Kota Yoshioka is currently working as technical advisor for Chagas disease control project which isrun by Japan International Cooperation Agency (JICA) and the Ministry of Health of Nicaragua (2009-2014).

Obtained MPH from the Graduate School of International Health Development, Nagasaki University, Japan.Served as JICA volunteer in Costa Rica as rural development promoter for two years and in Guatemala supporting Chagas disease control program at district level for one year.Internship for 10 months in JICA's reproductive health project in Madhya Pradesh, India.Fluent in Spanish.

KOTA YOSHIOKA

Technical Advisor

JICA Nicaragua Chagas
Disease Control Project
Nicaragua

CHAGAS DISEASE (AMERICAN TRYPANOSOMIASIS)

Caused by a ProtozoanTrypanosoma Cruzi

Kota YOSHIOKA

CASE STUDY/BACKGROUND PAPER

Chagas disease (American Trypanosomiasis), caused by a protozoanTrypanosoma cruzi, is a zoonosis predominantly prevalent in the American continents (Figure 1). The Pan American Health Organization (PAHO/WHO) estimated that 8-9 millionpeople or 1-2% of the Latin American population were infected with Chagas disease in 2005 (PAHO 2006). Serological screening at blood banks in Latin America in 2007 detected <1% of blood units with HIV in all countries, but reported >1% of blood unites positive for T. cruziin highly endemic countries (Table 1). The principle forms of human infection are via vector-borne, congenital, transfusional and oraltransmission.In the 1990s more than 80% of the human infection was attributable to the vector-borne transmission (Schofield 1994). As a result of the intensified efforts on vector control and serological screening of blood donors, the incidence of Chagas disease has decreasedby 70% since the 1980s (Dias 2007, Moncayo and Silveira 2009).

In 1997, the Central American countries with PAHO/WHO launched an initiative with an objective to interrupt Chagas disease transmission by vector control and screening at blood banks.

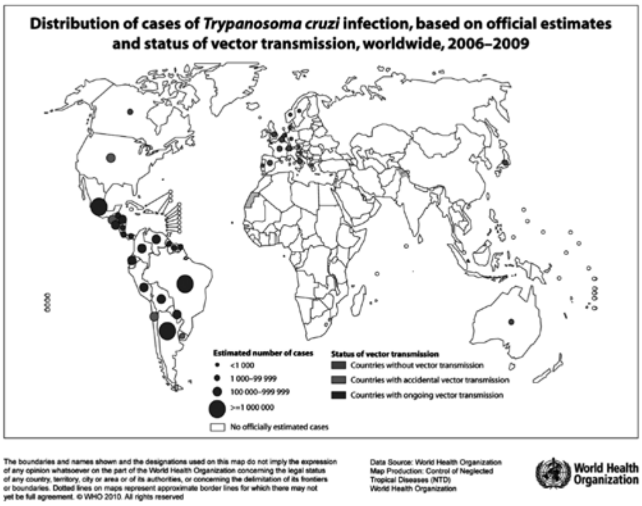

Figure 1: Distribution of Chagas disease infection by WHO

The vector control targeted two main species, Rhodnius prolixus andTriatoma dimidiata. Extensive indoor insecticide spraying dramatically reduced the distribution of R. prolixus. This species is to be eliminated in Central America due to its susceptibility to insecticide and strictly domestic habitats (Hashimoto & Schofield 2012). The current challenge is control of T. dimidiata, which is not eliminable because of its wide distribution and sylvatic population. As T. dimidiatacan repeatedly infest houses even after insecticide spraying, there is a need to establish universal and sustainable

Country	HIV	HBsAg	HCV	Syphilis	*T. cruzi*
Bolivia	0.10	0.38	0.97	1.01	2.53
Brasil	0.69	0.48	0.53	0.96	0.59
Ecuador	0.43	0.29	0.43	0.57	0.17
El Salvador	0.09	0.24	0.29	1.14	2.09
Guatemala	0.82	1.21	0.69	2.10	0.97
Honduras	0.25	0.43	0.43	0.75	1.06
Mexico	0.28	0.19	0.66	0.32	0.41
Nicaragua	0.26	0.32	0.62	1.02	0.21
Paraguay	0.60	0.49	0.72	8.83	3.27
Peru	0.39	0.49	0.81	1.43	0.77

Source: PAHO 2009

Table 1: Proportion (%) of blood units positive for infections at blood banks inten Latin American countries, 2007.

surveillance systems to detect and treat infested houses to prevent the vector-borne transmission of Chagas disease.

