

A NEW APPROACH TO THE INTEGRATED MANAGEMENT STRATEGY FOR DENGUE PREVENTION AND CONTROL: FEASIBILITY OF A SYSTEM INTEGRATING POINT-OF-CARE DIAGNOSTICS & DATA

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BACKGROUND

- The Integrated Management Strategy for Dengue Prevention and Control (IMS-dengue) model aims to promote the functional integration of 6 key components for dengue control (see Figure 1).
- Despite its adoption by PAHO/WHO Member States in 2003, dengue cases in the Americas increased 5-fold by 2013.
- Weak information systems are a major factor limiting the success of the IMS-dengue model, but even more limiting is weak coordination between surveillance and response.
- Innovations are needed to enable early case detection and management of entomological or other critical information to trigger immediate dengue control interventions and identification of determinants of viral transmission.
- The Fionet™ system works with mobile companion devices for health workers, including the Deki™ Reader, to provide step-by-step guidance through their routine activities and transmit information to a secure web portal (see Figure 2).
- The Deki™ Reader automates the analysis of rapid diagnostic tests (RDTs) and helps health workers detect and correct errors.

OBJECTIVE

- To assess the acceptability of the Fionet™ system among health workers and households for case detection and data collection.
- To assess the impact of the introduction of the Fionet™ system on dengue control activities and surveillance.

METHODS

- CEIS — Fundación Santafé de Bogotá was commissioned by the Department of Quindío's Secretary of Health to conduct a seroprevalence study in 4 municipalities: Armenia, Calarcá, La Tebaida and Montenegro.
- The protocol of the seroprevalence study called for the collection of samples at randomly selected households; this was used as an opportunity to test the feasibility of implementing the Fionet™ system to strengthen the IMS-dengue model at the community level for the benefit of healthcare managers at national and regional levels.
- The vector-borne disease branch of Colombia's Ministry of Health worked with Fio to develop a household survey to transmit the following information to the Fionet™ web portal using tablets and Deki™ Readers:
 - Household physical conditions
 - Sources of water and water containers
 - Presence of immature forms of *Aedes aegypti* vector in water containers
 - Febrile cases in the household at time of visit
 - Results from point-of-care dengue RDTs offered to all household members present at time of visit
- The protocol was approved by Fundación Santafé de Bogotá IRB.
- After 2 days of training to use the Fionet™ system and point-of-care dengue RDTs with the Deki™ Reader, healthcare (HC) teams consisting of 1 lab/nurse technician equipped with a Deki™ Reader and 1 entomology technician equipped with a tablet visited the selected households and obtained signed informed consent to test household members for dengue and collect survey data (see Figure 3).
- Information was captured by the 2 devices using a common field (household code) for each household so that geo-tagged datasets uploaded to the Fionet™ web portal could be linked by household and parsed to populate pre-defined reports.

