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Original Research Article

Out of Pocket Expenditure for Yellow Fever Vaccination in India

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ABSTRACT

Introduction: Yellow fever is an acute viral hemorrhagic disease transmitted by infected Aedes mosquitoes. Though the cost of yellow fever vaccine is Rs 300/- only, as fixed by the government of India, the actual expenditure incurred by passengers is much more. Present study explores the out of pocket expenditure incurred by the passengers to take the yellow fever vaccine.
Materials & Methods: Present study was conducted in Yellow Fever Vaccination (YFV) centre of APHO Mumbai. Data was collected from 150 persons who attended YFV centre of APHO Mumbai between January to March 2016. Out of pocket expenditure for receiving Yellow Fever Vaccine included direct cost of Vaccine, Local travel expenditure incurred to reach to the Yellow Fever Vaccination Centre, Lodging and Food Charges, Loss of salary or wage. Data was collected by using standard questionnaire.
Results: Out of 150 travelers, more than 80% were travelling to Africa. Direct cost of one dose of Yellow Fever Vaccine was Rs 300/- only. Average out of pocket expenditure was Rs 2153 per person with range from Rs 400 to Rs 26950. Out of pocket expenditure was positively correlated with income of the passenger and distance to be travelled to reach to Vaccination centre. Distribution of YFV centres is scattered and is unevenly distributed across the states and zones.
Conclusion: Indirect cost for Yellow Fever Vaccination is more than the direct cost of the Vaccine. Bringing the services more close to beneficiaries will reduce the travel time and loss of salary or income hence reducing the out of pocket expenditure for yellow fever vaccination.

Key words: Out of pocket expenditure, Yellow Fever Vaccination, YFV centre, YFV charges, APHO Mumbai,

INTRODUCTION

Yellow fever is an acute viral hemorrhagic disease transmitted by infected Aedes mosquitoes. [1,2] Forty three countries of Africa (30) and Latin America (13), are either endemic for or have regions that are endemic for yellow fever with a combined population of more than 900 million at risk of yellow fever. There are an estimated 200000 cases of yellow fever, causing 30000 deaths, worldwide each year. [1-3]

Yellow fever is preventable by a relatively safe, effective vaccine. Ever since its development in 1937, the live-attenuated 17D yellow fever (YF) vaccine has been one of the most effective vaccines available to man. [4] All yellow fever vaccines currently manufactured are live-attenuated viral vaccines. [5] Yellow fever vaccine is recommended for people aged ≥9 months who are traveling to or living in areas with risk for YFV transmission in South America and Africa. [6] The live, attenuated YF 17D vaccine is delivered as a single subcutaneous inoculation of 0.5 ml. The vaccine induces neutralizing antibodies (the

mediator of protection) in 90% of vaccine recipients within 10 days after inoculation and in 99% within 30 days after inoculation. Immunity is very durable and probably lifelong. [6-8]

Increasing travel to the tropics, and adventure travel to remote areas in particular, has amplified exposure to YF. Each year, 9 million tourists from North America, Europe, and Asia travel to countries where YF is endemic. [9] Since the advent of YF 17D vaccine, the disease has been uncommon in travelers and expatriates from developed nations, with only 11 reported cases since 1950. [10,11] The risk of a traveler acquiring YF is determined by immunization status, geographic location, season of travel, length of exposure, occupational and recreational activities partaken of while traveling, and the rate of YF virus transmission at the time. [9-11]

In India the demand for YF vaccine has increased regularly from 90,000 to nearly 180,000 in 2014. As on May 2017 Dte. GHS and Ministry of Health, Government of India have set up 41 Yellow Fever Vaccination (YFV) centers across the country [12] (Fig 1). All these centres for Yellow Fever Vaccination are located in urban areas. Charges for Yellow Fever Vaccine is Rs 300/- only. These charges include the cost of vaccine as well as logistics.

