WHO-EM/CTD/081/E

Report on the

Interregional meeting on leishmaniasis among neighbouring endemic countries in the Eastern Mediterranean, African and European regions

Amman, Jordan
23–25 September 2018

World Health Organization
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1. INTRODUCTION

An interregional meeting on leishmaniasis among neighbouring endemic countries in the Eastern Mediterranean, African and European regions was organized by the World Health Organization (WHO) Regional Office for the Eastern Mediterranean in Amman, Jordan, from 23 to 25 September 2018. The meeting was attended by representatives from the health ministries of Albania, Georgia, Greece, Iran (Islamic Republic of), Iraq, Jordan, Lebanon, Morocco, Pakistan, Saudi Arabia, Sudan, Syrian Arab Republic and Tunisia. Representatives from Afghanistan, Algeria and Libya were unable to attend. The Secretariat comprised staff from WHO headquarters, WHO regional offices in the Eastern Mediterranean, Africa and Europe, WHO country offices in Iraq, Pakistan, Syrian Arab Republic and Yemen, and WHO temporary advisors from Spain and Tunisia.

Dr Hoda Atta, Coordinator, Department of Communicable Disease Prevention and Control, WHO Regional Office for the Eastern Mediterranean, opened the meeting by welcoming the participants, experts, programme managers, and headquarters and country office staff, and acknowledged the importance of holding the review meeting in view of the current sociopolitical context and its related challenges for neglected tropical diseases in the three neighbouring regions of WHO.

Neglected tropical diseases are strongly associated with the Agenda for Sustainable Development, namely, target 3.3 of Sustainable Development Goal (SDG) 3 (the so-called “health goal”), that calls for ending neglected tropical disease epidemics by 2030, and SDG 1, which targets the ending of poverty in all its forms. Neglected tropical diseases are also strongly linked to universal health coverage (target 3.8), which targets providing access to health services and essential medicines. Access to medicines for neglected tropical diseases will be an indicator of the overall success of universal health coverage, for which a key principle is that “no one should be left behind”.

The objectives of the interregional meeting were to:

- review epidemiology and control of leishmaniasis in countries of the Eastern Mediterranean Region, as well as neighbouring countries in the African and European regions;
- discuss the strategic elements and operational action required to enhance early diagnosis and treatment, including surveillance and data management/reporting, access to medicines and consumables, control of vectors and reservoir hosts, and capacities of health staff;
- share experiences on surveillance of leishmaniasis with emphasis on the District Health Information Software (DHIS 2) online tool;
- identify ways to address and overcome the challenges faced by countries in controlling the disease, notably in complex operational environments;
- identify cross-border issues and areas of collaboration to improve disease control;
- agree on priority research topics for leishmaniasis within the universal health coverage agenda.

Eco-epidemiologically, the scope of endemic zones for cutaneous and visceral leishmaniases traverse WHO regional “borders”, which highlights the importance of cross-border collaboration, and the need to include neighbouring regions in relevant discussions. The scope of the meeting aimed to cover all topics relating to leishmaniasis control, for both cutaneous and visceral leishmaniasis, as well as discuss cross-border issues with neighbouring regions. As such, the meeting covered updates on epidemiology, diagnosis, treatment, vector control, surveillance, research and emergency situations.

The neighbouring regions of Europe and Africa and their national counterparts were thanked for their participation, and encouraged to have increasingly open and collective dialogue, as they share common goals.

The programme was adopted (Annex 1) and the participants were introduced (Annex 2). The meeting was chaired by Dr El Hag; the rapporteurs were Dr Moreno Nuncio and Dr Kakar.

2. OVERVIEW OF CUTANEOUS AND VISCERAL LEISHMANIASIS

2.1 Global overview and updated strategies for control and prevention of leishmaniasis

A global overview of leishmaniasis was presented using data published in the WHO Global Health Observatory (http://apps.who.int/neglected_diseases/ntddata/leishmaniasis/leishmaniasis.html). An article providing an update on the global situation, to be published 5 October 2018 in the Weekly Epidemiological Record, describes the distribution of cutaneous and visceral leishmaniasis burden among different WHO regions and trends in the reported number of new cases since 1998. With 137 772 cutaneous leishmaniasis cases, the WHO Eastern Mediterranean Region remains the region carrying the highest burden of cutaneous leishmaniasis globally, followed by the Region of the Americas with 24% of the burden. Since 1998 and up to 2015, a constant rise in the number of cutaneous leishmaniasis cases in the Eastern Mediterranean Region has been observed. Although the burden of visceral leishmaniasis is more spread out among regions, the African and South-East Asia regions suffer the highest percentage, both at 30%. A visible decline in the number of visceral leishmaniasis cases in the South-East Asia Region was also observed, while the other regions displayed fluctuating and stable trends.

Regarding progress made in control strategies, several studies and publications were highlighted and discussed. A recent study completed by Morocco to determine the appropriate interventions for effective control of leishmaniasis concluded that, despite all efforts, monitoring and control of cutaneous leishmaniasis remains challenging and that integrated vector management control with community participation is recommended as an effective strategy. Other publications included an evaluation of rapid diagnostic tests for cutaneous leishmaniasis in Morocco, which achieved a 68% sensitivity (95% confidence interval (CI): 61–74) and 94% specificity

(95% CI: 91–97), and the assessment of fipronil bait orally administered to *Rhombomys opimus*, for control of fleas (Siphonaptera: Pulicidae) and phlebotomine sandflies (Diptera: Psychodidae) in Kazakhstan. The presentation concluded with an acknowledgement of the countries' individual efforts, and emphasized the importance of continuing and strengthening previously established control efforts.

2.2 Situation of leishmaniasis control at a regional level: Eastern Mediterranean Region

Dr Atta, WHO Regional Office for the Eastern Mediterranean

Both cutaneous and visceral forms of leishmaniasis are present in the Eastern Mediterranean Region, making it a significant neglected tropical disease. Regarding cutaneous leishmaniasis, both the anthroponotic form, caused by *Leishmania tropica*, and the zoonotic form, caused by *L. major* with animal reservoir hosts, are endemic in the Region. The *Framework for action on cutaneous leishmaniasis in the Eastern Mediterranean Region 2014–2018* was developed following several global and regional mandates, including resolution WHA60.13 on Control of leishmaniasis (2007), EM/RC54/R.3 on Neglected tropical diseases: an emerging public health problem in the Eastern Mediterranean Region (2007), and EM/RC40/R.7 on Leishmaniasis (1993).

Cutaneous leishmaniasis is one of the priorities in the WHO Eastern Mediterranean Region as it carries a large portion of the global burden. According to data reported in the Global Health Observatory, the Eastern Mediterranean Region reported 69.6% of the total number of cutaneous leishmaniasis cases detected worldwide in 2016 (followed by the Region of the Americas with 28.5% and the European Region with 1.6%). Of the total cases in the Region, over 90% were reported from three countries: the Syrian Arab Republic, Afghanistan and Pakistan, each of which reported more than 10 000 cases. Most of the cases are due to the anthroponotic form of the disease. Regarding visceral leishmaniasis, the Eastern Mediterranean Region carries about 19% of the global burden, with the highest number of cases reported from Sudan and Somalia.

The Region is facing many challenges – emergencies, crises situations, outbreaks, population displacement, limited funding and weak surveillance – all which may have led to the rising trend in cutaneous leishmaniasis cases. The ongoing crises in Iraq and the Syrian Arab Republic have exposed these countries to issues such as deterioration of sanitation and water supplies, collapse and destruction of health system infrastructure, and uncontrolled urbanization, all of which can act as risk factors for leishmaniasis. Not only have such factors caused an increase in case load, such as the sudden increase from about 4000 cases to more than 18 000 cases observed in Iraq in 2015, but also a change in the disease epidemiology in neighbouring countries. Jordan and Lebanon have seen an increase in the number of cutaneous leishmaniasis cases since 2013, which can be attributed to huge levels of population movement. This also highlights the importance of establishing unified case

definitions when reporting and differentiating between autochthonous and imported cases in order to identify most probable source of infection.

However, despite these challenges, some progress has been made in the Region. In Afghanistan, for example, cutaneous leishmaniasis has been included in the Basic Package of Health Services and the Essential Package of Hospital Services, which will allow access to diagnostics and medicines throughout the country.

The issue of weak surveillance and underreporting was discussed. Globally, the underreporting estimate is high at 2.8–4.6-fold in high-burden cutaneous leishmaniasis countries and 1.2–1.8-fold in high-burden visceral leishmaniasis countries (and estimated to be higher in lower burden countries). The Syrian Arab Republic was used as an example for underreporting in the Eastern Mediterranean Region. In 2015, 42 390 cases of cutaneous leishmaniasis were reported by the Syrian Ministry of Health, but this represented only half of cases, because of the ongoing conflict and access issues in some areas. Data from other sources such as the Early Warning, Alert and Response Network (EWARN) system and nongovernmental organizations in the field (such as the MENTOR Initiative) were reporting the remaining 43 327 cases. This highlights the importance of using more than one source, and coordination between partners during crisis and/or emergency situations, in order to ascertain and assess the true burden of disease.

The regional target for cutaneous leishmaniasis in the Eastern Mediterranean Region is to detect and report at least 75% of all cases, and treat at least 90% of cases, by 2021. This requires enhancing efforts to strengthen case management and surveillance at the country level. The Eastern Mediterranean Region has strengthened its efforts in the past few years, following the World Health Assembly and Regional Committee resolutions on leishmaniasis. Two guidelines have been produced: the *Framework for action on cutaneous leishmaniasis in the Eastern Mediterranean Region 2014–2018*, and the 2014 *Manual for case management of cutaneous leishmaniasis in the WHO Eastern Mediterranean Region*.

The regional *Framework for action on cutaneous leishmaniasis in the Eastern Mediterranean Region 2014–2018* was reviewed. The framework consists of five pillars: surveillance, case management, research, capacity-building and prevention. Despite its targeted end date of 2018, all the principal recommendations in the framework are still applicable. Countries were invited to prepare and share their plans for 2019. Country plans for 2020–2021 were also discussed, as they are to be formulated under the outcome-centred Thirteenth General Programme of Work 13 (GPW 13) framework, focusing on integrating leishmaniasis control with other neglected tropical diseases to fall under the scope of universal health coverage.

