

RESEARCH PAPER



Yellow fever vaccination: how much do travelers from Eastern India know?

Vikas Bhatia^a, Sarika Palepu^{a,b}, Swayam Pragyan Parida^a, Arvind Kumar Singh^a, and Soumya Swaroop Sahoo^a

^aDepartment of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Bhubaneswar, India; ^bDepartment of Community Medicine, VCSG Govt. Medical Science and Research Institute, Srinagar, India

ABSTRACT

Introduction: International tourism has grown tremendously in the past 2–3 decades in India resulting in exposure of travelers to varied spectrum of diseases prevalent in different parts of the world. Immunization plays a prominent role in protection of the exposed individuals. The objective of the present study was to assess the awareness and knowledge regarding yellow fever and other travel vaccinations amongst travelers of eastern India.

Materials and methods: In the present cross-sectional study, participants attending Yellow Fever Vaccination Clinic at All India Institute of Medical Sciences, Bhubaneswar, during August–September 2018 were approached. Newly registered participants aged 15 y and above were interviewed consecutively till the required sample size of 300 was fulfilled. Awareness and knowledge regarding travel vaccinations and their adverse effects were assessed with pretested structured interview schedule. Bivariate and multivariate logistic regressions were done to assess the association of various factors with awareness of travel vaccinations.

Results: Among the participants, most of them were males (90.7%), belonged to the age group of 15–45 y (87.3%), married (64.3%), graduates (19%), and were working (78.3%). Most of the participants were traveling to South Africa (85.4%). Only 57.3% participants were aware of any travel vaccinations. Only 37.5% participants knew that yellow fever vaccine confers lifelong immunity. On multivariate logistic regression higher education, working occupation and history of previous vaccination were significantly associated with awareness of travel vaccinations.

Conclusion: Awareness regarding travel vaccinations is important to prevent fatal diseases like yellow fever. Vital information pertaining to diseases in different locations and availability of vaccines for prevention needs to be disseminated to the travelers to prevent occurrence of travel bound diseases.

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Introduction

In India, outbound tourism has exponentially increased in the recent times. In 2016, 21.9 million people from India have traveled to different parts of the world. The outbound tourism increased from 1.94 million in 1991 to 23.94 million in 2017.¹ With the increase in outbound travel, the necessity of travel vaccinations is increasing. Immunization plays a prominent role in prevention of exposure to the deadly virus like yellow fever in this era of exponential outbound tourism.

“Yellow fever,” an arboviral disease, is endemic in regions of South America and Africa. The virus causing this disease belongs to genus *flavivirus*, family Flaviviridae, a RNA virus. The virus is maintained in nature between forest mosquitoes and wild primates. Indian subcontinent is categorized as yellow fever receptive area. Primarily, the abundant presence of *Aedes aegypti* mosquito species, favorable climatic conditions of more than 24°C, and 60% relative humidity prevailing over large geographic area/during rainy season leave the country to be highly susceptible.²

As the prevalence of diseases varies according to geographic conditions, it is necessary to be aware of the precautionary measures, i.e., travel vaccinations. Few studies done in India reveal that awareness regarding travel vaccinations is as low as 23%.³ Another

study done in Turkey revealed that only 53.2% had taken at least one vaccination before traveling and 69.3% were not aware of yellow fever vaccination.⁴ Higher level of traveler’s education was correlated with higher acceptance of the recommended vaccinations.

Very scarce literature pertaining to travel vaccinations is available, particularly in eastern India. Hence, the current study was planned to assess the awareness and knowledge of travel vaccinations in general and yellow fever in particular and to explore the associated factors amongst beneficiaries attending Yellow Fever Vaccination Clinic at All India Institute of Medical Sciences (AIIMS), Bhubaneswar.

Methodology

Yellow Fever Vaccination Clinic was established in May 2015 at AIIMS, Bhubaneswar, serving as the only clinic providing vaccination in eastern India. Vaccination services are provided twice weekly (Monday and Thursday) under the nodal authority of head of the department, Department of Community Medicine and Family Medicine. About 50 participants (ranging from 6 to 80) are vaccinated on every functional day of the clinic.