Persons attending the YFV centres are of mixed group as students, unskilled workers, professionals and business persons. The average income of these persons varies from no income to more than Rs 100,000/ per month. Most of the passengers need to travel out of city and/or out of state to take the injection of Yellow Fever Vaccine. [13]

Though the direct cost of yellow fever vaccination is Rs 300/- only, as fixed by the government of India, the actual expenditures incurred by passengers to reach to yellow fever vaccination centres and taking the vaccine is much more. Present study was conducted to study the out of pocket expenditure incurred by the passengers to take the yellow fever vaccine.

Objectives: Specific objectives of the study were as follows,

1. To study the locations of certified yellow fever vaccination centre in India.
2. To study the direct and indirect costs incurred by passengers to take the yellow fever vaccine in India.

MATERIALS AND METHODS

Study was conducted in Yellow Fever Vaccination centre of APHO Mumbai. Yellow Fever Vaccination centre of APHO Mumbai caters services to passengers coming from western regions of the country. Average number of person's taking Yellow Fever Vaccine at APHO Mumbai is more than 800 per month.

A cross sectional descriptive study was conducted to study the expenditure incurred for vaccination. Total 150 persons attending Yellow Fever Vaccination centre at APHO Mumbai were included in the study. Study participants were selected by using systematic random sampling technique. Data was collected by using a self administered structured questionnaire. Information was collected on direct and indirect costs incurred on vaccination. Direct cost included the amount paid at the vaccination centre towards charges for vaccine and logistics. Indirect cost included expenditure incurred on (i) travel to reach to Yellow Fever Vaccination centre, (ii) food (iii) loss of wages and (iv) lodging & boarding, if any.

Data was entered in Microsoft excel. Analysis was done in line with objectives. Data was presented by using rate, ratios and proportions. Chi square test & student's t test was used as test of significance for qualitative and quantitative data respectively. P value <0.05 was taken as significant.

Study was conducted after taking permission from the appropriate authority. All participants were administered an informed written consent. Information collected was anonymised. No personal information like name, mobile number or email id was collected. If any person refused

to give information then the person was excluded from the study without affecting his/her eligibility for vaccination.

RESULTS

There are total 41 yellow fever vaccination centres in India. Out of these 41 Yellow Fever Vaccination centres 17(41.46%) are in West zone of India, 9 (21.95%) are in North & South zone each and 3(7.32%) are in Central and East Zone each (**Table 1**).

Table 1: Zone was distribution of Yellow Fever Vaccination centres

Zone of Residence	Number of centres	Percentage
North	9	21.95
South	9	21.95
Central	3	7.32
East	3	7.32
West	17	41.46
Total	41	100.0

State wise distribution of authorized Yellow Fever Vaccination centres is very much scattered. The number of authorized Yellow Fever Vaccination centres varies from zero to as high as 6 centres per states (Figure 1).

