Journal of Communicable Diseases
XIV Annual Conference of Indian Society for Malaria & Other Communicable Diseases (ISMOCD)
Pg. No. 49-55

Research Article

Knowledge, Attitude and Practices Regarding Zika Virus Infection in a Rural Indian Community: A Cross-sectional Survey

Sreelakshmi PR[1], Gurav YK[2], Jadhav U[3], Abraham P[4]

[1]Scientist-D, Medical Entomology and Zoology group, ICMR- National Institute of Virology, Pune, Maharashtra.
[2]Scientist-F and Group Leader, Health Technology Assessment Group, ICMR- National Institute of Virology, Pune, Maharashtra.
[3]MBBS, DPH, Taluka Health Officer, Purander, Pune, Maharashtra.
[4]Ex-Director, ICMR-National Institute of Virology, Pune, Maharashtra and Professor, Department of Clinical Virology, Christian Medical College, Vellore.
DOI: https://doi.org/10.24321/0019.5138.202336

I N F O

Corresponding Author:
Gurav YK, Scientist F, Health Technology Assessment Group, ICMR- National Institute of Virology 20-A, Dr Ambedkar Road, Pune, Maharashtra, India.
E-mail Id:
dr.pr2003@gmail.com
Orcid Id:
https://orcid.org/0000-0001-5322-5359
How to cite this article:
Sreelakshmi PR, Gurav YK, Jadhav U, Abraham P. Knowledge, Attitude and Practices Regarding Zika Virus Infection in a Rural Indian Community: A Cross-sectional Survey. XIV Annual Conference of Indian Society for Malaria & Other Communicable Diseases (ISMOCD). 2023;49-55.

Date of Submission: 2023-08-15
Date of Acceptance: 2023-09-20

A B S T R A C T

Background: In recent years Zika virus outbreaks have been reported from different parts of India. It is essential to understand the community's level of awareness and behaviour with regard to Zika infection to devise effective preventive and control measures.

Methods: A cross-sectional survey was conducted among the adult residents of Belsar village, a rural community in Maharashtra state where a Zika case was confirmed. The Knowledge Attitude and Practices of the residents in relation to Zika virus infection were assessed using a questionnaire adapted from the WHO's resource pack on KAP studies for Zika viral disease. Composite scores were calculated for each domain. The mean score was considered the cut-off for determining good knowledge, attitude and practice. Factors associated with good scores of KAP were assessed using chi-square and binary logistic regression analysis.

Results: Two hundred and eighty-five adult individuals were surveyed with a mean (SD) age of forty-two years. Less than half of the population had good knowledge and practice levels. Only one-third of the population had the right attitude towards the prevention of Zika infection. Most of the participants received information through campaigns conducted by the local government. Knowledge scores were significantly correlated with attitude and practice scores. Younger age and higher education emerged as significant factors for good knowledge.

Conclusion: This community's knowledge attitude and practice regarding Zika virus infection call for improvement. Community-based health education activities regarding such viral infections must be undertaken under the leadership of local governments.

Keywords: Zika Infection, Zika Virus, Knowledge-Attitude-Practice, Outbreak, Rural Community, India

Introduction

There are many risk factors for Zika virus outbreaks in India. The high vector density of the *Aedes* mosquito, suitable climatic conditions for the breeding of these mosquitoes, and the varied socio-cultural diversity increase the country's risk for emerging infection of arboviral diseases.[1,2] The first laboratory-confirmed case of Zika infection in India was reported from Ahmedabad in Gujrat in 2016.[3] In 2018 larger outbreaks of Zika virus were reported from the states of Rajasthan and Madhya Pradesh.[4,5] Most recently in 2021, two outbreaks from Kerala, and Uttar Pradesh and one confirmed case from Maharashtra were reported.[6] These recent and recurring Zika virus outbreaks in the country are a clear indication, highlighting the Zika infection as a significant public health issue.

As there are no specific vaccines or treatment measures for the Zika virus educating the public remains the mainstay in controlling outbreaks. The effectiveness of any public health intervention will depend on the community's response and preparedness. Assessment of the knowledge, attitude and practice of the community will give insightful inputs to tailor interventions based on local needs. Data on Knowledge Attitude Practice (KAP analysis) are not available for Zika infection at the community level in India, and it may vary across different socio-economic strata. Following the report of the first case of Zika viral infection from Maharashtra, we undertook this study to understand the knowledge, attitude and practices regarding Zika viral infection in the rural community of Belsar village, in Maharashtra, India.

