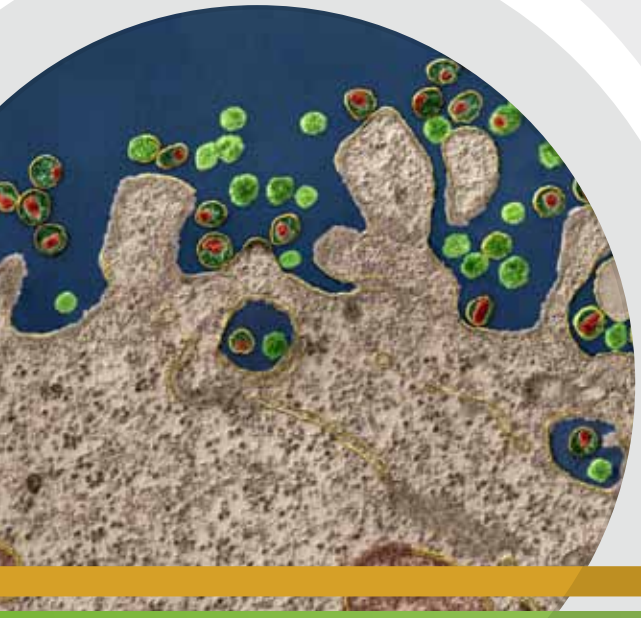

TECHNICAL REPORT

Geographical distribution of areas with a high prevalence of HTLV-1 infection

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ECDC TECHNICAL REPORT

Geographical distribution of areas with a high prevalence of HTLV-1 infection

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This report was commissioned by the European Centre for Disease Prevention and Control (ECDC), coordinated by Dragoslav Domanović and produced by Antoine Gessain and Olivier Cassar (Institut Pasteur, Unité d'Epidémiologie et Physiopathologie des Virus Oncogènes, Département de Virologie, Paris, France).

The report was reviewed by the following external experts: Hans Zaaijer, Sanquin Blood Foundation, Amsterdam, the Netherlands; George Galea, National Tissue Service, Tissue and Cells Directorate, SNBTS, Edinburgh, UK; Mika Salminen, Head of Virology Unit, Department of Infectious Disease Surveillance and Control, Institute of Health and Welfare, Helsinki, Finland; Ramadan Jashari, President of the European Association of Tissue Banks, Belgium; Paolo Grossi, Università degli Studi dell'Insubria, Varese, Italy, Graham Taylor, Professor of Human Retrovirology, Retrovirology & GU Medicine, Imperial College London, Jefferiss Research Trust Laboratories, St Mary's Campus, London, UK.

Declarations of interest were received from the contractor(s) in accordance with ECDC's Independence Policy and no conflict was identified.

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Abbreviations

ATLL	Adult T-cell leukaemia/lymphoma
ECDC	European Centre for Disease Prevention and Control
ELISA	Enzyme-linked immunoabsorbent assay
EU	European Union
HTLV – 1/2	Human T-cell leukaemia/lymphoma virus type 1 and type 2
IFA	Immuno-fluorescence assay
INNO-LIA	Innogenetics line immunoassay
PA	Particle agglutination
PCR	Polymerase chain reaction
STLV-1	Simian T-cell leukaemia virus type 1
SoHO	Substances of human origin
TSP/HAM	Tropical spastic paraparesis/HTLV-1 associated myelopathy
WB	Western blot

Executive summary

In November 2012, the EU Commission adopted the Directive 2012/39/EU amending Directive 2006/17/EC as regards certain technical requirements for the testing of human issues and cells intended for human application.

In line with ECDC's recommendations provided in the 'Risk Assessment of HTLV-1/2 transmission by tissue/cell transplantation' dated 14 March 2012, this Directive replaces the term 'incidence' with 'prevalence' in the description of endemic areas of HTLV-1/2 infection. According to the new requirements 'HTLV-1 antibody testing must be performed for donors living in, or originating from high-prevalence areas or with sexual partners originating from those areas or where the donor's parents originate from those areas' and this applies to both donors of non-reproductive tissues and cells and reproductive cells. In order to assist Member States with the implementation of the new requirements, the EU Commission asked ECDC to construct a map indicating HTLV-1 high-prevalence areas in the world.

ECDC contracted experts from the Institut Pasteur in Paris to systematically review the published evidence on the distribution of HTLV-1 infection prevalence throughout the world and to identify high-prevalence countries and areas. An ad-hoc group of experts then critically reviewed the list of countries with identified status of HTLV-1 infections and agreed on the determined prevalence. ECDC subsequently constructed the maps according to the agreed list, compiled the data and prepared a technical document.

Request from the European Commission

On 26 August 2013, ECDC received the following request from the European Commission's Directorate-General for Health & Consumers – Health systems and products [transcript]:

Dear Dr Sprenger,

Subject: Request for ECDC to generate a global map of HTLV-1 high-prevalence areas for the implementation of the Directive 2012/39/EU.

In November 2012 the Commission adopted Directive 2012/39/EU amending Directive 2006/17/EC as regards certain technical requirements for the testing of human tissues and cells for human application.

In line with ECDC's recommendations provided in the 'Risk assessment of HTLV-1/2 transmission by tissue/cell transplantation' from 14 March 2011, this Directive replaced the term 'incidence' with 'prevalence' in the description of the endemic areas for HTLV-1/2 infection. According to the new requirement, 'HTLV-1 antibody testing must be performed for donors living in , or originating from, high-prevalence areas or with sexual partners originating from those areas or where the donor's parents originate from those areas' for both donors of non-reproductive tissues and cells and reproductive cells.
The Member States need to transpose the new requirements by 17 June 2014 at the latest. After this date, a full and harmonised implementation of the requirements of the Directive 2012/39/EU concerning HTLV-1 testing relies on the use by all Tissues and Cells National Competent Authorities of a single map indication the HTLV-1 high prevalence areas.

In this regard, we would like ECDC to construct this map indicating the HTLV-1I high prevalence areas in the world, to be used by all Tissues and Cells National Competent Authorities when assessing the suitability of tissues and cells donors. As suggested in the 'Risk assessment of HTLV-1/2 transmission by tissue/cell transplantation', and unless recent data invalidate the recommended threshold, a prevalence over 1 % in the general population or prevalence of over 1/10.000 among first-time blood donors could be considered as indicators of high prevalence and endemic transmission of HTLV-1.

Considering the planned timing we would appreciate if ECDC could complete its work by 1 June 2014.
My services remain at your disposal for further information. On this matter, you can contact Ms. Ioana Siska or Mr. Stefaan Van der Spiegel, who are responsible for this dossier. Their respective phone and e-mail addresses are indicated below.

Yours sincerely,

Signed Andrzej Rys

Background

In 1980, HTLV-1 (human T-cell leukaemia/lymphoma virus type 1) was the first oncogenic human retrovirus to be discovered. HTLV-1 is present throughout the world with clusters of high endemicity in southern Japan, the Caribbean region, areas of South America and tropical Africa and foci in the Middle East, Australia and Melanesia. The origin of this puzzling geographical distribution is probably linked to a founder effect in certain human groups. It is estimated that there are at least 5–10 million people worldwide with HTLV-1 infection. HTLV-1 has three modes of transmission: mother-to-child, mainly linked to prolonged breast-feeding; sexual, mainly occurring from male to female, and via transplantation of organs, tissues and leucocyte-rich blood components. From a molecular point of view, HTLV-1 possesses a remarkable genetic stability, an unusual feature for a retrovirus. Viral amplification via clonal expansion of infected cells, rather than by reverse transcription is, very probably, the reason for this striking genetic stability. The low sequence variation of HTLV-1 can be used as a molecular tool to follow the migration of infected populations in the recent or distant past and thus to gain new insights into the origin, evolution and mode of transmission of such retroviruses and of their hosts. The few nucleotide substitutions observed among virus strains are specific to the geographical origin of the patients rather than pathology. HTLV-1 has a simian origin and was originally acquired by humans through interspecies transmission from STLV-1 (simian T-cell leukaemia virus type 1) infected monkeys in the Old World (Africa, Europe and Asia). Such zoonotic transmission is still ongoing in some African regions. HTLV-1 is the etiological agent of two severe diseases, which are relatively frequent in the main HTLV-1-endemic areas: a malignant T CD4+ cell lymphoproliferation, of very poor prognosis, known as adult T-cell leukaemia/lymphoma (ATLL) and a severe chronic neuro-myelopathy named Tropical Spastic Paraparesis/HTLV-1-associated myelopathy (TSP/HAM). Other diseases are associated to HTLV-1 infection in some high endemic areas, such as uveitis in Japan, infective dermatitis in Jamaica, Brazil and Africa. Despite some improvement, especially for ATLL, therapy of the HTLV-1 associated diseases remains disappointing and discouraging. Symptomatic treatment remains the mainstay of therapy of TSP/HAM. While the clinical aspects and the physiopathology of the HTLV-1-associated diseases, as well as the modes of transmission of this virus, have been well studied and defined, there is still little known about world distribution and the global and regional estimation of HTLV-I prevalence. This lack of knowledge is mainly due to four different factors:

- Several large regions/areas have not been investigated for HTLV-1 infection. Thus, the prevalence in the general population remains largely unknown in several areas of the world. This is evident in some highly-populated regions of Asia and in North and East Africa.
- The assays used for HTLV-1 serology exhibited a lack of specificity, causing HTLV-1 prevalence to be overestimated in the 1980s and 1990s.
- Most of the work done on assessing the prevalence of HTLV-1 is based on the study of blood donors, pregnant women and hospitalised patients. Population-based studies to estimate HTLV-1 prevalence in large areas, or even at a country level, remain very rare.
- More particularly, in most of the studied areas, HTLV-1 distribution is not homogeneous. HTLV-1 is present, mainly as relatively small foci or clusters with a high or very high prevalence of infection, yet nearby there can be areas with quite low endemicity. This has been very well illustrated in southern Japan and some areas of South America and Central Africa. Thus, a precise estimation of HTLV-1 prevalence in the general population of a specific country or area is relatively difficult and, in some cases, nearly impossible.

Very few studies have given an estimate of the global prevalence of HTLV-1. Japan and the African continent have been generally considered to be the two regions in which HTLV-1 infected persons were most numerous. South America has also been considered to be a significant locus of HTLV-1 carriers. In a pioneer study carried out twenty five years ago, de The and Bomford estimated the total number of HTLV-1 carriers to be 10–20 million people [1]. At that time, large regions had not been investigated, few population-based studies were available and the assays used for HTLV-1 serology were not specific enough. Recent estimates suggest that there are at least 5–10 million HTLV-1 infected individuals [2]. However, these results were based only on individuals originating from known endemic areas with reliable epidemiological data, representing a base population of approximately 1.5 billion. Correct estimates in other highly-populated regions, such as China, India, North West Africa and East Africa are not available and the current number of HTLV-1 carriers is probably much higher.

HTLV-1 epidemiology

Populations studied

Most prevalence studies have been performed on series of blood donors, pregnant women or hospitalised patients. In very few instances, there have been population-based studies done in villages, towns or regions of a given country. The epidemiological and demographic characteristics of blood donors could be very different depending on the country. In some areas they can be quite representative of the middle-class population but in other areas, either they are mainly the family members of hospitalised patients, or they originate from less well-off socio-economic populations and sometimes give blood to get paid. Finally, in several areas (especially in some African studies) they are mainly young men. HTLV-1 prevalence varies according to age, sex and economic status in most of the HTLV-1 endemic areas. Therefore, although the prevalence among blood donors can be useful, it does not always provide the best data for accurately estimating the HTLV-1 prevalence in a given country. In most cases the real prevalence is probably higher than that found in blood donors. For this reason, data based on pregnant women are generally more useful for comparing the situation between different areas or countries since they are quite representative of a given region and the mean age of pregnant women is generally comparable (about 22 to 26 years) in most countries. Studies done in general populations among adult in- or out-patients can also be very useful for trying to estimate the HTLV-1 prevalence in a given area since the vast majority of patients tested do not have any of the very rare diseases specifically linked to HTLV-1 infection.

Serological and molecular methods for the diagnosis of HTLV-1 infection

Diagnostic methods used for the study of HTLV-1 infection are mainly serological assays, searching for antibodies directed specifically against various HTLV-1 antigens. Screening tests are usually enzyme-linked immunoabsorbent assay (ELISA) [3-5] or particle agglutination (PA) [6-8]. Confirmatory tests can be immuno-fluorescence (IFA) [3, 9, 10], but are mostly Western blot (WB) [11, 12] or Innogenetics line immunoassay (INNO-LIA) [5]. Research can also be done on the integrated provirus, in the DNA from peripheral blood cells, by means of qualitative and/or quantitative polymerase chain reaction (PCR). Despite some improvements in WB assay specificity over the last two decades, indeterminate serological patterns remain frequent following WB analysis, and represent an important concern for routine screening in blood banks across Europe, in the Americas and in some parts of Africa. It is also, of course, a major issue for comparative analyses between epidemiological studies performed in areas of both low and high endemicity, especially in tropical areas [13, 14]. The significance of these frequently indeterminate WB varies but in most cases, it remains unknown and a matter of debate (reviewed in Filippone et al. [13]). In rare cases, the patterns have been associated with HTLV-1, but mainly HTLV-2 infection, exhibiting an atypical HTLV-serology; HTLV-1 seroconversion, or infection with a different retrovirus such as the recently discovered HTLV-3 or HTLV-4 [15]. Furthermore, some have been considered to be the results of cross-reactivity with other microbial agents, especially Plasmodium falciparum in Central Africa and Indonesia [16, 17].The molecular methods include amplification of the proviral DNA by polymerase chain reaction. The proviral DNA is commonly obtained from peripheral blood mononuclear cells or peripheral blood buffy-coats. The main genomic regions targeted are the pol and tax genes. These PCR methods, mainly in-house ones, have been useful to discriminate between HTLV-1 and HTL V-2 infections. Furthermore, they also clarify the infection status of individuals exhibiting an HTLV or an indeterminate WB profile.