2.3 Situation of leishmaniasis control at a regional level: European Region

Dr Gasimov, WHO Regional Office for Europe

An overview of the current epidemiological situation of cutaneous and visceral leishmaniasis in the European Region was provided. Although the European Region's current share of global cutaneous leishmaniasis disease burden is less than 2%, it is largely underestimated or undetermined in a number of countries. The cutaneous form of the disease is still neglected and poorly reported. In the European Region, 25 countries (47%) are endemic for cutaneous leishmaniasis: both the anthroponotic form caused by *L. tropica* and the zoonotic form caused by *L. major* are present, as well as cutaneous leishmaniasis caused by *L. infantum*, which shares the same vectors as visceral leishmaniasis. Around 3000 cases of cutaneous leishmaniasis are reported annually in the Region, with the number of imported cases ranging from 1000–3000 in the last four years. Visceral leishmaniasis, caused by *L. infantum*, is reported by 27 countries (51%) with dogs, foxes, gerbils and jackals as the identified reservoir hosts. More than 300 cases of visceral leishmaniasis are reported annually from the Region.

The *Strategic framework for leishmaniasis control in the WHO European Region 2014–2020* was developed by WHO in close collaboration with all stakeholders to improve surveillance, control and prevention of leishmaniasis. The framework outlines regional goals and objectives to be achieved by 2020' together with the recommended strategic approaches and priority interventions, with special attention to: programme management; case detection and management; disease surveillance; control of reservoir hosts; integrated vector control; environmental operational research; capacity-building; community participation and health education; cross-border cooperation; intersectoral collaboration; partnership action; and monitoring and evaluation. The regional goals to be met by 2020 in the European Region are to:

- eliminate mortality due to visceral leishmaniasis;
- significantly reduce morbidity due to both visceral and cutaneous leishmaniasis;
- contribute to improving the health status of populations at risk and minimize the socioeconomic losses provoked by the disease in countries where leishmaniasis is a public health problem.

In 2017, the *Manual on case management and surveillance of the leishmaniases in the WHO European Region* was developed and published. It is considered as a standardized approach to case management and epidemiological surveillance, with standardized case and treatment definitions, and acts as a practical guide for health care and public health workers dealing with diagnosis and treatment of different clinical forms of leishmaniasis and for those involved in surveillance.

The WHO Regional Office for Europe supports countries by providing technical assistance and strategic guidance, capacity strengthening and procurement of diagnostics and medicines. Special attention is given to improvement of surveillance of leishmaniasis both at the regional and country levels. Strong collaboration with the Instituto de Salud Carlos III, a WHO Collaborating Centre for Leishmaniasis, has been established.

The way forward for the European Region is to continue: strengthening leishmaniasis surveillance in terms of comprehensiveness, and establishment of a regional database as well as national-level databases; providing technical assistance to countries to develop and implement national strategies and action plans; strengthening institutional capacities; and improving case management, prevention and research capabilities.

2.4 Situation of leishmaniasis control at a regional level: African Region

Dr Abate Beshah, WHO Regional Office for Africa

Out of the 47 countries in the African Region, 22 countries are endemic for all forms of leishmaniasis. The true burden of leishmaniasis is still unknown as no mapping has been completed, and the disease is largely underreported and underdiagnosed. While cutaneous leishmaniasis is widely distributed and endemic in over 22 countries, visceral leishmaniasis is focused in East African countries – Ethiopia, Kenya, South Sudan and Uganda – which reported the highest numbers of visceral leishmaniasis cases in 2016 globally, excluding India and Brazil. Regarding visceral leishmaniasis, most countries usually follow their own national algorithm for diagnosis, and treatment options include combination therapy, monotherapy, AmBisome and miltefosine. Detection has generally been passive, with poor post-treatment follow-up in most countries. Regarding cutaneous leishmaniasis, no standardized treatment protocol exists and countries use antimonials, local therapy and/or cryotherapy, with poor outcomes. Vector control strategies are dependent on the Malaria Control Programme.

The Regional Office for Africa supports countries through capacity-building, donation of drugs, outbreak response and technical assistance to enhance surveillance through DHIS 2 and national plans. Current efforts underway include improving country ownership and increasing domestic funding, enhancing DHIS 2 implementation to improve reporting, and training of health care workers in case management. The main challenges and areas that require more attention include vector control measures, efficacy of medicines in the treatment of visceral leishmaniasis/HIV co-infected patients and cutaneous leishmaniasis patients, and mapping of leishmaniasis endemicity in the whole Region. Unavailability of treatment guidelines in some countries, such as Uganda, and poor follow-up in post-treatment cases are further challenges that need to be addressed.

2.5. Country presentations

Each country presented information regarding epidemiology, control measures implemented and future plans for leishmaniasis prevention and control. Summaries of the individual country presentations are given in Annex 3.

Common aspects between country presentations include the treatment methods, which have been generally well established and standardized. Shared challenges include lack of/weak surveillance, lack of standardized vector and reservoir control measures, poor compliance to recommended diagnostic methods for cutaneous leishmaniasis, and inadequate funding and intersectoral collaboration.

3. ENHANCING DIAGNOSIS AND TREATMENT OF CUTANEOUS AND VISCERAL LEISHMANIASIS

3.1 Access to diagnostics and medical treatment

Professor Mokni, La Rabta Hospital, Tunisia

Case management for leishmaniasis is dependent on the form of disease and the causative parasite. Diagnosis for visceral leishmaniasis uses several techniques including the direct agglutination of promastigotes and, more recently, detection through the dip-stick test of the K39 antigen. Diagnosis for cutaneous leishmaniasis relies on clinical expertise to identify suggestive lesions, followed by parasitological confirmation. Standardized diagnosis and treatment protocols for leishmaniasis are well documented, including in the *Manual for case management of cutaneous leishmaniasis in the WHO Eastern Mediterranean Region* and the *Manual on case management and surveillance of the leishmaniases in the WHO European Region*. Guidance is also provided in WHO's *Control of the leishmaniases* (Technical Report Series 949), but this is not generally followed and variability occurs between countries. Additionally, major issues still exist, particularly with cutaneous leishmaniasis cases, whereby numerous patients do not seek medical attention and those who do receive diagnosis may not be reported.

Standard diagnostic procedures for cutaneous leishmaniasis were discussed, including dermal scraping followed by culture using Novy-MacNeal-Nicolle medium and direct examination. Studies also show that the site of influence could influence the sensitivity of diagnosis. There are currently no rapid diagnostic tests that have been fully validated in the field and remote areas. An example from Sri Lanka showed only 28.4% of samples were positive using the rapid diagnostic immunochromatographic strip test (IC-RDT) compared to 79.7% using conventional polymerase chain reaction (PCR) methods. Additionally, rapid diagnostic tests should differentiate between the different species of cutaneous leishmaniasis.

Since diagnosis for cutaneous leishmaniasis relies largely on clinicians being able to detect suspicious lesions, all clinical presentations must be well recognized. Well documented forms include leishmaniasis recidivans, localized cutaneous leishmaniasis or multiple cutaneous leishmaniasis, depending on the infecting parasite and resultant immune response. Resurgence can also occur in a disseminated form with local, regional, general or mucosal lesions. Multiple cutaneous leishmaniasis with more than 10 lesions present as disseminate cutaneous leishmaniasis. Dissemination forms include mucocutaneous leishmaniasis, satellite papules, nodular lymphangitis and diffuse cutaneous leishmaniasis. While present information acknowledges a vast and diverse array of clinical presentations, many atypical forms exist. Examples of atypical forms from the field include leishmaniasis/HIV co-infection in Cameroon, where leishmanial parasites were identified in Kaposi's sarcoma lesions, whereas the initial clinical presentation – fever, high mortality rate, hepatosplenomegaly and weight loss – were more suggestive of visceral leishmaniasis.

Various treatment regimens for leishmaniasis include peroral, topical and parenteral medicines. Regarding visceral leishmaniasis, there is a general consensus on the main aspects of treatment and recommendations are well outlined in the global technical report *Control of the leishmaniases*. Regarding cutaneous leishmaniasis, different decision-making algorithms have been developed in regional manuals to act as guides. Various peroral treatment medicines exist (allopurinol, rifampicin, metronidazole, itraconazole), but they are only effective on some species and are generally toxic. Parenteral treatments such as antimonials, amphotericin B and pentamidine have a superior efficacy, but are very toxic. Full comparisons of cutaneous leishmaniasis treatments can be found in Annex 4.

The importance of monitoring patients during treatment was also emphasized, due to side-effects associated with parenteral medicines (including pancytopenia, pancreatitis, elevations of hepatocellular enzymes and electrocardiogram (EKG) abnormalities), and also because of the lack of an upper limit dose. Patient monitoring should be through complete blood count tests, hepatic function tests and monitoring of serum amylase and lipase, and treatment should be interrupted when pancreatitis is confirmed.

Peroral treatment medicines include fluconazole and miltefosine, but they are costly and have limited efficacy against *L. major* only. Pentavalent antimonials can be administered locally and parenterally. Local administration is less toxic, but requires multiple schedules and ideal regimens are still being determined. New formulations for topical treatments, such as paromomycin, also being explored and investigated. Physical treatments such as cryotherapy, which uses liquid nitrogen, and thermotherapy, which uses infrared radiation, are also good alternatives especially for pregnant women and children. Costs incurred would only be for initial set-up, apparatus and maintenance. Thermotherapy probes, however, must be properly sterilized following the administration of local anaesthesia.

3.2 Stock management and medicines logistics

Dr Ruiz-Postigo, WHO headquarters

WHO is currently supporting countries endemic for visceral leishmaniasis with donations of medicines and/or funds for control programmes through agreements and donations from Gilead Sciences and the Department for International Development (DFID), United Kingdom of Great Britain and Northern Ireland. Extensions of these agreements are dependent on effective medicines use and reporting of control programmes' activities. For cutaneous leishmaniasis, there are no drugs donations presently and only limited funding from WHO. There is a need for high-level advocacy in order to respond to the World Health Assembly resolution WHA60.13, focused on access to treatment for all those affected by leishmaniasis. There are also difficulties with medicines logistics. An emergency stock is present at WHO headquarters, but with limited capacity. Countries were invited to consider procurement through national resources or partners' support.

