ORbrut	CI 95%	p-value
	Yes	No			
Age					
37 - 76	16	65	1.46	0.65-3.25	0.356
22 - 36	13	77	1		
Sex					
Male	20	74	2.04	0.87-4.79	0.096
Female	9	68	1		
Study level					
Higher	23	92	2,08	0.80-5.45	0.129
Primary/secondary	6	50	1		
Corporation					
Medical	15	24	5,27	2.25-12.33	0
Paramedics	14	118	1		
Structure					
Public	15	65	1.27	0.57-2.82	0.558
Private	14	77	1		

Source: Field survey

could be explained by the fact that the profession of doctor is absolutely at the higher level, whereas this condition is not necessarily required for other professions. The subjects of this profession represented 15.5% of all respondents. Katler et al. (2017) found that university educated people represented 25.7% of all respondents. The population surveyed by Huang et al. (2017) in China consisted of people with higher education in 66.29% of cases. The practice structure was mainly private (57%).Such a proportion could be explained by the fact that some health workers work in both the public and private sectors, mainly for financial reasons.Civil servant accounted for 47% of those surveyed by Huang et al. (2017).

Of the 258 health workers interviewed, 171 (66.3%) had heard of the zika virus disease. The rest of the results and the analysis therefore concern these 171 people. The last time they had heard of it was less than three years ago for 98.8% of them. This period corresponded approximately to the 2014 World Cup in Brazil where the disease was highly reported and talked about (Wahid et al., 2016). Brazil as an affected country was meant by 57.4% of people. Katler et al. (2017) found that health workers had information about Zika virus disease in 98.6% of cases. Samuel et al. (2018) found 80.5% of people had heard of Zika virus disease at the time of their study. Television and radio were the main information channels (85.4% and 17.1%, respectively). In the event of such a large public health event, health workers should be properly trained and directed to specialised health sites to increase the chances of getting better information than the general population.In the study by Katler et al. [2017], the internet was the main information channel (34.4%).Cumulative mass media accounted for 52.9% of information channels in the study by Samuel et al. (2018).The vector origin of the disease was confirmed in 76% of cases. Without person could be a victim for 91.2% of health workers, who recognised that it was more serious in the case of pregnant women (57.9%). Huang et al. (2017) reported a more severe severity in pregnant women in 76.12% of cases. The disease was not always symptomatic and was transmissible for 49.1 and 81.9% of respondents respectively. It was asymptomatic in 80% of cases according to 51 and 53% of health workers surveyed by Katler et al. in 2016 and 2017 respectively (Katler et al,. 2017). Biting by an infected mosquito was the most reported route of transmission (56.7%).The same route was reported by 98% of health workers in the study by Katler et al. (2017) and by 83.52% of respondents by Huang et al (2017) and Prue et al. (2017) in the USA found the same pattern (48.5%) among community members surveyed. In 51.5% of cases, the subjects reported a suspected case that had occurred in the

Table 4. Factors associated with the attitude of health workers towards a suspected case of Zika virus disease.

Variable	Notification of a suspect case		OR_{brut}	IC 95%	*p-value*	$OR_{adjusted}$	IC95%	*p-value*
	Yes	No						
Age								
37 - 76	45	36	1.37	0.75-2.50	*0.301*			
22 - 36	43	47	1					
Sex								
Male	49	45	1.06	0.58-1.94	*0.847*			
Female	39	38	1					
Study level								
Higher	67	48	2.33	1.21-4.48	*0.011*	1.02	0.45-2.31	*0.962*
Primary/secondary	21	35	1					
Corporation								
Medical	26	13	2.26	1.07-4.77	*0.031*	0.43	0.18-1.04	*0.060*
Paramedics	62	70	1					
Structure								
Public	57	23	4.80	2.50-9.19	*0.000*	4.88	2.37-10.03	*0.000*
Private	31	60	1					
Knowledge of suspect case definition								
Yes	16	13	1,2	0.54-2.67	*0.661*			
No	72	70	1					

Source: Field survey

workplace.Indeed, it is important for any health worker to report any health event. This may be a disease with epidemic potential, an event that may constitute a health emergency of international concern, or a disease subject to elimination or eradication measures (OMS, 2011). This applies to the zika virus disease as well as to any other health phenomenon. Analysis of the knowledge and attitudes of health workers led to the following conclusions: the definition of a suspect case was unknown to 83.0% of respondents, but case notification was reported by 51.5% of them.

The Zika virus disease has made news at a time when the world's attention has been diverted by the West African Ebola epidemic. This could explain the high lack of awareness of the signs among the respondents. The univariate analysis found that knowledge of suspected Zika virus disease was influenced by only one factor; the health workers' corporation. Subjects from the medical profession were more familiar with the signs than those from the paramedical profession (OR = 5.27; CI: 2.25-12.33; p_value = 0). Being committed to the clinical management of patients, health workers from medical corporations would be more likely to learn about the disease and its

symptomatology in particular. In the authors final model, only the practice structure, adjusted for education level and corporation, significantly influenced health workers' attitudes towards disease. Public structures health workers seemed to have a better attitude compared to their private colleagues (adjusted OR = 4.88; CI: 2.37-10.03; p_value: 0.000). This could be explained by the fact that those working in the public sector have more training in epidemiological surveillance and are the most involved in surveillance activities. These activities are not always well structured at the private level. As an implication, there is a need to involve, or even compel, the private sector more and more in epidemiological surveillance. This sector could be the starting point for phenomena of unexpected magnitude. Studies have already been conducted in Côte d'Ivoire on the knowledge and attitudes of health workers on two emerging diseases, Ebola and dengue. Kouassi et al. (2016) found that 56.9% of surveyed health workers knew all the definitions of suspected cases in their study of Ebola virus disease during a series of trainings organised by the national health authorities. In the study on dengue, which is also a mosquito-borne disease, Ekra et al. (2017) found that the health workers surveyed had an inadequate level of knowledge in 79% of cases (Ekra et al., 2017). The resurgence of these emerging diseases with their strong mediation may have aroused the interest of health workers.In a globalised world, emerging diseases need special attention, especially in developing countries.

The authors probably introduced a selection bias when assigning the exercise structure. They took into account the location of the survey (private or public structure) without taking into account the usual place of work of the respondents. According to the 2016-2020 PNDS, the Ivorian health system is dominated by the public sector with a lack of control over the private sector workforce (Ministère de la Santé et de l'Hygiène Publique(MSHP) de Côte d'Ivoire, 2016). The results on the practices of health workers have not been reported because the fight against this disease is part of the larger framework of mosquito control. Also, they did not find it relevant to do so because health professionals are not particularly at risk.

Conclusion

During the years 2014-2016, the Zika virus disease captured the attention of the medical community. This attention, although mitigated by the concomitance of the West African epidemic of the Ebola virus disease, deserves to be underlined. Man's behavior towards nature poses threats to his health. It is important to pay attention to these threats in all their forms. It is in this spirit that this study is inscribed, the major interest of which is to consider, in the face of the uncertainty and the limited resources at our disposal, the appropriate attitude to adopt in order to be as efficient as possible. Health workers, all corporations combined, have been identified as priority targets because they represent the only recourse for populations in terms of illness (information, advice, etc.).

CONFLICT OF INTERESTS

The authors have not declared any conflicts of interests.

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