First teleconference
17 December 2015
2:00 to 3:30 pm Geneva time
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The first teleconference of the World Health Organization (WHO) Scientific and Technical Advisory Group on Yellow Fever Risk Mapping (GRYF) was held on 17 December 2015. The list of participants in the teleconference is included in Annex 1. This report summarizes the briefing session given to this newly established advisory group, as well as the group’s discussions and decisions regarding future action on country requests for yellow fever risk classification.

**Welcome and introduction**

The Director of WHO’s Department of Global Capacities Alert and Response (GCR) welcomed participants of the group and explained the background to, and rationale for, the establishment of the GRYF.

In 2008 WHO’s Informal Working Group on Geographic Risk of Yellow Fever was established with the objective of harmonizing global risk mapping of yellow fever (YF). Many participants in the GRYF had been involved in the work of the informal working group and their contributions were acknowledged. In 2011 the revised mapping was published on WHO’s *International Travel and Health* website and in the Organization’s print publication of the same name which include annual up-to-date summaries of country requirements on yellow fever vaccination and WHO recommendations for yellow fever and other diseases. Because of the need for expert opinion on proposed changes submitted by countries, the GRYF was established following a request by WHO Member States during the Sixty-fourth World Health Assembly in May 2015 (Resolution WHA64.8); its terms of reference and membership are available on the WHO website[^1].

**Declarations of Interests by GRYF members**

In accordance with WHO policy, each expert was required to complete a Declaration of Interests form in advance of the teleconference to inform WHO of any actual or potential conflicts of interest that they might have in relation to the subject matter of this meeting. No interests declared were deemed relevant to the work of the group. GRYF members were reminded that they serve in their individual capacities as international experts providing advice to WHO exclusively. For any future teleconferences, it was noted that WHO’s Declarations of Interests policy requires all experts providing advice to the Organization to submit to the WHO Secretariat on an ongoing basis any information relating to real or perceived conflicts of interest. Accordingly, GRYF members and advisers were requested to supply WHO with updated declarations of interest whenever necessary, and at a minimum before each teleconference of the group.

**Election of the Chair, Vice-chair and Rapporteur**

The Secretariat proceeded with the election of the Chair, Vice-chair and Rapporteur as follows:

**Chair**

Dr Pedro Fernando da Costa Vasconcelos
Head, Department of Arbovirology and Hemorrhagic Fevers

Role of the advisory group, working tools and publication

The Secretariat presented the rationale for the establishment, scope of work and functions of the GRYF, as well as methods of work, the International Travel and Health website and the electronic information platform available to the group.

WHO was mandated by the World Health Assembly resolution WHA64.8 to establish the GRYF advisory group. The resolution provides for countries with areas at risk of yellow fever to participate in this group and, in consequence, most members are from WHO regions with countries where yellow fever is endemic. Depending on the agenda, the group may decide to invite a country where risk classification is being discussed to present its request and justification for risk classification.

Resolution WHA64.8 defines two objectives for the advisory group. The first is to maintain up-to-date yellow fever risk mapping, which is updated annually on WHO’s International Travel and Health website and the accompanying publication². The second objective is to provide guidance on yellow fever vaccination for travellers in ways that facilitate international travel. This guidance is available from the “Country list” document on the same website.

Under the IHR WHO is mandated to determine areas at risk for yellow fever. Annex 7 of the IHR stipulates that “Vaccination against yellow fever may be required of any traveller leaving an area where the Organization has determined that a risk of yellow fever transmission is present”. These areas are published in Annex 1 of International Travel and Health.

Annex 7 was amended during the World Health Assembly in May 2014 and stipulates that the period of protection afforded by yellow fever vaccination, and the term of validity of the vaccination certificate, will change from 10 years to the duration of the life of the person vaccinated. This change will enter into force legally in July 2016. However, some states have already enforced this recommendation. This information is summarized in Annex 1 of International Travel and Health.

² See Annex 1 and maps on WHO website, [http://www.who.int/ith/](http://www.who.int/ith/)
The scope of work of the GRYF is based on the latest WHO position paper on yellow fever vaccination. WHO recommends yellow fever vaccination with three objectives. The first is to protect population living in areas subject to endemic and epidemic disease. This is covered by the Yellow Fever Initiative (YFI) and is conducted by the WHO technical unit responsible for yellow fever control. The second objective is to protect travellers visiting areas with risk of yellow fever, and the last objective is to prevent international spread by minimizing the risk of introduction or re-introduction of the virus by viraemic travellers. The work of the GRYF will focus on the latter two objectives. This will be done in close collaboration with the technical unit responsible for yellow fever control.

In order to achieve these objectives, the advisory group will advise the IHR Secretariat on the following points:

- definition of criteria for inclusion/exclusion of countries/areas with risk of yellow fever transmission;
- review of requests received from Member States, including the public health justification and scientific data needed for the GRYF to decide whether or not to add or remove countries/areas with risk of yellow fever;
- collection, review and analysis of new epidemiological data on yellow fever transmission;
- promotion of the international harmonization of yellow fever risk mapping.

