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The incorporation of activities to control dengue by community health agents

ABSTRACT

OBJECTIVE: To evaluate the performance of Community Health Agents when dengue control activities were added to their tasks.

METHODS: Performance was measured comparing the evolution of selected indicators from the Brazilian National Dengue Control Program and the Family Health Strategy for 2002 to 2008 in the municipality of Sao Gabriel do Oeste, MS, Central Western Brazil, with those of Rio Verde de Mato Grosso, neighboring municipality with demographic, socioeconomic and health services similarities. Data were collected from municipal databases of the Information System for Yellow Fever and Dengue and the Information System for Primary Healthcare of the Mato Grosso do Sul State Health Office. The variables selected for the family health strategy activities were: monthly home visits, pregnant women whose antenatal care began in the first trimester, children under one with up-to-date vaccinations and hypertensive patients. Those selected for the Brazilian National Dengue Control Program were: properties inspected with *Aedes aegypti* and properties not inspected.

RESULTS: The two municipalities maintained a similar trend in dengue control indicators in the period studied. With regard to the Family Health Strategy, in 2002 Sao Gabriel do Oeste was better off in three of the four indicators studied, however, this situation was reversed at the end of the period when the county was overtaken by Rio Verde de Mato Grosso in three of the four indicators analyzed, including, the monthly average community health worker visits per registered family, the main activity of a Family Health Strategy agent.

CONCLUSIONS: Incorporating the National Dengue Control Program into the Family Health Strategy is viable and developed without prejudice to dengue control activities, however, the same did not occur with the activities of family health in Sao Gabriel do Oeste. The additional workload of the community health workers is the most likely hypothesis for the declining performance of these agents in the Family Health Strategy activities.

DESCRIPTORS: Community Health Workers. Family Health. Primary Health Care. Employee Performance Appraisal. Dengue, prevention & control.

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INTRODUCTION

The arbovirus that has most affected humans in recent years is dengue, becoming a serious global health problem, especially in tropical countries, where environmental conditions contribute to the development and proliferation of the *Aedes aegypti* mosquito.[5] According to the World Health Organization (WHO), around 50 million people are infected annually and, approximately, 2.5 billion live in endemic countries.[a] Although every effort has been made to develop and produce an effective vaccine to control this disease, this objective has not yet been achieved. Controlling the vector and early and appropriate treatment are the only measures capable of reducing incidence and lethality from dengue.[17]

Aedes aegypty is found in urban areas,[10] especially where waste is improperly disposed of or treated, the water supply is intermittent and urban infrastructure is precarious which, allied with unsatisfactory basic sanitation conditions, inadequate housing and cultural and educational factors, provide favorable conditions for the dengue virus to be transmitted.[9]

Dengue continues to be one of the main public health problems in Brazil, despite efforts by the authorities, since 1996, to control it through the Plan to Eradicate *Aedes aegypty*.[1,3] A significant increase in severity has been observed. After cases fell between 2002 and 2004, incidence climbed again, with more than 1,200,000 cases notified in 2010, accompanied by increased severity of the disease.[b]

The Family Health Care Strategy (ESF) led to a change in the Brazilian health care model. The health care system extended its reach, going beyond the limits of the health care unit and reaching out to where the users lived, even to inside their homes. In this strategy, the work of the community health worker (CHW) is critical. Their central role is to be the link between the health care team and the community[3] in order to strengthen the link with families, bring health care actions closer to the family context and increase the population's capacity to deal with their problems.[14]

These attributes are essential to controlling dengue, which with the creation of the National Dengue Control Program (PNCD), from 2002 onwards, became involved at a local level with endemic disease control agents (ECA) linked to the National Health Foundation. With this proceeding, actions to control dengue came to have two professionals acting at a local level, the activities of whom could be either independent, shared or overlapping.[3,4]

Aiming to improve the rationality and efficiency of actions to control dengue at the primary level, the PNCD[3,4] sought to unify the ECA's geographic base with micro-areas covered by the CHW. The Ministry of Health reinforced the integration of activities in primary care in 2009, establishing that the ECA and CHW should be co-responsible for controlling dengue and specifying their attributes. Some posts, such as health care education, community mobilization and identifying breeding sites remained common to both agents. Monitoring individuals with dengue came to be largely the responsibility of the CHW and destroying difficult to reach breeding sites and using larvicides became the specific task of the ECA.[c]