Material and Methods

Study Design and Setting

A cross-sectional survey was undertaken from August to September 2021. The first case of Zika virus disease in Maharashtra was reported from a rural community of Belsar village in the month of July 2021. The village Belsar is located in the Purandar constituency in the Pune district of Maharashtra with a total population of 3332 individuals. A similar study done by Nelson et al. in a rural community reported that 32% of the population surveyed were aware that Zika viral infection in pregnant women could lead to congenital malformations in the newborn. Assuming the prevalence of 32% and relative precision of 20% for 95% CI the sample size was calculated to be 212. This survey was undertaken among 285 individuals aged 18 years and above, who were permanent residents of the village.

Questionnaire and Data Collection

The knowledge attitude and practices regarding Zika viral disease among the villagers were assessed by interviewing them using a questionnaire. The questionnaire used for the survey was adapted from the WHO's resource pack on KAP studies for Zika viral disease.[7] The questionnaire had four sections with a total of 43 questions. The first section comprised seven questions on the baseline characteristics of the study group. Questions in section two assessed the knowledge domain with a total of fourteen questions. Questions assessed the participant's knowledge regarding the causative agent, modes of transmission, clinical features and methods of prevention of Zika virus infection. The attitude section comprised six questions. These assessed the participant's perceptions regarding Zika disease transmission, stigma towards the diseased, and the role played by each individual in the community in preventing illness. The last section comprised a total of sixteen questions regarding the practices which were followed in their homes in relation to the prevention of the Zika virus disease. The included questions were based on the practices adopted by the community to prevent vector breeding, the usage of personal protective measures against the bite of mosquitoes, and the promptness in seeking health care from private or government health facilities. Data were collected by the well-trained investigation team for data collection of the KAP study comprising staff from the National Institute of Virology, Pune and Accredited Social Health Activists (ASHA workers) of the Primary Health Centre, Belsar. A house-to-house survey was conducted by the data collectors covering the surrounding neighbourhood of the index case of Zika virus disease. The study was approved by the Human Ethics Committee at the institutional level.

Statistical Analysis

Each question in the domains of knowledge, attitude and practice was scored. The scores in each domain were added to obtain a continuous composite score for that domain. The mean score in each domain was taken as the cut-off to define good knowledge, attitude and practices respectively. The continuous quantitative variables are described using mean and standard deviation. Categorical variables are expressed in proportions. The correlation between scores in the knowledge and attitude domain was assessed by determining Pearson's correlation coefficient. The binary logistic regression technique was used to determine the significant predictors of good knowledge attitude and practice. The data were analysed using SPSS Version 16.

Results

A total of 285 individuals aged 18 years and above were included in this study. The mean (SD) age was 42.4 (14.8) years. The majority of the study participants belonged to the age group of 20-59 years (n = 231, 82.2%). Those aged 60 years and above constituted 14.6% (n = 41) of the population (Table 1). More than half of the participants were females (n = 190, 66.7%). A good proportion of them (n = 119, 41.7%) were educated above 10th standard.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202336

Farming was the major occupation practised by the study population (n = 158, 55.4%).

A total of 137 individuals (48.1%) had scored above the mean score in the knowledge domain. Almost all of the participants (n = 273, 95.8%) had heard of Zika viral infection. Most of the participants (n = 229, 80.4%) received information from IEC activities through media dissemination by the local administration. More than half of them (n = 156, 54.7%) acquired the knowledge regarding Zika virus from the local health authorities. Nearly 90% of the study participants (n = 256) knew that the Zika virus is transmitted through the bite of mosquitoes. While more than 80% (n = 233) reported fever and body aches to be major symptoms, only 64% (n = 183) knew that rashes and red eyes were part of the symptomatology.

