
Original article

Unpredictable checks of yellow fever vaccination certificates upon arrival in Tanzania

Selina Schönenberger, MD¹, Christoph Hatz, MD, DTM&H^{1,2}, and Silja Bühler, MD, MSc^{1*}

¹Department of Public Health, Division of Infectious Diseases/Travel Clinic, Epidemiology, Biostatistics and Prevention Institute, University of Zurich, Hirschengraben 84, Zurich 8001, Switzerland and ²Department of Medicine and Diagnostics, Swiss Tropical and Public Health Institute, Socinstrasse 57, Basel 4051, Switzerland

*To whom correspondence should be addressed. Tel: +41-44-634-4631; Fax: +41-44-634-4984; Email: silja.buehler@uzh.ch

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Abstract

Background Yellow fever (YF) is a mosquito-borne disease, which can be prevented by vaccination. While YF vaccination (YFV) is not generally recommended for travellers to Tanzania, proof of YFV may be required upon arrival. In April 2013, the World Health Organization concluded that one dose of YFV confers lifelong protection and countries have started to adapt their entry requirements. The traveller's consultant has to balance the risk of YFV and the risk of encountering problems when entering a country without a valid YFV, especially because countries are slowly implementing the requirements.

Methods We performed a survey among 421 travellers to Tanzania with a pre-travel consultation at the Travel Clinic of the University of Zurich about their experiences with YFV certificate inspections upon arrival in Tanzania between January and November 2015.

Results There were three main findings: (i) most vaccine card checks were done while crossing the land border of Tanzania. Inspections were frequently conducted at Arusha airport, less often in Dar es Salaam and Zanzibar. In the latter a significantly larger percentage of individuals arriving by ferry/boat were checked than those arriving by plane. (ii) Checks appeared to be non-systematic. They were also performed in travellers who did not enter Tanzania from a YF-endemic country. No seasonal or daytime pattern could be identified; the thoroughness of checks varied widely. (iii) In the case of travel without valid YFV, an exemption certificate was always accepted. In travellers with neither a valid YFV nor an exemption certificate, travellers reported forced YF vaccination and fines before entry was granted.

Conclusions We recommend YFV or a YF exemption certificate for all travellers to Tanzania until further notice. The decision of whether to vaccinate against YF or to issue an exemption should be based on exposure risk to YF infection in other countries during travel.

Key words: Yellow fever vaccination, country entry requirements, Tanzania, travel medicine, yellow fever exemption certificate

Introduction

Yellow fever (YF) causes an estimated 200 000 clinical cases and 30 000 deaths per year.¹ Among travellers, the risk of acquiring YF differs depending on duration of travel, activities during travel, season and visited areas. The estimated risk for YF illness is around 1:2000 in an unvaccinated traveller to West Africa for a 2-week journey and 1:20 000 for South America.²

To date, there is no specific treatment for YF infection and prevention by vaccination is critical to avoid yellow fever virus infection. On rare occasions, severe reactions after YF vaccination (YFV) are encountered. Since 1990, 31 cases of YF 17D vaccine-associated viscerotropic disease (YEL-AVD) and 12 deaths due to the YF vaccination have been reported. These numbers exceed the reports of natural YF infections in travellers

($n = 6$) during the same time span.³ However, numbers of deaths due to natural infection were so low because most of those travelling to endemic countries were vaccinated and protected against YF. For decades, one vaccine dose was officially accepted to confer protection for 10 years. In April 2013, the World Health Organization (WHO) Strategic Advisory Group of Experts on Immunization concluded that one dose of YFV confers lifelong protection.

Travel experts must regularly advise concerned travellers on YFV due to new WHO recommendations, especially because countries are slowly adapting their entry requirements.⁴ Furthermore, the traveller's consultant has to balance the risks of YFV, acquiring the infection and encountering problems when entering a country.

Tanzania is one of the most popular tourist destinations worldwide.⁵ While YFV is not generally recommended for travellers to Tanzania, proof of YFV is officially required for those arriving from a country with endemic YF (including more than 12 h transit at airport).^{6,7} Thus, there is a large uncertainty among travellers but also among experts on whether YFV should be administered before the trip to avoid difficulties upon arrival. In addition, the 2010 yellow fever outbreak in Uganda may have led to enforced controls of YFV certificates in Tanzania.⁸

The benefit of encountering no problems on entry is an important factor influencing the decision process on vaccinating against YF when travelling to Tanzania. An exemption certificate issued by certified travel experts can be an alternative for the YFV if vaccination is not indicated for medical reasons, but only due to border regulations.