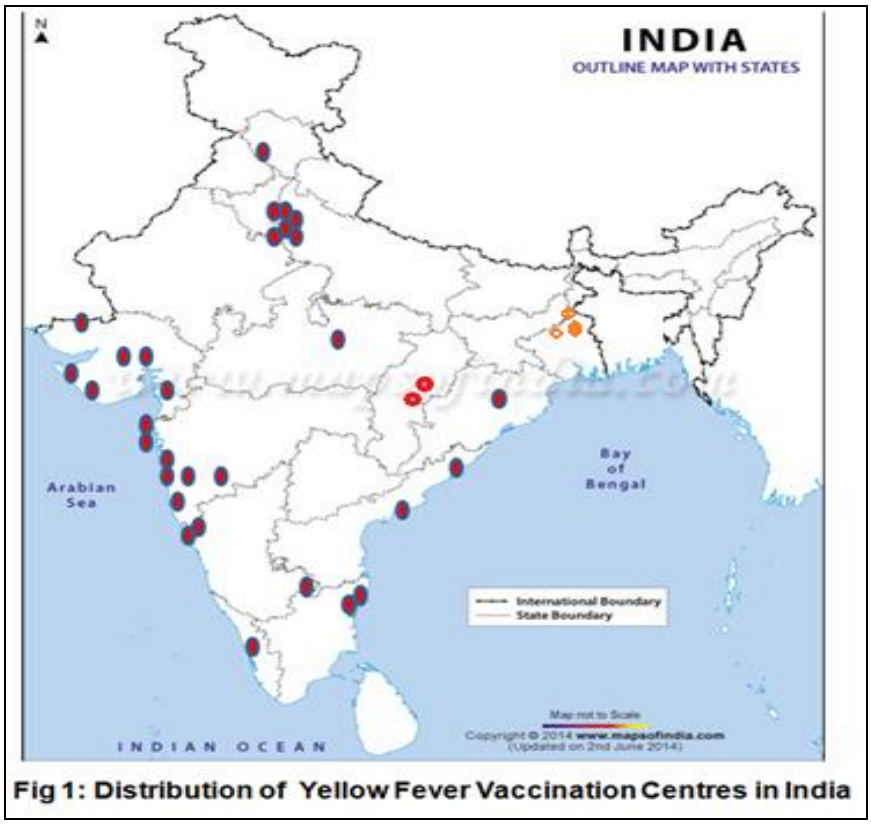


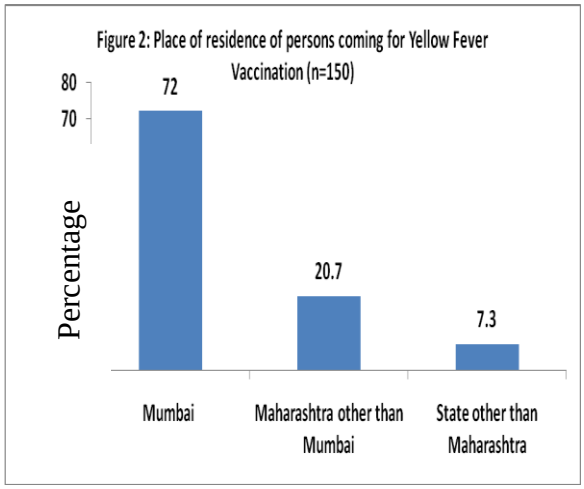
Fig 1: Distribution of Yellow Fever Vaccination Centres in India

Total estimated population of India is 1.34 billion. Over all density of Yellow Fever Vaccination centre is 3.08 centres per 100 million populations. Density of Yellow Fever Vaccination centre is 8.82 per 100 million populations in West zone followed by South zone (2.63 per 100 million populations), East Zone (2.19 per 100 million populations) and North zone (1.86 per 100 million populations) (Table 2).

Table 2: Zone wise density of Yellow Fever Vaccination Centres

Zone of Residence in India	Population	Number of centres	Number of centres per 100 million population
North	485170416	9	1.86
South	341895768	9	2.63
Central	174122078	3	1.72
East	136935718	3	2.19
West	192819397	17	8.82
Total	1330943377	41	3.08

Out of total 150 study participants 108 (72%) were from Mumbai, 31 (20.7%) were from Maharashtra state but district other than Mumbai and 11 (7.3%) were from state other than Maharashtra. A total of 42 participants travelled from outside of Mumbai to take the YF vaccine **(Figure 2)**.



Out of 42 passengers who travelled from outside of Mumbai to take the Yellow Fever Vaccine 52.4 percent were from North zone, 42.9 percent were from West zone, 2.4 percent were from South and East zone respectively (Table 3).

Table 3: Zone of residence of passengers coming from outside of Mumbai

Zone of Residence in India	Number of Passengers	Percentage
North	22	52.4
South	01	2.4
West	18	42.9
East	01	2.4
Total	42	100.0

Out of all passengers who were from outside of Mumbai maximum were from North zone were the density of Yellow Fever vaccination centres is 1.86 per 100 million populations. The association between the number of passengers from different zones coming for vaccination and the number of vaccination centres in the same zone is statistically significant (p=0.005) (Table 4).

Table 4: Association between zone of residence of passengers and density of Yellow Fever Vaccination centres

Zone of Residence in India	Number of centres	Number of Passengers
North	9	22
South	9	01
West	17	18
East	3	01
Total	38	42

$\chi^2 = 12.7$ df=3 p=0.005

The expenditure incurred towards direct cost of Yellow Fever Vaccine was Rs 300/- only. Average total expenditure incurred for Yellow Fever Vaccination was Rs 2453/-only. Average expenditure incurred on travelling to reach to Yellow Fever Vaccination centre, for food, Lodging & Boarding and loss of salary or daily wage was Rs 1368.2/-, Rs 164.05/-, Rs 99.67/- and Rs 184.33/- respectively (Table 5).