With the objective of avoiding duplicated actions, improving the efficiency of home visits and stimulating community participation in reducing *Aedes aegypt* infestations, in 2002 the Municipal Health Department of Sao Gabriel do Oeste, MS, Central Western Brazil, in a similar decision to that made by the Municipal Health Department of Sao José do Rio Preto, SP,[2] Southeastern Brazil, presented an integration proposal that was innovative within the state. The post of ECA was abolished and it was decided that the CHW belonging to family health care teams would also take on PNCD activities.[c]

In their micro-areas, the CHW routinely started to visit commercial property, wastelands, strategic points (cemeteries, tire repair shops, scrap yards and construction materials storage sites), to destroy difficult to reach breeding sites and to use chemical and biological larvicides. Moreover, daily recording of maps in the Yellow Fever and Dengue Information System (SISFAD), which had been until then the exclusive responsibility of the ECA, also became part of the CHW routine.[d]

Incorporating these dengue control activities into the CHW workload, with no decrease in the target population in the micro-areas, constituted additional work for this professional. Unless there was some free time already existing in their capacity to work, this would have repercussions on their performance, either in ESF activities or in dengue control activities.

The aim of this study was to evaluate community health workers' performances after dengue control measures were included in their tasks.

[a] World Health Organization. Dengue: guidelines for diagnosis, treatment, prevention and control. Geneva; 2009.
[b] Conselho Nacional de Secretários de Saúde. Dengue: situação atual, desafios e estratégias para enfrentamento. Brasília (DF); 2011. (Nota Técnica, 5).
[c] Ministério da Saúde. Diretrizes nacionais para a prevenção e controle de epidemias de dengue. Brasília (DF); 2009.
[d] Prefeitura Municipal de São Gabriel do Oeste. Lei Complementar nº 52 de 24 de abril de 2008. Dispõe sobre a regulamentação das atividades de agente comunitário de saúde, na forma que especifica e dá outras providências. São Gabriel do Oeste; 2008.

METHODS

Evaluating and characterizing according to diversity, amplitude and multiplicity the possibilities of constructions which make every case unique,[7] but at the same time having characteristics in common: the capacity to measure, to compare and to make value judgements.[16] In the case of evaluating performance, it needs to be understood in function of the diversity of definitions.[8]

Bearing in mind these characteristics, an evaluative process was structured which defined performance as the professional capacity to satisfactorily meet attributes of the workload and meet the organizations expectations, i.e., to perform activities and meet the objectives and goals of the PNCD and the ESF.

Thus, the CHW performance in the south of the urban zone of Sao Gabriel do Oeste was analyzed according to the evolution of indicators or results selected from the PNCD and the ESF, after incorporating dengue control activities, using evaluations of the same indicator in the municipality of Rio Verde de Mato Grosso, MS, as a reference.

The municipality of Rio Verde de Mato Grosso was selected as it neighbors Sao Gabriel do Oeste and belongs to the same administrative region of the state of MS, and has similar characteristics in terms of: population[e] (18,784 inhabitants in Rio Verde de Mato Grosso and 17,824 inhabitants in Sao Gabriel do Oeste); economic activity (agriculture); level of coverage of ESF in the urban area (both with 100%); number of family health care units (six and seven, respectively); and number of agents (46 and 52 CHW respectively). In Rio Verde de Mato Grosso, dengue control activities were not incorporated into the CHW workload.

Indicators of the results of activities performed by CHW in the urban zone of Sao Gabriel do Oeste after dengue control activities were incorporated were used to observe development of the programs. The performance of these professionals was observed by means of the evolution in PNCD and ESF selected indicators. The evaluative analysis compared these indicators with those of the municipality of Rio Verde de Mato Grosso.

Secondary data for the study were obtained from the Yellow Fever and Dengue Information System (FAD)[f] and (SISFAD)[g] and from the Primary Health Care Information System (SIAB)[h] of the Mato Grosso do Sul State Health Department.

Indicators concerning the dengue control situation and for the ESF for the period study were used, provided by the information systems mentioned above; representing the basic functions of the PNCD and the ESF; and sensitive to changes in CHW professional performance.

The following dengue control indicators were selected: building infestation (BI), defined as the proportion of households with larvae of the vector, and pending index (PI), which is the proportion of properties not visited by agents.

