

participación en programas salud
pública desde la comunidad:
el caso topadengue
participation in public health
programs from the community:
the topadengue case

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Abstract

TopaDengue is a project that combines community participation and ICTs, within a framework of a controlled experimental design with the aim of designing and evaluating a community program of *Aedes Aegypti* control. The final goal is to be

able to influence the development of public health policies based on the information produced by the community itself, appropriately shared through new technologies. In this article, we offer an introduction to this experience, its historical origins and preliminary results.

Keywords: Participatory process, public policies, health

GUEST AUTHOR ARTICLE

1 Introduction

Community participation in the control of the *Aedes Aegypti* mosquito is an example of citizen participation and collaboration in solving public health problems. Its positive impact in reducing the risk that the mosquito represents for the development of arbovirus epidemics such as Dengue, has been effectively demonstrated in the pilots [projects] of the *Camino Verde* (Andersson, et al., 2015) in Nicaragua, and its evolution with the incorporation of the TICs in what today we call DengueChat¹. On the basis of these experiences, TopaDengue² poses the challenge of adapting it to a new territory, seeking to validate the methodology outside of its original pilot, contextualizing it for the local reality of Bañado Sur de Asunción.

This contextualization was translated in the design of a community program that incorporates elements of citizen science and popular education, participatory ethnographic design with a territorial approach and within the framework of a controlled experimental design that allowed the evaluation of the impact of the program on the indices of larval infestation of the selected communities.

In this article, we describe TopaDengue as a case study, presenting its methodological details and preliminary results that show a positive impact on the evolution in the larval infestation rates in the community, and on the empowerment of the volunteers who carry it out.

1 The TopaDengue community program

In summary, TopaDengue implements a community entomology program in which volunteers from the community visit the houses of a selected territory weekly, carrying out entomological inspections in each house and document the *Aedes Aegypti* larvae and pupae they find, including the type of container in which it were found. The volunteers also document containers as potential (i.e., which do not contain larvae or pupae, but are unprotected) and protected (i.e., which do not represent a risk because they are adequately protected so as not to accumulate water). The documentation is done through forms on paper and in digital format through digital forms implemented on tablets. Depending on the territory visited, the volunteers decide when to collect the data on paper and digitize a posteriori, and when to use both methods concurrently.

As shown in Figure 1, the social model of the community program designed for Bañado Sur is based on two different groups of volunteers, who make up teams to visit a list of blocks assigned by community facilitators, which in turn coordinate the entire program and keep the community of volunteers together and motivated. The tours result in data and experiences that are socialized in the community to encourage the action of the volunteers and the extended community. This socialization is done by the use of technology, but also at each visit, in which the volunteers talk with the owners of the house, sharing their findings with them, but without intervening in the elimination of the hatcheries, leaving this action to each family. The socialization of the evidence, therefore, constitutes the central element of the program, whose central hypothesis postulates that the surveillance carried out by members of the community itself, on its own, will encourage the families of the territory to take action, thereby reducing the levels of larval infestation of the territory intervened.