Table 5: Out of pocket expenditure incurred by passengers for Yellow Fever Vaccination

Expenditure Head	Expenditure in Rs Mean (range)
Travel to reach to Vaccination Centre	1368.2 (60 – 26000)
Food	164.05 (0 – 1500)
Lodging & Boarding	99.67 (0 – 2500)
Loss of salary or wages	184.33 (0 – 4000)
Vaccination Charges	300.00
Total expenses	2453.22 (400 – 26950)

Out of total 150 passengers 42 were from out of Mumbai and 108 were from within Mumbai. Average expenditure incurred by within Mumbai passengers was Rs 749.95 with Standard error of Rs 109.12 only. Average expenditure incurred by out of Mumbai passengers was Rs 1147.48 with Standard error of Rs 749.95 only. The difference between average expenditure incurred by within Mumbai and Out of Mumbai passengers was statistically highly significant (p=0.0001) (Table 6).

Table 6: Association between expenditure for Yellow Fever Vaccine and the place of residence

Place of Residence	Number of Passengers	Expenditure incurred in Rs (Mean ± SE)	P value
Within Mumbai	108	749.95 ± 109.12	0.0001
Out of Mumbai	42	1147.48 ± 749.95	
Total	150	2453.22 ± 257.56	

DISCUSSION

Total estimated population of India is 1.34 billion and there are 41 Yellow Fever vaccination centres. [12,14] Out of 29 States and 7 Union Territories only 17 States and 1 Union Territory has centre for Yellow Fever Vaccination. All centers for Yellow Fever Vaccination are concentrated in large metropolitan service area or big cities and more than 40 percent of the centres are concentrated in west zone. In India the distribution of Yellow Fever Vaccination centres is very much scattered with density of 3.08 centres per 100 Million populations. As of June 2001 In the United States, 3110 Yellow Fever Vaccination centres were available to the general public and on an average each state has 1 certified centres per 100,000 population. [15,16]

In India there are 12 states and 6 union territories not having any certified centres for Yellow Fever Vaccination. Although, the number of yellow fever vaccination centers has increased during last years from 27 to 41, there is need as well as opportunity to establish new Yellow Fever Vaccination centres in India giving priority to States and Union Territories where there are no Vaccination centres and assessment of community need.

At Yellow Fever Vaccination centres of APHO Mumbai, more than 25 percents of the passengers travelled from out of Mumbai to take the Yellow Fever Vaccine. The direct cost of Yellow Fever vaccine, as fixed by Government of India, is Rs 300/- only. However, the passengers travelling from out of Mumbai incur additional expenditure on travelling, lodging boarding, food and loss of wages. This additional indirect expenditure incurred by passengers is around 8 times of the direct cost of the vaccine. Expenditure on travelling to reach to Yellow Fever Vaccination Centre was as high as Rs 26000/- only, which is around 100 times of the cost of the vaccine. Average expenditure incurred to take the Yellow Fever Vaccine was significantly higher by passengers travelled from out of Mumbai as compare to the passengers from within Mumbai.

Availability, Accessibility and Affordability are important principles of Human Rights based approach for high quality and sustainable health care services. [17] Scattered distribution and non existences of Yellow Fever Vaccination centres in many states makes it difficult to access the services at affordable cost. If the services can be made available close to the beneficiaries the indirect expenditure on accessing the services will be reduced.

CONCLUSION

In India, the distribution of Yellow Fever Vaccination centres is scattered and out of pocket expenditure incurred by vaccines are significantly higher in comparison to the cost of vaccine as fixed by the government of India.

Recommendations: More centres for Yellow Fever Vaccination need to be established. Yellow Fever Vaccination centres should be evenly distributed across the zones and states. Bringing the services more close to beneficiaries will reduce the travel time and loss of salary or income hence reducing the out of pocket expenditure for yellow fever vaccination.

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