The ESF indicators selected were: mean monthly CHW visits per registered family; proportion of pregnant women with antenatal care initiated in the first trimester; proportion of children under one year old with up-to-date vaccinations; and the proportion of monitored hypertensive patients.

The indicators were calculated based on data on the results of the CHW activities and graphics and tables drawn up to analyze the evolution of indicators and CHW performance.

The study was approved by the Research Ethics Committee, *Universidade Federal do Mato Grosso do Sul* (Process 1062/2007).

RESULTS

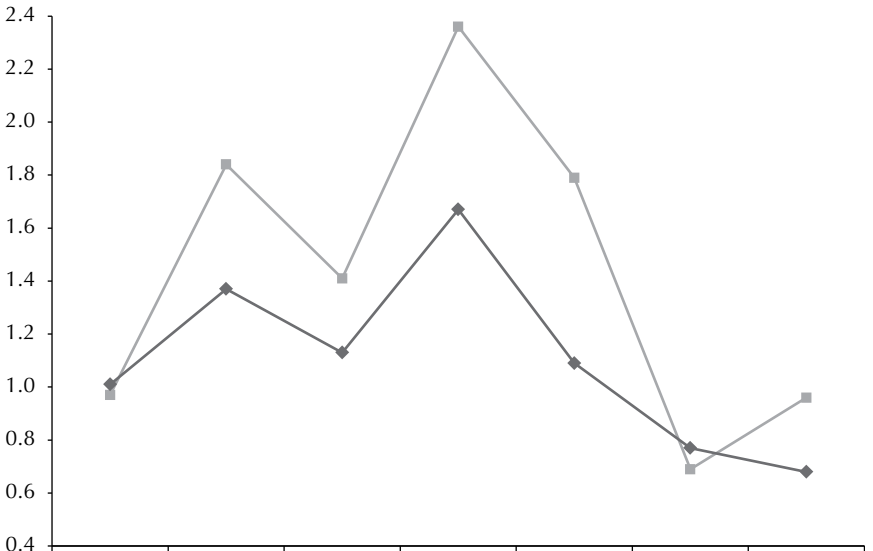
The BI values oscillated above 1.0% in both municipalities from 2002 to 2005, and declined from 2005 onwards. Rio Verde de Mato Grosso showed a small increase in 2008 (Figure 1).

Analysis of data referring to the PI was limited to the 2006 to 2008 period. Data on dengue control visits were recorded together with ESF visits, in Sao Gabriel do Oeste, until 2005, which made it impossible to calculate this indicator. The data needed to calculate the index were only available in Rio Verde de Mato Grosso from 2006 onwards due to changes in versions of the Municipal FAD.

The PI in Sao Gabriel do Oeste was 13.0% in 2006, reaching the highest level 2007 (18.4%) and falling to 13.8% in 2008, varying within a range above that recommended by the PNCD (10.0%). In this period, Rio Verde de Mato Grosso started with PI of 6.8% (2006), which increased to 10.2% in 2007 and overtook that of Sao Gabriel do Oeste with a rate of 15.2% in 2008.

The CHW in Sao Gabriel do Oeste had a higher mean of monthly ESF visits than Rio Verde de Mato Grosso in the first two years (2002 to 2003). However, this mean fell from 2004 onwards, before showing a slight increase in

[e] Instituto Brasileiro de Geografia e Estatística. Cadernos de Informações de Saúde. Brasília (DF); 2010 [cited 2010 Jan 1]. Available from: http://tabnet.datasus.gov.br/tabdata/cadernos/cadernosmap.htm
[f] Sistema de Informação da Febre Amarela e Dengue, 2002 a 2006, versão 13.4.
[g] Sistema de Informação da Febre Amarela e Dengue, 2007 e 2008, versão 14.
[h] Sistema de Informação da Atenção Básica, 2002 a 2008 versão 5.0.