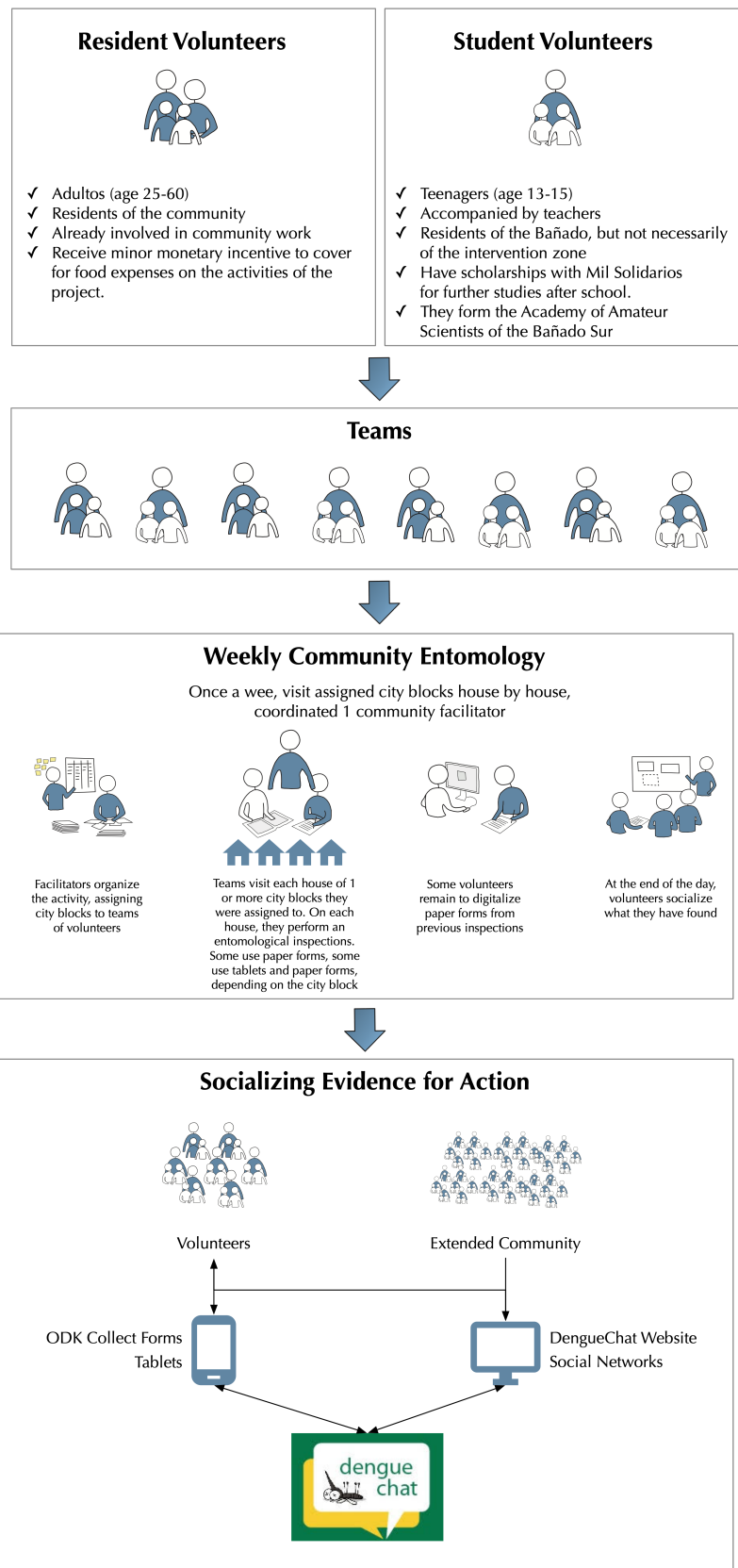


Fig. 1: TopaDengue Community Program. Source: The authors.

1 The territory

The selection of the territory of intervention was carried out with the objective of evaluating the impact of the program in a context of exclusion and precariousness. Due to the short time imposed by the project schedule, the territory access strategy consisted of identifying an organization with experience and pre-existing relationships to accelerate the process of building trust. The South Bañado was selected from the experience of the *Enfoque Territorial*³ and *Mil Solidarios* Association⁴ with the territory.

The *Bañado Sur* is one of the most traditional territories within the wide spectrum of peri-urban zones or poverty belts, where families reside largely excluded from the benefits of the economic and social system. In

the Bañado Sur approximately 16,000 people live, mostly belonging to families living in extreme poverty, formed in their origin by small producers or without land that, moved by the basic needs, migrated from the countryside to the capital in search of better opportunities.

As we have presented in Figure 1, community participation is organized around two groups of volunteers: a first ring, basically composed of the pre-existing structure of people already engaged with other community activities, and; a second ring, constituted by adolescent students that come from the rest of the population of the territory.