For the present study, sample size was calculated assuming the prevalence of awareness of travel vaccination as 23% according to a study.³ Taking absolute precision as 5%, the sample size was estimated to be 272 (using the formula $- 1.96^2 \times P \times Q/d^2$, P = prevalence, $Q = 100 - P$, d = absolute precision). With an anticipated nonresponse rate of 10%, the required sample size was calculated as 300.

The study was conducted from August to September 2018. Newly registered participants aged 15 y and above (as they would be able to provide informed consent) were approached for inclusion in the study. Participants with preexisting psychiatric morbidities, who were unable to comprehend interview questions and not willing to provide consent, were excluded from the study. About 328 participants were approached for participation in the study. Consecutive patients who fulfilled the inclusion criteria were enrolled in the study till the required sample size was achieved. Awareness and knowledge regarding travel vaccinations were assessed in them.

The data were entered in Microsoft Excel 2013. All the statistical analyses were done in Stata 17.0 and SPSS 23. Descriptive analysis (socio-demography and awareness regarding travel vaccinations and adverse effects, etc.) was done and results were presented as proportions. Various associated factors of awareness as socio-demography, history of previous international travel, and history of travel vaccinations taken by family members were analyzed. Bivariate logistic regression was done for determining the association. Variables found significant with bivariate analysis (p -value < 0.25)⁵ were incorporated in multivariate logistic regression model. Variables with p -value < 0.05 on multivariate analysis were considered significant.

Ethical clearance for the study was taken from Institutional Ethics Committee, AIIMS Bhubaneswar.

Results

Among the participants, most of them were males (90.7%). Majority of the participants belonged to the age group of 15–45 y (87.3%) followed by 46–60 y (7.3%). Most of them were married (64.3%) and were graduates (19%) or studied till secondary school (15%). Majority of the participants were working (78.3%) and were in private organizations (77.9%). Median monthly income of participants was Rs. 27,000 (range varying from Rs. 0 to 150,000) (Table 1).

Majority of the participants belonged to the state of Odisha (83.3%). However, about 38 participants (12.7%) traveled from various states to get vaccinated at AIIMS, Bhubaneswar. The distribution of participants is shown in Figure 1 with the help of choropleth maps.

Most of the participants were traveling to South Africa (85.4%) followed by Asia (4.6%) (Figure 2). Only 213 participants (71%) elicited their travel dates. Participants received vaccine at a median duration of 15 d before the scheduled departure (range varying from 1 to 180 d). About 13% participants ($n = 39$) received yellow fever vaccination below the recommended duration of 10 d prior to the travel. The major reasons for yellow fever vaccination were prerequisite for employment (79.7%) followed by visit to family/friends (8.1%) (Figure 3).

Table 1. Sociodemographic characteristics of the beneficiaries.

Sl. no.	Characteristic	N (%)	
1	Age (in y)	15–45	262 (87.3)
		46–60	22 (7.3)
		>60	16 (5.4)
2	Gender	Male	272 (90.7)
		Female	28 (9.3)
3	Education	Illiterate	4 (1.3)
		Primary school completed	10 (3.3)
		Middle school completed	64 (21.3)
		High school completed	81 (27)
		Graduate	97 (32.3)
		Postgraduate	44 (14.7)
4	Migration history	No	251 (83.7)
		Yes	49 (16.3)
5	Occupation	Working	235 (78.3)
		Nonworking	65 (21.7)
6	Organization (if working)	Government	37 (15.7)
		Private	183 (77.9)
		Self-employed	15 (6.4)

The participants were also enquired about the source of information regarding Yellow Fever Vaccination Clinic at AIIMS, Bhubaneswar. Majority of the participants had the information through friends ($n = 91$) followed by employer ($n = 65$) and mass media ($n = 61$) (Figure 4). About 39.7% participants ($n = 119$) were also aware of other yellow fever vaccination centers in India. Amongst them, only 8% participants ($n = 24$) could recall the location of other centers. The other centers as elicited were at New Delhi ($n = 5$), Kerala ($n = 4$), Patna ($n = 2$), Kolkata ($n = 2$), Hyderabad ($n = 2$), Mumbai ($n = 2$), Lucknow ($n = 2$), Raipur ($n = 1$), Goa ($n = 1$), Bombay ($n = 1$), Pune ($n = 1$), and Bangalore ($n = 1$).