Table 1.Socio-demographic Characteristics of the Study Population

Characteristics	N (%)*
Age group (years)	
< 20	9 (3.2)
20-39	119 (42.3)
40-59	112 (39.9)
≥ 60	41 (14.6)
Females	190 (66.7)
Education (years)	
< 4	41 (14.4)
4-10	125 (43.9)
> 10	119 (41.7)
Occupation	
Unemployed	82 (28.8)
Farmer	158 (55.4)
Daily wage earners	33 (11.6)
Shop keepers	7 (2.5)
Doctor	1 (0.35)

*Abbreviation: N (%): Frequency (Percentage).

Table 2.Distribution of Study Participants with Good KAP Scores across Various Socio-demographic Strata

Category	Good Knowledge N (%)*	Good Attitude N (%)*	Good Practice N (%)*
Age group (years)			
≤ 40	84 (61.8)[$]	44 (32.4)	69 (50.7)
> 40	53 (35.6)	40 (26.8)	73 (49.0)
Gender			
Male	36 (37.9)[#]	28 (29.5)	54 (56.8)
Female	101 (53.2)	56 (29.5)	88 (46.3)
Education			
High school and below	63 (38.0)[@]	54 (32.5)	76 (45.8)
Above high school	74 (62.2)	30 (25.2)	66 (55.5)

*Abbreviation: N (%): Frequency (Percentage)

[$]Statistically significant at 0.05 level, p value ≤ 0.001

[#]Statistically significant at 0.05 level, p value = 0.005

[@]Statistically significant at 0.05 level, p value ≥ 0.001

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202336

Table 3.Correlation Between KAP Scores and With Years of Education

Variables	Correlation Coefficient (r)	p Value*
Knowledge-attitude	0.334	< 0.001
Attitude-practice	0.291	< 0.001
Knowledge-practice	0.368	< 0.001
Years of education-knowledge	0.222	< 0.001
Years of education-practice	0.129	0.029
Years of education-attitude	-0.900	0.130

*Statistically significant at 0.05 level (two-tailed).

A majority of this population (n = 270, 94.7%) were aware that pregnant women were at a higher risk of developing complications. However, only 23.5% (n = 67) of participants knew that Zika virus infection could be transmitted from person to person via sexual route. Less than one-fourth (n = 69, 24.2%) of the study population knew that Zika viral infection can remain asymptomatic. More than 90% (n = 263) knew that Zika infection was a preventable one and almost all (258/263, 98.1%) of them knew that prevention of artificial collection of water was required to avert mosquito breeding. The scores in the knowledge domain ranged from 0 to 11. The mean (SD) score was 8 (1.4). While one person scored 0, a total of 13 participants scored 11. More females (101, 53.2%) than males (36, 37.9%) had good knowledge regarding Zika virus infection (p = 0.015).

Zika virus infection was perceived to be a major public health problem by 66.3% (n = 189) of the study population and a similar proportion of individuals were worried about contracting the infection (n = 186, 65.3%). Only 59.6% (n = 170) responded that they would not discriminate against a person with Zika virus infection. The attitude scores ranged from 0 (n = 2) to 6 (n = 84). The mean (SD) score in this domain was 4.8 (1.1). Nearly 30% of individuals (n = 84) scored above the mean value of attitude scores. No factors were found to be significantly associated with a good attitude towards Zika virus infection.

The scores in the practice domain ranged from 0 (n = 2) to 7 (n = 142). The mean (SD) score in the practice domain was 6.3 (0.9). Nearly half of the population (n = 142, 49.8%) had scores above the mean value in the practice domain. Table 2 gives the distribution of the study participants with good knowledge, attitude, and practice in various age and education groups. Almost all of the study participants (n = 280, 98.2%) had the practice of routinely inspecting their premises for water collections. While 62.2% did the inspection daily (n = 173), 8.2% (n = 23) checked their surroundings less than once a week. More than 80% of the population (n = 252, 88.4%) responded that they practised dry days for vector control. Out of the 252 individuals who practised dry days 72% (205) did cleaning and drying of all containers which were used for storage of water in their houses. More than half of the houses (n = 182, 64%) had wired mesh installed for the doors and windows to prevent mosquitoes from entering.