For the purpose of advising travellers to Tanzania regarding the administration of a YFV vs issuing a YF exemption certificate vs travelling without either one, it is desirable to have data on the practices of vaccination checks upon arrival. In this study, we conducted post-travel interviews in a representative sample of travellers to Tanzania to assess (i) if and (ii) where travellers encountered YFV checks upon arrival in Tanzania. Furthermore, we investigated (iii) whether travellers without a valid YFV experienced any consequences.

Methods

We performed a cross-sectional study amongst travellers to Tanzania who sought pre-travel advice at the Travel Clinic of the University of Zurich. All customers completed an electronic form before their travel consultation. All pre-travel data forms filled between January and July 2015 were retrospectively searched to identify individuals with the destination Tanzania. We contacted the individuals via e-mail and invited them to participate in the study. Questionnaire-based phone-interviews were performed between 1 October 2015 and 7 December 2015. The following information was gathered: age and sex, date of entry to Tanzania, place of entry, mode of entry (air travel, land border crossing), flight route if applicable, date of entry to Zanzibar if applicable, mode of entry to Zanzibar (air travel, boat), YFV status/exemption, inspection of the vaccination card (yes/no), level of thoroughness of inspecting vaccine certificates and consequences when no valid YFV could be

presented. By level of thoroughness the quality of inspections is meant, i.e. in how much detail were the inspections performed.

The statistical analysis of anonymized data was performed with Stata 14.0 (StataCorp LP, College Station, TX, USA). Frequency and percentages, medians and interquartile ranges were calculated. The Mann–Whitney U test and the Kruskal–Wallis test were applied to compare non-normally distributed data. Frequencies and percentages of categorical variables were compared using χ^2 or Fisher's exact tests as appropriate. Furthermore, quotations from interviews were reported to illustrate vaccine card inspection procedures. Ethics approval was obtained from the Zurich Ethics committee (KEK-ZH-Nr. 2014-0440).

Results

Overall, 488 individuals with the travel destination Tanzania were identified. Of these 421 (86.3%) could be interviewed; 226 were female (53.7%) and the median age was 33 years [interquartile range (IQR) 25–47]. Travellers arrived in Tanzania between January and November 2015.

Of these, 218 (51.8%) travellers had a valid YFV (YFV received less than 10 years ago, 'YFV group'), 146 (34.7%) had an exemption certificate ('exemption group'), and 57 (13.5%) had neither a YFV nor an exemption certificate ('neither YFV nor exemption group'). In the exemption group, 110 (75.3%) never had a YFV before, and 36 (24.7%) had received a YFV more than 10 years ago.

In the 'neither YFV nor exemption group', 52 (91.2%) had never received a YFV in the past, and 5 (8.8%) had received a YFV more than a decade ago (Table 1). Sex was similarly distributed in the three groups; age was also comparable in those with a YFV and the 'neither YFV nor exemption group' group [33 years, IQR 26–39 (neither YFV nor exemption group), 30 years, IQR 23–44 (YFV group), $P = 0.33$]. The median age was higher in those who received an exemption certificate compared with the other two groups (40 years, IQR 28–51, $P < 0.0001$). Of those who had initially received an exemption certificate, four individuals received a YFV later because they did not feel safe enough to enter Tanzania with only an exemption certificate. They were included in the YFV group.

Of all the interviewed travellers, in 119 (28.3%) the vaccination card was inspected. Most of them (79; 66.4%) had a valid YFV, 33 (27.7%) had an exemption certificate and 7 (5.9%) inspected travellers had nothing to show. None of the travellers who had received a YFV more than 10 years and did not carry an exemption certificate was checked. Several travellers had more than one arrival point in Tanzania, as many travelled from Tanzania mainland to Zanzibar, or the other way around and some had to show their vaccination cards twice. Overall, we counted 682 arrivals in the 421 interviewed travellers and 130 checks (11 were checked two times). Most arrivals were in Zanzibar ($n = 301$), followed by Arusha airport ($n = 212$), Dar es Salaam ($n = 130$), via the land border ($n = 39$).