The highest degree of participation is concentrated within the first ring. These residents have close emotional ties based on the identification of similar experiences. A strong sense of belonging to a group is manifested among the members, and they have previous experiences of teamwork among them. For the purposes of the project, they are incorporated under the names of "Facilitators" and "Resident Volunteers".

The figure of "facilitators" corresponds to the referring settlers, leaders in their communities, with experience in working with neighbors. They know about the idiosyncrasies of the place and they are committed to its development. They are able to represent both parties, speak for the community before the researchers; and they speak for the researchers before the rest of their classmates and the community. They are in charge of the coordination of their other colleagues, the "Resident Volunteers", who become integrated into "brigades". Another constituent element of the brigades is the institutionally established link between the team of researchers and the "Mil Solidarios" organization. From this link the boys of the aforementioned institution will join the activities carried out by the brigades as "Student Volunteers".

The volunteers of the first ring, usually mothers leaders of the community, must frequently put aside their economic activities to participate, so they are offered a per diem to facilitate their participation. The students already receive a scholarship from the Asociación Mil Solidarios, and their main incentive is then to be part of a program that we baptize with the name of Academia de Científicos Amateurs del Bañado Sur" (Amateur Academy of South Bañado Scientists), which offers them additional training workshops on science topics and the possibility of a final certificate of graduation if they participate in more than 60% of the meetings.

1 DengueChat and ICT tools

DengueChat "is an interactive web and mobile platform that combines mobile technology, entomological data collection, clear information and game theory concepts to motivate communities to participate in vector control" (Coloma, et al., 2016). It has been developed with the objective of storing and socializing the information collected by the brigades during their periodic visits to homes.

The volunteers digitize the observations made through a digital form designed with the XLSForm⁵ standard and implemented through the ODK Collect application⁶, installed in the project's Tablets. The choice of ODK Collect is based on a process of participatory ethnographic design, in which volunteers and researchers experienced several options during the first trips made. The selected tool allows data collection without internet connection, and has compatibility with low range devices and different versions of the Android operating system. Additionally, it has the support of a broad community of developers who contribute to its source code, which is open and free for all.

With the addition of ODK to the platform toolset, TopaDengue designed and developed mechanisms for automatic synchronization of the data collected with the DengueChat web platform, which analyzes and synthesizes the data to produce the "green houses graphic", which presents the Community risk evolution using the metaphor of the traffic light in which the percentage of "green houses" represents the percentage of households that have been free of active hatcheries for at least two weeks. The more green houses, the better, and by socializing this graphic with the volunteers, they realize the impact of their routes, or the need to intensify them if a negative evolution is shown. DengueChat also implements gamification mechanisms that reward advances in the percentage of green houses, distributing points for participating volunteers; and mechanisms for socializing the experience through a community forum where volunteers can share messages and photos.

In addition to facilitating the collection, analysis and socialization of data and community experience itself, the interaction with the various components of the socio-technical platform offers an opportunity to develop information and ICT management skills for each volunteer.

Each component of the platform was fed by what was observed in the Bañado experience. In the process of design and development, we developed out extensions that will seek to facilitate the organization of the weekly tours, a more flexible digitization of the data (using any form design) and the socialization of it through the same notification strategy, three needs identified during the pre-liminal evaluation of the first

phase of the project. The new extensions will be evaluated through a future study in which researchers and volunteers will weekly share semi-structured observations on the use experience from new designs integrated into the platform. Figures 2, 3 and 4 show the components of the socio-technical platform in action.