Only 37.5% participants knew that yellow fever vaccine confers lifelong immunity, whereas a majority (31.6%) of them didn't know about the validity. The duration of immunity conferred as elicited from the participants ranged from 1 y to lifetime.

Only 57.3% participants were aware that any vaccination is needed for travel. When interviewed, only 15 participants (0.5%) could recall the vaccines as hepatitis B ($n = 5$), anti-rabies ($n = 3$), measles–mumps–rubella ($n = 3$), cholera ($n = 3$), varicella ($n = 2$), measles ($n = 1$), and meningococcal vaccine ($n = 1$) (multiple responses were noted from participants). About 39.3% participants ($n = 118$) responded that diseases are prevented by travel vaccinations. However, only 20 participants could recall the disease prevented as hepatitis B ($n = 11$), rabies ($n = 3$), chicken pox ($n = 2$), measles ($n = 1$), mumps ($n = 1$), rubella ($n = 1$), cholera ($n = 1$), meningococcal meningitis ($n = 1$), malaria ($n = 1$), dengue ($n = 1$), and poliomyelitis ($n = 1$) (multiple responses were noted from participants).

About 17.3% participants ($n = 52$) were aware that adverse effects might occur with travel vaccinations. Amongst them, 44 participants (84.6%) responded that the adverse effect could be fever ($n = 36$), allergy/skin rash ($n = 13$), vomiting ($n = 3$), localized pain ($n = 3$), anaphylaxis ($n = 2$), nausea ($n = 1$), and weakness ($n = 1$) (multiple responses were noted from participants).

To understand the factors affecting awareness on travel vaccinations, a brief history of prior vaccination by participants was also elicited. It was seen that 12.7% participants ($n = 38$) had received vaccination in the past (duration varying from 1 to 14 y) for travel. Vaccines taken were cholera ($n = 3$), hepatitis ($n = 2$), chicken pox ($n = 1$),

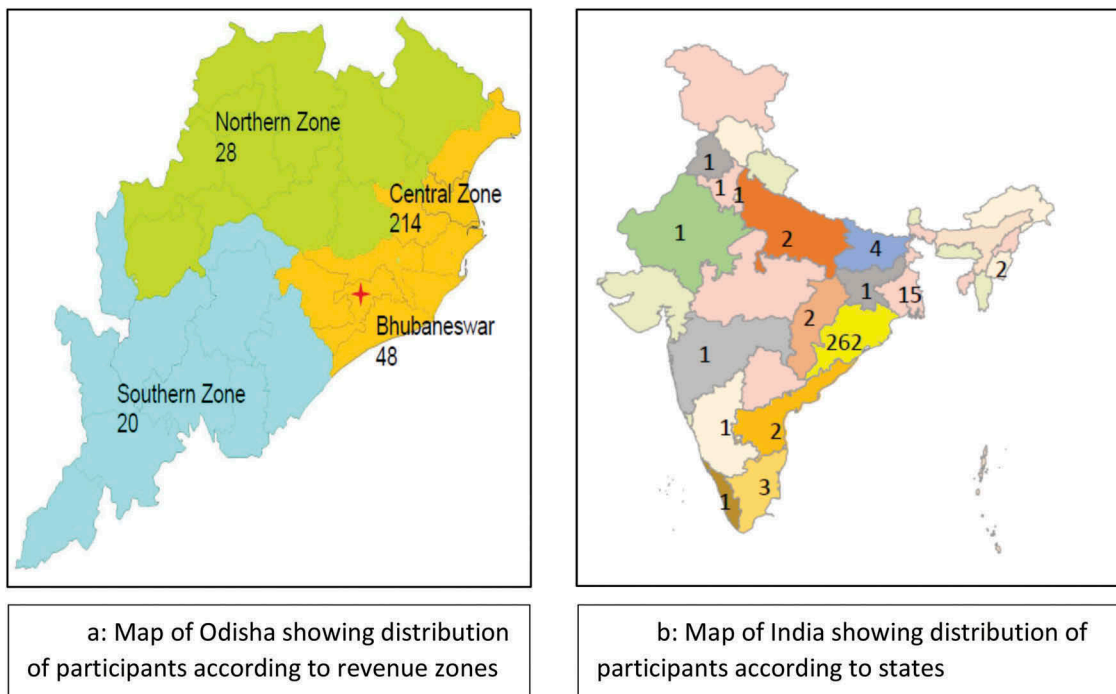


Figure 1. Distribution of participants by place of residence.