4. SURVEILLANCE, DATA MANAGEMENT AND REPORTING OF CUTANEOUS AND VISCERAL LEISHMANIASIS

4.1 Global surveillance using DHIS 2

Dr Ruiz-Postigo, WHO headquarters

Efforts are being made by WHO to strengthen surveillance for leishmaniasis in order to forecast diagnostics and medicines requirements accurately and to develop a more focused control approach. Currently, surveillance for leishmaniasis consists of updates on the Global Health Observatory, which includes basic information reported at the national level with three variables for cutaneous leishmaniasis and four for visceral leishmaniasis, and detailed country profiles with more detailed information at the subnational level with 20 variables. Globally, there are currently 42 countries providing information necessary to produce country profiles. While the Global Health Observatory is updated twice a year, country profiles are updated annually, but require a long data collection, review and validation process (usually 3–6 months). Currently, WHO is shifting towards monthly real-time surveillance to improve not only timeliness but completeness of data, as data compilation efforts are still largely unsatisfactory. This has been supported through the use of an online electronic platform, namely DHIS 2, a free, customizable, open source information system that allows data collection, visualization and sharing that supports both individual and aggregate data.

Despite existing challenges, electronic surveillance is expanding, and has already been adopted by countries as their national health information system, driven by other major public health programmes such as HIV, tuberculosis and leprosy. The main purpose of DHIS 2 use is for real-time data collection, visualization and dissemination using a bottom-up approach. Some advantages of DHIS 2 over conventional surveillance approaches for leishmaniasis include the ability to automatically generate detailed country profiles using the 20 variables/indicators, customizable by country, to produce tables, graphs and subnational-level maps, including health facility or village level, all from entering data manually or importing through Excel a single time for all reports.

4.2 Progresses and challenges to implementing DHIS 2 at country level

Dr Aly and Dr Osman, WHO Regional Office for the Eastern Mediterranean

Health information systems in the Eastern Mediterranean Region

The Department of Information, Evidence and Research, WHO Regional Office for the Eastern Mediterranean, works with countries to develop their health information systems. Health information systems are made up of data components that capture, store, manage and/or transmit information related to the health of individuals for monitoring performance, disease trends and health planning. The components that make up a health information system are data sources, data processing and the information outputs; and cutting across all three components is the

process of integration, and different standards used in emergency settings. Different categories of health data include service delivery, disease surveillance, morbidity and mortality, and vital registration.

The department works to improve the functionality of national health information systems by applying international standards and by building national capacities. Efforts are underway to implement more electronic systems over paper-based systems. The advantages and added value of using electronic formats instead of paper include:

- data management (data collection and storage, data access at multiple levels, running quality checks);
- instant reporting;
- set-up of automated alerts and calculation of epidemic thresholds;
- regular development of reports (through graphs, maps and other forms of analysis);
- enabling comparison across time and place;
- enabling trend analysis (data can be displayed by epidemiological weeks, months and years);
- reduction of personnel errors;
- feasibility of integration.

DHIS 2 is being used by the department as an electronic system for reporting, and is well suited for lower-income countries as costs are only incurred for the initial installation of the system and trainings for personnel. The Regional Office for the Eastern Mediterranean has been supporting DHIS 2 implementation since 2014 in several countries, including:

- Sudan, for use as a routine health information system and progressing towards an integrated disease surveillance system (to include malaria and leishmaniasis);
- Northern Syrian Arab Republic, for use in service delivery and event capture (inpatient and out-patient diagnosis);
- Lebanon, for routine surveillance of notifiable diseases (aggregate data) and individual data for severe acute respiratory infections;
- Libya, for developing a routine health information system (pilot phase in health facility);
- Pakistan, for establishing disease integration (malaria, HIV).

Past experiences in countries have shown that in order to successfully implement an electronic system, an ideal and functional health information system should have: a national plan; adequate infrastructure; essential data at the lowest possible level; monitoring indicators for system attributes, which include timeliness and reporting rates; and monitoring indicators for programme management. Methods for data quality checks also need to be put in place to monitor reporting rates, guarantee data quality, and avoid parallel programmes and duplication of efforts.

There are several factors that affect a country's ability for full automation and/or integration with existing systems including governance, programme commitment, the availability of resources, and the presence of existent health electronic systems. For integration of health information systems, the objectives and targets need to be clearly identified to avoid parallel systems, and then an integration project can be formulated with a timeframe, targets and deliverables.

DHIS 2 use for leishmaniasis in the Eastern Mediterranean Region

Countries in the Eastern Mediterranean Region are classified into low-burden/non-endemic countries and high-burden countries for cutaneous and visceral leishmaniasis. Previously, WHO provided countries with Excel templates once a year to complete all data related to leishmaniasis case reporting. A simple form was sent to low-burden countries and a more detailed form to high-burden countries. Starting in 2018, high-burden countries were requested to enter data on the WHO DHIS 2 platform, customized with data entry forms for leishmaniasis surveillance with the required indicators. Log-in credentials as well as a step-by-step guide and instructional videos were developed by WHO and delivered to the focal person in each country in charge of data entry and validation. DHIS 2 has several advantages over conventional data collection methods which include, but are not limited to, automated analysis, especially at subnational level, and real-time updating.

Different outputs and reporting formats exist for leishmaniasis disease surveillance, including updates on the Global Health Observatory, annual global updates published on the Weekly Epidemiological Record and annual country profiles. The Global Health Observatory reports on three indicators for cutaneous leishmaniasis and visceral leishmaniasis separately, namely, the status of endemicity, the number of autochthonous cases, and the number of imported cases. Results are publicly available online in the form of tables, graphs and maps. Country profiles summarize data into five subsections for high-burden countries: general information; epidemiology; control and surveillance; diagnosis; and treatment, outcomes and medicines.

Currently, nine high-burden countries were reporting on DHIS 2 for 2016 and 2017 data. While reporting rates are high, ranging between 67% and 83%, an issue with data completeness still exists, especially indicators related to treatment outcome data for visceral leishmaniasis, and clinical, laboratory and treatment data for cutaneous leishmaniasis. Countries were invited to consider shifting to more detailed data at subnational level, where possible, with support from WHO regional offices and headquarters.

5. CONTROL OF VECTORS AND RESERVOIR HOSTS

5.1 Global and regional updates on vector control and reservoir hosts: monitoring and evaluation to measure impact

Global updates on vector and reservoir control

Dr Yaghoobi-Ershadi, Tehran University of Medical Sciences, Islamic Republic of Iran

Vector control for leishmaniasis aims to reduce sandfly–human contact and/or density; however, up-to-date information on the ecology of vectors and reservoirs is still required. The choice and effectiveness of vector control methods depends on the understanding of the local epidemiology and disease type, causative species, vector behaviour, feeding preference and habitats.

Leishmaniasis vector control measures are usually integrated with other vector-borne diseases, such as malaria. Control measures include indoor residual spraying, the use of insecticide-impregnated nets, space spraying and different rodent control operations. Various global and regional guidelines have been published by WHO on good indoor residual spraying practices, monitoring and evaluation, and biosafety, such as the monitoring and evaluation tool kit for indoor residual spraying,[1] test procedures for insecticide resistance monitoring in malaria vectors,[2] and pesticides and their application.[3]

A review of countries' experiences on vector control measures for leishmaniasis and their resultant impact were discussed, as well as WHO-recommended insecticides and mosquito nets. Reservoir control measures include aerial and ground surveys, colony extermination by deep ploughing and poisoning with zinc phosphide, or prevention of colonization through artificial barriers such as irrigation canals and cultivation. Country examples were from Afghanistan (2005), the Islamic Republic of Iran (2005), Tunisia (2009) and Morocco (2015). In the southeastern Errachidia province of Morocco, where the sand rat *Meriones shawi* is the main identified reservoir, strychnine-poisoned wheat baits were used over 5000 hectares during an outbreak from 2010 to 2012. This control measure, along with climate change and increasing herd immunity, lead to a decline in the incidence rate after 2011. Prevention and control of leishmaniasis is usually influenced by the role and contribution of national organizations. According to an analytic hierarchy process study conducted in 2016 in the Islamic Republic of Iran, the health ministry's share

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[1] Monitoring and evaluation tool kit for indoor residual spraying: kala-azar elimination in Bangladesh, India and Nepal. Geneva: World Health Organization on behalf of the Special Programme for Research and Training in Tropical Diseases; 2010 (https://www.who.int/neglected_diseases/resources/9789241500364/en/).

[2] Test procedures for insecticide resistance monitoring in malaria vector mosquitoes – second edition. Geneva: World Health Organization; 2016 (https://www.who.int/malaria/publications/atoz/9789241511575/en/).

[3] Pesticides and their application: for the control of vectors and pests of public health importance – sixth edition. Geneva: World Health Organization; 2006 (https://www.who.int/whopes/resources/who_cds_ntd_whopes_gcdpp_2006.1/en/).

for the control of anthroponotic cutaneous leishmaniasis, zoonotic cutaneous leishmaniasis and zoonotic visceral leishmaniasis were calculated to be between 21.1–23.6%. It was concluded that leishmaniasis control is not possible by the health ministry alone, and other national organizations should play a role in this regard.

Regional updates on vector and reservoir control
Dr Al-Eryani, WHO Regional Office for the Eastern Mediterranean

Current vector control strategies against leishmaniasis in countries in the Eastern Mediterranean Region include: vector control; animal reservoir control; vector surveillance; and health education for prevention. An array of vector control activities are being carried out in countries, but with mixed results and outcomes (Annex 5). This directly reflects the diverse biology and epidemiology of leishmaniasis, as well as the complexities of the different modalities of vector and reservoir control implementation, which are often non-standardized. Monitoring and evaluation of activities also needs to be reinforced, as the impact of activities is not always measured and vector surveillance is very limited.

Common major challenges related to vector control as a means for leishmaniasis prevention, outlined by countries in the Region, include: inadequate infrastructure of vector surveillance and control; lack of monitoring and evaluation for executed interventions; insufficient human capacity and capability, with critical human resource deficiencies not only for the surveillance of leishmanial parasites, but also for all vector-borne diseases; limited contribution of research in the development of vector control policies and strategies; and, poor community engagement and health education messaging. Moreover, countries are facing many external challenges that hinder the effective implementation of present interventions, such as ongoing insecurity in some areas, population movement, inadequate financial resources, high staff turnover and weak collaboration with other related sectors.