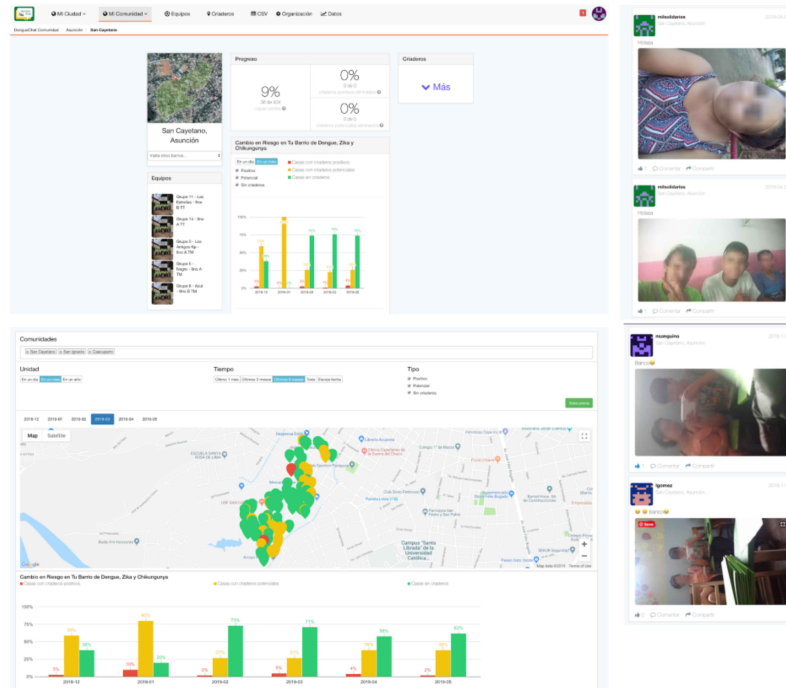


Fig. 2: Data components and DengueChat platform forum. Currently, the platform only supports the Spanish language. Source: The authors.

V0

**FORMATO PARA VOLUNTARIOS
REGISTRO DE ENTOMOLOGÍA COMUNITARIA (REC)**

Para registrar la persona que lo atendió durante la visita, registrar sexo y edad. Ejemplos: M20 (hombre de 20 años), F17 (mujer de 17 años). Para registrar auto-reporte de casos, registrar sexo, edad y enfermedad (D=Dengue, Z=Zika, Ch=Chikungunya). Ejemplos: DM20 (Dengue, hombre de 20 años), ZF18 (Zika, mujer de 18 años). Para registrar el tipo de criadero, registrar el código de criadero y la cantidad de recipientes de ese tipo. Ejemplo: A2 (2 recipientes de tipo plato de animales).		Códigos y tipos de criaderos A - Plato de animales B - Barril, Tambor L - Llantita M - Florero con agua	P - Pileta T - Sanitarios, tinas, cubeta, balde, botella X - Otros
Código de Local Tipo de Lugar Estado de la Visita C = Cerrada, R = Rechazo, E = Efectiva	Tipo de Puesto V = Vivienda D = Baldo C = Comercio	G = Comería H = Hospital / Sanatorio Ch = Charateria	P = Inst. Pública O = Obra / Construcción D = Deshabitada R = Rescadora T = Taller X = Otros

Observación:
- Registrar siempre todas las botellas, los barriles y llantas tantos positivos como negativos
- Otros tipos de criaderos se registrarán sólo cuando sean positivos

Las primeras filas son de ejemplo

Fecha de Revisión (AAAA-MM-DD)	Clasificación de Lugar Visitado	Persona que lo atendió durante la visita	Autoreporte de casos	Tipo de criadero (Código y cantidad)	¿Protegido? (Sí/No)	¿Larvas? (Sí/No)	¿Papas? (Sí/No)	¿Eliminado? (Sí/No)	Comentario
14/07/18	E	M24	DM24, ZF18, DM35, CHF20	A2	0	1	0	0	
14/07/18	E	M24	DM24, ZF18, DM35, CHF20	X1	0	1	0	0	el recipiente es una olla en desuso