Checks were most frequent at the land borders (25/39, 64.1%), followed by Arusha (65/212, 30.7%) and Dar es Salaam airports (15/130, 11.5%; Figures 1 and 2). The fewest checks were conducted in Zanzibar ($n = 24/301$, 8.0% of arrivals). One traveller took a domestic flight from Dar es Salaam

Table 1. Yellow fever vaccination status in 421 travellers to Tanzania

YFV status	YFV group	Exemption group	Neither YFV nor exemption group	Total
YFV before (>10 years)	14	36	5	55
No YFV before	204	110	52	366
Total	218	146	57	421

YFV, yellow fever vaccination.

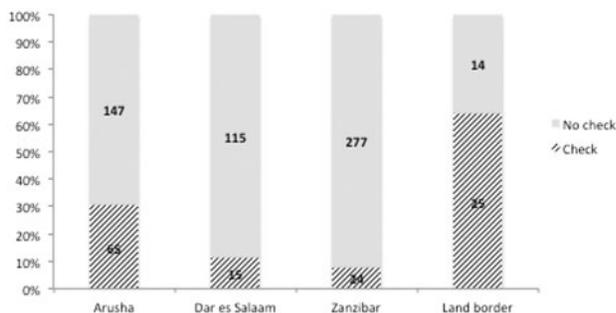


Figure 1. Percentage and number of arrivals with YFV check per entry location in Tanzania. Numbers in chart indicate number of arrivals per entry location. YFV, yellow fever vaccination

to Mwanza, where his vaccination card was checked. No seasonal or daytime pattern of checks could be identified.

Arrival from Yellow Fever Endemic Countries

We found no travellers who had stayed in a YF endemic country before arriving in Tanzania by plane. Apart from transits, individuals arriving from countries with YF endemicity (Kenya and Zambia) entered Tanzania via a land border. Vaccination cards were inspected in 24 out of 37 (64.9%) travellers coming from Kenya and in 1/1 arriving from Zambia.

Transit via Airports in Yellow Fever Endemic Countries to Mainland Tanzania

Transit flights via a YF endemic area went via Nairobi, Mombasa and Addis Ababa. In Nairobi, some travellers had to change the plane while others stayed on board; in addition, our interviewees reported that new passengers with a stay in Kenya boarded the aircraft in Nairobi. However, none of our interviewed travellers who flew from Nairobi to Tanzania had stayed in Kenya. Upon arrival in Tanzania, travellers with a transit in Nairobi were checked as follows: in Arusha 42/77 (54.5%); in Dar es Salaam 9/85 (10.6%). Vaccination card checks were performed independently of whether travellers had changed the airplane during transit.