RESULTS

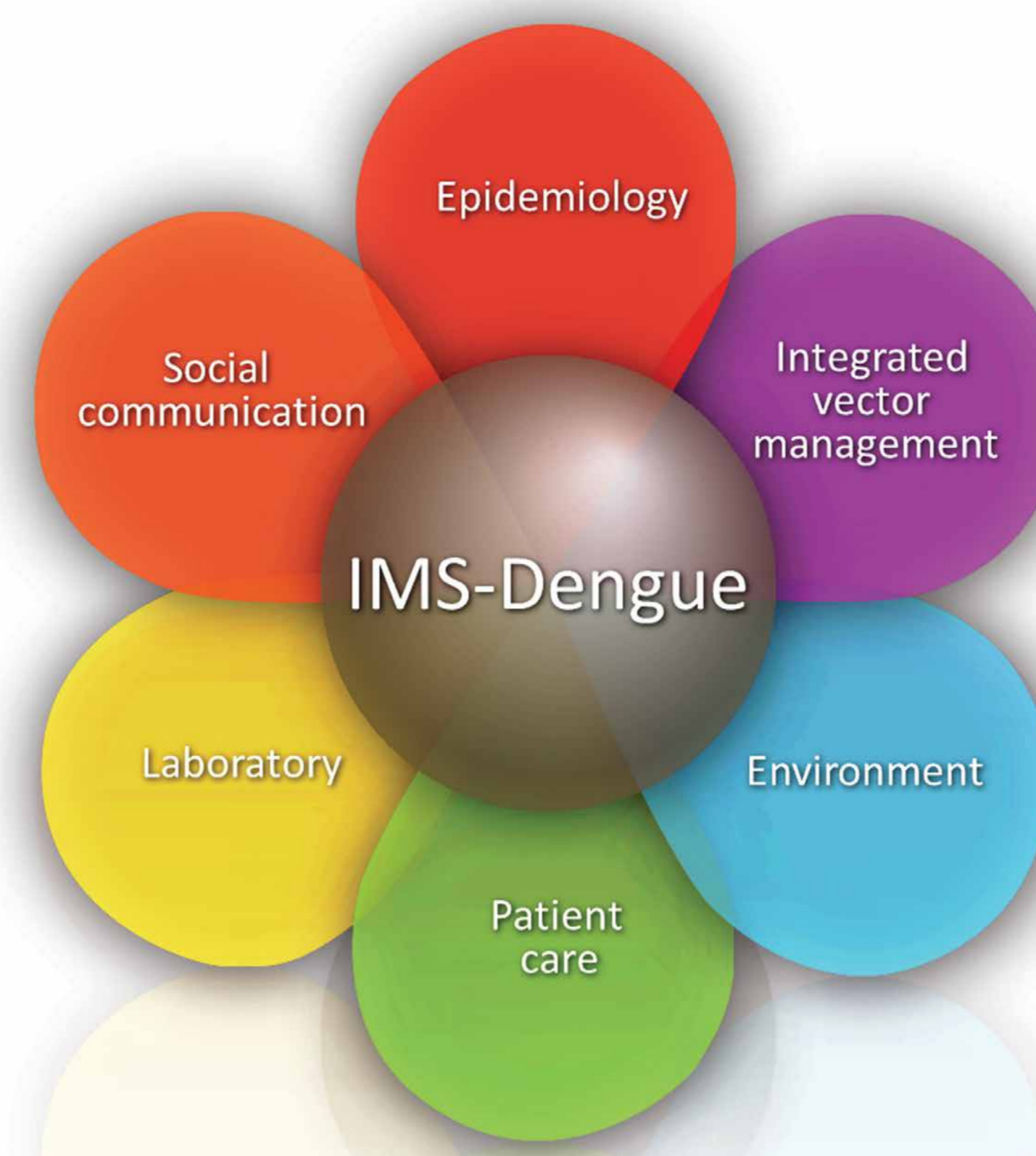
- 245 household visits were conducted in the 4 municipalities over a 6-week period (see Table 1).
- 680 point-of-care dengue RDTs were performed.
- 534 water containers were examined.
- 95 (17.8%) of water containers were found to have immature forms of *Ae. aegypti* vector.
- >95% of datasets reached the Fionet™ web portal within 24 hours of data collection (see Figure 4).
- Data collected was automatically linked by household and presented on the Fionet™ web portal in pre-defined reports (see Figures 5-7).
- 100% of members present at each household accepted point-of-care testing with dengue RDTs and the Deki™ Reader.
- Offering testing with dengue RDTs and the Deki™ Reader facilitated acceptance of household inspection by HC teams.
- HC team members reported high acceptability and ease-of-use with implementing the Fionet™ system.

CONCLUSIONS AND FUTURE DIRECTIONS

- Large-scale implementation of PAHO/WHO recommended IMS-dengue model could be greatly improved with use of innovative technology that improves:
 - Quality of data collection
 - Availability and timeliness of information
 - Deployment of control measures to areas identified as foci of transmission
- The Fionet™ system proved to be a feasible tool for strengthening implementation of IMS-dengue at the community level for the benefit of healthcare managers at national and regional levels.
- High-levels of acceptability and usability were observed by:
 - General population
 - HC teams in the field
 - Healthcare managers

6 key components for dengue control as outlined in the PAHO/WHO IMS-dengue model

FIGURE 1



The Fionet™ system (developed by Fio Corporation) provides real-time access to reliable data captured during health service delivery