V1

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Código Manzana Dirección Tipo de Puesto Estado de la Vivienda C = Cerrada, R = Rechazo, E = Efectiva	Personas que lo atendió durante la visita Ejemplo: M24 (mujer de 24 años) o F17a (femenina de 17 años). Tipo de Puesto V = Vivienda D = Baldo C = Comercio	Códigos y tipos de criaderos A - Plato de animales B - Barril, Tambor L - Llantita M - Macetero o florero con agua Tipo de Puesto G = Comería H = Hospital / Sanatorio Ch = Charateria	P - Pileta T - Sanitarios, tinas, cubeta, balde, botella X - Otros N - Negativo/sin criaderos positivos o potenciales P = Inst. Pública O = Obra / Construcción D = Deshabitada R = Rescadora T = Taller X = Otros
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Observación:
- Registrar siempre todas las botellas, los tumbos y llantas tantos positivos como negativos - Otros tipos de criaderos se registrarán sólo cuando sean positivos

Fecha de Revisión (AAAA-MM-DD)	Estado	Sexo y edad Anfitrión	Auto-reporte síntomas (Sexo y edad)	Síntomas?	El los últimos 15 días SENEPA visitó esta vivienda para: Fumigar (Sí/No) / Lavarse (Sí/No)	Tipo de criadero	¿Protegido? (Sí/No)	¿Larvas? (Sí/No)	¿Larvas? (Sí/No)	¿Papas? (Sí/No)	Fecha de Eliminación (AAAA-MM-DD)

V2

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Proyecto PINV-15-188 TopaDengue

Fecha de Revisión	Estado de Vivienda	Sexo y edad Anfitrión	Auto-reporte de síntomas	Personas c/ síntomas?	¿Qué síntomas?	Si no tiene 15 días SENEPA visitó esta vivienda para: Fumigar / Lavarse	Criadero	¿Protegido?	¿Larvas?	¿Larvas?	¿Papas?	Fecha de Eliminación	
2018-10-10	E	M40	D1F20	2F	Fiebre, Dolbr	1 / Fumigar	Larvas?	Ejemplo Abajo	B1	0	1	0	2018-10-10
									X10	0	1	0	
									T2	0	0	0	
2018-10-10	E	M40	D1F20	2F	Fiebre, Dolbr	1	0	Ejemplo Abajo	B1	0	1	0	2018-10-10
									X10	0	1	0	
									T2	0	0	0	
2018-10-10	C												
2018-10-10	R												

V3

1. Manzana	2. No. de Ciudad	3. Observaciones al Ciudadano	4. Organización	5. Fecha de Revisión	6. Manzana	7. No. de Ciudadano	8. Observaciones al Ciudadano	9. Organización	10. Fecha de Revisión	11. Manzana	12. No. de Ciudadano	13. Observaciones al Ciudadano	14. Organización	15. Fecha de Revisión	16. Manzana	17. No. de Ciudadano	18. Observaciones al Ciudadano	19. Organización	20. Fecha de Revisión	

Fig. 3: Evolution of Forms on paper, progressively adapted to improve the registration of information, from the original version used in Nicaragua, through intermediate designs, to the current version in the format of "Business Cards". Source: The authors.

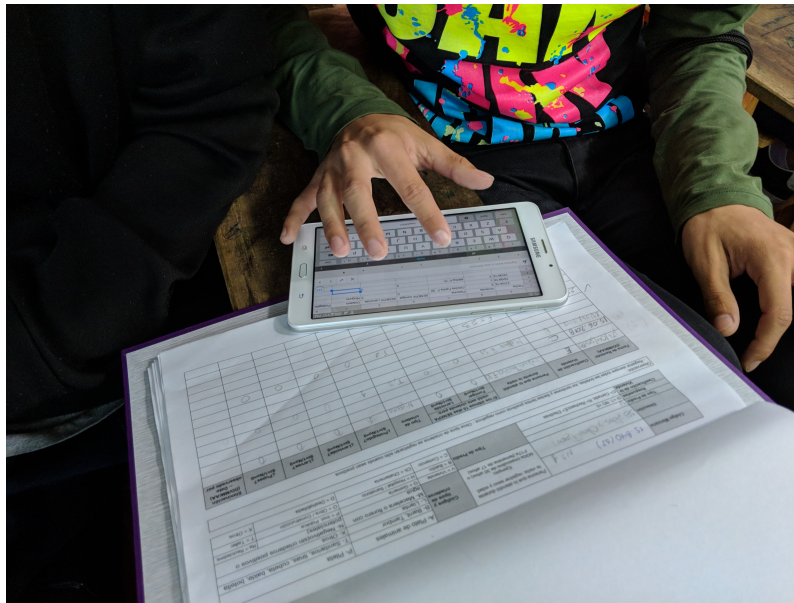


Fig. 4: Volunteers in the process of digitizing the data collected through the paper form. Source: The authors.