Major epidemiological determinants of HTLV-1

HTLV-1 is not a ubiquitous virus. It is present throughout the world, with clusters of high endemicity often located near areas where the virus is almost absent [18, 19]. In these foci, the HTLV-1 seroprevalence in adults is estimated to be at least 1–2% but it can also reach 20–40% among people aged over 50 years in specific clusters. The main highly endemic areas are the south-western part of Japan, some parts of the Caribbean and its surroundings regions. There are foci in South America, especially in parts of Colombia and French Guyana, some areas of intertropical Africa (such as south Gabon) and in the Middle East (such as the Mashhad region in Iran) and rare isolated clusters in Australia and Melanesia. In Europe, the only country with an endemic HTLV-1 region is Romania. The origin of this puzzling geographical or rather ethnic repartition is not well understood, but is probably linked to a founder effect in some groups, followed by the persistence of a high viral transmission rate. Interestingly and despite different socio-economic and cultural environments, HTLV-1 seroprevalence increases gradually with age, especially in women, in all the highly-endemic areas. The general increase with age may be related to a cohort effect, as is well demonstrated in Japan, while the increase seen in older women might also be due to an accumulation of sexual exposures with age [18,20-23].

Three modes of transmission have been demonstrated for HTLV-1:

- Mother to child transmission, which is mainly linked to prolonged breast-feeding (longer than six months) [24]. Ten to 25 % of the breast-fed children born whose mothers are HTLV-1 infected will become infected. A high level of HTL V-1 proviral load in milk and in blood cells as well as high HTLV-1 antibody titers in the serum and long duration of breast-feeding (at least > 6 months) represent major risk factors for HTL V-1 transmission from mother to child [24-28].
- Sexual transmission, which mainly, but not exclusively, occurs from male to female and is thought to be responsible for the increased seroprevalence with age in women [22, 29-32].
- Transmission with contaminated blood products (containing HTLV-1 infected lymphocytes) which is responsible for an acquired HTLV-1 infection among a high proportion (15–60%) of the blood recipients [33, 34]. HTLV-1 infection is also present among intravenous drug users but to a lesser extent than HTLV-2 [35]. HTLV-1 has also been transmitted during organ transplantation [36].

HTLV-1 infection in transfusion and transplantation

Immunosupression and HTLV-1 positive recipients of organ transplants

The impact of immunosuppression on the natural history of HTLV-1 infection has not been completely investigated. Very few cases of HTLV-1 associated disease have been reported in immunosuppressed HTLV-1 positive recipients of an organ transplant. In one study among 26 HTLV-1 positive recipients of liver transplants from living donors, four (15%) developed ATL with fatal outcomes in all cases [37]. Another study of 10 HTLV-1 positive kidney recipients with long-term follow-up revealed no HTLV-1 disease [38]. Additionally, there were no differences in overall post-transplant survival between HTLV-1 positive and HTLV-1 negative recipients [37]. According to current recommendations, persons seropositive for HTLV-1 can be accepted for transplantation. However, such potential recipients should be informed and give consent regarding the risk of HTLV-1 associated disease before transplantation.

Donor derived HTLV-1 infections

Transmissions of HTLV-1 infection through blood transfusion [39, 40], liver [41-43], kidney [41, 42, 44], hematopoietic stem cells [45, 46] and bone [47] transplantation have been reported. The risk of HTLV-1 transmission by transfusion and transplantation varies with the prevalence of the HTLV-1 infection in the general and donor population. The type of substances of human origin (SoHO) that may contain various numbers of lymphocytes is another variable that influences transmission, as is the diagnostic window period which varies between 41 and 65 days or more in the case of transfusion-transmitted HTLV-1[48].

According to EU Directive, persons with HTLV-1 infection should be permanently deferred from donation of blood and blood components although routine screening of blood donation is not recommended [49]. The risk of HTLV-1 transmission in the EU is estimated to be small due to the low prevalence of HTLV-1 infection in the blood donor population; wide use of universal leukoreduction; rare use of fresh blood components and pathogen inactivation of platelets. The main goals of prevention strategy are minimising organ wastage due to false-positive screening and avoiding donor-derived HTLV-associated diseases. Reports of HTLV-1 associated disease after transplantation are rare. There have been no reported cases of donor-derived HTLV-1-associated death after organ transplantation anywhere in the world. Based on data from low-prevalence countries (Europe and the United States) and the current shortage of donor organs, it appears plausible to authorise the decision to transplant an organ without the prior knowledge of the donor's HTLV-1 status. Currently, in low prevalence areas organ donors are not tested for HTLV-1 antibodies so recipients should be informed of the possible inadvertent transmission of this (and other) infections at the time of consent. Anti-HTLV-1 screening should be attempted in donors coming from geographical regions with a high prevalence of HTLV-1 infection. Combinations of HTLV-1 positive donor and HTLV-1 negative recipient are usually not accepted, although evidence-based policies do not exist. Despite variations in the leukocyte content in various tissues and cells, Directive 2012/39/EU stipulates that ‘HTLV-1 antibody testing must be performed for donors living in, or originating from high-prevalence areas, or with sexual partners originating from those areas or where the donor’s parents originate from those areas’. This applies to both donors of non-reproductive tissues and cells and reproductive cells.

Treatment

No specific proven medical treatment for asymptomatic HTLV-1 infection is currently available. Anti-retroviral drugs effective in HIV infection, corticosteroids, alpha interferon, AZT, anti-CD25 monoclonal antibody, cyclosporine and valproic acid have been used in patients with HAM/TSP or ATLL [50, 51].

Methods and data source

To perform the requested task and to obtain as much objective data as possible, ECDC have collected data from literature on the prevalence of HTLV-1 infection in the general population, in first-time blood donors and in other population groups (regular blood donors or pregnant women). The data retrieved were used to compile a list of high-prevalence and low-prevalence countries and areas and to identify those countries with no data or no reliable data. The evidence and lists were critically evaluated and discussed with an ad-hoc group of experts during a consultation meeting. ECDC then developed world and continent maps, showing the status of HTLV-1 seroprevalence in countries and areas worldwide.

Prevalence classification criteria

The following criteria for the prevalence classification were used: 'high prevalence' – a prevalence over 1% in the general population or prevalence of over 1/10 000 among first-time blood donors; 'low prevalence' – a prevalence below 1% in the general population or prevalence of below 1/10 000 among first-time blood donors. Countries and areas with unreliable or absent data on prevalence are classified in a separate category. Based on the data retrieved through a systematic review of the literature, the countries and areas were categorised according to two main criteria:

Criterion 1: The presence or absence of reliable studies as well as validity of evidence on the HTLV-1 prevalence. According to this criterion countries and areas were divided into four groups:

A Countries where there is strong evidence of HTLV-1 infection
B Countries where the evidence is less strong but some HTLV-1 infection is likely
C No reliable evidence on HTLV-1 prevalence
D Studies show no evidence of HTLV-1 infection.

Criterion 2: Prevalence of HTLV-1 infection in the general population or among first-time blood donors. According to this criterion the prevalence of HTLV-1 infection in countries and areas were assigned as:

A 'High HTLV-1 prevalence' - a prevalence of over 1/10 000 among first-time blood donors and/or over 1% in the general adult population (over 18 years)
B 'Low HTLV-1 prevalence or no HTLV-1 infection' - a prevalence of below 1/10 000 among first-time blood donors and/or below 1% in the general adult population (over 18 years) or HTLV-1 infection not detected;
C 'Absence of information or no reliable evidence on HTLV-1 prevalence'.

Systematic review of the literature

This systematic review has been carried out in accordance with the guidance for undertaking systematic reviews compiled by the University of York's Centre for Reviews and Dissemination. A systematic search of PubMed and LSI Web of knowledge databases was performed, from their inception to August 2014, for all HTLV -1 epidemiological reports. The search strategy was based on the use of medical subject heading (MeSH) terms and free text words, including the following: 'HTLV-1 epidemiology', 'HTLV-1 prevalence', 'HTLV-1 population-based study', 'HTLV-1 and blood donors', 'HTLV-1 and pregnant women'. Thus, most of the 1 200 papers referenced in PubMed were analysed.

The electronic search was enhanced by a manual search of the reference lists of all the articles identified. All other appropriate articles identified in the manual search were subsequently obtained. Two researchers screened the titles and abstracts from the electronic searches against the inclusion and exclusion criteria and considered reports on relevant epidemiological studies for inclusion. If insufficient information was available to make a decision, the full article was read and discussed in order to reach a consensus.

Electronic searches were carried out to identify book chapters on aspects of HTLV-1 epidemiology and abstracts (around 500) of the epidemiology sections of any international conferences on HTLV and related viruses since 1985.

Study eligibility and data extraction

All manuscripts and reports detailing HTLV-1 studies with HTLV-1 infection status confirmed by a specific test (mostly confirmation by Western blot but also PCR in some cases) were included. Limitations relating to language and study design were applied. Thus, if only very few individuals were tested for HTLV-1 infection the study was excluded. Furthermore, a language restriction was used and only manuscripts published in English, French or Portuguese were considered for the review.

The reviewers abstracted the data from each study to obtain information about the year of publication, type of study, number of individuals tested, their geographic origin if known, the tests implemented to determine viral infection and any other relevant information relating to the studied population. Both reviewers extracted the data and all uncertainties were discussed.

Expert consultation

To achieve its objectives, ECDC organised a meeting of experts in the field of HTLV-1 infection who critically reviewed the report on the distribution of HTLV-1 infection prevalence worldwide and agreed that the document objectively reflected the data available in the literature. In addition, experts suggested some additions to the document and agreed on principles for condensing the data from the report as a suitable source for the construction of maps, indicating the areas with a high prevalence of HTLV-1 infection.

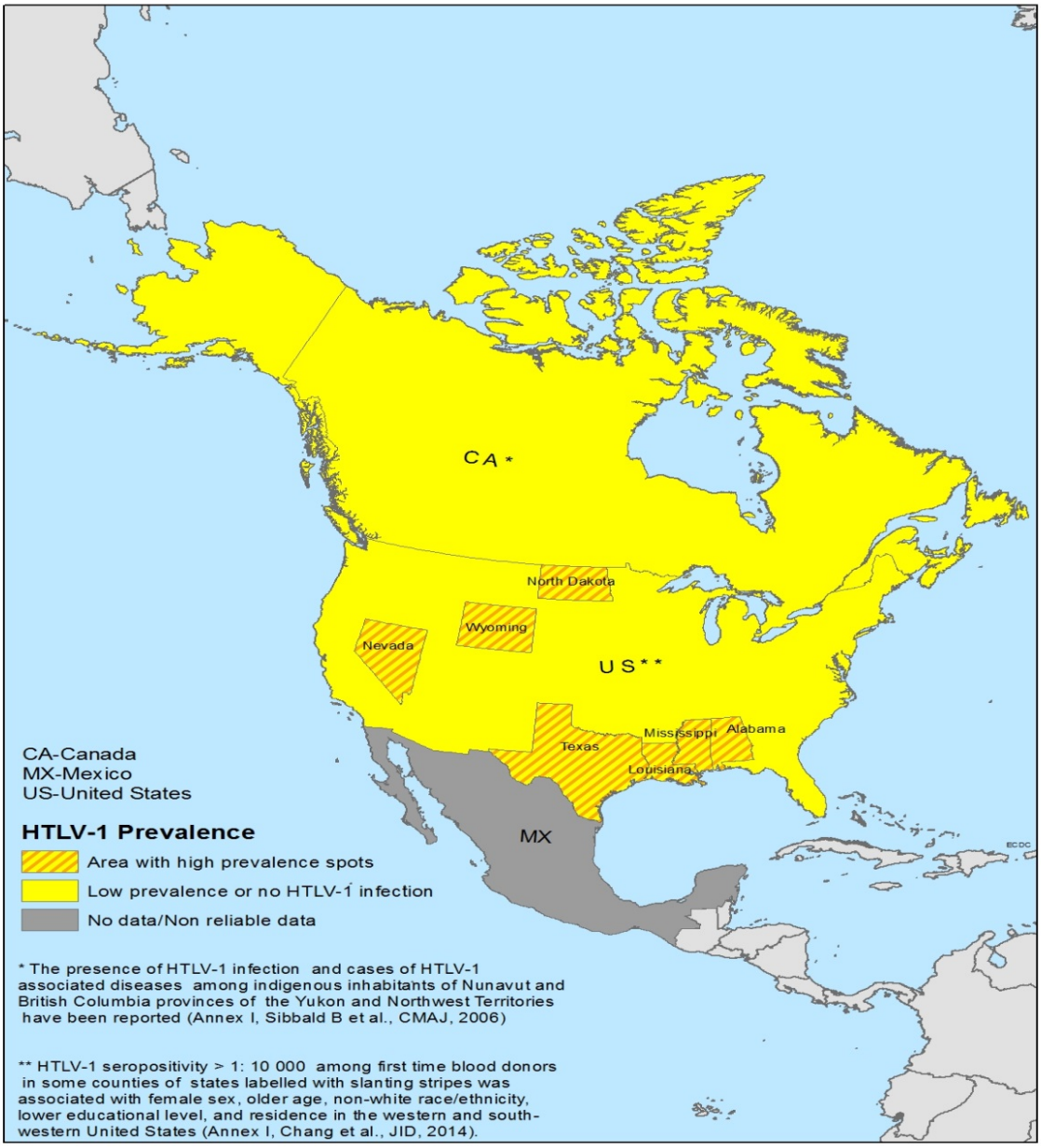
Map development

ECDC's Geographic Information Systems (GIS) team created maps using the web mapping application, EMMA v1.1.