The diversity of the disease and its associated vectors and animal reservoir hosts, coupled with external challenges, underpins the need for standardization and clarity of guidance. The upcoming WHO global operational manual on vector control, surveillance, monitoring and evaluation of cutaneous and visceral leishmaniasis will likely build consensus and generate more distinct recommendations, and also add the dimension of cost-effectiveness (such as indoor residual spraying in case of outbreaks of anthroponotic cutaneous leishmaniasis). Mapping of vector control activities and practices is being conducted. In addition, WHO recently developed a document on the global vector control response (GVCR) 2017–2030,[4] which provides guidance to countries to strengthen vector control through a new strategy of increased capacity, improved surveillance, better coordination and integrated action. It provides a general framework for intersectoral collaboration and implementation at the country level. A

[4] Global vector control response 2017–2030. Geneva: World Health Organization; 2017 (http://www.who.int/vector-control/publications/global-control-response/en/)

regional plan of action 2019–2023 for implementation of the GVCR 2017–2030 has also been developed to support countries in the Eastern Mediterranean Region to implement the GVCR, while taking into consideration their local contexts.

5.2 Research priorities for prevention and control of leishmaniasis under the universal health coverage agenda: summary of group work

Professor Ben-Ismail, Pasteur Institute, Tunisia

Research topics of significance to leishmaniasis prevention and control were classified into subgroups: case management, disease prevention, and epidemiology and surveillance. Groups discussed and agreed upon research priorities for each subgroup. Results of the group work are given below.

Group 1. Case management

There is a need to assess and compare the current treatment protocols in use for cutaneous leishmaniasis, including: intralesional injectable regimens; cryotherapy regimens; efficacy of miltefosine in the treatment of Old World *L. tropica*; upper dose limit for parenteral antimonials; and thermotherapy. Development of cost-effective alternative treatment options, such as topical ointments containing plant extracts, should also be explored. There is a need for assessment of risk factors related to the severity and fatality of visceral leishmaniasis cases. Evaluation of the performance of available diagnostic methods in field conditions, including smear microscopy, serology and clinical diagnosis, is required. Assessment of the effectiveness of immunotherapy, and evaluation of early/late treatment on the body's immune response in both the field and laboratory conditions, are further priority research areas.

Group 2. Disease prevention

There is a need for studies on the host feeding preferences/habits of the main vectors of anthroponotic cutaneous leishmaniasis. Evaluation of repellents against sandfly bites sourced from plant extracts, and investigation of the reasons for sandflies attraction to *Leishmania* skin lesions, are required. Evaluation of the impact of bandages on ulcers against disease transmission in endemic foci for anthroponotic cutaneous leishmaniasis is also necessary. For anthroponotic and zoonotic cutaneous leishmaniasis, studies on the dispersal distances of main vectors are needed, and a network should be developed for identification of vectors and reservoirs in endemic foci. Assessment of the role of health education in leishmaniasis vector control programmes and the role of community participation in prevention of anthroponotic and zoonotic cutaneous leishmaniasis should be undertaken. The cost-effectiveness of vector and reservoir control in endemic foci should also be studied. Studies on zoonotic cutaneous leishmaniasis-prone regions, using a combination of the analytic hierarchy process and Geographic Information System (GIS), are a further research priority.

Group 3. Epidemiology and surveillance

As leishmaniasis is a focal disease, reporting of endemicity of the disease should ideally be calculated at subnational level in order to concentrate and direct control approaches. Through a technical advisory group, disease endemicity should be determined at subnational level and classified into levels depending on the severity of disease as opposed to the previous format of “endemic/non-endemic”. Factors and respective thresholds that define the different endemicity levels should be researched and agreed upon, including: number of new cases reported; form of disease (cutaneous or visceral); environmental factors; population at risk; reservoir host, if any; and parasite and vector implicated.

6. ADDRESSING LEISHMANIASIS IN CRISIS SITUATIONS AND OUTBREAK RESPONSE

6.1 Global- and regional-level experience in responding to outbreaks of leishmaniasis

Dr Ruiz-Postigo, WHO headquarters, and Dr Atta, WHO Regional Office for the Eastern Mediterranean

The Global Leishmaniasis Programme at WHO headquarters keeps an emergency warehouse stocked with medicines and diagnostics to supply countries in times of emergency. However, the warehouse has a very limited capacity. Moreover, priority has to be given to visceral over cutaneous leishmaniasis, due to the fatal nature of the disease if left untreated. This greatly hinders the capability of the warehouse to respond to all emergency requirements faced by countries, especially in cases of cutaneous leishmaniasis, as was experienced in the Eastern Mediterranean Region in 2018.

Several emergencies for cutaneous leishmaniasis were called and support was requested in the Eastern Mediterranean Region in 2018. In Pakistan, from 1 January to 18 April, a total of 6011 cases of cutaneous leishmaniasis were reported by the Directorate of Health in the Federally Administered Tribal Areas. The cases were reported from six districts: Bajaur, Mohmand, Khyber Agency, Frontier Region Kohat, North Waziristan and Orakzai. The district of Khyber Agency recorded the highest number at 3065 cases.

Through the lead of the WHO Health Emergencies Programme, Regional Office for the Eastern Mediterranean, a rapid risk assessment was carried out in coordination with WHO headquarters, the Regional Office and WHO Country Office in Pakistan, and information was collected on: actual magnitude; date started; response provided; assistance provided; gaps in the response; and possible assistance from the Regional Office. This was then posted in the Global Outbreak Alert and Response Network (GOARN) website to facilitate resource mobilization.

In the Syrian Arab Republic, an increase in the number of cutaneous leishmaniasis cases in the northern area was detected through the EWARN system, a surveillance system run through the WHO Gaziantep Office through sentinel sites covering a population of 9.5 million. In 2018, a total of 25 562 cases were reported from Epidemiological Week 1 to Epidemiological Week 12. As with the Pakistan scenario, a consolidated rapid risk assessment was developed with input from country level (WHO Damascus, Amman and Gaziantep hubs), regional level (Department of Communicable Disease Prevention and Control, and Health Emergencies Programme), and global level (Global Leishmaniasis Programme and Health Emergencies Programme).

Both experiences of leishmaniasis outbreaks demonstrated the need for better communication and coordination between different levels and programmes for effective early response. It was also suggested to involve the Water, Sanitation and Health (WASH) cluster in leishmaniasis prevention activities.

6.2. Country-level response to leishmaniasis outbreaks: Pakistan

Dr Kakar, WHO Pakistan

In 2014, the Disease Early Warning System (DEWS) in Pakistan was discontinued and emergency alerts based on district or health facility data are no longer operative. The main source of information is now media reports and personal statements/opinions, especially through social media.

In 2018, the Department of Health in Khyber Pakhtunkhwa alerted a cutaneous leishmaniasis outbreak in Shangla district. In-depth investigation found that incidence of the disease was within a normal range for Shangla. However, the situation worsened in other districts of Khyber Pakhtunkhwa and in agencies of the neighbouring Federally Administered Tribal Areas. During the same period, reports were received from Balochistan of outbreaks in Dera Bugti, Killa Saifullah, Zhob, Lasbela and Quetta districts.

WHO supports Pakistan through the provision of guidelines, training sessions and distribution of medicines. The year 2018 also saw the successful registration of Glucantime by the Drug Regulatory Authority in Pakistan. To respond to alerts, medicines were procured, resources were mobilized and outreach camps were organized. The alerts also started a dialogue at country level on the development of a response plan to cutaneous leishmaniasis outbreaks. However, areas that still require attention include: surveillance; integration with other vector-borne diseases and other sectors; governance and political commitment; and preventative measures, such as community engagement and vector control interventions, especially in highly endemic foci.

6.3 Country-level response to leishmaniasis outbreaks: Syrian Arab Republic

Dr Kady, WHO Syrian Arab Republic, Aleppo Office

In the Syrian Arab Republic, leishmaniasis cases reported from the northwestern area represented 91% of cases in 2017. Increased risk factors for disease transmission and proliferation include: population movement within the country, with about 1.2 million internally displaced persons recorded from January to June 2018 (an average of 6584 daily); deterioration of the environmental situation including rubble and reduced garbage collection, which can potentially increase the number of breeding sites for sandfly proliferation; and access challenges to diagnostics and treatments, including the cessation of national generic production of meglumine antimoniate.

Surveillance in the country is complex, with different entities reporting for different areas. These include the Ministry of Health routine surveillance system, the EWARS system operated from the Damascus hub, and the EWARN system run through the Gaziantep hub. Overlap in reporting is minimal, as coverage is dependent on the authority in control at that time, with the Ministry of Health reporting for Government-controlled areas and the Gaziantep hub reporting for opposition-controlled areas in the north.

Not only has the conflict caused a considerable increase in the overall number of leishmaniasis cases, but also an increase in cases in central and eastern areas of the country. Internal displacement may be the main reason behind the increase in the number of cases seen in Al-Hasakah, Hama, Lattakia, Tartous and Rural Damascus. WHO is collaborating with partner nongovernmental organizations present in the field, notably the MENTOR Initiative. Through this partnership, 209 000 long-lasting insecticidal nets were distributed in communities in the northern Syrian Arab Republic, a camp was set up in Al-Raqqa and treatment was provided through a total of 244 000 vials of Glucantime from 2015–2018. Financial support has also been provided to MENTOR for capacity-building, printing and distribution of educational materials. This experience demonstrates the importance and impact of coordination between different partners, especially when faced with access issues.

7. CROSS-BORDER CHALLENGES AND AREAS OF COLLABORATION

Dr Moreno, Instituto de Salud Carlos III

Cross-regional collaboration is needed in leishmaniasis control, considering that the epidemiological foci of disease types often overlap WHO geographic designations. Visceral leishmaniasis caused by *L. donovani* is predominantly found in East Africa – Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda – countries that belong to both the African and Eastern Mediterranean regions. For this reason, the WHO holds bi-regional consultations for the Eastern Africa focus, which in the past have highlighted the role of uniform reporting mechanisms for disease surveillance, the importance of sharing relevant research findings and the importance of using standardized case management protocols. There is a need for mapping at

subnational levels, especially at bordering areas, in order to inform both national and local coordination. Countries that lack case management services for incoming refugees are encouraged to include leishmaniasis in their national agendas. A similar situation is found between Maghreb countries – Algeria, Morocco and Tunisia – in regards to sharing a disease form with similar characteristics. Joint "focus" targets, frequent coordination meetings, improved communication, and collaboration between existent cross-border communicable disease programmes are some of the relevant recommendations from previous consultations.