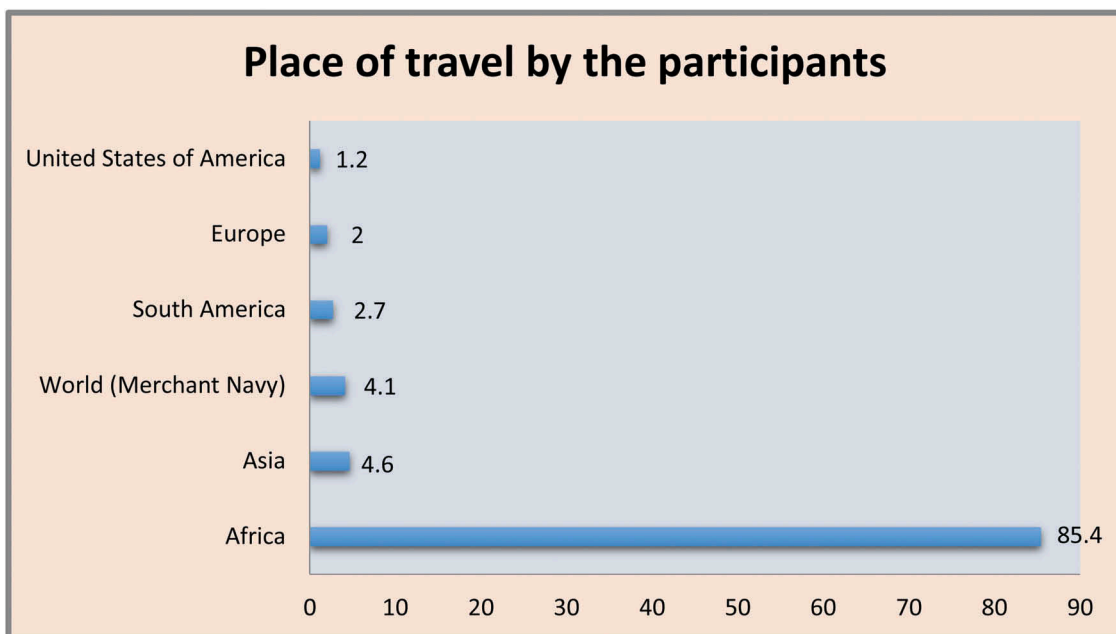


Figure 2. Distribution of participants by place of travel.

meningococcal ($n = 1$), MMR ($n = 2$), pneumococcal ($n = 1$), and tetanus ($n = 2$). One participant developed fever and rash with measles vaccine. Participants were also enquired about history of travel vaccinations received by any family member. About 19.3% participants ($n = 58$) responded that their family members have received travel vaccinations.

A bivariate analysis was done to assess the variables affecting awareness regarding travel vaccinations. It was seen that age, education, marital status, occupation, source of information, purpose of travel, and history of previous vaccination were significant on bivariate analysis. On multivariate logistic

regression, only education (literacy), occupation (working), and history of previous vaccination were significantly associated with awareness of travel vaccinations (Table 2).