Almost all of the participants (n = 272, 95.4%) had the habit of regularly using protective measures against mosquito bites. Among them a majority (225/272) used mosquito repellents and many of them preferred to use repellent ointments for local application (211/225, 93.8%). A smaller proportion (59/225, 26.2%) of them used vaporisers to repel the mosquitoes. Less than one-fourth of the population used bed nets (62/272, 22.8%) and only 29% (79/272) had the habit of wearing long-sleeved dresses while they went to work. The participants (n = 146, 51.2%) also had the practice of burning locally available materials like dry leaves to create smoke in their premises, to drive away the mosquitoes.

Among those with good knowledge (n = 137), 51.8% had good practice (n = 71). Table 3 shows the correlation between knowledge-attitude, attitude-practice and knowledge-practice scores. The highest correlation was obtained between scores in the knowledge and practice domains. In the binary logistic regression model after adjusting for other socio-demographic variables, younger age (40 years and younger) and higher education (above high school grade) were found to be significant determinants of good knowledge (adj OR = 0.49 (0.28–0.85) and 0.43 (0.26-0.73) respectively).

Discussion

This study brings out the knowledge, attitude and practice regarding Zika viral infection in a rural Indian community. About 48.1% of the population had good knowledge related to Zika infection prevention and approximately equal proportions (49.8%) were seen adopting the recommended practices for prevention of Zika infection in the community. However, only 30% had a positive attitude towards this viral infection. We have not come across the community-based

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202336

KAP studies for Zika infection from India. A study done in 2016 among the health care professionals in Northern India concluded that a majority of study participants (61.4%) had poor knowledge regarding the Zika infection.[8] A study conducted in a rural community in the Dominican Republic reports poor understanding and behaviour by the participants.[9] The present study reports that a higher proportion of rural residents had good knowledge regarding Zika virus infection. The better understanding in this study could be the result of the wide IEC measures undertaken in the village under local leadership after a case of Zika was reported in the region. The present study was conducted immediately after the campaigns conducted by local administration and health authorities. It could be one of the reasons for improved KAP regarding Zika virus infection in this community. The majority of individuals (80.4%) reported that they obtained information regarding Zika infection via the mass media campaigns arranged by village administrative authorities. This study shows the importance of decentralised involvement of local administration and health authorities in effectively imparting knowledge to the community. Similar studies conducted in areas of active transmission of Zika virus infection have reported good KAP scores among the participants due to the impact of awareness campaigns.[10,11]

The knowledge scores among women were found to be significantly higher than among men in this study. This is an encouraging finding as the far-reaching implications of Zika infection in pregnancy and the risk of congenital malformations can be effectively prevented by the good health behaviour of women. This study clearly brings out the knowledge gap in the sexual route of transmission of the virus. Though 94.7% were aware that pregnant women were the susceptible group, only 23% of the participants were aware of the transmission of the virus through sexual route. The finding is comparable with other similar studies. Even amongst the target groups like pregnant women, the knowledge regarding sexual transmission of the virus is poor.[12,13] Mouchtouri et al. in their study among pregnant women report that though more than 77% of their study population had heard of the Zika virus, only 37% knew about the sexual mode of transmission.[14]

In general, studies report low levels of knowledge, attitude and practice related to Zika virus infection across the global community.[9,15,16] Even among healthcare providers the knowledge on Zika virus infection was found to be wanting.[8,17-19] However, higher levels of education and occupation have been associated with good KAP scores.[20,21] In the present study, higher education and younger age emerged as significant predictors of good knowledge scores while education alone was significantly associated with good practice scores. Nery Jr et al. in their study found a higher prevalence of Zika virus infection among pregnant ladies who belonged to the higher age group and lower educational categories.[22] Our study found no significant gender differences among the scores in the practice domain. A recent study from the Phillippines reports good KAP scores among younger women belonging to reproductive age groups, especially among those who had higher degrees of education.[21] Higher knowledge and better behaviour towards Zika infection have been reported by Huang et al. among young and educated individuals.[23]

This study was undertaken in the background of Zika infection in the community. The KAP scores obtained from this rural community could be influenced by the intense awareness programmes by the local government and health authorities. Hence the results may not be similar in other rural parts of the country. The study did not include any pregnant women. It is important to impart awareness regarding the infection and related complications to this group. This is the first study to the knowledge of the investigators, which has assessed the KAP levels of an Indian community regarding Zika viral infection. We have used the adapted WHO questionnaire for this study which may be replicated in other settings. The study reveals the gaps in KAP among the participants with respect to Zika virus infection. Similar studies should be conducted in other parts of the country, among the general community and special groups, with repeated assessments over time.