Recently, collaboration was markedly needed to address the increased movement of populations across borders due to crisis situations such as the one in the Syrian Arab Republic. Response was coordinated through the WHO Gaziantep hub, reporting to the Regional Office for Europe, and the WHO Damascus, Aleppo and Amman offices, reporting to Regional Office for the Eastern Mediterranean. Expedited delivery of medicines and a response mechanism required transparency, information sharing and exchange among all partners involved.

Discussion highlighted the use of WHO collaborating centres for assistance, technical expertise, guidance and information exchange. The Instituto de Salud Carlos III is a WHO collaborating centre for leishmaniasis which assists through: provision of experts for epidemiological and outbreak assessments in endemic countries; preparation of protocols for xenodiagnoses and maintenance of sandfly colonies; evaluation of diagnostic and control tools; and training for health personnel from endemic countries in the areas of entomology, laboratory diagnosis and laboratory quality assurance. As the national reference laboratory in support, the Instituto de Salud Carlos III directly supports the national health system in serological and parasitological diagnosis of leishmaniasis. Other reference activities include molecular epidemiology, virulence, drug susceptibility and geographical distribution. The institute is also active in training activities and participates in numerous courses and masters in the fields of tropical medicine, diagnosis and microbiology.

8. STRENGTHENING THE CAPACITY OF HEALTH STAFF FOR SKIN NEGLECTED TROPICAL DISEASES INCLUDING LEISHMANIASIS

Dr Gabrielli, WHO headquarters

Capacity-building activities for leishmaniasis are implemented at several levels, including managerial, operational and technical. All modalities and activities that can contribute to information exchange can potentially enhance the process of capacity-building, such as review meetings, country missions, and dissemination of manuals and guidelines.

There are two current types of formal capacity-building activities carried out by WHO headquarters Department of Control of Neglected Tropical Diseases in collaboration with the other levels of the Organization: those administered to WHO staff at country-office level, which are usually carried out by WHO headquarters or

regional offices and cover managerial, operational and technical aspects of neglected tropical disease programmes; and courses delivered to national staff working in the health sector, which target a specific technical area and are delivered by WHO collaborating centres, identified experts or centres of excellence.

A capacity-building manual dedicated to neglected tropical diseases with skin manifestations was published by WHO in June 2018. *Recognizing neglected tropical diseases through changes on the skin: a training guide for front-line health workers* is a pictorial training guide for health workers, covering a large number of skin neglected tropical diseases. It is available online in English and French, and can be downloaded for dissemination from http://www.who.int/neglected_diseases/resources/9789241513531/en/. Because of the associated social stigma, cutaneous leishmaniasis, leprosy and lymphatic filariasis are also planned to be included in a manual dedicated to neglected tropical diseases and mental health, which will contribute to the operationalization of the WHO Mental Health Gap Action Programme (mhGAP) and its intervention guide, which addresses mental, neurological and substance use disorders in non-specialist health settings.

WHO has also been developing online courses in the area of neglected tropical diseases. The course on clinical management of skin neglected tropical diseases is delivered through the Universitat Oberta de Catalunya in Barcelona, Spain, for three months through online teaching, with a 10-day on-the-job training for selected top students. The focus of these courses is cutaneous leishmaniasis, leprosy, buruli ulcer and yaws, and participants were selected and sponsored by WHO from each of the regions.

Numerous capacity-building tools specifically related to leishmaniasis control have also been developed. The Pan American Health Organization has developed online self-learning programmes on both visceral and cutaneous leishmaniasis, and a similar course on post-kala-azar dermal leishmaniasis is available through the WHO eLearning platform. Other online/offline courses under development include courses on visceral leishmaniasis in East Africa, visceral leishmaniasis in the Mediterranean Basin and cutaneous leishmaniasis in Africa and Asia. A pictorial timeline of facts has been published on the WHO website, outlining the history of the disease up to the present time.

Capacity-building for operational research is managed by the Special Programme for Research and Training in Tropical Diseases (TDR) in collaboration with neglected tropical diseases departments/units at WHO headquarters and regional level; notably, a small grant scheme is managed by regional offices to support field studies aimed at solving operational challenges faced by neglected tropical disease programmes. Organized by Institute Pasteur Tunis, a regional course for the Eastern Mediterranean on capacity-building in tropical disease implementation research is also held every two years to address proposal strengthening, in order to increase chances of support by TDR and other agencies.

Specific needs for capacity-building for leishmaniasis identified by the meeting participants include: diagnosis and treatment (for health professionals); surveillance in order to align with WHO global reporting requirements (for programme officers/data managers); vector and reservoir control (for entomologists and mammologists); and reinforcing programme management (for managers of control programmes).

9. PREPARATION FOR GPW 13: COUNTRY SUPPORT PLANS FOR 2020–2021, AND PLANNED ACTIVITIES FOR 2019

Dr Ruiz-Postigo, WHO headquarters and Dr Atta, WHO Regional Office for the Eastern Mediterranean

Countries were invited to prepare their 2019 country plans, after negotiating with their respective ministries, clearly outlining the planned activities, for submission to their regional offices. For the subsequent year, WHO will be implementing GPW 13, a new bottom-up approach to the programme of work which will closely follow the SDGs, with a triple billion target: one billion more people with universal health coverage, one billion better protected from health emergencies and one billion enjoying better health. Leishmaniasis control falls under WHO's GPW 13 impact and outcome framework (2019–2023) target 35, which aims to "Eliminate at least one neglected tropical disease in 30 additional endemic countries". WHO country offices will be required to state their activities according to the pre-defined targets, and the level of technical support required from the regional offices and headquarters to complete said activities. This updated programme of work also calls for integration with other communicable diseases, as it will measure universal health coverage.

10. RECOMMENDATIONS

To Member States

1. Implement resolution WHA60.13 on Control of leishmaniasis to ensure that:

- domestic funds are allocated for the procurement of first-line treatment for both cutaneous and visceral leishmaniasis; priority should be given to medicines needed to prevent deaths due to visceral leishmaniasis;
- human leishmaniasis is included in the national surveillance system (ideally supported by vector and reservoir data) so that countries can collect and analyse routine data; this will allow timely action at the country level and data-sharing with the WHO leishmaniasis control programme at regional and global level through WHO country offices.

2. Build/sustain political commitment to ensure uninterrupted implementation of activities for prevention and control of leishmaniasis.

3. Develop/update national programmes and strategies on prevention and control of leishmaniasis, using a multisectoral approach and community engagement, and protocols for case management of leishmaniasis, to ensure compliance with WHO recommendations.

4. Promote cross-border collaboration and cooperation on leishmaniasis prevention and control among neighbouring countries of the WHO Eastern Mediterranean, African and European regions.
5. Identify, in collaboration with WHO, research priorities for prevention and control of leishmaniasis, and support the relevant research activities.

To WHO

6. Publish detailed leishmaniasis profiles for 11 selected countries from the Eastern Mediterranean, African and European regions to raise awareness of the global burden of leishmaniasis.
7. Make available the necessary treatment, as last resort and on an ad hoc basis, for patients with severe visceral leishmaniasis when there are difficulties providing treatment in countries, with the aim of contributing to the goal of zero mortality due to primary visceral leishmaniasis in immunocompetent patients.
8. Provide technical support to countries to implement web-based surveillance of leishmaniasis within the national health information system, at health facility level or lowest subnational administrative level, and ensure that data analysis and data-sharing with WHO is occurring automatically on at least a quarterly basis (with a monthly breakdown of data).
9. Create and fund a central procurement mechanism to promptly ship medical supplies (medicines and rapid diagnostic tests) on an emergency or routine basis to selected countries where WHO has temporarily taken over this function on behalf of the health ministry. Given the expected low volume/frequency of requests from countries, it is recommended to create a global warehouse at WHO headquarters for the three regions (Eastern Mediterranean, African and European).
10. Continue to support capacity-building for prevention, control and surveillance of leishmaniasis and to publish self-learning training packages, online and offline, on visceral leishmaniasis (L. infantum) and cutaneous leishmaniasis (African and Asian forms).
11. Continue to facilitate intercountry and interregional coordination on prevention and control of leishmaniasis.
12. Develop guidance outlining core interventions for emergency and complex control situations.

Annex 1

PROGRAMME

Sunday, 23 September 2018

08:30–09:00	Registration	
09:00–09:30	Opening session	
	• Welcome note	
	• Opening remarks	*WHO Representative in Jordan*
	• Objectives and outcomes of meeting	*Dr H. Atta, WHO/EMRO*
	• Appointment of chair and rapporteur	
	• Introduction of participants	
	Overview of cutaneous and visceral leishmaniasis	
09:30–09:45	Global overview and updated strategies for control and prevention of leishmaniasis	*Dr J Ruiz Postigo, WHO/HQ*
09:45–10:00	Situation of leishmaniasis control at a regional level – EMRO	*Dr H. Atta, WHO/EMRO*
10:00–10:15	Situation of leishmaniasis control at a regional level – EURO	*Dr E. Gasimov, WHO/EURO*
10:45–11:00	Situation of leishmaniasis control at a regional level – AFRO	*WHO/AFRO*
11:00–12:00	Discussion	
13:00–14:00	Leishmaniasis control at country level: updates, challenges and way forward – Afghanistan, Albania, Algeria, Georgia, Greece, Islamic Republic of Iran	*Ministry of health representatives*
14:00–15:00	Leishmaniasis control at country level: updates, challenges and way forward (cont'd) – Iraq, Jordan, Lebanon, Libya, Morocco, Pakistan	*Ministry of health representatives*
15:30–16:30	Leishmaniasis control at country level: updates, challenges and way forward (cont'd) – Saudi Arabia, Syrian Arab Republic, Sudan, Tunisia, Turkey, Yemen	*Ministry of health representatives*
16:30–17:00	Discussion	