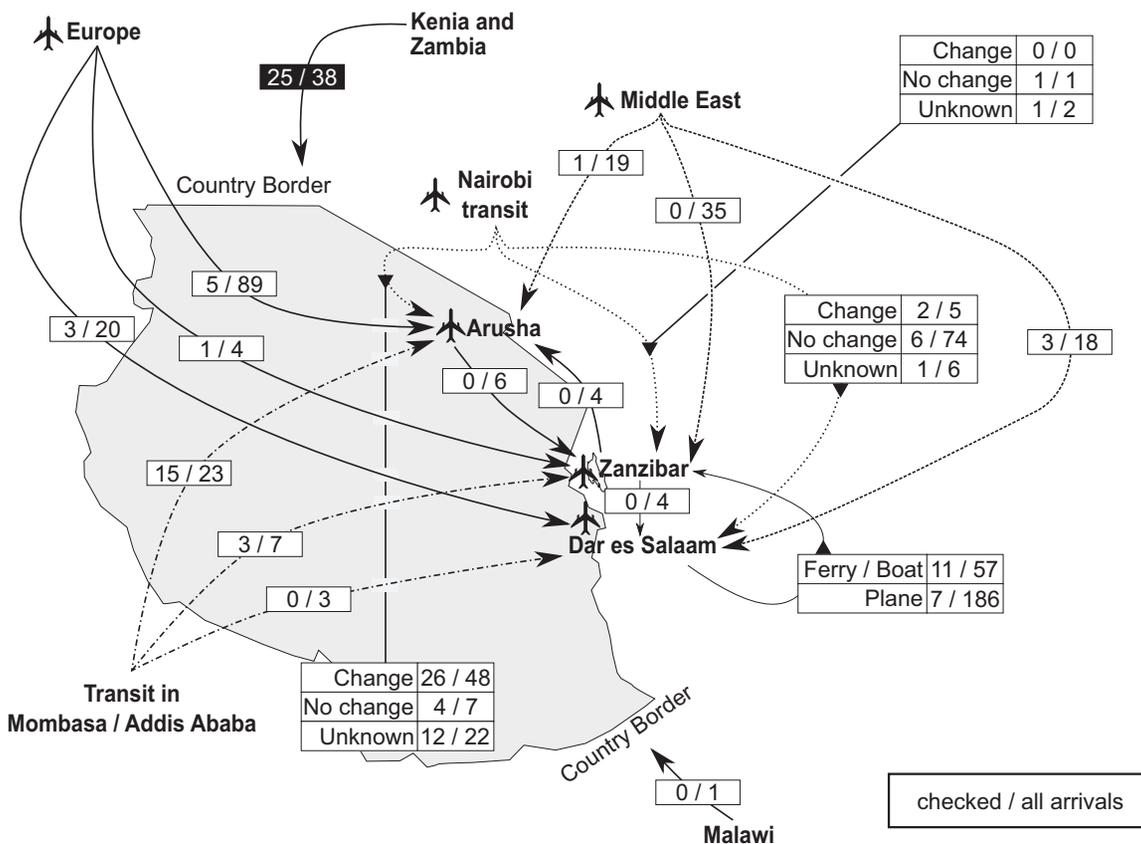


Figure 2. Map of traveller arrivals to Tanzania and performed checks (arrivals with checks/all arrivals). Change: change of aircraft, no change: no change of aircraft; Black box: officially required checks

The travellers with a transit in Addis Ababa had to show their vaccination card as follows: in Arusha 15/23 (65.2%), in Dar es Salaam 0/3.

Travel from Europe to Mainland Tanzania

Checks in travellers coming directly from Europe (without transit) were less common. Upon arrival in Arusha, 7/89 (7.9%) individuals and in Dar es Salaam 3/20 (15.0%) travellers were inspected. Similarly, when arriving from the Middle East, in Arusha 1/19 (5.3%) and 3/18 (16.7%) in Dar es Salaam had to show their vaccination card.

Travelling to Zanzibar

In Zanzibar, most checks were performed if travellers arrived via transit in Addis Ababa (2/3, 66.7%) or Kenya (Mombasa/Nairobi; 3/8, 37.5%) followed by 1/4 (25.0%) travellers arriving directly from Europe. No traveller arriving from the Middle East was checked (0/35).

Among individuals travelling to Zanzibar from mainland Tanzania, a significantly larger percentage of individuals arriving by ferry or boat (11/57, 19.3%) were inspected than those arriving by plane (7/194, 3.6% $P < 0.001$).

Thoroughness of Vaccination Card Checks and Problems Encountered When Entering Tanzania

In Arusha, the most common situation (35/66, 53.0%) was described by an interviewee as follows: 'In front of the airport building two persons wanted to see our international vaccination card. They skimmed through the pages without checking our passport. After this short look we could enter the airport building [...]'. Other typical methods for controls were: checking the vaccination card together with the passport by a customs officer in the airport building, asking for the international vaccination card and the passport by the tour guide who was taking the travellers to the visa station. One interviewee described that custom officers took random samples of the debarking travellers for YFV inspection.

In Dar es Salaam, two different techniques for the vaccination card controls were reported: either the customs officer checked the vaccination card together with the passport or vaccination controls were performed in a separate booth.

Interviewed people reported that in Zanzibar airport and ferry terminal, signposts informed travellers to have their vaccination cards ready. After debarking the ferry some travellers had to queue and to show the vaccination card without the passport. When the travellers arrived by plane some of them were asked for the vaccination card at the passport control.

At Tanzania land borders, the controls were performed more thoroughly. Four travellers described a situation similar to the following: 'At the border, there was a separated room for the vaccination card control. There sat a man and next to him was a box with needles and the YFV. If you could not show any vaccination you would receive it there'.