Results

Countries and areas categorised and divided according to the above criteria are listed in tables (see annexes of the report). Maps indicating prevalence of HTLV-1 infection in the countries and areas are presented below by continent.

Figure 1. HTLV-1 prevalence in sovereign states and territories on the North American continent[1]

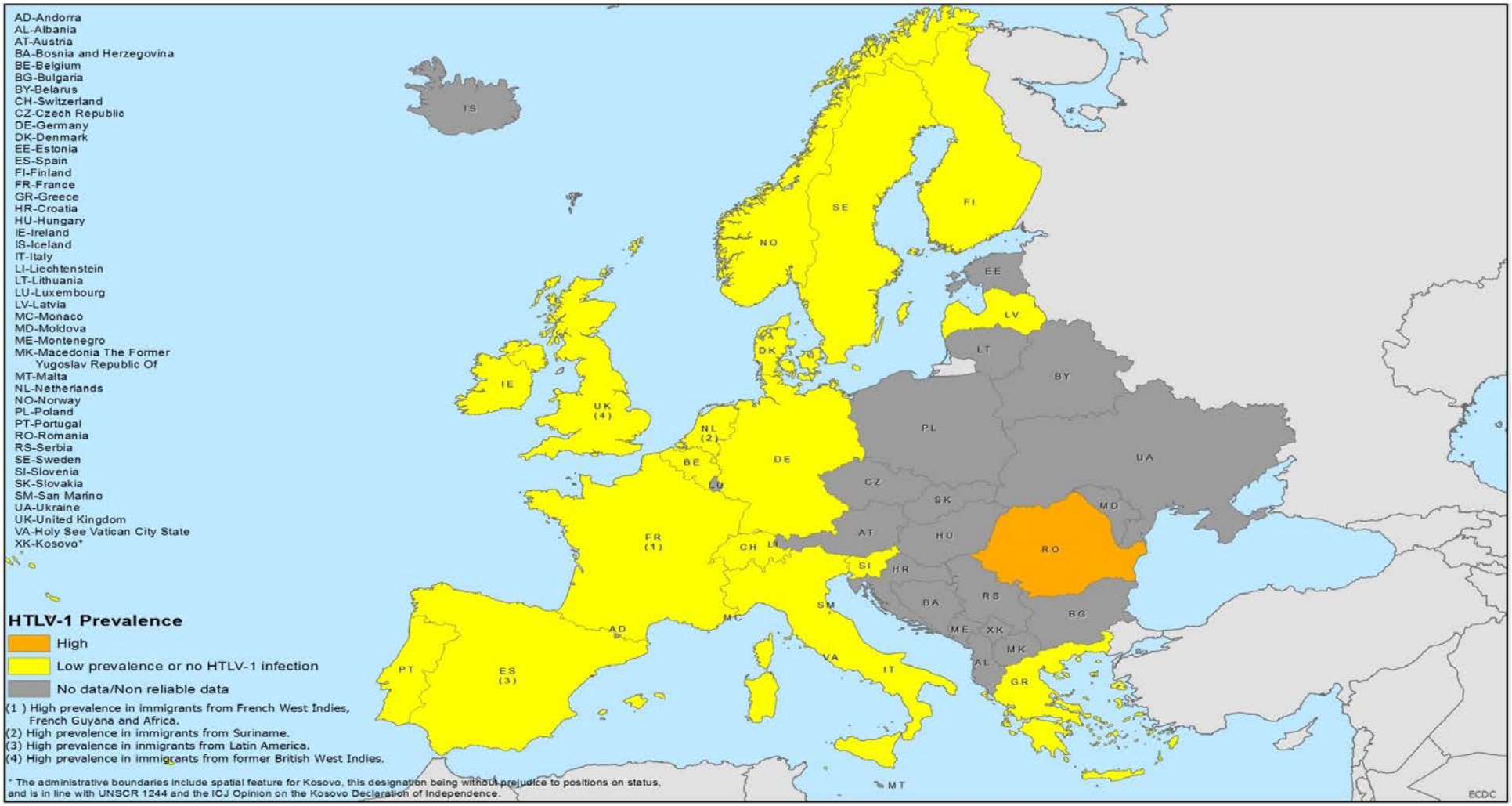


[1] Tables, references and comments for other prevalence distributions are in Annex 1.

Figure 2. HTLV-1 prevalence in sovereign states and territories of Central/South America and the Caribbean Islands[2]

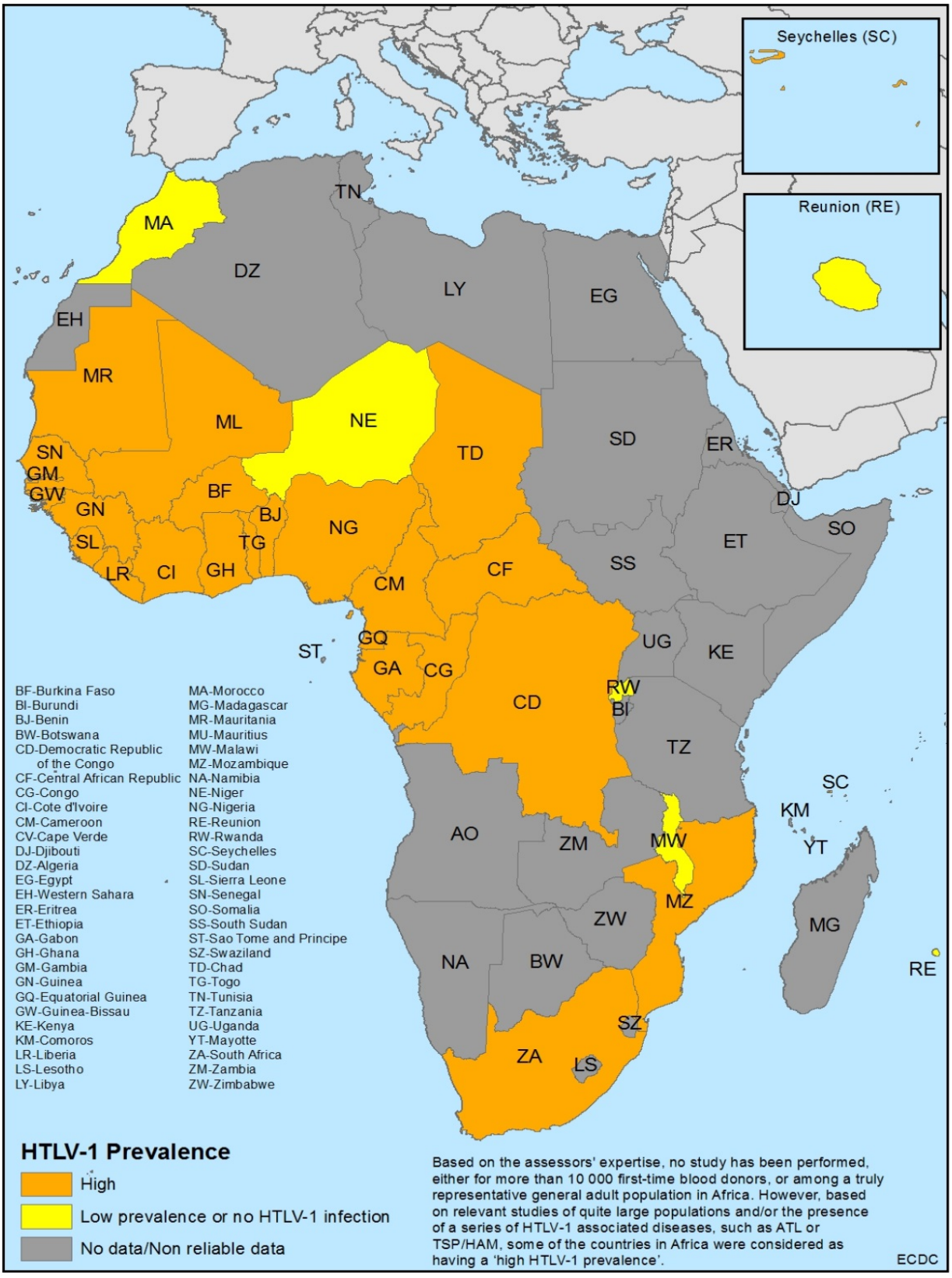
[2] Tables, references and comments for other prevalence distributions are in Annex 2.

Figure 3. HTLV-1 prevalence in sovereign states and territories of Europe[3]



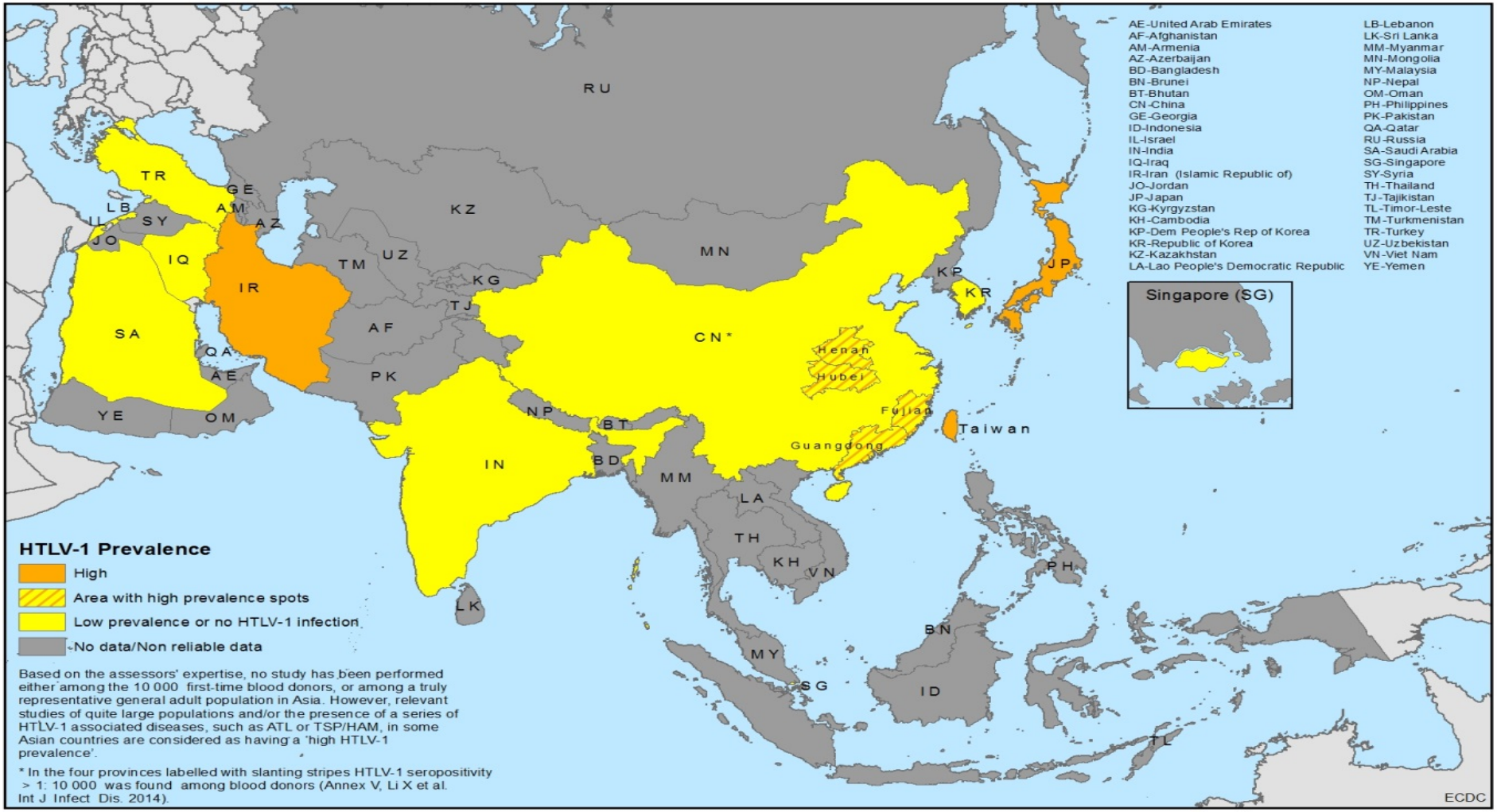
[3] Tables, references and comments for other prevalence distributions are in Annex 3.