Discussion

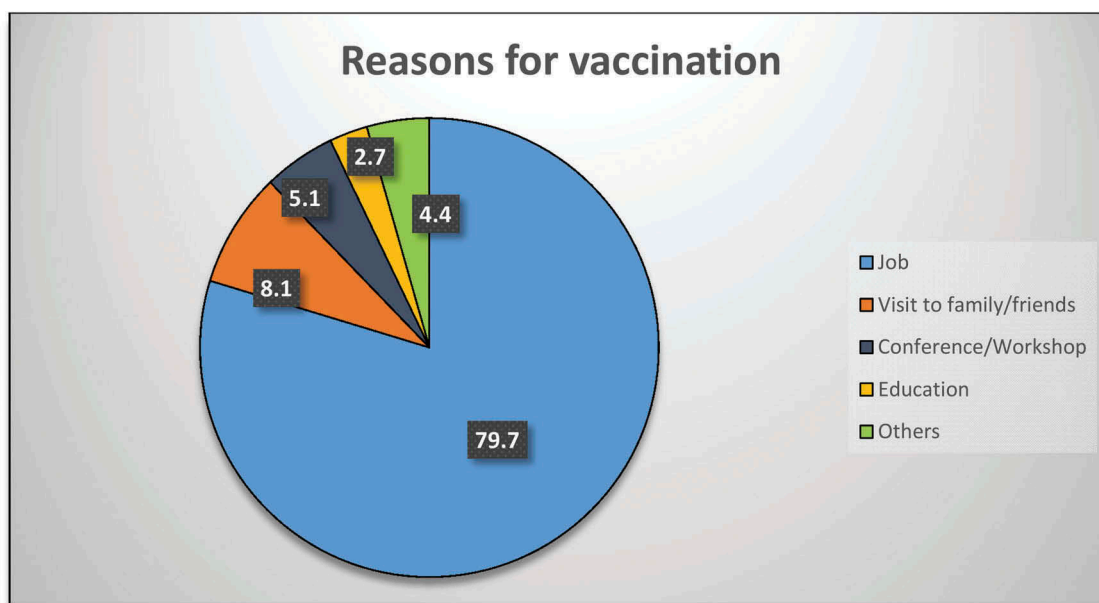
In the present study, majority of the participants were males and belonged to the age group of 15–45 y, which is similar to a study done by Zhang et al.⁶ The study⁶ also showed that employment or job was the most common reason for travel similar to our study. Majority of the participants were

Table 2. Association of various factors with awareness of travel immunizations.

Sl. no.	Characteristic	Unadjusted OR (p-value, 95% CI)	Adjusted OR (p-value, 95% CI)
1	Age (15–45 y, 46–60 y, >60 y)	0.7 (0.07, 0.33–1.05)	0.66 (0.24, 0.33–1.32)
2	Gender (male, female)	1.38 (0.41, 0.63–3.02)	–
3	Education (illiterate, primary school completed, middle school completed, high school completed, graduate, postgraduate)	0.48 (<0.05, 0.38–0.61)	0.47 (<0.05, 0.36–0.62)
4	Marital status (married, unmarried/widowed)	1.57 (0.05, 0.98–2.51)	1.37 (0.26, 0.79–2.39)
5	Occupation (working, not-working)	2.08 (<0.05, 1.20–3.61)	2.1 (0.02, 1.10–4.00)
6	Source of information (family, friends, employer, mass media, travel agency, other sources)	0.85 (0.07, 0.72–1.01)	0.99 (0.9, 0.82–1.2)
7	Purpose of travel (job, visit, educational [conference, workshops, etc.], others)	0.84 (0.15, 0.66–1.06)	1.05 (0.73, 0.78–1.43)
8	History of previous travel immunization (yes, no)	3.17 (<0.05, 1.4–7.1)	2.86 (0.02, 1.15–7.08)
9	History of previous travel immunization by family members (yes, no)	0.99 (0.44, 0.98–1.00)	–

The present study revealed that there is a profound gap in understanding of travel vaccinations by participants. It was seen that only 57.3% participants were aware that any vaccination is needed for travel. Similarly in a study by Aziz et al., 60% participants thought that vaccination is important for travel.⁹ Awareness regarding occurrence of side effects with travel vaccinations was very low in our study (17.3%) as compared to study by Zhang et al. (79.2%).⁶ This might be due to the reason that 81.1% of the participants have received vaccinations for travel in the past in the study by Zhang et al. against 12.7% in our study. Very low awareness about travel vaccines was observed in our study. A systematic review by Kain et al.¹⁰ has documented that low perceived risk of infection due to travel by the participants was the major factor for not seeking or non-adherence to pretravel advice. This indeed is a vicious cycle affecting the health care seeking behavior of travelers.

Only few participants with previous history of travel vaccinations could recall the vaccine in our study. Vaccinations taken in previous travel were hepatitis B, meningococcal, polio, and cholera similar to a study done by Hassan et al.¹¹ As previous vaccination

**Figure 3.** Distribution of participants by reasons for vaccination.

traveling to Africa similar to a study done in Mumbai.⁷ Majority of the participants receiving yellow fever vaccine were from the state of Odisha as AIIMS, Bhubaneswar, which is the only certified center for vaccination in the state.