Source of Funding: None

Conflict of Interest: None

References

1. Mourya DT, Yadav PD, Ullas PT, Bhardwaj SD, Sahay RR, Chadha MS, Shete AM, Jadhav S, Gupta N, Gangakhedkar RR, Khasnobis P, Singh SK. Emerging/re-emerging viral diseases & new viruses on the Indian horizon. Indian J Med Res. 2019;149(4):447-67. [PubMed - https://pubmed.ncbi.nlm.nih.gov/31411169/] [Google Scholar - https://scholar.google.com/scholar?q=Emerging/re-emerging+viral+diseases+%26+new+viruses+on+the+Indian+horizon&hl=en&as_sdt=0,5]
2. Bhardwaj S, Gokhale MD, Mourya DT. Zika virus: current concerns in India. Indian J Med Res. 2017;146(5):572-5. [PubMed - https://pubmed.ncbi.nlm.nih.gov/29512599/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Zika+-virus%3A+current+concerns+in+India&btnG=]
3. Sapkal GN, Yadav PD, Vegad MM, Viswanathan R, Gupta N, Mourya DT. First laboratory confirmation on the existence of Zika virus disease in India. J Infect. 2018;76(3):314-7. [PubMed - https://pubmed.ncbi.nlm.nih.gov/28988896/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=-First+laboratory+confirmation+on+the+exist-

