

# EWARS-csd

## (Early Warning and Response System) for climate-sensitive diseases



<b>Scope of work</b>	<p>EWARS-csd falls into the “Country preparedness and outbreak response” scope of work.</p> <p>It was designed to effectively predict epidemics of climate-sensitive diseases such as dengue, chikungunya, Zika, cholera, and malaria in a user-friendly manner. The conceptualization of EWARS-csd was based on the biological relationship between changes in weather conditions and the manifestation of disease outbreaks in specific geographic areas/populations. EWARS-csd is perceived not only as a statistical, but also as an information system designed to support decision-making for national and local level health institutions. It enables them to take action to mitigate the impact of impending outbreaks.</p>
<b>Aim</b>	<p>This predicting tool aims to: (i) strengthen surveillance systems for climate sensitive diseases; and (ii) trigger early vector control by improving the coordination between all relevant stakeholders, such as local epidemiologists, meteorologists, entomologists, national and local management agencies that assess risk and develop response strategies, and the public communication channels used to disseminate warning information.</p>
<b>Why is it needed?</b>	<p>Climate-sensitive infectious diseases are currently the fastest spreading illnesses in the world, with over half of the world’s population living in areas at risk of dengue, as one of many examples. With climate change, such diseases continue to spread and become a health burden for more communities. It is essential to have tools that can predict when and where outbreaks might occur, to better prepare communities and control programmes.</p> <p>Usually, a country’s national vector control programme is guided by reported cases, which are often underestimated. EWARS-csd works upstream by predicting in advance outbreak scenarios based on alarm predictors such as meteorological, epidemiological, and entomological data. This can guide an early structured response in time and space prior to the disease manifestation.</p>
<b>Functions</b>	<p>EWARS-csd builds a prediction algorithm that is data and area specific, using historical disease records. It retrospectively analyses their association with alarm indicators (functions of dashboard 1 used at the country or central level). It also employs prospective (weekly) alarm information, such as mean temperature, humidity, rainfall, and ovitrap index, among others, to predict a forthcoming outbreak (a function of dashboard 2 used at district level).</p> <p>EWARS-csd uses a robust modelling system with a user-friendly interface to enable data understanding by frontline health care workers and data use for appropriate local response. It has the potential to improve collaboration at regional level (i.e., regional surveillance, data sourcing, joint response, etc.) for surveillance and response, applying a multisectoral approach.</p>
<b>Designed by</b>	<p>EWARS-csd employed a co-design and co-production approach led by the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) and the World Health Organization’s Climate Change and Health Unit, together with endemic countries, the University of Freiburg (Germany) and the University of Gothenburg (Sweden), and engaging key stakeholders such as the World Meteorological Organization, IT experts, endemic partner countries (ministries of health, district health managers, local meteorological and entomological entities) in five WHO regions. Its development benefited from users’ feedback, including recommendations for improvements.</p>
<b>Launched</b>	<p>EWARS-csd has been developed, used, and validated since 2012 in more than 17 countries in the WHO Regions of Africa, the Americas, the Eastern Mediterranean, South-East Asia, and the Western Pacific. It is close to being fully implemented in the national surveillance platforms of Colombia, the Dominican Republic, Mexico, and Thailand.</p>
<b>Access</b>	<p>EWARS-csd is a free open-access tool, based on free R software. It was created with the aim of granting countries full ownership of the tool and its processes.</p>



<b>Target users</b>	Country ministries of health and district health managers.
<b>Countries</b>	All tropical and sub-tropical countries prone to climate-sensitive diseases. EWARS-csd is currently being used in five of the six WHO regions (see above).
<b>Languages</b>	A generic English version is offered, but typically once installed on the country's local server, the local language can be used. For instance, the Dominican Republic and Mexico have the tool in Spanish, and Thailand has it in Thai.
<b>Technical features</b>	Essentially, EWARS-csd is designed in such a way that it can integrate into countries' routine activities, i.e., without adding more work or effort to already overstretched national control programmes. It facilitates a user-friendly interface (only minimal calibration or application is needed) and can be hosted by any local server so that ministry of health and districts/municipalities are digitally connected for information exchange and monitoring.
<b>Interoperability</b>	It is designed in a flexible way so that countries can monitor alarm signals at the central and local level. Commonly, the ministry of health or the national institute of health is the central level overseeing the process, but the district level is usually the first to take action, in agreement with the central level. Larger countries such as India could see states acting as central levels to align with the large number of districts and localities. Interoperability with the surveillance system DHIS2 has also been achieved.
<b>Outreach</b>	The WHO/Climate Change and Health Unit (CCH) and TDR are overseeing the administrative process, while the partner universities (Freiburg and Gothenburg) maintain the technical and operational aspects, as well as providing expertise on surveillance, training, and response. TDR supports implementation research for evaluating the feasibility, acceptability, and impact of using EWARS-csd, and WHO/CCH is helping with access to meteorological data.
<b>Security and privacy</b>	The tool is 100% owned by users and uploaded on local servers, so countries have control of their data, ensuring security and privacy. The tool is also designed to allow secure access and communication within and between districts, meaning that ministries of health have the administrative power to assign users and passwords.
<b>Core features</b>	<ul style="list-style-type: none"> <li>✓ <b>Data management and reporting</b> <ul style="list-style-type: none"> <li>• EWARS-csd works as a subset of the national surveillance programme.</li> <li>• While it requires simple time and area specific information (in Excel format), it can also act as a data hub/storage of prospective information.</li> <li>• It organizes the data feeding in an automated way, automatically connecting and feeding data between the surveillance programme and meteorological or entomological entities, which saves time and effort and improves consistency of data.</li> </ul> </li> <li>✓ <b>Availability and support</b> <ul style="list-style-type: none"> <li>• The tool has a series of published reports (available on WHO's website), video training (on YouTube and the EWARS-csd GitHub), and pre-recorded PowerPoint presentations to guide users in the installation, calibration, and interpretation of the tool's parameters.</li> <li>• The EWARS-csd team provides monthly follow-up and technical assistance.</li> </ul> </li> <li>✓ <b>Customization and flexibility</b> <ul style="list-style-type: none"> <li>• The tool relies on the country's local (often already existing) server.</li> <li>• Country IT personnel are engaged to understand the tool's features and to take part in the installation process.</li> <li>• The tool is designed in a way that additional or independent maintenance is not required as it aligns with the routine IT tasks of the country's server.</li> </ul> </li> <li>✓ <b>Security and compliance</b> <ul style="list-style-type: none"> <li>• Data are located in and owned by the country. Therefore, data security follows the country's own protocol. The tool provides a means for increasing security aspects for users, but it is entirely up to users how they control it.</li> </ul> </li> <li>✓ <b>User management</b> <ul style="list-style-type: none"> <li>• There is no limitation on the number of users, depending on the server's capacity. However, due to the automated feature of data feeding, the central level (ministry of health) will only do semi-automatic calibration once per year. Otherwise, no specific management activities are needed.</li> </ul> </li> </ul>