Figure 4. HTLV-1 prevalence in sovereign states and territories of Africa[4]



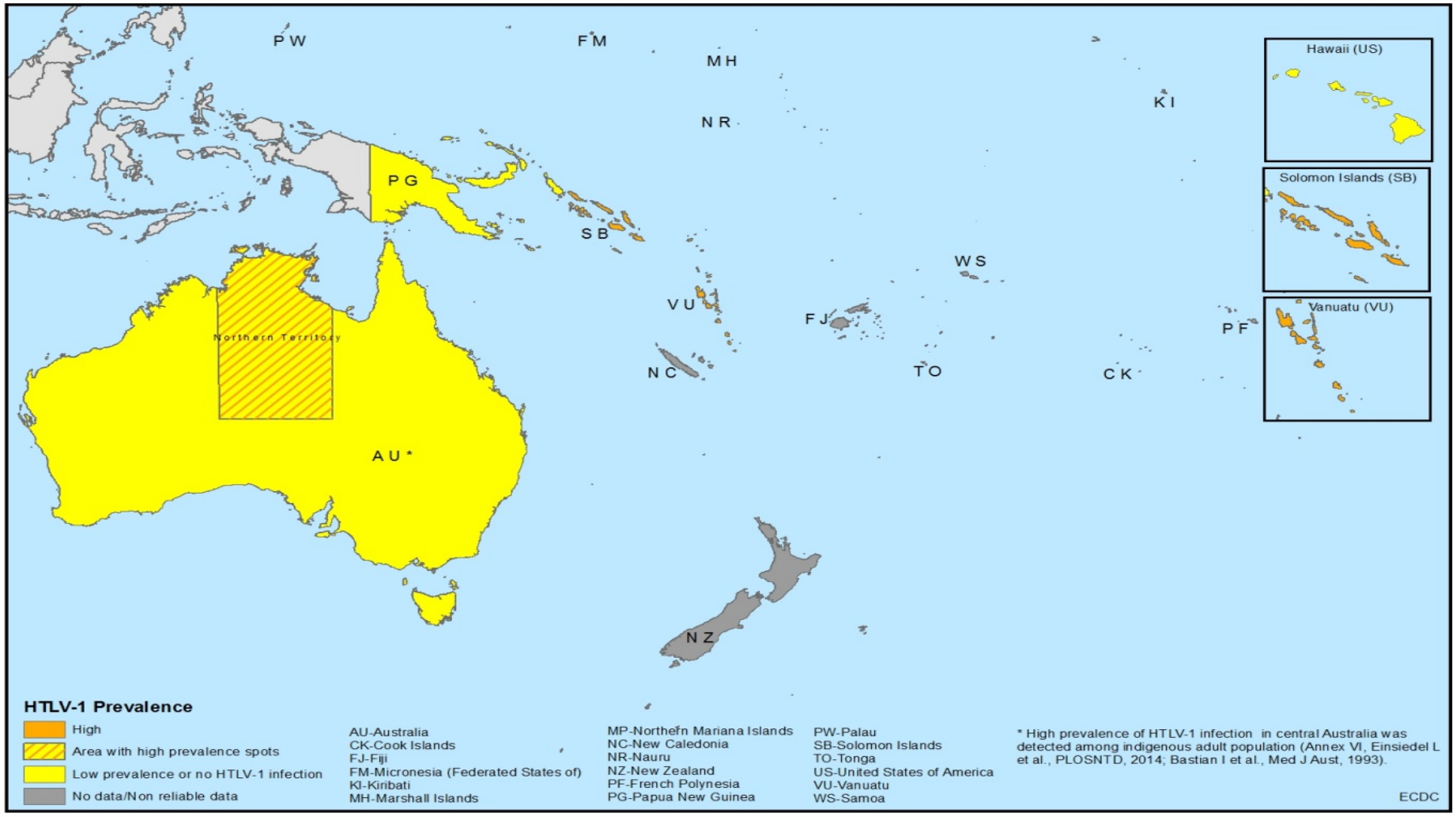
[4] Tables, references and comments for other prevalence distributions are in Annex 4.

Figure 5. HTLV-1 prevalence in sovereign states and territories of the Arabian Peninsula and Asia[5]



[5] Tables, references and comments for other prevalence distributions are in Annex 5.

Figure 6. HTLV-1 prevalence in sovereign states and territories of Oceania[6]



[6] Tables, references and comments for other prevalence distributions are in Annex 6.

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Annex 1. Tables and references for HTLV-1 prevalence in sovereign states and territories on the North American continent

Table 1. HTLV-1 studies in sovereign states and territories on the North American continent

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
1	USA	318 892 103	+				1) Chang YB et al., J Infect Dis, 2014 2) Glynn SA et al., JAMA, 2000 3) Williams AE et al., Science, 1988
2	Canada	34 834 841		+			1) O'Brien SF et al., Transf Med,2013 2) Zahariadis G et al., Am J Trans,2007 3) Sibbald B et al., CMAJ, 2006
3	Mexico	120 286 655		+°			1) Gongora-Biachi RA et al., Rev Invest Clin, 1996 2) Gongora-Biachi RA et al., J Acquir Immune Defic Syndr,1992

Legend:

° Very few tested samples and/or registered cases of HTLV-1 associated diseases
A Countries where there is strong evidence of HTLV-1 infection
B Countries where the evidence is less strong but some HTLV-1 infection is likely
C No reliable evidence on HTLV-1 prevalence
D Studies show no evidence of HTLV-1 infection.

Table 2. HTLV-1 Prevalence in sovereign states and territories on the North American continent

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
1	USA	318 892 103		+*		1) 104/2,047,740 (FTBD) 2) 22-55/369,828 (FTBD) 3) 10/38,898 (BD)	1) Chang YB et al, J Infect Dis, 2014 2) Glynn SA et al., JAMA, 2000 3) Williams AE et al., Science, 1988
2	Canada	34 834 841		+=		1) 1-9/100,000 (BD) 2) 4/55,755(FTBD) 3) 10-12/800,000 (BD) - Inuit people of Nunavut	1) O'Brien S et al., Transfus Med, 2013 2) Zahariadis G et al., Am J Trans,2007 3) Sibbald B et al., CMAJ, 2006
3	Mexico	120 286 655			+°	1) 2/662 (HW) 2) 0/590 (PW)	1) Gongora-Biachi RA et al., Rev Invest Clin, 1996 2) Gongora-Biachi RA et al., J Acquir Immune Defic Syndr, 1992

Legend:

FTBD First-time blood donors;
BD Blood donors
PW Pregnant women
HW Healthy women
A 'High HTLV-1 prevalence' based on the following indicators: over 1/10 000 among first-time blood donors and/or over 1% in the general population of adults over 18 years
B 'Low HTLV-1 prevalence or no HTLV-1 infection'
C Absence of information or no reliable evidence on HTLV-1 prevalence'
° Very few individuals tested
= HTLV-1 prevalence among Canadian FTBD reached 0.7 cases/per 10 000 (Zahariadis et al., Am J Trans, 2007);
* HTLV-1 prevalence among American FTBD was 0.51 cases/per 10 000 (Chang et al., JID, 2014) and reached 1.5 cases/per 10 000 (Glynn et al. JAMA, 2000). HTLV-1 seropositivity was associated with female sex, older age, non-white race/ethnicity, lower educational level, and residence in the western and south-western United States (Chang et al., JID, 2014).

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Annex 2. Tables and references for HTLV-1 prevalence in sovereign states and territories on the Central and South American continents

Table 1. HTLV-1 studies in sovereign states and territories in Central/South America and the Caribbean islands

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
1	Argentina	43 024 374	+				1) Berini CA et al., Sex Transm Infect, 2010 2) Trenchi A et al., J Med Virol, 2007 3) Gastaldello R et al., J Acquir Immune Defic Syndr, 2004
2	Bahamas, The	321834			+		Harrington WJ et al., J Acquir Immune Defic Syndr, 1991
3	Barbados	289 680	+				Riedel DA et al, J Infect Dis, 1989
4	Belize	340 844			+		NDA
5	Bolivia	10 631486		+°			1) Trevino A et al., AIDS Res Hum Retroviruses, 2014 2) Tsugane S et al., Am J Epidemiol, 1988
6	Brazil	202 656 788	+				1) Mello MA et al., Viral J, 2014 2) Guimares de Souza V et al, Rev Soc Bras Med Trop, 2012 3) Carneiro-Proietti AB et al, AIDS Res Hum Retroviruses, 2012 4) Y dy RR, Rev Soc Bras Med Trop, 2009 5) Catalan-Soares B et al, Cad saude Publica, 2005
7	Chile	153 296	+				1) Cartier L et al., Truth and Questions, 1996 2) Cartier L et al., Intern Med, 1992 3) Vasquez P et al., Blood, 1991
8	Colombia	46 245 297	+				1) Zaninovic V et al., AIDS Res Hum Retroviruses, 1994 2) Blank A et al., Leuk Lymphoma, 1993 3) Trujillo JM et al., AIDS Res Hum Retroviruses, 1992 4) Zaninovic V et al., Ann Neural, 1988
9	Costa Rica	4 755 234		+°			Khabbaz RF et al., AIDS Res Hum Retroviruses, 1990
10	Cuba	11 047251		+°			1) Silva-Cabrera E et al;, Rev Cubana Med Trop, 1997 2) Hernandez Ramirez P et al., Vox Sang, 1991
11	Dominican Republic	10 349 741	+				Koenig RE et al., AIDS Res Hum Retroviruses, 1992
12	Ecuador	15 654 411		+°			Guderian R et al., Trans R Soc trop Med Hyg, 1994
13	Easter Island (Chile)	5 761		+°			Ohkura S et al., J Gen Viral, 1999
14	El Salvador	6 125 512			+		Sheremata WA et al., Neurology, 1993
15	French Guyana (France)*	237 549*	+				1) Caries G et al., J Gynecol Obstet Biol Reprod, 2004 2) Kazanji M - Gessain A, Cas Daude Publica, 2003 3) Plancoulaine S et al., Int J Cancer, 1998
16	Guadeloupe (France)*	404 635*	+				1) Rouet F et al., J Clin Microbial, 2001 2) Rouet F et al., Transfusion, 1999
17	Guatemala	14 647 083			+		NDA
18	Guyana	735 554	+				Pouliquen JF et al., J Clin Microbial, 2004
19	Haiti	9 996 731	+				1) Tortevoye P et al., Am J Trap Med Hyg, 2005 2) Allain JP et al., J Acquir Immune Defic Syndr, 1992 3) Harrington WJ et al., J Acquir Immune Defic Syndr, 1991
20	Honduras	8 598 561	+				1) Segurado A et al., J Acquir Immune Defic Syndr, 1997 2) De Rivera IL et al., J Clin Microbial, 1995
21	Jamaica	2 930 050	+				1) Maloney EM et al., J Infect Dis, 2006 2) Brady-West and Buchner DC et al., West Indian Med J, 2000 3) Murphy EL et al., Am J Epidemic!, 1991
22	Martinique (France)	392 291*	+				1) Mansuy JM et al., Am J Trap Med Hyg, 1999 2) Denis F et al., Bull Acad Natl Med, 1988
23	Nicaragua	5 848 641		+°			Qiu X et al., J Med Virol, 2008
24	Panama	15 485	+				1) Castillo LC et al., Acta Neural Scand, 2000 2) Reeves WC et al., Am J Trap Med Hyg. 1990
25	Paraguay	6 703 860			+		NDA
26	Peru	30 147935	+				1) Alarcon JO et al., J Acquir Immune Defic Syndr, 2006 2) Sanchez-Palacios C et al., Int J Infect Dis, 2003 3) Zurita S et al., Am J Trap Med Hyg, 1997
27	Suriname	573 311	+				Alberga H et al., Ned Tijdschr Geneeskd, 1996
28	Trinidad and Tobago	1 223 916	+				1) Daisley H et al., Trap Med Parasite!, 1991 2) Blattner WA et al., J Acquir Immune Defic Synd, 1990
29	Uruguay	3 332 972		+°			Muchinik G et al., J Acquir Immune Defic Syndr, 1992
30	Venezuela	28 868 486	+				Leon G et al., Rev Panam Salud Publica. 2003

Legend:

° Very few tested samples and/or HTLV-1 associated diseases registered cases; *According to estimations by the National Institute of Statistics and Economic Studies (www.insee.fr); A - Countries where there is strong evidence of HTLV-1 infection: B - Countries where the evidence is less strong but some HTLV-1 infection is likely; C - No reliable evidence on HTLV-1 prevalence; D - Studies show no evidence of HTLV-1 infection. NDA – No data available.