ence+of+Zika+virus+disease+in+India&btnG=]
4. Yadav PD, Malhotra B, Sapkal G, Nyayanit DA, Deshpande G, Gupta N, Padinjaremattathil UT, Sharma H, Sahay RR, Sharma P, Mourya DT. Zika virus outbreak in Rajasthan, India in 2018 was caused by a virus endemic to Asia. Infect Genet Evol. 2019;69:199-202. [PubMed - https://pubmed.ncbi.nlm.nih.gov/30703541/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Zika+virus+outbreak+in+Rajasthan%2C+India+in+2018+was+caused+by+a+virus+endemic+to+Asia&btnG=]
5. Malhotra B, Gupta V, Sharma P, Singh R, Sharma H, Vyas M, Mathur RP, Mathur VK, Meena D, Malhotra H, Yadav PD, Sapkal G, Pt U, Deshpande GR, Gunjikar R, Shaman H, Mourya DT, Gupta N, Singh S, Ravindran P, Tiwari J, Nyayanit DA, Kumar N, Phalke S, Chugani A, Bhandari S, Suravajhala P, Solanki PS, Salaria M. Clinico-epidemiological and genomic profile of first Zika Virus outbreak in India at Jaipur city of Rajasthan state. J Infect Public Health. 2020;13(12):1920-6. [PubMed - https://pubmed.ncbi.nlm.nih.gov/33172818/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Clinico-epidemiological+and+genomic+profile+of+first+Zika+Virus+outbreak+in+India+at+Jaipur+city+of+Rajasthan+state&btnG=]
6. World Health Organization [Internet]. Zika virus disease – India; 2021 Oct 14 [cited 2021 Dec 27]. Available from: https://www.who.int/emergencies/disease-outbreak-news/item/zika-virus-disease-india
7. World Health Organization [Internet]. Knowledge, attitudes and practice surveys: Zika virus disease and potential complications; 2016 [cited 2021 Dec 1]. Available from: https://apps.who.int/iris/bitstream/handle/10665/204689/WHO_ZIKV_RCCE_16.2_eng.pdf [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge%2C+attitudes+and+practice+surveys%3A+Zika+virus+disease+and+potential+complications&btnG=]
8. Gupta N, Randhawa RK, Thakar S, Bansal M, Gupta P, Arora V. Knowledge regarding Zika virus infection among dental practitioners of tricity area (Chandigarh, Panchkula and Mohali), India. Niger Postgrad Med J. 2016;23(1):33-7. [PubMed - https://pubmed.ncbi.nlm.nih.gov/27098947/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge+regarding+Zika+virus+infection+among+dental+practitioners+of+tricity+area+%28Chandigarh%2C+Panchkula+and+Mohali%29%2C+India&btnG=]
9. Nelson EJ, Luetke MC, Kianersi S, Willis E, Rosenberg M. Knowledge and perceptions of Zika virus transmission in the community of Puerto Plata, Dominican Republic. BMC Infect Dis. 2019;19(1):339. [PubMed - https://pubmed.ncbi.nlm.nih.gov/31014275/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge+and+perceptions+of+Zika+virus+transmission+in+the+community+of+Puerto+Plata%2C+Dominican+Republic&btnG=]
10. Delet J, Cabié A, Merle S, Voluménie JL, Monthieux A. Knowledge, attitudes and practices of pregnant women in Martinique in the immediate aftermath of the Zika virus outbreak. Eur J Obstet Gynecol Reprod Biol. 2018;222:70-4. [PubMed - https://pubmed.ncbi.nlm.nih.gov/29353134/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge%2C+attitudes+and+practices+of+pregnant+women+in+Martinique+in+the+immediate+aftermath+of+the+Zika+virus+outbreak&btnG=]
11. Whittemore K, Tate A, Illescas A, Saffa A, Collins A, Varma JK, Vora NM. Zika virus knowledge among pregnant women who were in areas with active transmission. Emerg Infect Dis. 2017;23(1):164-6. [PubMed - https://pubmed.ncbi.nlm.nih.gov/27855041/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Zika+virus+knowledge+among+pregnant+women+who+were+in+areas+with+active+transmission&btnG=]
12. Pires LC, Dantas LR, Witkin SS, Bertozzi AP, Dezena RC, Rodrigues MM, Gazeta RE, Passos SD. Knowledge of Zika virus transmission and its prevention among high-risk pregnant women in Brazil. Viruses. 2021;13(2):242. [PubMed - https://pubmed.ncbi.nlm.nih.gov/33557048/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge+of+Zika+virus+transmission+and+its+prevention+among+high-risk+pregnant+women+in+Brazil&btnG=]
13. Pooransingh S, Parasram R, Nandram N, Bhagwandeen B, Dialsingh I. Zika virus disease-knowledge, attitudes and practices among pregnant women-implications for public health practice. Public Health. 2018;165:146-51. [PubMed - https://pubmed.ncbi.nlm.nih.gov/30448643/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Zika+virus+disease-knowledge%2C+attitudes+and+practices+among+pregnant+women-implications+for+public+health+practice&btnG=]
14. Mouchtouri VA, Papagiannis D, Katsioulis A, Rachiotis G, Dafopoulos K, Hadjichristodoulou C. Knowledge, attitudes, and practices about the prevention of mosquito bites and Zika virus disease in pregnant women in Greece. Int J Environ Res Public Health. 2017;14(4):367. [PubMed - https://pubmed.ncbi.nlm.nih.gov/28362340/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge%2C+attitudes%2C+and+practices+about+the+prevention+of+mosquito+bites+and+zika+virus+disease+in+pregnant+women+in+Greece&btnG=]