	2002	2003	2004	2005	2006	2007	2008
Rio Verde de Mato Grosso	1.0	1.8	1.4	2.4	1.8	0.7	1.0
Sao Gabriel do Oeste	1.0	1.4	1.1	1.7	1.1	0.8	0.7

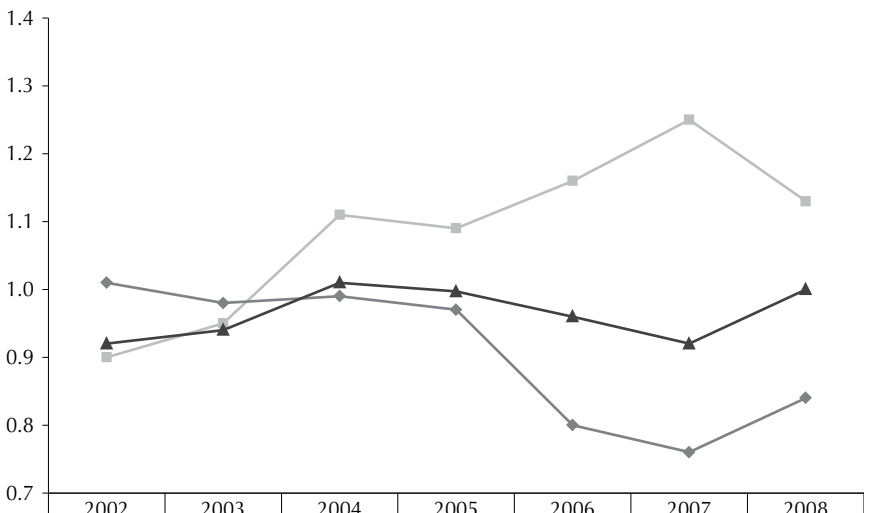
Figure 1. Building infestation index. Sao Gabriel do Oeste, Rio Verde de Mato Grosso, MS, Central Western Brazil, 2002 to 2008.

2007 to 2008. Form 2003 onwards, Rio Verde de Mato Grosso had levels superior to state levels (Figure 2).

Through the whole Sao Gabriel do Oeste showed a high proportion of pregnant women whose antenatal care had begun in the first trimester, above those of Rio Verde de Mato Grosso and of the state. This indicator exceeded the state level in this municipality from 2005 onwards, going from 61.5% in 2002 to 92.8% in 2008 (Figure 3).

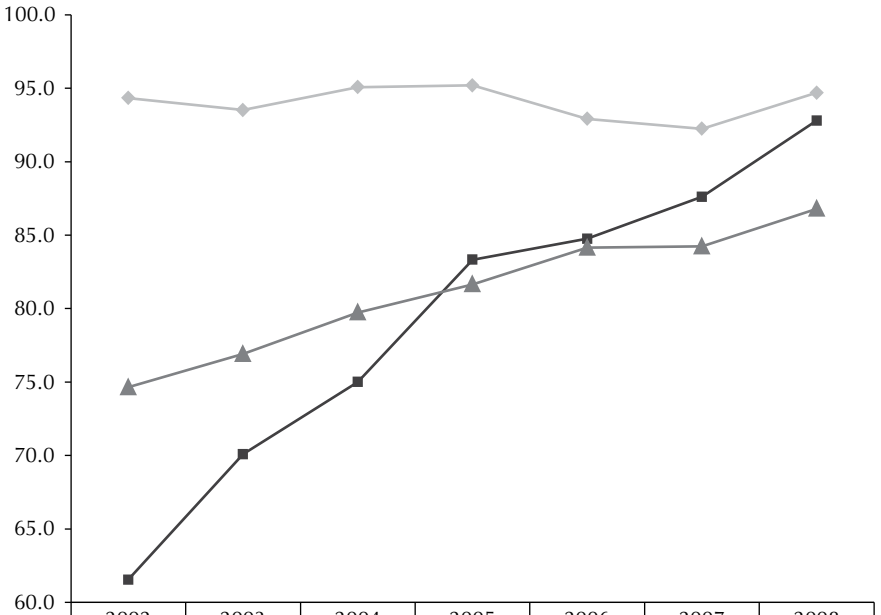
The proportion of children under one with up-to-day vaccinations in Sao Gabriel do Oeste varied over the period studied, (93.7% in 2002 and 98.6% in 2008 – the best rate of the period). However, these values were systematically lower than those of Rio Verde de Mato Grosso from 2004 onwards, and below state levels in 2004, 2005 and 2006 (Figure 4).