Japan International Cooperation Agency (JICA) has provided technical assistance on Chagas disease vector control in Central American countries, including Guatemala, El Salvador, Honduras and Nicaragua since 2000. Following the massive insecticide spraying campaign, JICA supported the Ministries of Health indesigning, implementingand managing community-based vector surveillance systems.The community-based vector surveillance is composed of five key functions: 1) health promotion to promote bug reports by the community, 2) bug detection by the community, 3) bug reports from the community to the local health facilities, 4) data analysis for planning actions, and 5) responsive actions to the community bug reports (Figure 2) (Hashimoto & Yoshioka 2012).However, depending on the local settings in terms of vector distribution, access between the community and the local health facilities, availability and characteristics of stakeholders and so forth, the five-function model of the community-based vector surveillance was to be customized.

Also, the trends in health system reorganization such as decentralization (Tobar 2006) and Renewing Primary Health Care (PHC) (PAHO 2007) have changedthe structural and organizational settingsincluding the vector control program in the Central American Ministries of Health. For example, in El Salvador,

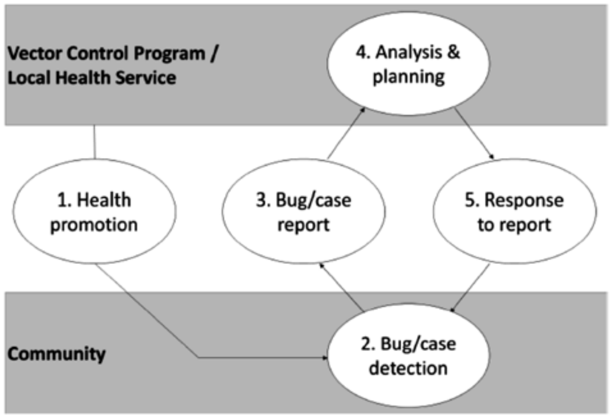

Figure 2: Five key functions of community-based surveillance system (Hashimoto & Yoshioka 2012)

the vector control technicians are concentrated inthe Departmental Health Offices with limited opportunities to reach the communities for field activities such as household bug search surveys and indoor insecticide spraying (Figure 3).Such field activities are conducted mainly by multi-purpose (polyvalent) Health Promoters from Local Health Center level. In Honduras, the vector control program was disorganized and integrated into the environmental health program. The Environmental Health Technician is responsible for multiple health issues, including vector control, and can dedicate very limited time for Chagas disease control.To establish the

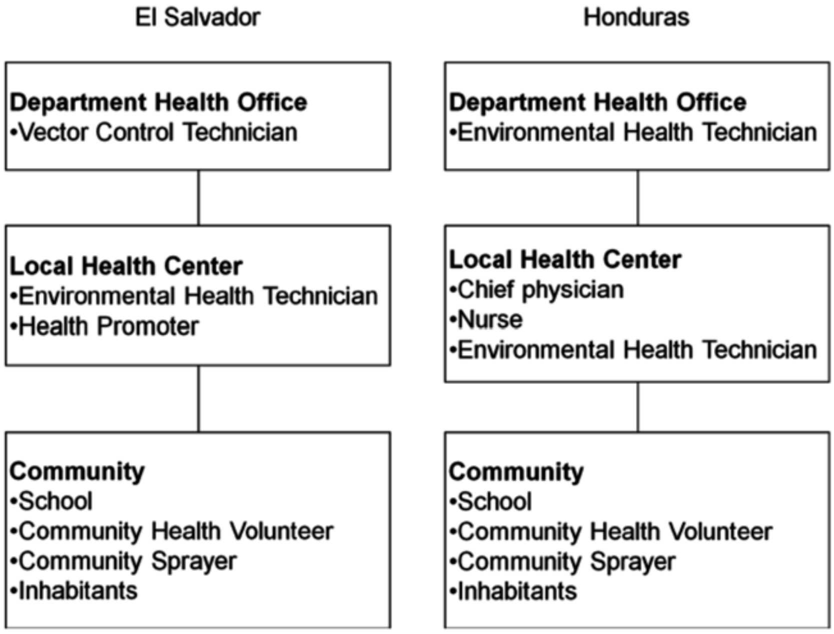

Figure 3: Structure and distribution of stakeholders for community-based surveillance system (Hashimoto & Yoshioka 2012)

functional surveillance systems, it was absolutely necessary to involve not only Vector Control Technician but also other disciplined stakeholders from the designing stage.

