Spatial analysis of health surveillance information in the SUS Ambulatory Care Information Systems at IBGE Intermediate Regions of Urban Articulation

Análise espacial das informações de vigilância sanitária lançadas no Sistema de Informações Ambulatoriais do SUS nas Regiões Intermediárias de Articulação Urbana do IBGE

Rosires Magali Bezerra de Barros*

Heloisa Helena Gomes Lima

Íris do Céu Clara Costa

ABSTRACT

Purpose: To evaluate the indicator 41, of the pact Guidelines, Goals and Indicators from 2013-2015 and to make the mapping and analysis of this information, considering the Intermediate Regions of Urban Articulation. **Methodology:** An ecological and descriptive study, held in Brazil, with data collection in the SIA/SUS from Datasus, data analysis in the SPSS Statistics (average and proportions) and spatial analysis via the TerraView-4.2.2 software. **Results:** It was found in this study that 79.33% of the counties perform Register of establishments subject to health surveillance; 18.52% implement Establishment of administrative processes; the counties that implement educational activity for the population and for the regulated industry were 63.23% and 46.46% respectively; most of the counties (91.22%) perform Inspection of establishments subject to health surveillance; as for receiving complaints/claims and service to complaints/claims, 84.45% and 85.15% of counties implement these processes, respectively. **Conclusion:** It is possible to know, through the RIAU, the indicator 41 profile and infer that these actions, recorded in the SIA / SUS, are still being implemented and structured in Brazilian municipalities, in order to achieve effective decentralization of health surveillance in the country.

KEYWORDS: Unified Health System; Health Surveillance; Decentralization; Ambulatory Care Information Systems

Universidade Federal do Rio Grande do Norte (UFRN), Caiacó, RN, BraZil

* E-mail: rosires@ufrnet.br

RESUMO

Objetivo: Avaliar o indicador 41 da Pactuação de Diretrizes, Objetivos, Metas e Indicadores de 2013-2015, realizar o mapeamento e a análise dessas informações, considerando as Regiões Intermediárias de Articulação Urbana. **Metodologia:** Estudo ecológico e descritivo, realizado no Brasil, com coleta de dados no SIA/SUS do Datasus, análise de dados no *SPSS Statistics* (média e proporções) e análise espacial por intermédio do *software* TerraView. **Resultados e discussão:** Observou-se que as ações básicas de vigilância sanitária, preconizadas pelo indicador 41, não são registradas no SIA/SUS por todos os municípios, mesmo sendo esperado, com o processo de descentralização, que esses estruturem minimamente seus serviços. Foi constatada fraca dependência espacial do indicador 41 nas RIAU, no período do estudo (Moran I = 0,326; p = 0,010) e ainda foi evidenciado que a meta estabelecida para o indicador 41 está distribuída de forma dispersa nas 161 regiões, não existindo uma uniformidade quanto ao indicador nessas regiões. **Conclusão:** É possível, por meio das RIAU, conhecer o perfil do indicador 41 e inferir que essas ações registradas no SIA/SUS encontram-se, ainda, em processo de implantação e estruturação nos municípios brasileiros, com a finalidade de alcançar a efetiva descentralização da vigilância sanitária no país.

PALAVRAS-CHAVE: Sistema Único de Saúde; Vigilância Sanitária; Descentralização; Sistemas de Informação em Atendimento Ambulatorial

INTRODUCTION

Current health surveillance (VISA) activities have first appeared in Brazil in the 18th and 19th centuries, with the inspection of cemeteries, food trade and ports in order to avoid the spread of diseases. These activities were carried out exclusively by the State through the sanitary police[1].

This process was discussed by Souto, who reminded us of the relevance of the medical police as an important state health policy in Europe at the end of the 18th century and its strong influence on the sanitary practices of the time in Brazil[2]. Costa emphasizes that this was the early age of health surveillance in Brazil, marked by excessive edition of standards, administrative arrangements and centralization[3].

With the creation of the Brazilian Unified Health System (SUS), health surveillance was conceived as a common competence of the federated entities. Its scope was expanded and included the intervention on the risks and problems inherent in the production and consumption of goods and products, arising from the provision of services of interest to health and the environment[4,5].