Monday 24 September 2018

08:30–08:45	Wrap up of Day 1	*Dr F.J. Moreno Nuncio, Instituto de Salud Carlos III, WHO Collaborating Centre for Leishmaniasis*
	Enhancing diagnosis and treatment of cutaneous and visceral leishmaniasis	
08:45–10:30	• Access to diagnostics and medical treatment • Stock management and medicines logistics • Discussion	*Professor M. Mokni, La Rabta Hospital, Tunisia* *Dr J. Ruiz-Postigo, WHO/HQ*
	Surveillance, data management and reporting of cutaneous and visceral leishmaniasis	
11:00–12:30	Global surveillance using DHIS 2: Global Health Observatory, country profiles and monthly real-time surveillance in selected countries Progress and challenges to implementing DHIS at country level Discussion	*Dr J. Ruiz-Postigo, WHO/HQ* *Dr M. Osman, WHO/EMRO* *Dr E. Ali, WHO/EMRO*
	Control of vectors and reservoir hosts	
13:30–14:30	Global updates on vector control and reservoir hosts: monitoring and evaluation to measure impact Regional situation of using vector control for leishmaniasis	*Dr R. Yaghoobi-Ershadi* *Dr S. Al-Eryani, WHO/EMRO*
14:30–15:30	Vector/reservoir control projects from countries implementing activities – Algeria, Islamic Republic of Iran, Morocco, Pakistan, Syrian Arab Republic, Tunisia	*Country presentations*
16:00–17:30	Research priorities for prevention and control of leishmaniasis under the agenda of universal health coverage	*Professor R. Ben-Ismail*

Tuesday, 25 September 2018

08:30–08:45	Wrap up of Day 2	*Dr A. Gabrielli, WHO/HQ*
	Addressing leishmaniasis in crisis situations and emergency response	
08:45–10:00	Global-level response	*WHO headquarters*
10:00–10:30	Regional-level response	*WHO/EMRO/EURO*
11:00–12:30	Country-level response – health ministry, WHO and nongovernmental organizations	*Syrian Arab Republic, Pakistan*
13:30–14:00	Cross-border challenges and areas of collaboration	*Plenary discussion, moderated by Dr F.J. Moreno Nuncio*
14:00–15:00	Strengthening the capacity of health staff for leishmaniasis control	*Group work, facilitated by Dr A. Gabrielli*
15:30–16:30	Conclusion and recommendations	
16:30	Closing session	

Annex 2

LIST OF PARTICIPANTS

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Annex 3

COUNTRY PRESENTATIONS

Afghanistan

Epidemiology

Disease form The forms of leishmaniasis present in Afghanistan are anthroponotic cutaneous leishmaniasis (ACL), zoonotic cutaneous leishmaniasis (ZCL) and visceral leishmaniasis (VL).

Case load In 2017 more than 13 145 new cases were reported in Kabul alone, out of 32 065 total cases (in view of underreported cases).

Distribution Leishmaniasis is reported in 23 out of 34 provinces of Afghanistan, the most endemic province is Kabul. ACL is reported from 20 out of 34 provinces. ZCL occurs in the northern provinces, especially Mazar-i-Sharif. VL cases are periodically reported, but very irregularly because of poor knowledge of the disease among the population and health care providers, lack of diagnostic capacity and lack of reporting mechanisms.

Risk factors Risk factors in the country include:

- political instability;
- ongoing conflict;
- lack of a fully functional health care infrastructure;
- mass migration of infected individuals;
- irregular treatment;
- absence of vector control strategies.

Current interventions

Passively detected cases are reported through a vertical reporting mechanism under the National Malaria and Leishmaniasis Control Programme (NMLCP) through the malaria and leishmaniasis information system (MLIS).

Diagnosis is based on clinical presentation in 81% of cases (2017) with very little capacity for case confirmation and no laboratory quality assurance system in place. A national treatment protocol has been developed and medicines for treatment (sodium stibogluconate and meglumine antimoniate) are included in the national essential medicines list.

A country strategic plan has been developed for 2015–2020 that focuses on early diagnosis, treatment and surveillance, but no vector control interventions. Before 2016, the NMLCP supplied only provincial malaria and leishmaniasis control programmes (PMLCPs) of endemic provinces through the support of WHO. Afterwards, leishmaniasis was integrated into the health system and anti-leishmaniasis medicines were procured by basic/essential package of health services (BPHS/EPHS) implementers from different sources and channels.

Albania

Epidemiology

Disease form The most prevalent form of the disease is VL, caused by *L. infantum* MON 1 with dogs as the only proven reservoir. The main vector is *Ph. neglectus* and *P. tobbi* plays a secondary role.

Case load VL is a paediatric disease in Albania: 70% of cases are in children, and 70% of those are among 1–4-year-olds. Cases of VL/HIV co-infection have been increasing, with records of congenital transmission.

Distribution VL is reported in each district/municipality with 30–100 cases annually, but mainly in the western coastal area. Cutaneous leishmaniasis (CL) is less

frequent; it is not reported every year, with 6 cases reported in 2016.

Current interventions

A gap analysis was carried out to strengthen epidemiological surveillance, improve case detection and increase access to diagnostics and medicines. Between September 2014 and 2015, 1368 cases were detected; and through the gap analysis an additional 1127 cases were identified, which highlights the underreporting from regional level to national/central level.

There is no national programme in the country and there is a lack of a national treatment protocol and a vector and reservoir control programme. Through support from WHO, efforts are underway to create working groups in order to strengthen national plans, clinical protocols and capacity-building.

Georgia

Epidemiology

Disease form Georgia is endemic for both CL and VL. CL, caused by *L. major* and an unknown vector species, is less frequent than VL. VL is caused by *L. infantum* and its main vectors are *Ph. kandelaki*, *Ph. Halepensis* and *Ph. Balcanicus*, with dogs as the main reservoir hosts.

Case load From 2014 to 2017, a total of 4 new cases of CL and 184 new VL cases were detected.

Distribution The majority of VL cases (~95 %) are found in eastern Georgia (Kakheti, Kvemo Kartli, Shida Kartli, Mtskheta-Mtianeti and Tbilisi) and ~5 % of cases are in western Georgia (new foci of VL in Kutaisi). CL is less frequent: during the last 5 years only 3 cases (laboratory confirmed) were registered. CL cases were located in the western part of Georgia.

Current interventions

Notification of leishmaniasis cases is mandatory in Georgia and both electronic (Electronic Integrated Disease Surveillance System (EIDSS)) and paper-based formats are used for reporting. Treatment is carried out with meglumine antimoniate, as other drugs are not available in the country, and all VL cases are tested for HIV.

There is currently no vector and reservoir control programme, but there is a state epidemiological surveillance programme that carries out indoor residual spraying.

Greece

Epidemiology

Disease form ZVL is endemic in the country and caused by *L. infantum*. Cases of CL are sporadic and caused by *L. tropica* and *L. infantum*.

Case load About 30–90 cases of VL are reported each year, with median annual incidence of 0.56 per 100 000 between 2004 and 2017. From 2004 to 2017, 24% of VL cases were immunosuppressed. Regarding CL, 0–14 cases have been reported annually. In 2016, an increase in the number of imported CL cases was recorded. Between 2004 and 2017, 59% of CL cases were associated with recent travels abroad.

Current interventions

Notification of both human and canine leishmaniasis cases is mandatory. Regarding human leishmaniasis, case-based notification has been in place since 1998, with a weekly case-based notification introduced in 2003, and electronic formats for reporting are under development. Regarding canine leishmaniasis, both laboratory confirmed and clinically suspected cases are mandatorily notifiable.

A national protocol for the treatment of leishmaniasis (endorsed by the Hellenic Centre for Disease Control and Prevention) has been established. VL cases are treated mainly with liposomal amphotericin B, and meglumine antimoniate can be imported upon special request. There is no post-treatment follow-up at the national level. CL cases are only treated in a few specialized hospitals with

cryotherapy, meglumine antimoniate, pentamidine or liposomal amphotericin B, depending on whether the patient presents with multiple lesions. Current vector control activities are integrated with mosquito control activities, but no research activities are carried out at national level.

An action plan for leishmaniasis control is being developed through multisectoral collaboration. Current efforts are also underway to increase awareness among health professions, enhance diagnosis and strengthen surveillance.

Iran (Islamic Republic of)

Epidemiology

Disease form Both VL and CL are endemic in the Islamic Republic of Iran. VL is the Mediterranean type (ZVL) caused by *L. infantum*, with dogs and other canines such as jackals and foxes as reservoirs. In 2017, around 80% of CL cases were ZCL. In the northwestern area of Meshkin-Shahr, 15% of dogs were seropositive and 90% of infected dogs had no clinical manifestations.

Case load The number of reported CL cases was 12 491 in 2017, with an incidence rate of 15.4 per 100 000, and 60 cases of VL were reported.

Distribution The main endemic areas for ACL are Kerman, Bam and Mashhad districts.

Current interventions

Diagnostic and treatment centres for CL have been established in endemic areas since 2008. Active case finding is carried out in new foci and vector surveillance is carried out every 4 years in old foci. The main medicines used for treating all forms of leishmaniasis are meglumine antimoniate (systemic and intralesional) and miltefosine for resistant cases. Recently, nanoliposomal amphotericin B was approved by the national Food and Drug Administration and will be used for CL cases in the future. A network of leishmaniasis laboratories is being established in order to standardize CL and VL diagnostic methods and improve surveillance. Current surveillance is carried out through online reporting, and analysis is done at district, provincial and national levels.

Following the revision of the national control plan, national action plans are being prepared for both ZCL and ACL. The main activities outlined in the ZCL action plan are rodent control, residual spraying, environmental sanitation and health education. Control measures outlined in the ACL national plan focus on early case detection, diagnosis and treatment, to reduce the number of reservoirs.

Iraq

Epidemiology

Disease form Both forms of leishmaniasis are endemic in Iraq.

Case load A total of 18 854 CL cases were reported in 2017, and 172 VL cases.

Distribution VL cases are focused in the eastern and southern parts of the country. CL is more prevalent, and the governorate reporting the highest number of cases in 2007–2017 was Diyala.

Current interventions

The majority of leishmaniasis cases are screened passively. CL cases are diagnosed clinically, while serological and parasitological tests are carried out for VL cases, although no HIV testing is performed. The main medicine used is sodium stibogluconate.

Several challenges are being faced, including financial, security and human resource insufficiencies. For 2019, plans include the finalization of an integrated vector control strategy, increased capacity-building, updates on case-based surveillance and research activities.

Jordan

Epidemiology

Disease form The main endemic form of leishmaniasis in Jordan is CL, while VL is very rare.

Case load In 2017, out of a total of 345 new CL cases reported, 159 cases were imported and 141 were among Syrian refugees. The incidence rate was 3.4/100 000.

During 2008–2017, a total number of 2995 CL cases were reported to the Ministry of Health. The average annual incidence rate in 2008–2018 was 3.9 per 100 000 population.