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202336

15. Samuel G, DiBartolo-Cordovano R, Taj I, Merriam A, Lopez JM, Torres C, Lantigua RA, Morse S, Chang BP, Gyamfi-Bannerman C, Thakur KT. A survey of the knowledge, attitudes and practices on Zika virus in New York City. BMC Public Health. 2018;18(1):98. [PubMed - https://pubmed.ncbi.nlm.nih.gov/29291723/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=+survey+of+the+-knowledge%2C+attitudes+and+practices+on+Zika+-virus+in+New+York+City&btnG=]
16. Argüelles-Nava VG, Alvarez-Bañuelos MT, Córdoba-Suárez D, Sampieri CL, Ortiz-León MC, Riande-Juárez G, Montero H. Knowledge, attitudes, and practices about Zika among a university community located in an endemic zone in Mexico. Int J Environ Res Public Health. 2018;15(11):2548. [PubMed - https://pubmed.ncbi.nlm.nih.gov/30441747/] [Google Scholar - https://scholar.google.com/scholar?q=Knowledge,+attitudes,+and+practices+about+Zika+among+a+university+community+located+in+an+endemic+zone+in+Mexico&hl=en&as_sdt=0,5]
17. Francis DL, Wongsin U, Chien SC, Hsu YH, Lohmeyer FM, Jian WS, Lin LF, Iqbal U. Assessment of knowledge, attitudes, and practices towards Zika virus among healthcare workers in St. Kitts. BMC Infect Dis. 2021;21(1):237. [PubMed - https://pubmed.ncbi.nlm.nih.gov/33663410/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Assessment+of+knowledge%2C+attitudes%2C+and+practices+towards+Zika+virus+among+healthcare+workers+in+St.+Kitts&btnG=]
18. Cheema S, Maisonneuve P, Weber I, Fernandez-Luque L, Abraham A, Alrouh H, Sheikh J, Lowenfels AB, Mamtani R. Knowledge and perceptions about Zika virus in a Middle East country. BMC Infect Dis. 2017;17(1):524. [PubMed - https://pubmed.ncbi.nlm.nih.gov/28747174/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge+and+perceptions+about+Zika+virus+in+a+Middle+East+country&btnG=]
19. Ibrahim NK, Moshref RH, Moshref LH, Walid JB, Alsati HS. Knowledge and attitudes towards Zika virus among medical students in King Abdulaziz University, Jeddah, Saudi Arabia. J Infect Public Health. 2018;11(1):18-23. [PubMed - https://pubmed.ncbi.nlm.nih.gov/28697901/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge+and+attitudes+towards+Zika+virus+among+medical+students+in+King+Abdulaziz+University%2C+Jeddah%2C+Saudi+Arabia&btnG=]
20. Harapan H, Rajamoorthy Y, Utomo PS, Anwar S, Setiawan AM, Alleta A, Bambang A, Ramadana MR, Ikram I, Wahyuniati N, Maulana R, Ichsan I, Indah R, Wagner AL, Kuch U, Groneberg DA, Rodríguez-Morales AJ, Andalas M, Müller R, Mudatsir M, Imrie A. Knowledge and attitude towards pregnancy-related issues of Zika virus infection among general practitioners in Indonesia. BMC Infect Dis. 2019;19(1):693. [PubMed - https://pubmed.ncbi.nlm.nih.gov/31387537/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge+and+attitude+towards+pregnancy-related+issues+of+Zika+virus+infection+among+general+practitioners+in+Indonesia&btnG=]
21. Maharajan MK, Rajiah K, Belotindos JA, Basa MS. Social determinants predicting the knowledge, attitudes, and practices of women toward Zika virus infection. Front Public Health. 2020;8:170. [PubMed - https://pubmed.ncbi.nlm.nih.gov/32582602/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Social+determinants+predicting+the+-knowledge%2C+attitudes%2C+and+practices+of+women+toward+Zika+virus+infection&btnG=]
22. Nery Jr N, Ticona JP, Gambrah C, Doss-Gollin S, Aromolaran A, Rastely-Junior V, Lessa M, Sacramento GA, Cruz JS, de Oliveira D, Dos Santos LL, da Silva CG, Botosso VF, Soares CP, Araujo DB, Oliveira DB, Alves RP, Andreata-Santos R, Durigon EL, de Souza Ferreira LC, Wunder Jr EA, Khouri R, Oliveira-Filho J, de Siqueira IC, Almeida AR, Reis MG, Ko AI, Costa F. Social determinants associated with Zika virus infection in pregnant women. PLoS Negl Trop Dis. 2021;15(7):e0009612. [PubMed - https://pubmed.ncbi.nlm.nih.gov/34329305/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=ocial+determinants+associated+with+Zika+virus+infection+in+pregnant+-women&btnG=]
23. Huang Y, Xu S, Wang L, Zhao Y, Liu H, Yao D, Xu Y, Lv Q, Hao G, Xu Y, Wu Q. Knowledge, attitudes, and practices regarding Zika: paper- and internet-based survey in Zhejiang, China. JMIR Public Health Surveill. 2017;3(4):e81. [PubMed - https://pubmed.ncbi.nlm.nih.gov/29084711/] [Google Scholar - https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Knowledge%2C+attitudes%2C+and+practices+regarding+Zika%3A+paper-+and+internet-based+survey+in+Zhejiang%2C+China&btnG=]

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202336