In this sense, Lucchese argued that after the implementation of SUS, the need to decentralize health surveillance actions became urgent, based on the increase in the population's access to health services and the fact that health surveillance intends to promote and protect people's health[6]. This process was regulated in the second half of the 1990s, with the publication of the Basic Operational Norms (NOB) and, in particular, of NOB n. 01/1996, which laid the foundations for the health surveillance decentralization process, based on the establishment of criteria to qualify and fund these activities within the cities[7].

Data related to health surveillance activities in the cities is to be recorded in the Outpatient Information System of the Unified Health System (SIA/SUS), based on a standard published by the Ministry of Health in the Health Care Department Ministerial Act n. 323/2010, which defines the activities to be recorded and reported at the state and federal levels[8].

Health surveillance procedures are recorded monthly and submitted for consolidation at the state and federal levels. However, it is possible to assume that this data is analyzed in an incipient fashion by the federal, state and city authorities, which do not generate information and indicators that could be used to manage these actions.

From this perspective, it is also possible to assume that this data is not used to evaluate the decentralization process of health surveillance actions in Brazil, since in this study we did not find any work that analyzes the decentralization of health surveillance based on this data nor its relationship with management tools and strategies.

Therefore, we decided to investigate the health surveillance information available in the SIA/SUS to evaluate indicator 41 of the Guidelines, Objectives, Targets and Indicators for 2013-2015, and to carry out the mapping and analysis of this information, considering the Intermediate Regions of Urban Articulation (RIAU).

METHOD

This is an ecological and exploratory study on indicator 41 conducted in Brazil. Data was collected from SIA/SUS on the website of the IT Department of the National Health System (Datasus). More specifically, we searched for procedures related to health surveillance recorded monthly in this system in 2014.

The health surveillance procedures performed by the states and cities are regulated by GM/MS Decrees n. 1.378/2013[9] and n. 475/2014[10]. In 2015, new procedures related to the implementation of quality management were added to the specific inspection actions in the pharmaceutical, active pharmaceutical and health products industries.

In the SIA/SUS table, there are 56 health surveillance procedures, distributed mainly in the following groups: recording, inspection, licensing, investigation, educational activities, quality management system and other procedures.

The procedures analyzed in this study were those proposed by indicator 41 of the 2013-2015 Guidelines, Objectives, Targets and Indicators of all Brazilian cities in the year 2014. One of the goals of indicator 41 is the reduction of risks and hazards to the health of the population, through health promotion and surveillance actions, and to strengthen these actions in the cities. The city goal of indicator 41 is to perform 100% of the health surveillance actions listed for the city[11].

According to the guidelines, objectives, targets and indicators, this indicator is important to assess the level of implementation of health surveillance actions, promoting more effective system coordination. This indicator is composed of the following actions: registration of establishments subject to health surveillance; introduction of administrative procedures for health surveillance inspection in establishments subject to health surveillance; educational activities for the population; educational activities for the regulated sector; receiving complaints; dealing with complaints[11].

The data from the cities was aggregated per RIAU (161 regions), according to the conceptual and methodological framework developed by the Brazilian Institute of Geography and Statistics (IBGE) in the Urban Articulation Regions Project (RAU)[12].

In order to build the health surveillance decentralization profile in the RIAU, the data obtained in the Datasus with TabWin, version 36.b, was exported to Microsoft Excel for descriptive analysis. This data was also visualized and analyzed on themed maps built on TerraView, version 4.2.2.

Data was analyzed using univariate descriptive statistics tools (proportion and average) and univariate and bivariate spatial analysis (Moran index). For the analysis of the data of indicator 41, the average of this indicator was calculated for the 161 intermediate regions of urban articulation using IBM SPSS Statistics, version 22.

RESULTS AND DISCUSSION

Descriptive analysis of non-spatial data

Brazil is a vast country: there are 5,570 cities, with significant differences between regions in terms of population, customs, geography, education. There are densely populated cities (metropolis) and towns with small populations. This social and demographic plurality is a constant challenge to the work of SUS.