Table 2. HTLV-1 prevalence in sovereign states and territories on the Central/South America continents and the Caribbean islands

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
1	Argentina	43 024 374	+			1) 3/2,403(PW) 2) 12/50,236 (BD) 3) 129/14,228 (BD)	1) Berini CA et al.,Sex Trans Infect, 2013 2) Mangano AM et al.,JMV, 2004 3) Biglione M et al.,JAIDS, 1999
2	Bahamas, The	321 834			+°	*ATL case reported*	Harrington WJ et al., J Acquir Immune Defic Syndr, 1991
3	Barbados	289 680	+			43/1,007 (GP)	Riedel DA et al., J Infect Dis,1989
4	Belize	340 844			+		NDA
5	Bolivia	10 631 486			+°	1/39 (GP Adult)	Tsugane S et al., Am J Epidemiol, 1988
6	Brazil	202 656 788	+			1) 29/2,766 (PW) 2) 39/13,382 (PW) 3) 6/2,965 (PW)4) 57/6,0754 (PW)	1) Mello MA et al., Virol J. 2014 2) Sequeira CG et al.,Rev Soc Bras Med Trop, 2012 3) Y dy , RSBMT, 2009 4) Biltencourt AL et al., J Acquir Immune Defic Syndr, 2001
7	Chile	153 296	+			1) 30/2,483 (BD) 2) 7/954 (BD)	1) Cartier L et al. Truth and Questions, 1996 2) Vasquez P et al. Blood, 1991
8	Colombia	46 245 297	+			1) 4/8,913 (BD) 2)29/1,077 (GP)	1) Martinez-Nieto O et al., Revista de salud publica, 2007 2) Trujillo JM et al., AIDS Res Hum Retroviruses. 1992
9	Costa Rica	4 755 234			+°	3/463 (GP Women)	Khabbaz RF et al., AIDS Res Hum Retroviruses, 1990
10	Cuba	11 047 251			+°	2) 0/1,600 (BO)	1) Silva-Cabrera E et al., Rev Cubana Med Trop,1997 2) Hernandez Ramirez P et al, Vox Sang, 1991
11	Dominican Republic	10 349 741	+			23/1,955 (BO)	Koenig RE et al., AIDS Res Hum Retroviruses, 1992
12	Ecuador	15 654 411			+°	4/142 (GP) *TSP/HAM cases reported*	Guderian R et al., Trans R Soc trop Med Hyg, 1994
13	Easter Island (Chile)	5 761			+°	1/108 (GP)	Ohkura S et al., J Gen Virol, 1999
14	El Salvador	6 125 512			+		Sheremata WA et al. Neurology, 1993
15	French Guyana (France)	237 549*	+			1) 218/6,331(PIN) 2) 144/3,834 (PW) 3) 108/1,614 (RP)	1) Tortevoye P et al. Am J Trop Med Hyg, 2005 2) Tortevoye P et al.Int J Cancer,2000 3) Plancoulaine S et al. Int J Cancer,1998
16	Guadeloupe (France)	404 635*	+			1) 77/37,724 (BD) 2) 195/59,426 (BD)	1) Rouet F et al. J Clin Microbiol,2001 2) Rouet F et al. Transfusion, 1999
17	Guatemala	14 647 083			+		NDA
18	Guyana	735 554	+			13/1,035 (BO)	Pouliquen JF et al. J Clin Microbiol,,2004
19	Haiti	9 996 731	+			1) 12/287(PW) 2) 11/500 (PW)	1) Tortevoye P et al Am J Trop Med Hyg, 2005 2) Allain JP et al. J Acquir Immune Defic Syndr, 1992
20	Honduras	8 598 561		+		1) 3/899 (HD) 2) 102/1,267(African descent), 2/412 (non-African decent)	1) Segurado A et al. J Acquir Immune Defic Syndr 1997 2) De Rivera IL et al. J Clin Microbiol, 1995
21	Jamaica	2 930 050	+			1) 376/15,022 (BD) 2) 2/400 (PW) 3) 806/13,260 (HD)	1) Brady-West and Buchner DC et al. West Indian Med J, 2000 2) Dowe G et al.West Indian Med J,1998 3)Murphy EI et al. Am J Epidemiol, 1991
22	Martinique (France)	392 291*	+			1) 9/467 (PW) 2) 17/716 (PW)	1) Mansuy JM et al., Am J Trop Med Hyg, 1999 2) Denis F et al., Bull Acad Natl Med,1988
23	Nicaragua	5848641			+°	1/410 (BD)	Qiu X et al.J Med Virol, 2008
24	Panama	15 485	+			19/3,207 (GP)	Reeves WC et al. Am J Trop Med Hyg, 1990
25	Paraguay	6703860			+		Zoulek G et al. Scand J Infect Dis, 1992
26	Peru	30147935	+			1) 74/1,253 (Shipibo-Konibo women) 2) 42/2,492 (PW)3) 14/568 (Random women)	1) Bias MM et al., PLosOne, 2013 2) Alarcon JO et al., J Acquir Immune Defic Syndr, 2006 3) Sanchez-Palacios C et al., Int J Infect Dis, 2003
27	Suriname	573 311	+			*3n77* (BD)	Alberga H et al., Ned Tijdschr Geneeskd, 1996
28	Trinidad and Tobago	1 223 916	+			1) 16/1,089 (BD) 2) 33/1,025(African descent individuals)	1) Daisley H et al., Trop Med Parasitol, 1991 2) Blattner WA et al., J Acquir Immune Defic Synd, 1990
29	Uruguay	3 332 972			+°	2/266 (BD)	Muchinik G et al., J Acquir Immune Defic Syndr, 1992
30	Venezuela	28 868 486	+			23/23,413 (BD)	Leon G et al., Rev Panam Salud Publica, 2003

Legend:

BD Blood donors
GP General population
PW Pregnant women
HD Healthy donors
° Few individuals tested.
A Countries with evidence of 'high HTLV-1 prevalence' based on the following indicators: over 1/10 000 among first-time blood donors and/or over 1% in the general population of adults over 18 years old
B Countries with 'low HTLV-1 prevalence or no HTLV-1 infection '
C Absence of information or no reliable evidence on HTLV-1 prevalence.

Based on research by both experts, no study has been performed on more than 10 000 first-time blood donors, or among a truly representative general population of adults in South America. Meanwhile, based on the assessors' expertise, a few studies on relatively large blood donor populations and/or the presence of HTLV-1 associated diseases such as ATL or TSP/HAM, some of the countries in South America were considered to have a 'high HTLV-1 prevalence'.

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Annex 3. Tables and references of HTLV-1 prevalence in sovereign states and territories of Europe

Table 1. HTLV-1 studies in sovereign states and territories of Europe

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
1	Albania (AL)	3 020 209			+		NDA
2	Andorra (AN)	85 458			+		NDA
3	Austria (AU)	8 223 062			+		Karlic H et al., Cane Res, 1997
4	Belarus (BO)	9 608 058			+		NDA
5	Belgium (BE)	10 449 361		+			Taylor GP et al, J Acquir Immune Defic Syndr Hum Retrovirol, 2005
6	Bosnia and Herzegovina (BA)	3 871 643			+		NDA
7	Bulgaria (BU)	6 924 716			+		NDA
8	Croatia (CT)	4 470 534			+		NDA
9	Czech Republic (CZ)	10 627 448			+		NDA
10	Denmark (DK)	5 569 077		+			1) Laperche S et al., Vox Sang, 2009 2) Dickmeiss E et al., Ugeskr Laeger, 2001 3) Christiansen PB et al., Vox sang, 1995
11	Estonia (EN)	1 257 921			+		NDA
12	Finland (FI)	5 268 799				+	Laperche S et al., Vox Sang, 2009
13	France (FR)	66 259 012	+				1) Laperche et al., Vox Sang, 2009 2) Taylor et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
14	Germany (GE)	80 996 685		+			1) Taylor et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005 2) Nubling M, Vox Sang, 2001
15	Greece (GR)	10 775 557		+			Laperche S et al., Vox Sang, 2009
16	Hungary (HU)	9 919 128			+		Koike F et al., Acta NeurolScand, 1988
17	Iceland (IC)	317 351			+		NDA
18	Ireland (IR)	4 832 765				+	Laperche S et al., Vox Sang, 2009
19	Italy (IT)	61 680 122		+			Taybr GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
20	Kosovo (KV)*	1 859 203			+		NDA
21	Latvia (LV)	2 165 165		+			Murovska M et al., Int J Cancer, 1991
22	Liechtenstein (LS)	37 313			+		NDA
23	Lithuania (LH)	3 505 738			+		NDA
24	Luxembourg (LU)	520 672			+		NDA
25	Macedonia (MC)	2 091 719			+		NDA
26	Malta (MT)	412 655			+		NDA
27	Moldova (MD)	3 583 288			+		NDA
28	Monaco (MN)	30 508			+		NDA
29	Montenegro (ME)	650 036			+		NDA
30	The Netherlands (NL)	16 877 351	+				Laperche S et al., Vox Sang, 2009
31	Norway (NW)	5 147 792				+	Laperche S et al., Vox Sang, 2009
32	Poland (PL)	38 346 279			+		NDA
33	Portugal (PT)	10 813 834	+				Taylor GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
34	Romania (RO)	21 729 871	+				1) Laperche S et al., Vox Sang, 2009 2) Paun Let al., Eur J Haematol, 1994
35	San Marino (SM)	32 742			+		NDA
36	Serbia (SB)	7 209 764			+		NDA
37	Slovakia (SV)	5 443 583			+		NDA
38	Slovenia (51)	1 988 292		+			Poljak M et al., Folia Biol, 1998
39	Spain (SP)	47 737 941	+				1) Trevino A et al., Virology J, 2012 2) Taylor GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
40	Sweden (SW)	9 723 809		+			LapercheS et al., Vox Sang, 2009
41	Switzerland (SZ)	8 061 516		+			Bani J et al., J Med Viral, 2004
42	Ukraine (UP)	44 291 413			+		NDA
43	United Kingdom (UK)	63 742 977	+				1) Laperche S et al., Vox Sang 2009 2) Taylor GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
44	Vatican City (VT)	842			+		NDA

Legend:

A Countries where there is strong evidence of HTLV-1 infection

B Countries where the evidence is less strong but some HTLV-1 infection is likely

C No reliable evidence on HTLV-1 prevalence; D Studies show no evidence of HTLV-1 infection

NDA No data available

* The administrative boundaries include spatial features for Kosovo, this designation being without prejudice to positions on status, and in line with UNSCR 1224 and the ICJ Opinion on the Kosovo Declaration of Independence.

Table 2. HTLV-1 prevalence in sovereign states and territories of Europe

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
1	Albania (AL)	3 020 209			+		NDA
2	Andorra (AN)	85 458			+		NDA
3	Austria (AU)	8 223 062			+		Karlic H et al., Cane Res, 1997
4	Belarus (BO)	9 608 058			+		NDA
5	Belgium (BE)	10 449 361		+		1/5,000 (PW)	Taylor GP et al., JAcquir Immune Defic Syndr Hum Retrovirol, 2005
6	Bosnia and Herzegovina (BA)	3 871 643			+		NDA
7	Bulgaria (BU)	6 924 716			+		NDA
8	Croatia (CT)	4 470 534			+		NDA
9	Czech Republic (CZ)	10 627 448			+		NDA
10	Denmark (ON)	5 569 077		+		1) 0/68,539 (FTBD) 2) 1/50,000 (BD) 3) 0/1,434 (BD)	1) Laperche S et al., Vox Sang, 2009 2) Dickmeiss E et al., Ugeskr Laeger, 200 3) Christiansen PB et al., Vox sang, 1995
11	Estonia (EN)	1 257 921			+		NDA
12	Finland (FI)	5 268 799		+		0/52,124 (FTBD)	Laperche S et al., Vox Sang, 2009
13	France (FR)	66 259 012		+		1) 54/1,115,030 (FTBD) 2) 12/10,398 (PW}	1) Laperche et al., Vox Sang, 2009 2) Taylor et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
14	Germany (GE)	80 996 685		+		1) 4/58,747 (PW) 2) 0/100,852 (BD)	1) Taylor et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005 2) Nubling M, Vox Sang, 2001
15	Greece (GR)	10 775 557		+		29/1,524,568 (BD)	Laperche S et al., Vox Sang, 2009
16	Hungary (HU)	9 919 128			+		Koike F et al., Acta NeurolScand, 1988
17	Iceland (IC)	317 351			+		NDA
18	Ireland (IR)	4 832 765		+		0/55,524 (FTBD)	Laperche S et al., Vox Sang, 2009
19	Italy (IT)	61 680 122		+		1/6,000 (PW)	Taybr GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
20	Kosovo (KV)*	1 859 203			+		NDA
21	Latvia (LV)	2 165 165		+		3/1,341(BD)	Murovska M et al., Int J Cancer, 1991
22	Liechtenstein (LS)	37 313			+		NDA
23	Lithuania (LH)	3 505 738			+		NDA
24	Luxembourg (LU)	520 672			+		NDA
25	Macedonia (MC)	2 091 719			+		NDA
26	Malta (MT)	412 655			+		NDA
27	Moldova (MD)	3 583 288			+		NDA
28	Monaco (MN)	30 508			+		NDA
29	Montenegro (ME)	650 036			+		NDA
30	The Netherlands (NL)	16 877 351		+		5/110,307 (FTBD)	Laperche S et al., Vox Sang, 2009
31	Norway (NW)	5 147 792		+		0/41,421 (FTBD)	Laperche S et al., Vox Sang, 2009
32	Poland (PL)	38 346 279			+		NDA
33	Portugal(PT)	10 813 834		+		5n557 (PW)	1) Taylor GP et al, J Acquir Immune Defic Syndr Hum Retrovirol, 2005
34	Romania (RO)	21 729 871	+			1) 115/215,732 (FTBD) 2) 4/621 (BD)	1) Laperche Setal., Vox Sang, 2009 2) Paun L et al, Eur J Haematol,
35	San Marino (SM)	32 742			+		NDA
36	Serbia (SB)	7 209 764			+		NDA
37	Slovakia (SV)	5 443 583			+		NDA
38	Slovenia (SI)	1 988 292		+		1/10,369 (PW)	Poljak M et al., Folia Biol, 1998
39	Spain (SP)	47 737 941		+		2/20,366 (PW)	Taylor GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
40	Sweden (SW)	9 723 809		+		2/117,383 (FTBD)	Laperche S et al., Vox Sang, 2009
41	Switzerland (SZ)	8 061 516			+	1/1,266,466 (BD)	Boni J et al, JMV, 2004
42	Ukraine (UP)	44 291 413			+		NDA
43	United Kingdom (UK)	63 742 977		+		1) 40/850,801 (FTBD) 2) 52/126,010 (PW)	1) Laperche S et at., Vox Sang, 2009 2) Taylor GP et al., J Acquir Immune Defic Syndr Hum Retrovirol, 2005
44	Vatican City (VT)	842			+		NDA

Legend:

PW Pregnant women
FTBD First-time blood donors
BD Blood donors
PW Pregnant women
NDA No data available

A Countries with evidence of 'high HTLV-1 prevalence' based on the following indicators: over 1/10 000 among first-time blood donors and/or over 1% in the general adult population (over 18 years)

B Countries with 'low HTLV-1 prevalence or no HTLV-1 infection'

C Absence of information or no reliable evidence on HTLV-1 prevalence

* The designation of Kosovo in the table is without prejudice to position on status and is in line with UNSCR 1224 and the ICJ Opinion on the Kosovo Declaration of Independence.