Rio Verde de Mato Grosso had increasing levels of patients with hypertension monitored by agents: from



	2002	2003	2004	2005	2006	2007	2008
Rio Verde de Mato Grosso	0.9	1.0	1.1	1.1	1.2	1.3	1.1
Sao Gabriel do Oeste	1.0	1.0	1.0	1.0	0.8	0.8	0.8
Mato Grosso do Sul	0.9	0.9	1.0	1.0	1.0	0.9	1.0

Figure 2. Mean monthly home visits by community health. Sao Gabriel do Oeste, Rio Verde de Mato Grosso, MS, Central Western Brazil, 2002 to 2008.



	2002	2003	2004	2005	2006	2007	2008
Rio Verde de Mato Grosso	61.5	70.1	75.0	83.3	84.8	87.6	92.8
Sao Gabriel do Oeste	94.3	93.5	95.1	95.2	92.9	92.2	94.7
Mato Grosso do Sul	74.6	76.9	79.7	81.7	84.1	84.2	86.8

Figure 3. Proportion (%) of pregnant women with antenatal care begun in the first trimester. Sao Gabriel do Oeste, Rio Verde de Mato Grosso, MS, Central Western Brazil, 2002 to 2008.

82.3% in 2002 to 98.6% in 2004, exceeding those of Sao Gabriel do Oeste and of Mato Grosso do Sul. At first, Sao Gabriel do Oeste was the best performing municipality as regards this indicator within the three instances compared here (90.5% in 2002 and 92.3% in 2003), but fell considerably from 2004 onwards, with the lowest rate seen in 2008 (84.8%).

DISCUSSION

Included in the PNCD objectives,[3,4,15] is reducing BI with regards *Aedes aegypti* in all Brazilian municipalities to reach an index of < 1.0%. The BI in Sao Gabriel do Oeste remained high throughout the period studied, above this rate, and started to fall in 2005, reaching a value of < 1.0% in 2007.

The same rise between 2002 and 2005, followed by a fall from 2005 onwards in this indicator was also observed in Rio Verde de Mato Grosso (Figure 1) which enables it to be occluded that the causes of the oscillations observed affected both municipalities. Thus, the differences are not attributable to differences in the work practices in the two municipalities. Even with the incorporation of additional activities, the CHW in Sao Gabriel do Oeste managed to obtain more efficient activities, as they obtained better results than those of Rio Verde de Mato Grosso over the period.

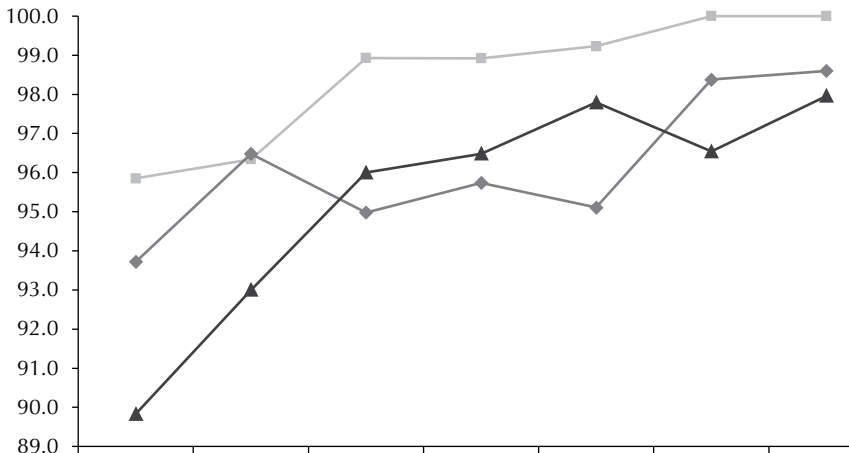
The IP, indicator of CHW efficiency in home visit to control dengue, was unsatisfactory in both municipalities at the end of the period, as it exceeded the reference level established by the PNCD (10.0%).[13] Although Rio Verde de Mato Grosso showed a satisfactory results in 2006, from this year onwards the trend was for the IP to be slightly worse than that of Sao Gabriel do Oeste in 2008 (15.2% and 13.7%, respectively).

It was difficult to obtain IP which met the PNCD recommended levels in both municipalities. Such percentages may reveal access difficulties faced by agents during inspections, when encountering closed properties, as their visits often coincided with the inhabitants' working hours. They also encountered abandoned properties and cases in which the residents refused permission to enter, although there are specific legal instruments to support agents in such situations.[i]

Although no quantitative minimum has been established, the Ministry of Health ordinance[j] recommends

[i] Ministério da Saúde. Amparo legal à execução das ações de campo – imóveis fechados, abandonados ou com acesso não permitido pelo morador. Brasília (DF); 2006.