In the present study, about 13% participants received yellow fever vaccination below the recommended duration of 10 d prior to the travel. According to a study by Hagmann et al.,⁸ delayed yellow fever administration (<10 d before departure) was noted for 48% of children and 33% of adults. In our study, majority of the participants received vaccination as a prerequisite for job. Hence, they might have sought early consultation as per recommendations. However, only 37.5% of them knew correctly about the lifelong immunity conferred by yellow fever vaccine similar to a study by Tiwari et al. (41%).³

history was significantly associated with increased awareness, detailed information ought to be provided to the participants at the time of vaccination. This will have a profound impact on decreasing occurrence of travel bound diseases.

Our study is the first of its kind in eastern India assessing awareness and knowledge regarding travel vaccinations. Factors associated with enhanced awareness were also evaluated in the present study.

The present study however has few limitations. Participants were recruited from Yellow Fever Vaccination Clinic adding to selection bias as they might be more aware regarding travel vaccinations. The paradox of the present study is that although participants were interviewed from Yellow Fever Vaccination Clinic, awareness of travel vaccination was low. Awareness

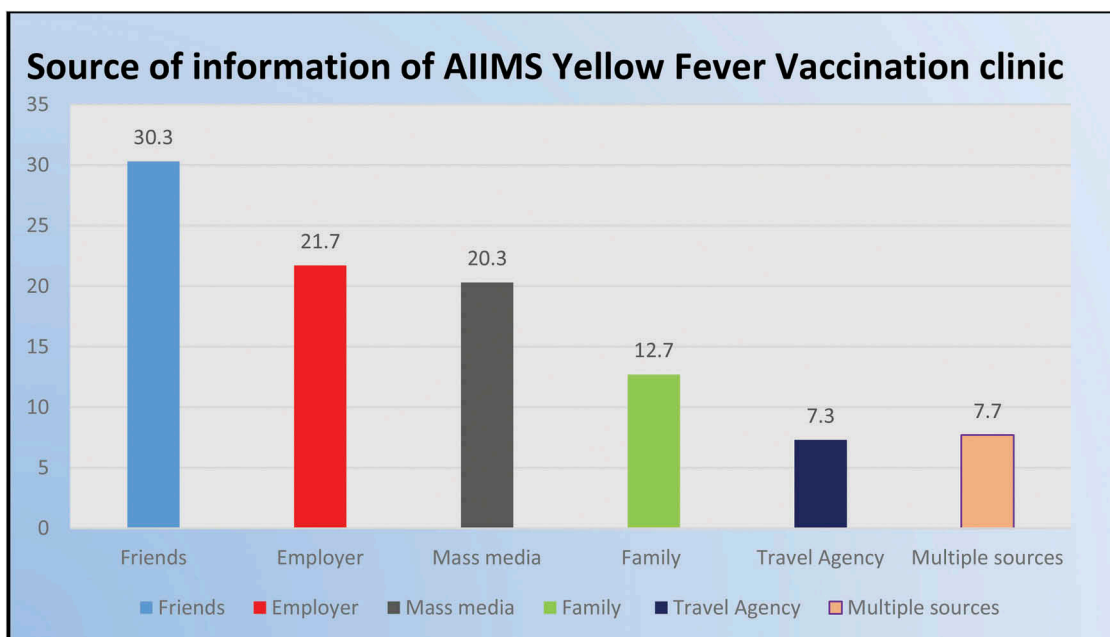


Figure 4. Distribution of participants by source of information of vaccination clinic.

might be even lower if the present study was conducted in general population. Hence, the study findings are not generalizable and have limited external validity.

Conclusion

In the present study, it was seen that many participants were not aware of travel vaccinations. Immunization plays a major role in protection against fatal diseases like yellow fever for which no treatment is available till date. With the tremendous growth in outbound tourism, providing necessary information to travelers on the mode of spread, diseases preventable by vaccines, duration of immunity conferred by the vaccine, and severity of disease is the need of the hour. Vaccination clinics can hence be a sustainable platform for disseminating information to travelers and prevent the occurrence and decrease the prevalence of many travel-bound diseases.

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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