Based on research by both experts, very few studies have been performed among over 10 000 first-time blood donors in European countries (Laperche S et al., Vox Sanguinis, 2009; The HTLV-1 European Research Network, J Acquir Immune Defic Syndr Hum Retrovirol, 1996) and there is no study truly representative of the general adult population in any European country. To date, the only European country exhibiting a 'high HTLV-1 prevalence' is Romania. A number of HTLV-1 associated disease cases have been reported, such as ATLL and/or TSP/HAM, originating mostly from high HTLV-1 endemic areas (e.g. Africa, West Indies, South America) especially in France, United Kingdom and Spain.

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Annex 4. Tables and references of HTLV-1 prevalence in sovereign states and territories of Africa

Table 1. HTLV-1 studies in sovereign states and territories of Africa

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
1	Algeria	38 813 722			+*		Gasmi M et al. AIDS Res Hum Retroviruses, 1994
2	Angola	19 088 106			+		NDA
3	Benin	10 160 556	+				1) Verdier M et al.AIDS inAfrica,1994 2) Bonis J et al, J Acquir Immune Defic Syndr, 1994 3) Dumas M et al. AIDS Res Hum retroviruses,1991
4	Botswana	2 155 784			+		NDA
5	Burkina Faso	18 365 123	+				1) Collenberg E et al. J Med Virol, 2006 2) Verdier M et al. AIDS in Africa,1994
6	Burundi	10 395 931			+*		Bonis J et al., J Acquir Immune Defic Syndr,1994
7	Cameroon	23 130 708	+				1) Filippone C et al. J Clin Microbial, 2012 2) Mauclere P et al. J Infect Dis, 2011 3) Mauclere P et al. J Infect Dis, 1997
8	Cape Verde	538 535			+		NDA
9	Central African Republic	5 277 959	+				1) Pepin J et al. Clin Infect Dis, 2010 2) Gessain A et al. J Acquir Immune Defic Syndr, 1993
10	Chad	11 412 107	+				Delaporte E et al. J Acquir Immune Defic Syndr,1989
11	Comoros	766 865			+		NDA
12	Congo	4 662 446	+				Tuppin P et al. J Acquir Immune Defic Syndr, 1996
13	Cote d'Ivoire	22 848 945	+				1) Calvignac S et al. Emerg Infect Dis, 2012 2) Verdier M et al. AIDS in Africa,1994 3) Bonis J et al. J Acquir Immune Defic Syndr,1994 4) Verdier M et al.J Infect Dis, 1990 5) Ouattara SA et al. J Acquir Immune Defic Syndr, 1989
14	Democratic Republic of the Congo	77 433 744	+				1) Delaporte E et al., J Acquir Immune Defic Syndr Hum Retrovirol1995 2) Goubau P et al., J Med Virol,1993 3) Wiktor SZ et al., Lancet,1990
15	Djibouti	810 179			+		Fox E et al.,Ann Inst Pasteur, 1988
16	Egypt	86 895 099			+		1) Kawashti MI et al., Egypt J Immunol, 2005 2) El FarrashMA et al., Microbiol Immunol, 1988 3) Constantine, NT et al., Epidemiol Infect, 1991 4) Saxinger W et al, Science, 1984
17	Equatorial Guinea	722 254	+				1) Delaporte E et al., J Acquir ImmuneDefic Syndr,1989 2) Vallejo A et al. ,Aids, 1994
18	Eritrea	6 380 803			+		NDA
19	Ethiopia	96 633 458			+*		1) Ramos JM et al., J Clin Virol, 2012 2) Ramos JM et al., J Clin Virol, 2011 3) BucknerC et al., j Infect Dis, 1992
20	Gabon	1 672 597	+				1) Etenna S et al., J Clin Microbiol, 2008 2) Bertherat E et al., J Acquir ImmuneDefic Syndr,1998 3) Le HesranJY et al., Int J Epidemiol, 1994
21	Gambia, The	1 925 527	+				Del Mistro A, et al.,AIDS ResHum Retroviruses,1994
22	Ghana	25 758 108	+				Armah HB et al., J Med Microbiol, 2006
23	Guinea	11 474 383	+				1) Jeannel D et al., J Acquir ImmuneDefic Syndr. 1995 2) Gessain A et al., J Acquir Immune Defic Syndr, 1993
24	Guinea-Bissau	1 693 398	+				1) Van Tienen C et al.,Retrovirology, 2010 2) Larsen 0 et al., J Acquir Immune DeficSyndr 2000
25	Kenya	45 010 075			+		Hunsmann G et al., Med Microbiol Immunol, 1984
26	La Reunion (France)	840 974	+				1)Aubry P et al., Bull Soc Patho exot, 2013 2)MahieuxR et al., AIDS ResHum Retroviruses 1994
27	Lesotho	1 942 008			+		ND
28	Liberia	4 092		+*			Hunsmann G et al., Med Microbiol Immunol, 1984
29	Libya	6 244 174			+		ND
30	Madagascar	23 201 926			+		ND
31	Malawi	17 377 468		+*			Candotti D et al., J Med Virol, 2001
32	Mali	16 455 903		+*			1) Fouchard N et al., Leukemia,1998 2) Larouze B et al., Cancer Res, 1985
33	Mauritania	3 516 806		+*			Desrames A et al., J Virol, 2014
34	Mauritius	1 331 155			+		NDA
35	Mayotte (France)	212 645			+		NDA
36	Morocco	32 987 206		+*			1) Gasmi M et al., AIDS Res Hum Retroviruses,1994 2) Thyss A et al., press Med, 1990

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
37	Mozambique	24 692 144	+				1) Vicente AC et al., Plos Negl Trop Dis, 2011 2) Gudo ES et al., Transfusion, 2009
38	Namibia	2 198 406		+*			1) Lecatsas G et al., S Afr Med J,1988 2) Steele AD et al., Am J Trop Med Hyg,1994
39	Niger	17 466 172		+*			Develoux M et al., Med Trop, 1996
40	Nigeria	177 155 754	+				1) Olaleye DO et al., Int J Epidemiol, 1995 2) Olaleye DO et al., Am J Trop Med Hyg, 1994 3) Williams CK et al., IARC Sci Publ, 1984
41	Rwanda	2 337 138		+*			Group RS, Lancet, 1989
42	Sao Tome and Principe	190 428			+		NDA
43	Senegal	13 635 927	+				Diop S et al., J Clin Microbial, 2006
44	Seychelles	9165	+				1) Aubry P et al., Bull Soc Pathol Exot, 2013 2) Lavanchy D et al., Lancet, 1991
45	Sierra Leone	5 743 725		+			1) Ronday MJH et al., Br J Ophtalmol, 1996 2) Stewart JS et al., Lancet, 1984
46	Somalia	10 428 043			+		Scott DA et al., Am J Trop Med Hyg, 1991
47	South Africa	48 375 645	+*				1) Taylor MB et al., Epidemiol Infect, 1996 2) Bhigjee AI et al., S Afr Med J,1994 3) Bhigjee AI et al., S Afr Med J,1993 4) Bhigjee AI et al., Brain,1990
48	South Sudan	11 562 695			+		NDA
49	Sudan	35 482 233			+		NDA
50	Swaziland	1 419 623			+		NDA
51	Tanzania	49 639 138			+		Matee MI et al., East Afr Med J, 1999
52	Togo	7 351 374	+*				1) Balogou, Bull Soc path Exo,2000 2) Verdier M et al., AIDS in Africa,1994 3) Bonis J et al. J Acquir Immune Defic Syndr, 1994
53	Tunisia	10 937 521			+*		1) Mojaat N et al., J Acquir Immune Defic Syndr,1999 2) Bonis J et al., J Acquir Immune Defic Syndr, 1994 3) Larouze B et al., Cancer Res,1985 4) Saxinger W et al., Science,1984
54	Uganda	35 918 915			+*		1) Group RS, Lancet, 1989 2) Larouze B et al., Cancer Res,1985
55	Zambia	14 638 505			+*		Tabor E et al., Jama, 1990
56	Zimbabwe	13 771 721		+*			Houston S et al., Trans R Soc Trop Med Hyg, 1994

Legend:

* Very few individuals tested

A Countries where there is strong evidence of HTLV-1 infection

B Countries where the evidence is less strong but some HTLV-1 infection is likely

C No reliable evidence on HTLV-1 prevalence

D Studies show no evidence of HTLV-1 infection

NDA No data available.

Table 2. HTLV-1 prevalence in sovereign states and territories of Africa

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
1	Algeria	38 813 722			+*		Gasmi M et al., AIDS Res Hum Retroviruses, 1994
2	Angola	19 088 106			+		NDA
3	Benin	10 160 556	+			39 / 2,625 (HS)	Dumas M et al., AIDS Res Hum retroviruses, 1991
4	Botswana	2 155 784			+		NDA
5	Burkina Faso	18 365 123	+			5 / 492 (PW)	Collenberg E et al., J Med Virol, 2006
6	Burundi	10 395 931			+*	9 / 1,004 (HS + P)	Bonis J et al. J Acquir Immune Defic Syndr, 1994
7	Cameroon	23 130 708	+			42 / 3,783 (RP)	Mauclere P et al., J Infect Dis, 1997
8	Cape Verde	538 535			+		NDA
9	Central African Republic	5 277 959	+			1) 67/896 (RP) >=55y 2) 5/689 (GP)	1) Pepin J et al., Clin Infect Dis, 2010 2) Gessain A et al., J Acquir Immune Defic Syndr, 1993
10	Chad	11 412 107	+			1) 9/1,496 (GP) 2) 8/666 (HS) TSP/HAM case	1) Louis LP et al., Clin Infect Dis, 2010. 2) Delaporte E et al., J Acquir Immune Defic Syndr, 1989
11	Comoros	766 865			+		NDA
12	Congo	4 662 446	+			14/2,070 (PW)	Tuppin P et al., J Acquir Immune Defic Syndr, 1996
13	Cote d'Ivoire	22 848 945	+			1) 10/776 (RP) 2) 22/1,201 (HS)	1) Calvignac S et al., Emerg Infect Dis, 2012 2) Bonis J et al., J Acquir Immune Defic Syndr, 1994
14	Democratic Republic of the Congo	77 433 744	+			43/1,166 (PW)	Delaporte E et al., J Acquir Immune Defic Syndr Hum Retrovirol 1995
15	Djibouti	810 179			+		Fox E et al., Ann Inst Pasteur, 1988
16	Egypt	86 895 099			+	2/3,158 (GP)	El FarrashMA et al., Microbiol Immunol, 1988
17	Equatorial Guinea	722 254	+			1) 2/810 (80) 2/435 (PW)	1) Delaporte E et al., J Acquir ImmuneDefic Syndr, 1989 2) Vallejo A et al., Aids, 1994
18	Eritrea	6 380 803			+		NDA
19	Ethiopia	96 633 458			+*	1)0/556 (P) 2)0/156 (PW) 3) TSP/HAM cases	1) Ramos JM et al., J Clin Virol, 2012 2) Ramos JM et al., J Clin Virol, 2011 3) Abebe M et al., Trans Royal Soc Trop Med Hyg, 1991
20	Gabon	1 672 597	+			1) 19/907 (PW) 2) 106/1,240 RP) 3) 33/456 (GP)	1) Etenna S et al., J Clin Microbiol, 2008 2) Le HesranJY et al., Int J Epidemiol, 1994 3) Bertherat E et al., J Acquir ImmuneDefic Syndr, 1998
21	Gambia, The	1 925 527	+			11/909 (Mothers)	Del MistroA et al., AIDS ResHum Retroviruses, 1994
22	Ghana	25 758 108	+			20/960 (PW)	Armah HB et al., J Med Microbiol, 2006
23	Guinea	11 474 383	+			22/1,785 (BD)	Gessain A et al., J Acquir Immune Defic Syndr, 1993
24	Guinea-Bissau	1 693 398	+			1) 69/2,127 (GP) 2) 275/5,376 (RP)	1) Larsen 0 et al., J Acquir Immune DeficSyndr 2000 2) Van Tienen C et al., Plos One, 2011
25	Kenya	45 010 075			+		Hunsmann G et al., Med Microbiol Immunol, 1984
26	La Reunion (France)	840 974		+		1) 2/114,187 (BD) 2) 1/3,900 (BD)	1) Aubry P et al., Bull Soc Patho exot, 2013 2) MahieuxR et al., AIDS Res
27	Lesotho	1 942 008			+		ND
28	Liberia	4 092	+*			10/620 (GP)	Hunsmann G et al., Med Microbiol Immunol, 1984
29	Libya	6 244 174			+		ND
30	Madagascar	23 201 926			+		ND
31	Malawi	17 377 468		+*		4/159 (BD)	Candotti D et al., J Med Virol, 2001
32	Mali	16 455 903	+*			1) 11/799(BD) 2) ATL cases	1) Diarra AB et al., Transf Clin Biol, 2014 2) Fouchard N et al., Leukemia, 1998
33	Mauritania	3 516 806	+*				Desrames A et al., J Virol, 2014
34	Mauritius	1 331 155			+		NDA
35	Mayotte (France)	212 645			+		NDA
36	Morocco	32 987 206		+*		1) TSP/HAM cases 2) TSP/HAM case 3) 1/297 (GP)	1) Gasmi M et al., AIDS Res Hum Retroviruses, 1994 2) Thyss A et al., press Med, 1990 3) De The G, IARC Sci Publ, 1984
37	Mozambique	24 692 144	+			1) 18/1,989 (BD) 2) 25/2,019 (BD)	1) Vicente AC et al., Plos Negl Trop Dis, 2011 2) Gudo ES et al., Transfusion, 2009
38	Namibia	2 198 406			+*	1) 3/289 (Kung Bushmen) 2) 0/704 (Black individuals)	1) Steele AD et al., Am J Trop Med Hyg, 1994 2) Lecatsas G et al., S Afr Med J, 1988
39	Niger	17 466 172		+*		3/600 (BD), 0/300 (PW), TSP/HAM cases	Develoux M et al., Med Trop, 1996
40	Nigeria	177 155 754	+			1) 15/736 (BD) 2) 20/364 (PW) 3) 105/4,153 (P)	1)Olaleye DO et al., Int J Epidemiol, 1995 2) Olaleye DO et al., Am J Trop Med Hyg, 1994 3)Williams CK et al., IARC Sci Publ, 1984
41	Rwanda	2 337 138		+		3/1,870 (urban) 2/742 (rural)	Group RS, Lancet, 1989
42	Sao Tome and Principe	190 428			+		NDA
43	Senegal	13 635 927	+			8/4,900 BD)	Diop S et al., J Clin Microbial, 2006
44	Seychelles	9165	+			65/1,055 (GP)	Lavanchy D et al., Lancet, 1991
45	Sierra Leone	5 743 725	+*				1) Ronday MJH et al., Br J Ophtalmol, 1996