[j] Ministério da Saúde. Portaria n. 2.488, de 21 de outubro de 2011. Aprova a Política Nacional de Atenção Básica, estabelecendo a revisão de diretrizes e normas para a organização da atenção básica para o Programa Saúde da Família e Programa de Agentes Comunitários de Saúde. *Diario Oficial Uniao*. 24 out 2011 [cited 2011 Jan 10]. Available from: http://brasilsus.com.br/legislacoes/gm/110154-2488.html



	2002	2003	2004	2005	2006	2007	2008
Rio Verde de Mato Grosso	95.9	96.3	98.9	98.9	99.2	100.0	100.0
Sao Gabriel do Oeste	93.7	96.5	95.0	95.7	95.1	98.4	98.6
Mato Grosso do Sul	89.8	93.0	96.0	96.5	97.8	96.5	98.0

Figure 4. Proportion (%) of children under one year with up-to-date vaccinations. Sao Gabriel do Oeste, Rio Verde de Mato Grosso, MS, Central Western Brazil, 2002 to 2008.

that the CHW carry out at least one monthly visit to each family in their micro-area.[12] The CHW in Sao Gabriel do Oeste did not achieve good indices for this indicator (Figure 2), especially in 2007. This year, in which a dengue epidemic occurred, required intensification of the activities in this program, which affected the performance of exclusively ESF activities.

In research conducted in 2008 in Cajuri, MG, with a group of CHW from the ESF teams, 45.4% reported visiting all of the families once a month. The 27.3% who did not manage to do this indicated this was due to unforeseen situations.[6]

A significant indicator which directly reflects CHW action id the proportion of pregnant women whose antenatal care began in the first trimester (Figure 3). The ESF has a differentiated care path for pregnant women, which involves the CHW identifying women in the community with a late period, a probable indicator of pregnancy. When a woman in this situation is detected, the CHW immediately makes the first appointment.[11]

The accumulation of the two programs seems not to have been a limiting factor for monitoring pregnant women by CHW in Sao Gabriel do Oeste, or for early detection of pregnancy, as the percentages remained at an excellent level. In addition to reflecting goo follow up by CHW, these results indicate the value placed on antenatal monitoring by the pregnant women. An increase in this index was observed in Rio Verde de Mato Grosso over the period, suggesting that the CHW managed to discover pregnant women quickly in their micro-areas, as well as giving them guidance on the importance of antenatal care (Figure 3).

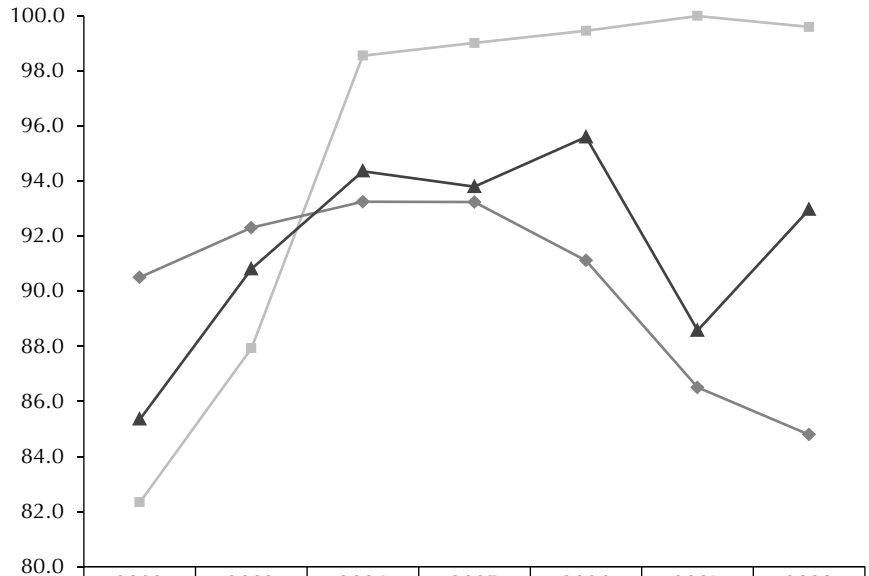
Monitoring the vaccination scheme in children under one is another important activity performed by the CHW. A copy of each child's vaccination record means agents can monitor the vaccination situation of all children in their micro-area.[k]