A total number 689 CL cases and 4 VL cases were reported among Syrian refugees from 2010 to 2017.

Distribution The districts reporting the highest number of cases were Zarqa and North Shuna.

Current interventions

Current activities carried out nationally include case detection and treatment, vector and reservoir control, and public health education. Sodium stibogluconate is used for both CL and VL, and cryotherapy is for CL cases only.

The absence of a national leishmaniasis control programme creates challenges, such as a lack of national guidelines and polices. Also, capacity among health workers in case management is still weak especially in the Lowlands and South regions.

Lebanon

Epidemiology

Disease form The disease vector is not found and most cases reported were imported from the Syrian Arab Republic. The most detected parasite is *L. tropica*

Case load In 2019, out of 399 patients screened, 219 tested positive for CL. Since 2013, no cases of VL have been detected or reported in the Beqaa area.

Distribution Since 2013, extensive screening, reporting and treatment of CL cases has been carried out in Beqaa Valley due to the large numbers of incoming refugees. This district is located in the eastern part of the country, bordering the Syrian Arab Republic.

Current interventions

Active screening is carried out by volunteer dermatologists, through field visits, to detect and refer cases to health care centres where case management is available. The Ministry of Public Health in coordination with the International Medical Corps completely covers diagnosis, laboratory testing (including biopsies and smears) and treatment costs for all patients. Awareness campaigns are also carried out by nongovernmental and governmental organizations through the Ministry of Public Health.

Both parasitological and serological diagnostic methods are available Lebanon. Public hospitals have also been treating leishmaniasis cases according to protocols, using both intralesional and systemic meglumine antimoniate. Vector control activities are used in outbreak and emergency situations.

Morocco

Epidemiology

Disease form Both forms of leishmaniasis are endemic in Morocco: ACL/ZCL and VL.

Case load VL is a paediatric disease in the country. In 2017, out of a total 108 VL cases, 80 cases were in children aged under 4 years old. Regarding CL, a total of 6807 cases were reported both actively and passively.

Distribution CL is prevalent in the country, while most VL cases are reported from four regions: Draa-Tafilalet, Sous Massa, Oriental and Fez-Meknes.

Current interventions

While most cases of leishmaniasis are reported passively, about 14 were detected through active screening in 2017. Clinical and parasitological diagnoses are carried out for CL cases while serology is used for VL cases. HIV testing is only performed for adult cases at the regional level. The main drugs

used for treatment is meglumine antimoniate (CL and VL); however, liposomal amphotericin B will be introduced soon for VL treatment.

Several advocacy meetings have been held with local authorities at provincial and regional levels to increase awareness about leishmaniasis, as well as to build capacity in programme management. Control interventions include case management, education of patients and population in endemic areas, rodent and *Phlebotomus* surveillance and control. Ongoing activities include the strengthening of the national surveillance system and reporting of leishmaniasis cases through DHIS 2.

Pakistan

Epidemiology

Disease form ACL caused by L. tropica and ZCL caused by *L. major* are present in the country. *Ph. sergenti* is considered as vector of ACL and *Ph. papatasi* of ZCL. VL has also been reported, caused by *L. infantum*, with dogs as the main identified reservoir.

Case load Data and the national health information system are fragmented and only report a fraction of cases. The total number of leishmaniasis cases reported from Balochistan province was 8024 in 2017 and 5800 in 2018. The total number of cases from the public sector in 2017 was 9171; however, this excludes cases treated in the private sector and by armed forces institutes.

Distribution CL is endemic in most regions neighbouring the Islamic Republic of Iran and Afghanistan (Balochistan, Khyber Pakhtunkhwa including ex-Federally Administered Tribal Areas).

Current interventions

Regarding CL cases, diagnosis is mainly clinical and parasitological diagnosis is only performed at a few centres mainly run by Médecins Sans Frontières (MSF) International and malaria microscopists. Treatment for all leishmaniasis cases is through pentavalent antimonials, either meglumine antimoniate or sodium stibogluconate, intramuscularly/intravenously or intralesionally, for the treatment of CL. Cryotherapy and thermotherapy are also used by some partners and provincial programmes. Glucantime was officially registered by the Drug Regulatory Authority of Pakistan (DRAP) in 2018, allowing provinces to procure directly. In Khyber Pakhtunkhwa/ex-Federally Administered Tribal Areas, paromomycin and miltefosine have been used when antimonials were not available.

Guidelines for leishmaniasis control were developed in 2003, reviewed and finalized in 2017. Vector control has not been included as part of prevention and control of leishmaniasis nationally.

Saudi Arabia

Epidemiology

Disease form *Ph. papatasi* has been identified as the vector and *L. major* as the parasite for CL, the predominant form of leishmaniasis in the country, with *M. libicus* as the reservoir in the Riyadh region and *Psymommous obesus* (the fat rat) as the reservoir in the eastern region. Some cases, especially in the mountainous regions, are caused by *L. tropica* and could be transmitted directly from human to human through *Ph. sergenti*. VL is transmitted by *Ph. Orientalis*, with dogs and canines as the reservoir hosts.

Case load In 2017, a total of 1007 CL cases were reported with a national annual incidence rate of 3.01 per 100 000, and 5 VL cases were reported.

Distribution VL was recorded as scattered cases in the south, almost exclusively from Jazan Region, whereas CL has a high incidence in Tabuk, Al-Ahsa and Hafr Al-Baten regions.

Risk factors Several factors have led to the re-emergence and persistence of leishmaniasis, including:

- rapid urbanization;

- invasion of disease reservoir habitats by humans;
- the development of agricultural and irrigation schemes;
- climate change;
- population movement, particularly migration of non-immune populations into endemic areas.

Current interventions

A national case management policy, the *National policy for management of cutaneous leishmaniasis cases*, was published in March 2018. Diagnosis for CL cases is made through a combination of clinical and epidemiological investigation and is confirmed by laboratory testing. VL diagnosis is made through parasitology or serology.

Therapeutics for CL consist of local/topical treatments such as paromomycin ointment, imidazole ointment, local infiltration of lesion with Pentostam (sodium stibogluconate) thermotherapy, cryotherapy or systemic treatment through sodium stibogluconate, fluconazole, miltefosine or amphotericin B. Treatment used for VL cases is sodium stibogluconate or amphotericin B infusion.

The national leishmaniasis control programme uses a One Health approach, with a focus on vector and reservoir control. Additionally, health education programmes are carried out in endemic communities as well as training for personnel in the control programme.

Syrian Arab Republic

Epidemiology

Disease form	CL is present in anthroponotic and zoonotic form in the Syrian Arab Republic, as well as ZVL.
Case load	53 232 CL cases were reported in 2017.
Distribution	ACL is mainly found in urban areas, whereas ZCL is predominantly detected in rural areas.

Current interventions

CL has been endemic in the country for several decades. The disease is notifiable, and diagnosis and treatment are provided free of charge. Diagnosis is usually clinical and sometimes with laboratory confirmation. For laboratory quality-assurance purposes, 10% of CL slides from peripheral centres are re-examined at the national reference laboratory and all VL slides are re-examined. Treatment follows WHO guidelines, and uses local or systemic antimonials or cryotherapy.

The crisis resulted in a rise in the number of VL cases in many governorates such as Tartous, As-Sweida and Hama. A sharp decrease was seen in Aleppo with a remarkable increase in cases in Lattakia and Tartous, which could be due to the large internal displacement of populations from endemic foci to relatively safer governorates. Other governorates that were previous foci also had a remarkable increase, such as Deir-ez-Zor, Al-Bokamal, Al-Mayadin and Rural Damascus.

In 2017, 53 232 CL cases were reported through 224 health centres, of which 5711 cases were detected through two school screening campaigns. Monthly reports are collected from peripheral centres to the main leishmanial control programme in each directorate, who in turn report to the national programme.

National leishmaniasis control activities include active case detection, early laboratory diagnosis and treatment, health education and community awareness campaigns, capacity-building for health personnel, and control of vectors through insecticide spraying campaigns, distribution of LLINs and environmental corrections and management.

The conflict has had a significant impact on environmental conditions (poor quality of housing, malnutrition, overcrowding, deficient medical facilities, high density of rodents, lack of waste collection and management, open sewage) and available human resources. These factors coupled with population movement and climate changes are holding back control efforts.

A new projects are underway for northeastern areas of the country concerning treatment through the provision of a cryotherapy device and liquid nitrogen containers. Vector control measures are also being planned through the distribution of LLINs, protective clothing and a mobile clinic.

Sudan

Epidemiology

Disease form Both forms of leishmaniasis are present in the country. VL is caused by *L. donovani* and CL by *L. major* with *Ph. papatasi* as its vector.

Case load A total of 3810 new VL cases and 4107 CL cases were reported in 2017.

Distribution CL has been reported in many regions of Sudan with four major outbreaks in River Nile, White Nile, Khartoum state and South Kurdofan. Regarding VL, Gedarif state carries the highest burden of cases.

Current interventions

Nationally, leishmaniasis is widely distributed with the occasional appearance of new foci. Along with accessibility challenges, this hinders adequate access to diagnostics and medicines. Additionally, services often suffer from poor infrastructure especially at the primary health care level. In 2016 and 2017, many cases were treated in Gedarif state but were originally from states not known to contain VL transmission – Kassala and Red Sea states. Following their investigation, health centres were set up in the new foci with subsequent trainings held for health and laboratory personnel and statisticians.

Treatment of CL follows the "step-wise treatment decision algorithm" outlined in the WHO Eastern Mediterranean Region's manual for case management. Regular trainings are carried out for laboratory technicians as well as doctors, nurses and pharmacists. Other control activities include community health education, indoor residual spraying, bed nets distribution and a kala-azar camp in Gedarif.

A study on the national epidemiology of CL, its geographical distribution, risk factors for disease and spread of carrier fly. A national protocol for diagnosis and treatment is also being approved by the Advisory Council of Dermatology and Dermatologists, after which a workshop will be carried out for distribution. Dissemination will also take place at dermatology hospitals to increase awareness among specialists. In coordination with the Sudanese National Council for Medical Specialties, training of new dermatology registrars and laboratory technicians on the national protocol will be held.

Tunisia

Epidemiology

Disease form CL is the predominant form of leishmaniasis, caused by *L. major*, *L. tropica*, *L. killicki* and *L. infantum*. VL cases are sporadic and caused by *L. infantum*.

Case load A total of 4902 ZCL cases were reported in 2017, and 23 VL cases.