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
							2) Stewart JS et al., Lancet, 1984
46	Somalia	10 428 043			+		NDA
47	South Africa	48 375 645	+			1) 7/1,259 (PW) 2) 9/270 (GP) 3) 26/1,018 (GP)	1) Taylor MB et al., Epidemiol Infect, 1996 2) Bhigjee AI et al., S Afr Med J,1994 3) Bhigjee AI et al., S Afr Med J,1993
48	South Sudan	11 562 695			+		NDA
49	Sudan	35 482 233			+		NDA
50	Swaziland	1 419 623			+		NDA
51	Tanzania	49 639 138			+		NDA
52	Togo	7 351 374	+*			1) 21/1,717 (GP) 2) 10/603 (GP)	1) Balogou AA et al., Bull Soc path Exo,2000 2) Bonis J et al., J Acquir Immune Defic Syndr, 1994
53	Tunisia	10 937 521			+*	1) 0/500 (BD) 2) 2/527 (GP) 3) 0/442 (PW)	1) Mojaat N et al.,J Acquir Immune Defic Syndr, 1999 2) Bonis J et al.,J Acquir Immune Defic Syndr, 1994 3) Larouze B et al., Cancer Res,1985
54	Uganda	35 918 915			+*	1/135 (P)	Larouze B et al., Cancer Res,1985
55	Zambia	14 638 505			+*	0/226 (GP)	Tabor E et al., Jama, 1990
56	Zimbabwe	13 771 721			+*	TSP/HAM cases	Houston S et al., Trans R Soc Trop Med Hyg, 1994

Legend:

HS Healthy subjects
PW Pregnant women
RP Rural populations
BD Blood donors
GP General population
P Patients

* Very few individuals tested

NDA No data available

A Countries with evidence of 'high HTLV-1 prevalence' based on the following indicators: over 1/10 000 among first-time blood donors and/or over 1% in the general adult population over 18 years

B Countries with 'low HTLV-1 prevalence or no HTLV-1 infection'

C Absence of information or no reliable evidence on HTLV-1 prevalence.

Based on the assessors' expertise, no study has been performed, either for more than 10 000 first-time blood donors, or among a truly representative general adult population in Africa. However, based on relevant studies of quite large populations and/or the presence of a series of HTLV-1 associated diseases, such as ATL or TSP/HAM, some of the countries in Africa were considered as having a 'high HTLV-1 prevalence'.

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Annex 5.Tables and references for HTLV-1 prevalence in sovereign states and territories of the Arabian Peninsula and Asia

Table 1. HTLV-1 studies in sovereign states and territories of the Arabian Peninsula and Asia

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
1	Afghanistan	31822 848			+		NDA
	Arabian Peninsula *	64 989 628					
2	*Saudi Arabia*	27 345 986		+			1) Kawashti MI et al., Egypt Immunol, 2005 2) Balkhy ZA et al., Milit Med, 2004 3) Ul-Hassan Z et al., Saudi Med J, 2004 4) El-Hazmi MM et al., Saudi Med J, 2004 5) Arif M et al., Ann Trop Med Parasitol, 1998 6) Bernvil et al., Transfus Sci, 1997
3	*Yemen*	26 052 966			+		NDA
4	*Oman*	3 219 775		+°			1) Knox-Macaulay et al., Scand J Inf Dis, 1997 2) Al-Mufti S et al., J AIDS, 1997
5	*Qatar*	2 123 160			+		NDA
6	*United Arab Emirates*	5 628 805			+		NDA
7	*Kuwait*	2 742 711		+			Al- Mufti S et al., J AIDS, 1997
8	Armenia	3 060 631			+		NDA
9	Azerbaijan	9 686 210			+		NDA
10	Bangladesh	166 280 712		+°			Haque A et al., Ann Soc Belg Med Trop, 1995
11	Bhutan	733 643			+		NDA
12	Brunei	422 675			+		NDA
13	Burma	55 746 253			+		NDA
14	Cambodia	15 458 332			+		NDA
15	China	1 355 692 576	+				1) Li X et al., Int J Infect Dis. 2014 2)Du J et al., Virus Res, 2014 3) Wang YC et al., J Med Virol, 2005 4) Zhuo J et al., Chin Med J, 1995
16	East Timor	1 201 542			+		NDA
17	Georgia	4 935 880		+°			1) Senyuta N et al., Int J Cancer, 1998 2) Gursevitch V et al., Int J Cancer, 1992
18	India	1 236 344 631		+°			1) Kumar H et al., Indian J Pathol Microbiol, 2006 2) Prakash KJ et al., Trop Doc, 2002 3) Babu PG et al., Scand J Infect Dis, 1995
19	Indonesia	253 609 643		+°			1)Takao S et al., JCV, 2000 2) Tanggo Y et al., Intervirology, 2000
20	Iran	80 840713	+				1)Hedayati-Moghadam MR et al., Iran J Basic Med Sci, 2013 2) Rafatpanah H et al., J Clin Virol, 2011 3) Azarpazhooh MR et al. AIDS Res Hum Retroviruses. 2012 4) Abbaszadegan MR et al., JCM, 2003 5)Rezvan H et al., Transf Today, 1996
21	Iraq	32 585 692	+				Stienlauf Set al., Emerg Inf Dis, 2009
22	Israel	7 821 850	+				StienlaufS et al., Emerg Inf Dis, 2009
23	Japan	127103 388	+				1) Suzuki Set al., J Matern Fetal Neonatal Med, 2014 2) Satake M et al., J Med Virol, 2012 3) Watanabe T et al., Int J Hematol, 2011
24	Jordan	7 930 491			+		NDA
25	Kazakhstan	17 948 816			+		NDA
26	Korea North	24 851 627			+		NDA
27	Korea South	49 039 986	+				1) Kwon SY et al., J Med Virol, 2008 2) Kim JM et al., Yonsei Med J, 1999
28	Kyrgyzstan	5 604 212			+		NDA
29	Laos	6 803 699			+		NDA
30	Lebanon	5 882 562		+			1) Naman R et al., J Inf, 2002 2) Tamim H et al., Am J Infect Control, 2004
31	Malaysia	30 073 353		+°			Yap SF et al., Southeast Asian J Trop Med Public Health, 1992

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
32	Mongolia	2 953 190			+°		Batsuuri J et al., Scand J Infect Dis, 1993
33	Nepal	30 986 975			+°		Nakashima K et al., J Trop Med Hyg, 1995
34	Pakistan	196 174 380			+		NDA
35	Philippines	107 668 231		+°			1) Hayes CG et al, JID, 1990 2) Ishida T et al., Int J Epidemiol, 1988
36	Russian Federation	142 470 272		+			Stienlauf S et al., Emerg Inf Dis, 2009
	Siberia=	37 700 000		+°			1) Syrtsev AV et al., Int J Cancer, 2000 2) Gessain et al., JAIDS, 1996 3) SenuitaSB et al., Vopr Virusol, 1990
37	Singapore	5 567 301		+			Wang TL et al., J Clin Pathol, 1991
38	Sri Lanka	21 866 445			+		NDA
39	Syria	17 951 639			+		NDA
40	Taiwan	23 359 928	+				1) Lu SC et al., Int J Hematol, 2001 2) Chen YM et al., AIDS Res Hum Retroviruses, 1999 3) Kuo TI et al., Int J Cancer, 1985
41	Thailand	67 741 401		+°			1) Urwijitaroon Y et al., J Med Assoc Thai, 1997 2) Burusrux S et al., J Med Assoc Thail, 1995
42	Turkey	81 619 392		+			1) Sertoz R et al., Mikrobiyol Bul., 2010 2) Stienlauf S et al., Emerg Inf Dis, 2009
43	Turkmenistan	5 171 943		+			Senyuta N et al., Int J Cancer, 1998
44	Uzbekistan	28 929 716			+		NDA
45	Vietnam	93 421 835			+		NDA

Legend:

° Very few tested samples and/or registered cases of HTLV-1 associated disease
= Estimate of the Siberian population according to the 2010 Russian census
* The Arabian Peninsula includes the following countries: Saudi Arabia, Yemen, Oman, Qatar, United Arab Emirates and Kuwait
A Countries where there is strong evidence of HTLV-1 infection
B Countries where the evidence is less strong but some HTLV-1 infection is likely
C No reliable evidence on HTLV-1 prevalence
D Studies show no evidence of HTLV-1 infection.

Table 2. HTLV-1 prevalence in sovereign states and territories in the Arabian Peninsula and Asia