The proportion of children with up-to-date vaccination in Sao Gabriel do Oeste varied over the period, remaining lower than that of Rio Verde de Mato Grosso and of the state between 2004 and 2006, but increasing in 2007 to 2008 (Figure 4). The performance of CHW in Rio Verde de Mato Grosso, who only carried out ESF activities, was excellent, with percentages above those of Sao Gabriel do Oeste and of the state. Having the CHW in Sao Gabriel do Oeste perform activities from both programs appeared to reflect unfavorably on monitoring these children's vaccinations.

In the ESF, monitoring patients with high blood pressure is done through monthly register and control of patient with a medical diagnosis of arterial hypertension. These data are updated on every home visit and the notes subsequently revised by the team nurse.[g]

The CHW in Rio Verde de Mato Grosso performed excellently and managed to increase their percentages significantly. The same was not seen in Sao Gabriel do Oeste, as such percentages declined sharply from 2004, falling below those of Rio Verde de Mato Grosso and of the state.

[k] Ministério da Saúde. SIAB: manual do sistema de informação de atenção básica. Brasília (DF); 1998.



	2002	2003	2004	2005	2006	2007	2008
Rio Verde de Mato Grosso	82.3	87.9	98.6	99.0	99.5	100.0	99.6
Sao Gabriel do Oeste	90.5	92.3	93.3	93.2	91.1	86.5	84.8
Mato Grosso do Sul	85.4	90.8	94.4	93.8	95.6	88.6	93.0

Figure 5. Proportion (%) of patients with high blood pressure monitored by community health workers. Sao Gabriel do Oeste, Rio Verde de Mato Grosso, MS, Central Western Brazil, 2002 to 2008.

According to the indicators studied here, incorporating PNCD activities into those of the ESF CHW did not negatively affect dengue control in Sao Gabriel do Oeste compared with Rio Verde de Mato Grosso. However, the same was not observed when comparing these agents' ESF activities as, with the exception of the proportion of children under one with up-to-date vaccination, the other results worsened, not only in relation to Rio Verde de Mato Grosso, but also, in the case of two of them (mean monthly visits and monitoring patients with arterial hypertension), in relation to the mean observed in other municipalities in Mato Grosso do Sul.

The activities were incorporated without any decrease occurring in the population for whom the CHW was responsible. The area or the population for which these agents are responsible could be adjusted so as to create conditions in which this agent can satisfactorily fulfill their tasks.

Thus, incorporating these dengue control activities into ESF activities should be an option considered by administrators, as this initiative contributes directly to integrating the programs, unifying and rationalizing home visits, as well as the population for whom the CHW is responsible. Adjusting the area or the population for which the CHW is responsible could be implemented to recreate them for the service and for the families, as well as to strengthen integrality of primary health care, the structuring principle of the public health care system organization.

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Article based on the doctoral thesis of Cazola LHO, entitled: "Atuação do Agente Comunitário de Saúde na Estratégia Saúde da Família e no Programa de Controle da Dengue: experiências de dois municípios brasileiros de pequeno porte", presented to the Postgraduate Program in Health and Development in the Midwest Region of the *Universidade Federal de Mato Grosso do Sul*, in 2011.

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The authors declare that there are no conflicts of interest.

HIGHLIGHTS

The study assessed the effects of incorporating activities from the dengue control program into the tasks of community health agents without reducing their family health care strategy duties.

This, technically viable, incorporation did not negatively affect the national dengue control program, in contrast to what occurred with family health care strategy activities, as, of the four indicators evaluated, only one showed satisfactory results.

The new activities were incorporated without reducing the population for whom each community health agent was responsible, leading to overwork leading to the negative results in family health care strategy performance.

The presence of one sole agent is viable, it rationalizes the programs and unites primary health care activities, but the micro-areas need to be redefined, i.e., to decrease the number of individuals for whom the community health agents are responsible in their territories, which would be reflected in reduced workload and lead to improved efficiency in both programs.

Professor Rita de Cássia Barradas Barata
Scientific Editor