The group will meet regularly via teleconferences and may also organize face-to-face meetings. The meeting report is drafted by the Secretariat and submitted to the Rapporteur and Chair after consultation with the group. Members and advisers will be granted access to an EZcollab electronic platform to share background information and documents. The webpage for the GRYF is available from the WHO web site.

The group requested the terms of reference of the yellow fever risk assessment group working under the umbrella of the Yellow Fever Initiative.

**Informal WHO Working Group on Geographic Risk Mapping for Yellow Fever**

The Secretariat presented the revisions to yellow fever risk mapping since 2008. The revision process was triggered by the following:

- viscerotropic and neurological adverse events;
- the re-emergence of transmission of yellow fever virus in Paraguay in 2008 although the last human case was reported in 1974;
- the need to harmonize recommendations specifically for international travellers going to areas with risk of yellow fever virus transmission;
- the requirement of the IHR 2005 revision that WHO should provide a list of countries at risk for yellow fever transmission.

A first international consultation was organized in September 2008 to:

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3 [http://www.who.int/ith/yellow-fever-risk-mapping/en/]
• propose factors for describing yellow fever risk mapping;
• create classifications of risk;
• define where vaccine is recommended;
• review criteria for inclusion/removal of countries from the list of those at risk for yellow fever transmission.

The consultation discussed a number of factors, including:

• ecological factors in yellow fever virus transmission;
• presence and distribution of yellow fever vectors and nonhuman primate hosts;
• reported human and nonhuman primate yellow fever cases;
• historical human sero-surveys;
• detection of the yellow fever virus in vectors and nonhuman primate hosts.

On the basis of these discussions, four levels of risk for yellow fever transmission were defined, namely: endemic, transitional, low risk and no risk.

An informal working group on the geographic risk of yellow fever was then formed and met regularly by teleconference as from September 2008. The yellow fever risk mapping of each country was reviewed on the basis of agreed criteria, published resources, country reports and expert opinions, and the decisions were incorporated into a database. The working group produced a risk classification and recommended vaccination in endemic and transitional areas. It was agreed that, in low-risk areas, consideration of whether to vaccinate must weigh potential exposure to yellow fever (e.g. prolonged travel, heavy exposure to mosquitoes, inability to avoid mosquito bites) against individual risk factors for vaccine-associated adverse events. Revised and more detailed risk maps and vaccination maps were produced.

Special considerations were agreed as follows for:

**Areas of low risk**
- Port cities for cruise ships in South America, e.g. Cartagena, Barranquilla (Colombia); Port of Spain (Trinidad and Tobago);
- Tourist cities, e.g. Nairobi (Kenya); Asuncion (Paraguay).

**Areas of no risk**
- Inca Trail and Machu Picchu;
- Travellers spending less than 12 hours in an airport of a country with yellow fever were not considered to be at risk.

A second international consultation was held in 2010 to review and endorse the working group’s proposals prior their publication in WHO’s *International travel and health* and other international publications.

The working group was able to work on the harmonization of recommendations for travellers, using the best available evidence to make decisions on risk classification in a transparent manner. All countries and areas at risk of yellow fever were reviewed.
The working group drew attention to the lack of consistency between country requirements regarding the age of vaccination, and it was suggested that the GRYF could initiate a discussion with countries on this issue. WHO recommends that the yellow fever vaccine is contraindicated in infants under 6 months of age and is not recommended for those aged 6–8 months, except during epidemics when the risk of yellow fever virus transmission may be very high. To protect populations living in areas at low risk of yellow fever transmission, WHO recommends routine immunization of children. In areas at low risk, preventive mass campaigns are not recommended.

The risk of introduction of yellow fever virus into vulnerable countries such as India was underlined by the working group, as was the importance of monitoring the circulation of yellow fever in countries. Key elements to consider when evaluating the risk for travellers were the national capacity to conduct surveillance and national measures to control yellow fever virus circulation in vectors, non-human primates and humans.

**Evidence-based decision-making**

The secretariat informed the GRYF that, since 2008, an increase in the circulation of yellow fever virus had been reported in Africa (Central African Republic, Cameroon) and the Americas (Argentina, Brazil, Colombia, Trinidad and Tobago, Venezuela). Consequently, a group of yellow fever experts developed a [multidisciplinary risk assessment tool](#), which includes sero-surveys in human and nonhuman primates as well as assessment of vector density and infectivity. Ecological and environmental indicators are also included in the risk assessment to attempt to explain why the changes have occurred and, potentially, to predict future risk. The risk assessment tool was first used in the Central African Republic where multiple outbreaks had been reported in a short period in different areas of the country. The main objective was to assess the perceived increase in yellow fever virus circulation in the previous years and in areas where historically the virus had not been found. The risk assessment tool provides information about ecological areas of risk in zones where yellow fever virus is circulating.

The proposed methodology aims to support a more systematic approach to data collection and analysis in order to assess yellow fever virus circulation and risk in an area, and to determine appropriate vaccination strategies. As more assessments and data become available, attempts will be made to establish criteria for comparing the level of risk of yellow fever virus transmission in the areas studied. These criteria are expected to better inform future decisions and developments, such as mathematical modelling, and to support other decision-making tools. The working document was initially implemented in Cameroon and Central African Republic. It was then revised and validated during an informal consultation of yellow fever experts on 13–14 September 2011 in Geneva, Switzerland.