Of those who were checked, none encountered a problem if they could either present a valid YFV or an exemption certificate. Out of seven travellers who were checked and could not

present either of those, two arriving by bus from Nairobi had to pay a fine of around 80 US dollars before proceeding across the border without vaccination. The other five travellers arriving from Kenya via land border encountered no problems or could enter after a short discussion.

Twelve interviewees reported that they observed travellers being vaccinated at the airport; 11 in Arusha and one in Dar es Salaam. Two interviewees observed other travellers who could not obtain a visa because they could not show an international vaccination card on arrival in Zanzibar and at the land border.

Discussion

We present the results from 421 post-travel interviews among Swiss travellers regarding their experiences with YFV inspections when travelling to Tanzania, one of the most frequent destinations of European travellers. Our objectives were to assess if, where and how travellers encountered YFV checks upon arrival in Tanzania, a country where according to official recommendations YFV is only indicated when entering from a country with risk of YF virus transmission or having a more than 12 h transit in a YF endemic country (6). To our knowledge, no other study has investigated YF vaccine card checks in Tanzania or any other country.

It was difficult to identify a pattern for conducted checks. They were done in travellers entering from a YF endemic country, transiting via a YF endemic country, but also in those arriving from a country without YF endemicity. Furthermore, checks were performed throughout the whole observation period and at any time of the day. In the case of travel without valid YFV, an exemption certificate was always accepted whilst travellers who had nothing to show experienced problems (e.g. forced YFV, fines).

Vaccine cards of more than half of all travellers arriving in Arusha with a transit in a YF endemic country were inspected irrespective of whether individuals had changed the plane or stayed on the same plane. Fewer travellers arriving from the Middle East or Europe were checked. In Dar es Salaam, on the contrary, most travellers who were checked came from Europe or the Middle East. It remained unclear why the control pattern differed between Arusha and Dar es Salaam airports. Especially in Arusha, a large percentage of travellers with a transit in a YF endemic country were inspected. We believe that this was the case because vaccination card controls were often conducted independently of passport controls. Thus, the inspectors could not differentiate whether a passenger had only a transit in, e.g. Nairobi or whether he/she had newly boarded the plane after a stay in the Kenya/Ethiopia.

If the official recommendation had been followed, only travellers with a prior stay in a YF endemic countries should have been checked. In our study, this would have meant that 38 travellers should have been inspected. In this group, 65.8% of travellers were checked. All other interviewed travellers should not have been checked according to official recommendations. However, in this group, 104 inspections in 643 entries (16.2%) were conducted.

The quality of the checks appeared to differ not only from entry place to entry place but also from situation to situation. The procedure of checking the YF status ranged from a short

question by a custom officer over a short look into the international vaccination card without checking the traveller's identity to a detailed control with checking the date of the vaccination and the passport. Also the consequences of not having a valid YFV or exemption certificate ranged from a discussion over paying a fine to receiving the vaccination at the border. In case of travel without valid YFV, an exemption certificate was always accepted ($n = 33$). None of those encountered any problem or discussion upon entry to Tanzania.

Strengths and Limitations

A strength of our study is the high response rate: more than 85% of all contacted travellers could be interviewed. Thus, we believe that the studied population is representative of the individuals with a travel consultation to Tanzania at the Zurich Travel Clinic. Furthermore, travellers were contacted in a timely manner, limiting recall limitations.

Potential limitations include that numbers for some entry routes were small and thus generalisability is uncertain. Furthermore, we did not ask whether transits were shorter or longer than 12 h. Officially YFV is required if the transit is longer than 12 h.⁶ However, none of the interviewees reported to have been asked about the duration of transit at the airport control.

Conclusion

The pattern of checks of YF vaccination certificates and consequences do not appear to follow a rational procedure. Based on those inconsistent and unpredictable practices at Tanzanian borders we recommend YFV or a YF exemption certificate for all travellers to Tanzania until further notice. The decision of whether to vaccinate against YF or to issue an exemption should

be based on exposure risk to YF infection in other countries during travel. Travellers should be informed that YFV cards checks may be encountered independently of travel route and transit status.

Conflict of interest: None declared.

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