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
1	Afghanistan	31822848			+		NDA
	Arabian Peninsula *	64 989 628					
2	*Saudi Arabia*	27 345 986		+		1) 0/30,000 (BD) 2) 2/24,654 (BD) 3) 1/47,426 (BD) - East region 4) 0/20,423 (BD)- Central region 5) 0/21,000 (BD) 6) 2/38,201 (BD)	1) Kawashti M et al.,Egypt Immunol,2005 2) Balkhy ZA et al., Milit Med, 2004 3) Ul-Hassan Z et al., Saudi Med J, 2004 4) El-Hazmi MM et al.,Saudi Med J, 2004 5) Arif M et al., Ann Trop Med Parastol,1998 6) Bernvil et al.,Transfus Sci, 1997
3	*Yemen*	26 052 966			+		NDA
4	*Oman*	3 219 775			+°	0/1,586 (BD)	1) Knox-Macaulay et al., Scand J Inf Dis, 1997
5	*Qatar*	2 123 160			+		NDA
6	*United Arab Emirates*	5 628 805			+		NDA
7	*Kuwait*	2 742 711		+		1/10,819 (BD)	Al- Mufti S et al., J AIDS, 1997
8	Armenia	3 060 631			+		NDA
9	Azerbaijan	9 686 210			+		NDA
10	Bangladesh	166 280 712			+°	4/444 (P)	Haque A et al., Ann Soc Belg Med Trop,1995
11	Bhutan	733 643			+		NDA
12	Brunei	422 675			+		NDA
13	Burma	55 746 253			+		NDA
14	Cambodia	15 458 332			+		NDA
15	China*	1 355 692 576		+°		1-2) 130/529,401	1) Li X et al., Int J Infect Dis.2014 2)Du J et al., Virus Res, 2014
16	East Timor	1 201 542			+		NDA
17	Georgia	4 935 880			+°	1/47 (P)	1) Senyuta N et al., Int J Cancer, 1998
18	India	1 236 344 631		+°		1) 14/10,000 (BD) 2) 0/520 (P); 0/496 (BD); 0/201 (PW) 3) 3/934 (P)	1) Kumar H et al., Indian J Pathol Microbiol,2006 2) Prakash KJ et al., Trop Doc, 2002 3) Babu PG et al., Scand J Infect Dis,1995
19	Indonesia	253 609 643			+°	1) 0/203 (GP) 2) 0/127 (GP); 0/791(BD); 0/451 (P)	1)Takao S et al;, JCV, 2000 2) Tanggo Y et al., Intervirology, 2000
20	Iran	80 840713	+			1) 6/2,034 (HS)- Golestan province 2) 35/1,654 (HS) Mashhad province 3) 208/28,928 (BD) Mashhad province	1) Kalavi K et al., Iran J Basic Med Sci, 2013 2) Rafatpanah H et al, J Clin Virol, 2011 3) Abbaszadegan MR et al., JCM, 2003 4) Rezvan H et al., Transf Today, 2014
21	Iraq	32 585 692		+		7/68,857 (BD)=	Stienlauf Set al., Emerg Inf Dis, 2009
22	Israel	7 821 850		+		3/294,342 (BD)	StienlaufS et al., Emerg Inf Dis, 2009
23	Japan	127103 388	+			1) 112/8,717 (PW) Kagoshima 2) 469/102,373 (PW)-Kyushu; 473/605,338 (PW) other areas 3) 34/33,617(PW) 4) 3,787/1,196,321(FTBD)–Whole Japan 5) 670/17,207(PW) – Okinawa 6) 14/2,414 (PW) – Honshu 7) 138/2,374 (PW)-Kagoshima/Kyushu 8) 885/16,283 (PW) – Kyushu 9) 187/5,015 (PW)-Nagasaki/Kuyushu	1) Nerome Y et al., Ped Int ,2014 2) Suzuki Set al., J Matern Fetal Neonatal Med, 2014 3) Yamada T et al., Microbiol Immunol, 2014 4) Satake M et al., J Med Virol, 2012 5) Mahehama et al., Int J Gyneacol Obstet, 2004 6) Goto et al., J Exp Clin med, 1997 7) Umemoto et al., Cancer Lett, 1994 8) Oki et al., Asia Oceania J.Obstet Gynaecol, 1992 9) Hino et al., Jpn J Cancer Res, 1985
24	Jordan	7 930 491			+		NDA
25	Kazakhstan	17 948 816			+		NDA
26	Korea North	24 851 627			+		NDA
27	Korea South	49 039 986		+		1/15,173 (BD)	Kwon SY et al., J Med Virol, 2008
28	Kyrgyzstan	5 604 212			+		NDA
29	Laos	6 803 699			+		NDA
30	Lebanon	5 882 562		+		1) 2/3,529 (BD) 2) 0/1,900 (BD)	1) Tamim H et al., Am J Infect Control, 2004 2) Naman Ret al., J Inf, 2002
31	Malaysia	30 073 353			+°	2/1,038 (P)	Yap SF et al., Southeast Asian J Trop Med Public Health, 1992
32	Mongolia	2 953 190			+	0/1,100(GP)	Batsuuri J et al., Scand J Infect Dis, 1993
33	Nepal	30 986 975			+°	0/413 (BD)	Nakashima K et al., J Trop Med Hyg, 1995
34	Pakistan	196 174 380			+		NDA
35	Philippines	107 668 231			+°	1) 0/1,743 (GP) 2) 20/1,323 (GP)	1) Hayes CG et al, JID, 1990 2) Ishida T et al., Int J Epidemiol, 1988
36	Russian Federation	142 470 272			+	7/111,109 (BD)=	1) Stienlauf S et al., Emerg Inf Dis, 2009 2) HTLV European Research Network, J Acquir Immune Defic Syndr Hum Retrovirol, 1996

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major references
	Siberia°	37 700 000		+°		1) 5/429 (GP)2) 6/778 (GP)	1) Syrtsev AV et al., Int J Cancer, 2000 2) Gessain et al., JAIDS, 1996
37	Singapore	5 567 301		+			Wang TL et al., J Clin Pathol, 1991
38	Sri Lanka	21 866 445			+		NDA
39	Syria	17 951 639			+		NDA
40	Taiwan	23 359 928	+			1) 1,793 / 2,578,238 (BD) 2) 2,311 / 3,701,087 (BD) 3) 35 / 7,278 (GP)	1) Lu SC et al., Int J Hematol, 2003 2) Lu SC et al., Int J Hematol, 2001 3) Wang CH et al., cancer Res, 1988
41	Thailand	67 741 401			+	01 6,228 (BD); 0/832 (PW) 0/1,000 (GP)	1) Urwijitaroon Y et al., J Med Assoc Thai, 1997
42	Turkey	81 619 392		+		1) 0/10,000 (BD) 2) 4/25,054 (BD)=	1) Sertoz R et al., Mikrobiyol Bul., 2010 2) Stienlauf S et al., Emerg Inf Dis, 2009
43	Turkmenistan	5 171 943			+	3/1,510 (BD)	Senyuta N et al., Int J Cancer, 1998
44	Uzbekistan	28 929 716			+		NDA
45	Vietnam	93 421 835			+		NDA

Legend:

PW Pregnant women
BD Blood donor
FTBD First-time blood donor
GP General population
HS Healthy subjects
P Patients
NDA No data available
° Very few tested individuals
= Estimation of the Siberian population according to the 2010 Russian census
* The Arabian Peninsula includes the following countries: Saudi Arabia, Yemen, Oman, Qatar, United Arab Emirates and Kuwait
A Countries with evidence of 'High HTLV-1 prevalence' based on the following indicators: over 1/10 000 among first-time blood donors and/or over 1% in the general adult population over 18 years
B Countries with 'Low HTLV-1 prevalence or no HTLV-1 infection'
C Absence of information or no reliable evidence on HTLV-1 prevalence.

Based on the assessors' expertise, no study has been performed either among the 10 000+ first-time blood donors, or among a truly representative general adult population in Asia. However, relevant studies of quite large populations and/or the presence of a series of HTLV-1 associated diseases, such as ATL or TSP/HAM, in some Asian countries (South Korea) are considered as having a 'high HTLV-1 prevalence'.

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Annex 6. Tables and references for HTLV-1 prevalence in sovereign states and territories of Oceania

Table 1. HTLV-1 studies in sovereign states and territories of Oceania

	Countries and territories	Population (July 2014)	A	B	C	D	Major references
	Australo-Melanesia						
1	Australia	22 507 617	+				1) Einsiedel L et al., PLOS NTD, 2014 2) Polizzotto MN et al., Transfusion, 2008 3) Seed CR et al., Int Med J, 2005 4) Whyte GS et al., Med J Aust, 1997 5) Bastian I et al., Med J Aust. 1993
2	Fiji	903 207		+°			1) Chungue E et al., Eur J Epidemiol, 1993 2) Nicholson et al., Med J Aust, 1992
3	New Caledonia (France)	267 840		+°			1) Cassar O et al., in preparation 2) Nicholson SR et al., Med J Aust, 1992
4	Papua New Guinea	6 552 730	+°				1) Takao S et al., J Clin Virol, 2000 2) Yanagihara R et al., Hum Biol, 1992 3) Sanders RC et al., Arch Virol, 1990 4) Imai J et al., Jpn J Cancer, Res, 1990 5) Yanagihara R et al., N Engl J Med, 1990
5	Solomon Islands	609 883	+				1) Furusyo N et al., Am J Trop Med Hyg, 1999 2) Nicholson SR et al., Med J Aust, 1992 3) Yanagihara R et al., Am J Trop Med Hyg, 1991
6	Vanuatu	266 937	+				1) Cassar O et al., J Inf Dis, 2007 2) Nicholson SR et al., Med J Aust, 1992
	Micronesia						
7	Guam (USA)	161 001			+		Brindle RJ et al., Epidemiol Infect, 1988
8	Micronesia (Federated States of)	105 681			+		Nicholson SR et al, Med J Aust, 1992
9	Kiribati	104 488			+		Brindle RJ et al., Epidemiol Infect, 1988
10	Marshall Islands	51 483			+		NDA
11	Northern Mariana Islands(USA)	70 983			+		NDA
12	Palau	21186				+°	1) Brindle RJ et al., Epidemiol J Infect, 1988
13	Cook Islands(UK)	10 134				+°	1) Chungue E et al., Eur J Epidemiol, 1993 2) Nicholson SR et al., Med J Aust, 1992 3) Reddy D et al, J Med Virol, 1987
14	Easter Island (Chile)	5 761		+°			Ohkura S et al., J Gen Virol, 1999
	Polynesia						
15	French Polynesia(France)	280 026		+°			1) Chungue E et al., Eur J Epidemiol, 1993 2) Nicholson SR et al., Med J Aust, 1992 3) Chungue E et al., Med J Aust, 1989 4) Brindle RJ et al., Epidem Inf, 1988
16	Hawaii(USA)	1360 301		+°			1) Dixon PS et al., West J Med, 1990 2) Kimata JT et al., West J Med, 1989 3) Blattner WA et al., PNAS, 1986
17	New Zealand	4 401916			+°		Reddy D et al., J Med Viral, 1987
18	Samoa	196 628		+°			1) Nicholson SR et al., Med J Aust, 1992 2) Reddy D et al., J Med Viral, 1987
19	Tonga	106 440			+		NDA
20	Nauru	9 488		+			Nicholson SR et al., Med J Aust, 1992

Legend:

° Very few tested individuals

* The Federated States of Micronesia include the following countries: Chuuk, Kosrae, Pohnpei and Yap

NDA No data available

A Countries where there is strong evidence of HTLV-1 infection

B Countries where the evidence is less strong but some HTLV-1 infection is likely

C No reliable evidence on HTLV-1 prevalence

D Studies show no evidence of HTLV-1 infection.

Table 2. HTLV-1 prevalence in sovereign states and territories of Oceania

	Countries and territories	Population (July 2014)	A	B	C	Type and tested population	Major reference
	Australo - Melanesia						
1	Australia	22 507 617	+			1) 531/1,595- (IAP)- Central Australia 2) 28/1,897 (HS, PW)state	1) Einsiedel L et al., PLOSNTD, 2014 2) Bastian I et al., Med J Aust, 1993
				+		3) 0/2,962,715 (BD) 4) 16/1,608,733 (BD) Victoria	3) Seed CR et al., Int Med J, 2005 4) Whyte GS et al., Med J Aust, 1997
2	Fiji	903 207			+°	1) 0/426 (GP) 2) 0/222 (GP)	1) ChungueE et al., Eur J Epidemiol, 1993 2) Nicholson et al., Med J Aust.1992
3	New Caledonia (France)	267 840			+°	1) 0/426 (GP) 2) 3/733 (Adults >60 years old)	1) Nicholson SR et al., MedJ Aust, 1992 2) Cassar 0et al., in preparation
4	Papua New Guinea	6 552 730		+°		46/1,018 (GP) - Madang and Highlands	1) Takao S et al;, J Clin Virol, 2000 2) Sanders RC et al., Arch Virol, 1990 3) Imai Jet al., Jpn J Cancer Res, 1990
5	Solomon Islands	609 883	+			19/851- (GP) – 4 provinces	Yanagihara R et al., Am J Trop Med Hyg,1991
6	Vanuatu	266 937	+			26/4,211 (GP)	Cassar O et al., J Inf Dis, 2007
	Micronesia						
7	Guam (USA)	161001			+		NDA
8	Micronesia (Federated States of)†	105 681			+		NDA
9	Kiribati	104 488			+		NDA
10	Marshall Islands	51 483			+		NDA
11	Northern Mariana Islands (USA)	70 983			+		NDA
12	Palau	21 186			+		NDA
13	Cook Islands (UK)	10 134			+°	1) 0/196 (GP) 2) 0/201 (GP) 3) 0/50 (BD)	1) Chungue E et al., Eur J Epidemiol, 1993 2) Nicholson SR et al., Med J Aust, 1992 3) ReddyD et al., J Med Viral, 1987
14	Easter Island (Chile)	5 761			+°	1/108 (GP)	Ohkura S etal., J Gen Virol, 1999
	Polynesia						
15	French Polynesia (France)	280026			+°	1) 1/395 (BD); 0/609 (GP) - Tahiti, Austral and Marquesas islands, no Polynesian ancestry 2) 0/198 (GP) 3) 0/50 (BD, HS, PW)	1) ChungueE et al., Eur J Epidemiol, 1993 2) Nicholson SR et al., Med J Aust, 1992 3) Brindle RJ et al., Epidemhf, 1988
16	Hawaii (USA)	1360 301		+°		1) 0,2% (BD of Polynesian ancestry) and 0,8% (BD of Japanese descent) 2) 41/205 (Hawaiian Japanese adult migrants)	1) Dixon PS et al., West J Med, 1990 2) Blattner WA et al., PNAS, 1986
17	New Zealand	4 401916			+°	0/111 (BD of Maori ancestry)	Reddy D et al., J Med Virol, 1987
18	Samoa	196 628			+°	1) 0/1,980 (GP) 2) 0/50 (BD)	1) Nicholson SR et al., Med J Aust, 1992 2) Reddy D et al., J Med Virol, 1987
19	Tonga	106 440			+		NDA
20	Nauru	9 488			+	24/4,045 (GP)	Nicholson SR et al., Med J Aust, 1992

Legend:

IAP	Indigenous adult patients
BD	Blood donors
GP	General population
HS	Healthy subjects
PW	Pregnant women
°	Very few tested individuals
*	HTLV-1 prevalence level varying according to the population tested (indigenous adults from central Australia *vs.* non-indigenous Australian individuals)
†	The Federated States of Micronesia include the following countries: Chuuk, Kosrae, Pohnpei and Yap
NDA	No data available
A	Countries with evidence of 'High HTLV-1 prevalence' based on the following indicators: over 1/10 000 among first-time blood donors and/or over 1% in the general population adult population of adults over 18 years old
B	Countries with 'Low HTLV-1 prevalence or no HTLV-1 infection'
C	Absence of information or no reliable evidence on HTLV-1 prevalence.

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