1 Experimental design

The community program is implemented in the context of a controlled quasi-experiment that includes the making of external reference professional measurements in 2 intervention zones (ie, where the mobilization is carried out) and 2 control zones (ie, where only reference measurements are performed). Figure 5 shows the geographical detail of the zones associated with the project. We seek the saturation of two zones of households (Intervention 1 and 2) with their respective control zones in the same macro-territory (Control 1 and 2), in order to reduce the heterogeneity of the selected areas and with the objective of concentrating the volunteer work in a delimited block area, covering all houses with at least one monthly visit during the high-risk entomological seasons.

The reference measurements are surveys of larval indices performed by professionals of the Entomology Department of SENEPA⁷, with which reference measurements of the larval infestation indexes are established. Each external measurement includes the laboratorial analysis of the pupae and larvae surveyed in the sampling. Based on these reference measurements, larval infestation indices are evaluated in the intervention areas.

Each external measurement, therefore, establishes (1) a reference baseline that defines the risk existing before our interventions, in times of high infestation (April, 2018), (2) a baseline of the inter-epidemic period to measure the minimum risk during the low infestation season (July, 2018), and (3) a reference baseline, after our interventions, again during the high infestation season (April, 2019).

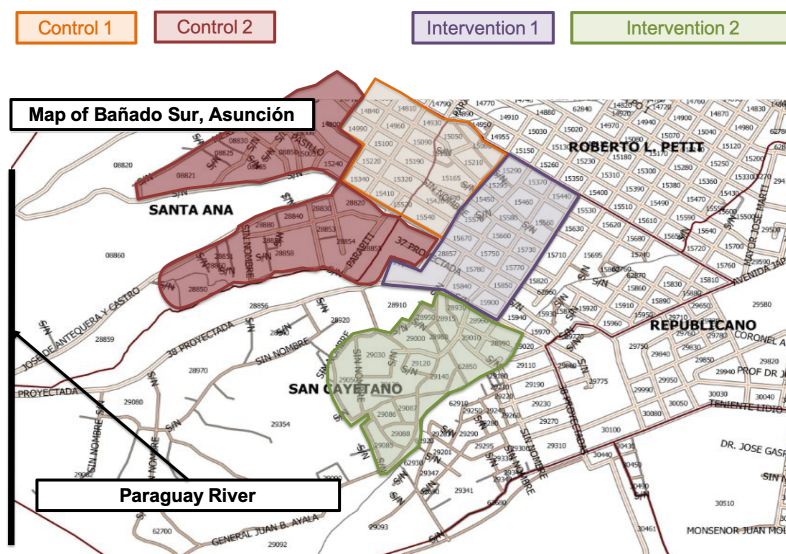


Fig. 5: Map of the intervention and control areas of the project. Source: The authors.

1 Preliminary Results of the Experiment

According to the external professional surveys carried out in cooperation with SENEPA, the community work of monitoring and control of hatcheries has managed to reduce or significantly stop the increase of larval infestation levels in the territory of intervention. The first survey was carried out in April 2018, prior to the intervention works. The second in July 2018, after having 3 months of work. The third and last survey was made as of the writing date of this article, in April 2019. The results show a significant reduction for the inter-epidemic period (July 2018) and a reduction of the increase for the period of high infestation (April 2019), the latter exacerbated by emergency situations in the territory that include levels of precipitation well above the average of the previous year and with half of the territory flooded due to an unexpected flood of the Paraguay River in the month of April 2019.