FIGURE 2



Simultaneous testing and data capture during visits

FIGURE 3



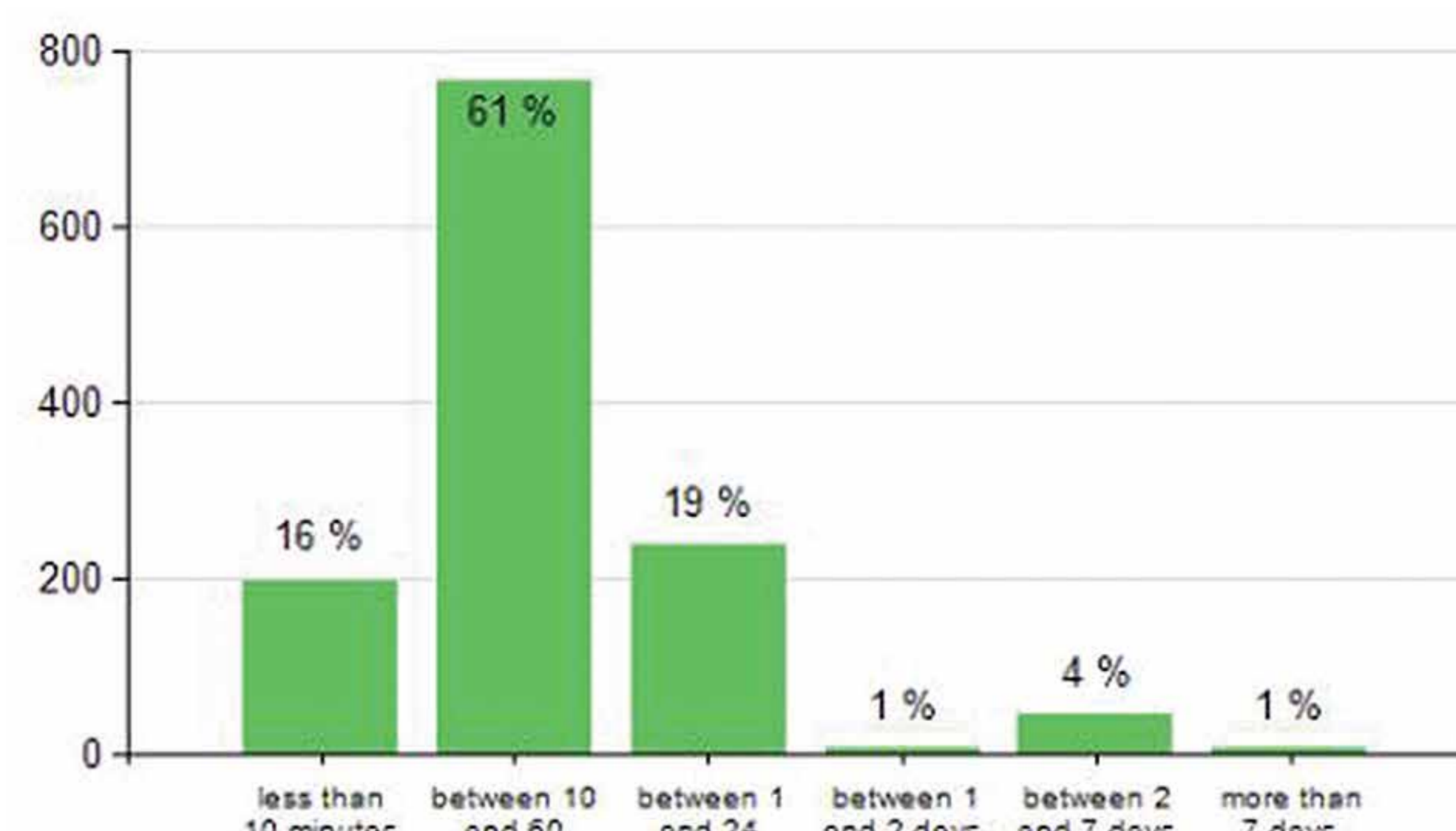
Household visits, number of inhabitants and water containers inspected by municipality

TABLE 1

Municipality	House hold visits	People present/ tested	Number of (+) RDTs			Water containers	
			N S1	IgM	IgG	Inspected	Presence of immature forms of <i>Ae. aegypti</i>
	n	n	n	n	n	n	n
Armenia	175 (71.4)	470/470	2	4	52	354	62 (17.1%)
Calarcá	34 (13.9)	99/99	3	5	12	72	13 (18.1%)
La Tebaida	17 (6.9)	49/49	4	3	5	44	9 (20.5%)
Montenegro	19 (7.8)	62/62	2	5	6	64	11 (17.2%)
Total	245 (100.0)	680/680	11	17	75	534	95 (17.8%)