Distribution CL is endemic in the centre and south of the country, while VL is scattered in the centre and north.

Current interventions

Passive detection is mainly carried out in known endemic areas with active detection in new foci, such as through school screening. Diagnosis is mainly clinical for CL, with parasitological examinations carried out at the regional laboratories. Rapid tests have been used to diagnose VL since 2017, but HIV testing is not performed systematically for detected cases.

Nationally, an increase in the number of ZCL cases is seen every 4–5 years. In 2013–2018, the highest incidence appeared in 2015 with 59.2 per 100 000. Four regions – Tataouine, Medenine, Sfax and Kebili – reported an increase in the number of CL cases in 2017 compared to 2016. While no new foci have been detected, this increase is indicative of a newer, non-immune population.

The main drugs used for treatment include meglumine antimoniate and liposomal amphotericin B, which is used mainly for the treatment of VL cases. The national strategy is currently being reviewed and updated, as well as the procedural manual.

Yemen

Epidemiology

Disease form	CL is the most prevalent form, caused by *L. tropica* and *L. major*. VL is less common and is caused by *L. donovani* and *L. infantum*.
Case load	9120, 4466 and 3176 cases of CL were reported in 2016, 2017 and 2018, respectively.
Risk factors	In 2016, the number of CL cases increased drastically. While the reasons for such a marked increase have not been investigated, it is likely attributable to worsening living conditions due to the armed conflict, hidden outbreaks and improvement of surveillance system.

Current interventions

Mandatory notification of both CL and VL started in 2006; however, the flow of statistical data and epidemiological reports are irregular which makes underreporting highly likely. In 2017, a surveillance system (e-DEWS) was started in order to strengthen national reporting.

Diagnosis for CL is based on clinical grounds at peripheral health services, and parasitological confirmation is usually carried out at hospital level. However, treatment may not be free-of-charge and some patients may seek treatment from the private sector. Sodium stibogluconate is the main medicine used for treatment, and has been procured by the Ministry of Health and Population and WHO since 2009. Major gaps still exist in control efforts, however, in terms of medical supplies, lack of vector control or reservoir control activities (apart from bed nets distributed by the malaria programme). Leishmaniasis was included into the national neglected tropical diseases master plan, 2018–2022.

Annex 4

TREATMENT FOR CUTANEOUS LEISHMANIASIS

Medicine	Mode of administration	Advantages	Disadvantages
• Allopurinol • Dapsone • Rifampicin • Metronidazole • Ketoconazole • Itraconazole	Peroral	• Simple mode of administration	• Poor effect • Effective only against some species • Toxic
Fluconazole	Peroral 200 mg daily for 6 weeks	• Most promising drug for Old World leishmaniasis	• Lack of proper trials for species other than L. major • High cost
Miltefosine	Peroral 2.5 mg/kg for 28 days	• Limited toxic side-effects	• Teratogenic
Pentavalent antimonials (meglumine antimoniate 85 mg Sb/ml and sodium stibogluconate 100 mg Sb/ml)	Parenteral – 20 mg/kg intramuscularly or intravenously for 20–28 days for CL/ Local Infiltration	• Good efficacy • Intralesional infiltration less toxic	• Very toxic, side-effects (arthralgia, myalgia, abdominal discomfort, elevation of hepatocellular enzymes, chemical pancreatitis, anaemia, leukopenia, thrombocytopenia, EKG abnormalities) • Multiple schedules • Intralesional infiltration – no ideal regimen
Pentamidine	Parenteral- 3 to 4 mg/kg /day IV every other day Total treatment 3 or 4 injections	• Used mostly for L. guyanensis and L. braziliensis.	Very toxic, side-effects (diabetes, rhabdomyolysis, hypokalemia, hypocalcemia, renal failure, abdominal discomfort, elevation of hepatocellular enzymes, chemical pancreatitis, anaemia, leukopenia, thrombocytopenia, cardiac abnormalities...)
Cryotherapy and thermotherapy	Physical treatment – application of liquid nitrogen for 20 seconds/radiofrequency device 50°C for 30 seconds.	• Simple • Non-toxic	• Cryotherapy : no ideal regimen • Thermotherapy: requires high-cost generator, probe must be sterilized, local anaesthesia needed

Annex 5

COUNTRY-LEVEL VECTOR AND RESERVOIR CONTROL MEASURES, EASTERN MEDITERRANEAN REGION

Country (and disease forms present)	Vector control	Animal reservoir control	Vector surveillance	Health education for prevention	Notes/recommendations
Afghanistan (mainly ACL; ZCL in northern provinces)	No vector control measures implemented against leishmaniasis	No	No	No	Monitoring the density of *Phlebotomus sergenti* in endemic foci of ACL; conducting susceptibility tests on the vector; rodent control operations in foci of ZCL using rodenticides such as zinc phosphide; and participation of senior technicians and field technicians in workshops on the control of leishmaniasis are recommended. Active case detection once every 2 months and new cases should be treated in ACL foci. Feral dogs should be destroyed.
Iran (Islamic Republic of) (ZCL, ACL, VL)	Indoor residual spraying (IRS) against malaria greatly reduced the burden of ACL in many foci. IRS is only recommended in epidemic and disaster situations. Long-lasting insecticidal nets (LLINs) are used for personal protection by some.	Poisoned baits are used for rodent control, and remain the main intervention in ZCL endemic areas	No	Pamphlets developed for awareness raising, but no regular health education programme	ZVL is endemic in seven foci, mainly in Fars and Ardebil provinces. High quantity of entomological research has been conducted by researchers, but there is no regular surveillance by control programmes.
Iraq (ZCL, ACL, VL)	Space spraying, IRS, insecticide-treated bed nets (ITNs); developing an integrated vector management strategy to address vectors of vector-borne diseases.	Rodent control (poisoning rodents and destroying their habitats)	Periodic insecticide resistance monitoring	Health education	Conducting joint research projects with neighbouring countries, and collaboration on building capacity; health education on the use of insecticide repellents; community participation and contribution by other related organizations on control of leishmaniasis; monitoring the density of *Ph. sergenti and Ph. papatasi* in foci of ACL and ZCL; conducting susceptibility tests on the vectors; organizing joint meetings on leishmaniasis annually with neighbouring countries; participation of field technicians and senior technicians in leishmaniasis workshops are recommended.

Country (and disease forms present)	Vector control	Animal reservoir control	Vector surveillance	Health education for prevention	Notes/recommendations
Jordan	Insecticide spraying (space spraying), improvement of homes, personal protection measures, elimination of sandfly habitats.	Rodent control. Animal hosts not identified for *L. major*		Raising awareness, personal protection measures, home improvement measures	IRS was used until malaria was eliminated. Conducting vector surveys and reservoir surveillance, and identification of animal reservoir hosts are recommended. Rate of infection should be studied carefully and the number of CL and VL cases should be separated. Recommended to provide national guideline on diagnosis and management of leishmaniasis, and increase awareness of the general population. Reservoir host of Jordanian zoonotic *L. tropica* should be identified.
Lebanon ZCL, VL	No	NA	NA	Health education in some areas, particularly Beirut	98% of CL cases are reported among Syrian refugees. IRS in refugee camps and reservoir control are recommended. Treatment of patients as soon as possible is recommended.
Morocco (ACL, ZCL, VL)	IVM strategy for vector control; IRS.	Rodent control and surveillance	Vector surveys in new foci for identification of vector (before and after IRS)	Information, education and communication (IEC) materials implemented by IVM committee (all sectors/multisectoral)	Use of LLINs in areas with high density of sandflies and in endemic foci of leishmaniasis is recommended.
Pakistan ACL, ZCL, VL	No	No	No	No	Data on ecology, sandflies, reservoir hosts and control are needed. Rodent control against *M. hurrianae* in foci of ZCL is recommended. Field technicians and senior technicians should participate in workshops on leishmaniasis control. Annual meeting with neighbouring countries should be organized.
Saudi Arabia (mainly ZCL, some ACL; some VL cases reported)	IRS, space spraying, environmental management, chemical repellents (including impregnated clothing), LLINs.	Rodent control; elimination of rodent habitats	Regular entomological monitoring, including insecticide monitoring	Health education programme	Investigation of the impact of vector control, including rodent control, on the incidence of disease; study of the impact of reservoir control on the reduction of incidence of ZCL; conducting susceptibility tests on the main vectors; and studies on the rate of leishmanial infection of sandflies are necessary.

Country (and disease forms present)	Vector control	Animal reservoir control	Vector surveillance	Health education for prevention	Notes/recommendations
Sudan (ZCL, VL)	Vector control against malaria vectors.	No	Vector surveillance of sandflies and other disease vectors at established sentinel sites, including vector behaviour and insecticide-resistance monitoring.	Health education programme, kala-azar campaign	IRS and ITNs for malaria control. Studies are being conducted to investigate vector behaviour and bionomics. Reservoir host for VL and ZCL is *Arvicantis niloticus*. Strengthening vector and reservoir host surveillance is recommended. Mechanical control with deep irrigation to kill the rodent with water; outdoor residual spraying; use of pyrethroid-impregnated bed nets; and IVM are recommended. Removing large tracts of acacia and *Balanites aegyptiaca* trees around villages is also necessary. In Somalia, the use of permethrin-treated screens is recommended.
Syrian Arab Republic (ACL, ZCL, VL)	IRS, space spraying, LLINs, environmental management.	Destruction of rodent habitats; poisoning of rodents	No	Health education programme, health promotion, awareness raising	Community participation for distribution of electronic repellents; evaluation of these repellents is currently ongoing. Research on vector behaviour is needed. Residual spraying of rifle pits with pyrethroids and use of repellents (deet 10%) by military personnel are recommended. In endemic foci of ACL, IRS and LLINs are recommended.
Tunisia ZCL ACL, VL	No	Rodent surveillance and control; elimination of chenopods to eliminate reservoir habitats	No	IEC materials and health education via media and nongovernmental organizations	Mechanical deep ploughing of rodent habitats and destroying chenopods should be evaluated against ZCL.

Country (and disease forms present)	Vector control	Animal reservoir control	Vector surveillance	Health education for prevention	Notes/recommendations
Yemen (ACL, ZCL; VL also reported)	No vector control	No reservoir control activities	No	Insufficient information available	LLINs are distributed by malaria programme. National guidelines, IRS in rifle pits and the use of repellents by military personnel are recommended.

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