Under the Yellow Fever Initiative, WHO and key partners assist Member States to adapt and use this yellow fever risk assessment tool to make relevant decisions on yellow fever vaccine policy and protect their populations from the disease. The assessment tool will be completed by a quantitative scoring method that will aid the decision-making process at national level.
Nevertheless, it was noted that this tool was not adequate for demonstrating the absence of yellow fever virus circulation. However, it could be adapted if at least two studies could be done in a specific area at an interval of 5–7 years, which represents the cycle of yellow fever virus circulation.

The Technical Report Recommendations for Scientific Evidence-Based Yellow Fever Risk Assessment in the Americas is available from the website of the Pan American Health Organization (PAHO).

Participants proposed using experience and expertise to fill the information gap where the tool cannot. Mathematical modelling may also be useful in determining parameters to estimate risk.

Follow-up on pending country requests

A brief summary of the four pending country requests was presented by the Secretariat.

Argentina

Argentina requested that, under the section on “Countries with risk of yellow fever transmission” in WHO’s International travel and health publication, Argentina’s risk of yellow fever should be limited to Corrientes and Misiones provinces since only these provinces are considered transitional areas.

Argentina also requested that it should be put on record that the rest of the country, which is home to more than 95% of the population, is risk-free and that, in the transitional areas, yellow fever vaccination is included in the national immunization schedule which is compulsory and is provided free of charge by the government.

The Argentinian proposal was as follows:

- Transitional area, Corrientes and Misiones provinces: travellers from this area must produce a certificate of vaccination when travelling internationally and if requested.
- Risk-free area, rest of the country: travellers from this area do not require vaccination when travelling internationally

Argentina maintained that, in accordance with the IHR, the term “affected area” is not the same as an affected country. Therefore, if travellers from risk-free zones are required to be vaccinated in order to enter other countries, Argentina will ensure that certificates of exemption from vaccination are issued by a physician.

Panama

The Ministry of Health has indicated that the provinces of Colon and Panama should be designated as “no risk” areas, whereas the informal working group on yellow fever geographic mapping considered parts of these provinces east of the Canal to be transitional areas, with a recommendation for vaccination of travellers.

Peru

The text of the 2015 edition of International Travel and Health reads as follows on Peru:

“Recommended for all travellers aged 9 months or over going to the following areas at altitudes below 2300 m: the Regions of Amazonas, Loreto, Madre de Dios, San Martin, Ucayali, Puno, Cuzco; Junín, Pasco and Huánuco and designated areas of the following Regions far-north of Apurímac; far
northern Huancavelica; far-north-eastern Ancash; eastern La Libertad; northern and eastern Cajamarca; northern and north-eastern Ayacucho, and eastern Piura.

Generally not recommended for travellers whose itineraries are limited to the following areas west of the Andes: Regions of Lambayeque and Tumbes and the designated areas (Map) of western Piura and south, west and central Cajamarca.

Not recommended for travellers whose itineraries are limited to the following areas: all areas above 2300 m altitude, areas west of the Andes not listed above, the cities of Cuzco and the capital city of Lima, Machu Picchu, and the Inca Trail.”

However, Peru proposed changes as follows:

Recommended for all travellers aged 9 months or over going to the following areas at altitudes below 2300 m: the entire regions of Amazonas, Loreto, Madre de Dios, San Martin and Ucayali, and designated areas (Map) of the following regions: far-north-eastern Ancash; northern Apurímac; northern and north-eastern Ayacucho; southern and eastern Amazonas, northern and eastern Cajamarca; north-western, northern and north-eastern Cuzco; far-northern Huancavelica; northern, central and eastern Huánuco; northern and eastern Junín; eastern La Libertad; central and eastern Pasco; eastern Piura; and northern Puno.

Kenya

Kenya conducted a yellow fever risk assessment in 2013. A national consensus meeting was held and its conclusions and recommendations were approved by the Independent Expert Group on Yellow Fever Risk Assessment.

Low prevalence of naturally-acquired yellow fever antibodies was reported in humans in the different ecological zones (< 1.7%). A preventive mass campaign was not recommended. As naturally-acquired antibodies were reported to be low, Kenya requested that the yellow fever vaccination recommendation for travellers be discontinued.

In line with the field results on yellow fever virus circulation, routine immunization will be introduced in two additional districts.

Closing remarks

The Chair proposed the creation of a working group composed of GRYF members and advisers to review each country request and to present a set of options to the Advisory Group. The request from Peru would be considered a top priority if changes were to be included in the next edition of *International Travel and Health*, anticipated for April 2016. Regarding the requests from Argentina, Kenya and Panama, the working group might need more time to analyse the situation and propose options.

The GRYF agreed to meet again via teleconference on 28 January 2016, at 14:00 Geneva time. In the meantime proposals for working groups to follow up on pending issues would be shared by the Chair and background documents would be posted on the EZcollab site.
Annex 1 List of participants

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