The decentralization process of health actions and services was implemented within the scope of SUS after the publication of operational norms by the Ministry of Health. That was when the subnational spheres of government began to take on the management of this system and the decentralization of funds was enforced. In a study of fund transfers to the cities in the decentralization process, we observed the progress of these cities to effectively take on city management. In 1993, there were 24 cities in semi-full management and, in 2005, this number rose to 657 cities in full management and the others in full management of basic care[13].

With this political and administrative decentralization of SUS health actions, it became the responsibility of the cities' health departments to coordinate the local component of the National Health Surveillance Systems and sanitary surveillance within their territorial limits, as explicitly stated by Ordinance n. 1.378, of July 9, 2013[9]. There are, therefore, 5,570 cities responsible for carrying out health surveillance actions in their territories.

Next we will present the descriptive analysis of the health surveillance actions listed by indicator 41 obtained from SIA/SUS data. These procedures are considered necessary for the decentralization of these actions in all Brazilian cities (Table).

Regarding the registration of establishments subject to health surveillance, we observed that this activity is important in the planning of health surveillance actions. However, despite the fact that almost 80% of the cities record their registration actions, it is noteworthy that the median number of recorded actions (m = 34) is low for capitals and big cities. What may justify this situation is the lack of computerized registration systems in many cities and the absence or use of outdated registrations, received or not from local tax authorities[14,15].

Still under discussion, the registration activity carried out by health surveillance in some cities may help tax authorities update their registrations and identify irregular establishments[16]. We can assume that this activity may contribute to the visibility of health surveillance initiatives in the city administration, which may, in turn, favor the consolidation of these actions locally.

Regarding the introduction of administrative processes of health surveillance, we verified that only 18.52% of the cities record this procedure. This piece of information is relevant because it indicates the difficulty of the cities in performing administrative sanitary acts, since they require minimum structural, procedural and legal conditions. Bastos et al. have already discussed the fragility of this information in the knowledge of the production and of irregularities and conformities in the pharmaceutical market of Salvador, Brazil[17]. Cohen found that in the state of Rio de Janeiro just over half of the cities were able to ensure the safety and the full progress of administrative and health processes[14].

In this sense, it is possible to assume that the small number of records about administrative processes in SIA/SUS reflects the precariousness of the administrative structures of health surveillance in the cities, since the enforcement of administrative police power requires the implementation of procedural routines provided for in health legislation.

In contrast to the administrative and legal framework inherent in health surveillance activities, education, information and communication actions do not require procedural and legal routines. However, they are essential in the perspective of empowering the population regarding their health. We verified that in 2014, 63.23% of the cities recorded educational activities for the population in SIA/SUS, whereas 46.46% recorded educational activities for the regulated sector. The educational actions aimed at the population and sectors under sanitary regulation are based on the conceptual perspective of the new health surveillance, as opposed to the traditional health surveillance, which was more oriented towards inspection and bureaucracy[18].

However, the actions of education and communication in surveillance are still little emphasized in the actions of city agencies. Routine actions to educate the population about risks in the use and consumption of products regulated by health surveillance have not yet been consolidated[16,17], although the professionals attest to the relevance of these practices in their work[19].

Table. Procedures related to indicator 41 by cities recorded in SIA/SUS in the year 2014.

Procedures monitored by indicator 41	Cities	
	Performing (n/%)	Non-performing (n)
Registration of establishments subject to health surveillance	4,419/79.33	1,151
Establishment of administrative procedures for health surveillance	1,032/18.52	4,539
Educational activities for the population	3,522/63.23	2,048
Educational activities for the regulated sector	2,588/46.46	2,982
Inspection in establishments subject to health surveillance	5,081/91.22	489
Receipt of complaints/reports	4,704/84.45	866
Attention to complaints/reports	4,745/84.15	825

Source: SIA/SUS - DATASUS/MS.

Costa pointed out that health surveillance uses technologies or tools of intervention in its daily practice, which are inherent in the exercise of police power[18]. Inspection and health inspection tools are common practices for verifying compliance with sanitary legislation. The inspection procedure in establishments subject to health surveillance, listed in indicator 41, is relevant to characterize it as an inspection action in the cities. In this study, we verified that 5,081 (91.22%) cities record these actions and only 489 do not.