From the field experiences of Chagas disease control in Central America,we drew twoimportant lessonsfor the community-based surveillance systems to be scalable and sustainable. First,task sharing between specialized vector control personnel and non-technical stakeholders could efficiently increase the surveillance coverage. The community inhabitants could effectively detect the vectors and in some cases could learn spraying techniques to treat reportedly infested houses with vectors. Local networks such as community health volunteers, schools and media also promoted bug reporting. Such multi-disciplinary approach contributed to increasing the coverage of vector detection and responseonly if the motivation and quality assurance werepresent.

Second, the community-based surveillance systems could be managed better by the local PHC services rather than the vector control program. When the management of surveillance systems was transferred from the districtvector control program to the local PHC services, it facilitated organization of locally available capacity and resources.To monitor performance of the community-based surveillance systems inextensive jurisdictional areas, the critical nodes withinthe surveillance systems were identified as a what-to-do list and its compliance was checked quantitatively in biannual evaluations.

Still, the community-based surveillance systems need to be improved in terms of the coverage and sustainability. The current surveillance does not cover all potentially at-risk areas for vector-borne transmission and not all vector reports are responded by the Ministry of Health (Table 2). Low response coverage could discourage the community inhabitants to continue reporting the bugs, affecting the sustainability

Country	Communities			Houses		
	To be under vector surveillance	Under vector surveillance	%	With vector reports	With institutional response*	%
Guatemala	2,138	482	23%	1,370	1,234	90%
El Salvador	na	12,282	na	5,784	na	na
Honduras	3,223	511	16%	1,228	831	68%
Nicaragua	na	453	na	441	30	7%

* The institutional response could be educational house visit or insecticide spraying
Source: Hashimoto 2012

Table 2: Coverage of community-based surveillance systems in four Central American countries, 2012

of the surveillance systems. In view of scalability and sustainability, we recommend enhancing more community involvement to improvethe coverage of response activities. The running cost of community-based surveillance systems should be programmed within the regular budgets of the local health services. Furthermore, the national programs should encourageand facilitate the PHC services especially in the endemic areas to organize annual campaigns to motivate the stakeholders and should monitor the disease transmission levels on a systematic and regular basis.

Dias JCP, 2007. Southern Cone Initiative for the elimination of domestic populations ofTriatoma infestans and the interruption of transfusional Chagas disease. Historical aspects,present situation, and perspectives . Mem. Inst. Oswaldo Cruz 102 (Suppl. I), 11 – 18.

Hashimoto K, Schofield CJ, 2012. Elimination of Rhodnius prolixus in Central America.Parasit. Vectors 5, 45.

Hashimoto K, 2012. Considraciones para certificar la interrupción y eliminación de trasmisión de T. cruzi por T. dimidiata. Powerpoint presentation in XIV annual meeting of Initiative of the Countries of Central America for Control of Vector-Borne and Transfusional Transmission and Medical Care for Chagas Disease (IPCA). 14 de noviembre del 2012. Belice.

Hashimoto K, Yoshioka K, 2012. Review: Surveillance of ChagasDisease. Advances in Parasitology 79, 375-428.

Moncayo A, Silveira AC, 2009. Current epidemiological trends for Chagas disease in LatinAmerica and future challenges in epidemiology, surveillance and health policy. Mem.Inst. Oswaldo Cruz 104 (Suppl. I), 17 – 30.

PAHO, 2006. Estimación Cuantitativa de la Enfermedad de Chagas en las Américas. OrganizaciónPanamericana de la Salud. WHO/NTD/IDM, OPS/HDM/CD/425 – 06.

PAHO, 2007. Renewing Primary Health Care in the Americas:A Position Paper of the Pan American Health Organization. Pan American Health OrganizationWorld Health Organization.Washington, D.C.

PAHO, 2009. Supply of Blood for Transfusion in the Caribbean and Latin American Countries in 2006-2007: Progress since 2005 of the Regional Plan of Action for Transfusion Safety. Pan American Health Organization, Technology, Health Care and Research Area. Health Technologies for Quality of Care Project. Washington, D.C. (THR/HT/2009/01ENG).

Schofield CJ, 1994. Triatominae – Biologia y Control. Eurocommunica Publications, West Sussex.

Tobar F, 2006. Descentralización y reformas del sector salud en América Latina . In: ZaidaY. (Ed.), Descentralización y gestión del control de las enfermedades trasmisibles enAmérica Latina, Organización Panamericana de la Salud, Buenos Aires, Argentina,65 – 112.