Total datasets uploaded to the Fionet™ web portal over time

FIGURE 4

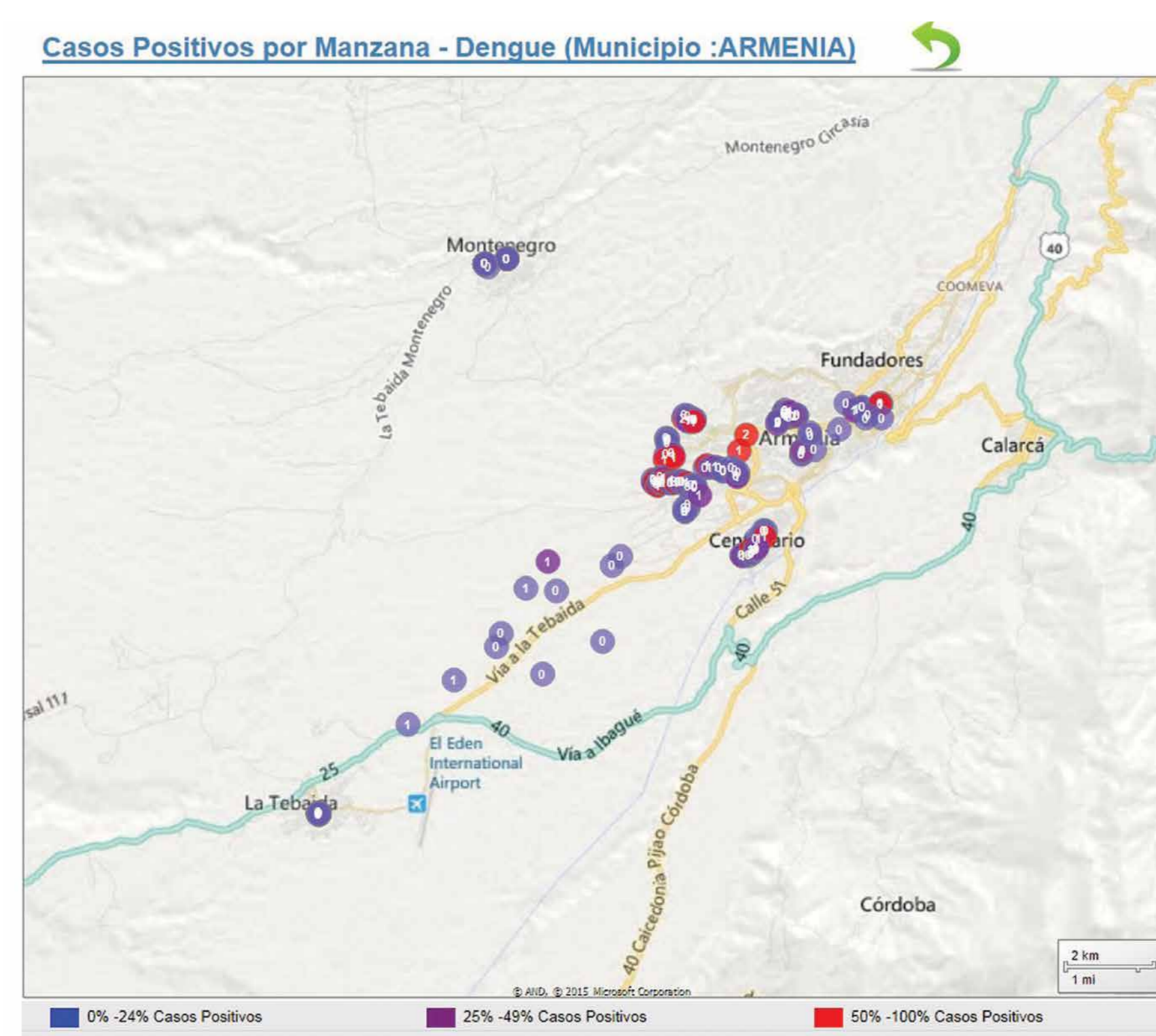


Datasets presented in tabular report on Fionet™ portal

FIGURE 5

Example of epidemiological map on Fionet™ portal

FIGURE 6



Integrated data from household, inhabitants and water containers

FIGURE 7

Resumen por Municipio

Detalles de la Manzana

Tipo de Predio	Característica de la Vivienda # de Familias	Nombre de la Institución Educativa	Tipo de Construcción	Vivienda Tiene Patio o Áreas Descubiertas	Áreas Descubiertas con Vegetación	Servicios Públicos en la Vivienda
Vivienda	Unifamiliar	N	Casa independiente	No		Acueducto;Alcantarillado;Energía A. Eléctrica;Gas Natural Domiciliario;Televisión por Cable;Internet

Información de los Habitantes

Identificación del Paciente	Tipo de Afiliación al Sistema de Seguridad Social	Ocupación	Nivel de Instrucción	Tipo de Afiliación al Sistema de Seguridad Social	Nombre de la Aseguradora	Dengue Sintomas
	Otro	HOGAR (AMA de CASA)	Primaria	Subsidiado	ASOCIACION MUTUAL LA ESPERANZA ASMET SALUD ESS	No

Información Detallada de los Recipientes

Tipo de Recipiente	Volumen del Recipiente	Uso del Agua que Contiene el Recipiente	Frecuencia de Recambio del Agua	Facilidad de Eliminación del Agua	Cuál de los Sigüientes Elen esta en el Interior del Rec
Tanques usados	1-10L	Lavar ropa	Semanal (mínimo una vez por semana)	Fácilmente eliminable (drenado, volteado, retirando el tapón, etc.)	Ninguno



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