Figure 6 shows the evolution of the larval infestation index (i.e., percentage of houses with the presence of larvae or pupae). The change in July 2018 shows a reduction in the indices with respect to the baseline of April 2018, both in the control and intervention territory. This is to be expected because the month of July corresponds to the inter-epidemic period of lower risk. The interesting thing, however, is that the proportion of the reduction is much higher in the intervention areas, reaching levels close to those considered without risk.

The April 2019 survey was affected by an emergency situation in the Asunción wetlands⁸, which exacerbated the levels of infestation. Despite this, however, the increase registered in the intervention area was much smaller than the registration in the control territory, as can be seen in Figure 6. Although it is still pending a refinement these analyzes by combining it with other data sources, Preliminary results indicate an interesting tendency that if sustained, would serve to motivate the continuation of this program and its elevation to the range of public policy that can be scaled and implemented in other territories.

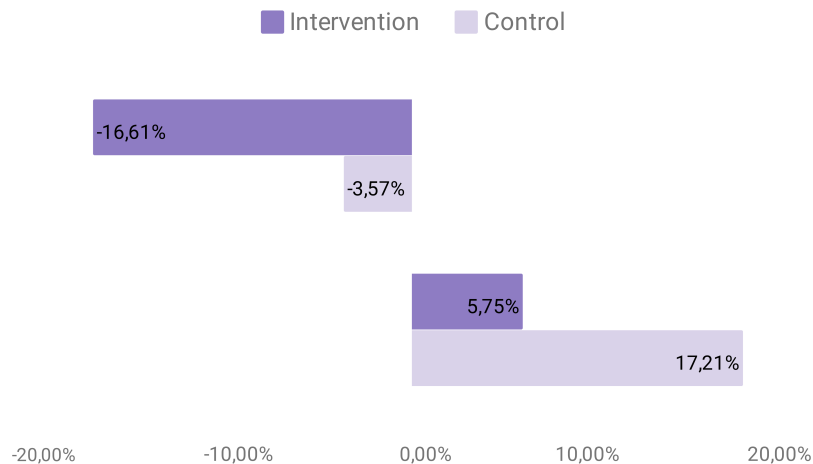


Fig. 6: Changes in larval infestation rates in intervention and control areas, compared to the base measurement made in April 2018..

1 Conclusions

From the experience of the project volunteers, surveyed through focus groups and individual interviews, in combination with the preliminary results presented in the previous section, it is possible to point out some important learnings:

+ In spite of adverse conditions for the integration of the community to participatory projects, the experience shows the feasibility of applying this type of projects in territories of high vulnerability.

+ The participation of the community is mediated to a high degree by the participation of the leaders or leaders of the community. There is a strong dependence in this sense on the work carried out by the leaders or facilitators in terms of coordination and direction for carrying out the periodic tasks. Participation under these conditions can open the discussion around the levels and quality of participation in terms of self-sufficiency or dependence of the members in relation to others.

+ Economic incentives, such as travel allowances for volunteers, which despite being tiny financial figures in relation to the project, are a determining factor in the sustainability of the tasks performed by them. They have managed to avoid desertion as a result of the multiple shortages that volunteers must face daily. This small monetary transfer helps to provide a support for the volunteer's participation day, so that he can disengage, at least partially, from his daily subsistence responsibilities. In conditions of a generalized need such as those involved, the application of this type of individual and economic incentive is often not optional.

+ The determination of a psycho-socio-cultural profile of the community is essential information at the moment of delineating the strategies of adhesion and participation to be carried out. This allows to reduce the risks of the application of measures that are not in tune with the participants or in which the resources may not be duly taken advantage of.

+ The constant ethnographic accompaniment and the participatory research-action approach allowed us to quickly learn and properly adjust the components of the platform and the process. Participation and collaboration as a basis for community health programs represent dynamic processes in constant evolution, which need an ethnographic approach to incorporate the observed in the continuous improvement of the program and its instruments.

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