This surprising result should be interpreted with caution, since sanitary inspection in many cities is the only intervention technology used to control risks, and it is limited by a normative and procedural nature[17,20]. In these cities, other intervention technologies (standardization, monitoring, education and communication) are hampered due to the prevalence of daily inspections in the routine of the professionals[21].

These activities can be questioned when we realize the incipient use of inspection roadmaps and the absence of standardization instruments of the processes and inspection reports[15]. In a study carried out by Cohen, she considered the significant number of cities that do not carry out inspections of pharmaceutical trade and health services[14].

Another procedure that was registered by many cities (84.45%) is the receipt of reports/complaints. It is interesting to note that, regarding reports/complaints, the number of cities that recorded this procedure was slightly higher (85.18%) than the number of cities that only recorded the receipt of reports/complaints. This information suggests that there are problems in the quality of the recording process, since a complaint must first be received to then be addressed.

It should be stressed that the existence of reporting services in the cities is important because they emphasize health surveillance intervention technologies that favor communication and a closer contact between the population and the service[7]. However, in Cohen's study, the fact that cities only act to deal with reports was seen as negative, since it can be related to the absence of routine planning. In this case, the services would only act by demand of the population[14].

It was observed that the basic actions of health surveillance recommended by indicator 41 are not recorded in SIA/SUS by all cities, even though they were expected to structure their services with the decentralization process. In many cities, if these services exist, they are still in phase of implementation and organization[13,22].

In this sense, we can assume that the process of implementation of health surveillance actions in the cities and the recording of this data in SIA/SUS have improved. As demonstrated in a study carried out in the state of Rio Grande do Sul, Brazil, there was an increase in the number of cities that record the activities proposed by indicator 41. Nevertheless, most cities did not reach 100% of the health surveillance actions proposed by this indicator[23].

In addition to the descriptive analysis of non-spatial data, the objective of this study was to perform the exploratory spatial analysis of indicator 41 and to verify the existence of spatial correlation of this indicator based on the intermediate regions of urban articulation. The search for a spatial pattern is relevant for the understanding of this indicator in the different regions of the country. The RIAU were set up based on the emergence of vertical structures that establish the network relationships of cities as fundamental elements for the interconnection of management, infrastructure and productive activities[12].

Spatial data analysis

Exploratory analysis of spatial data is the first step for us to understand the phenomenon. The visualization of extreme data on maps contributes to the design of more accurate analyses using the available spatial statistics tools[25]. Figure 1 shows the average of the spatial distribution of indicator 41 for the 161 RIAU in 2014.

We verified that no RIAU reached an average of 100% recorded procedures recommended by indicator 41. The best indexes were found in the regions of Belém, Bragança, Parintins, in the North of the country; Sinop, in the Center-West; Crateús, Fortaleza, Iguatu, Quixadá, Garanhuns, Maceió, Jacobina, Salvador, Feira de Santana, Jequié and Santo Antônio de Jesus, in the Northeast; Vitória, Macaé and São Paulo, in the Southeast; and, in the South, Cascavel, Curitiba, Guarapuava, Paranaguá, Pato Branco and Umuarama.

To verify the existence of spatial clusters, we calculated the Moran's I statistic, which estimates the global autocorrelation between direct neighboring areas. There was a weak spatial dependence of indicator 41 in the RIAU during the study period (Moran's I = 0.326; p = 0.01). This shows that the values of this indicator are slightly correlated in space, that is, that the values found in a region have a weak dependence relation with the values of neighboring or contiguous regions. Since it is an indicator that expresses the proportion of cities that perform basic health surveillance procedures and that the execution of these procedures is conditioned by several factors, the weak correlation was no surprise.

In the analysis of the clusters based on indicator 41, in Figure 2, we verified the presence of high-high clusters, predominant in the North, part of the Center-West and on the coast, and low-low agglomerates in part of the Southeast, Center-West and Northeast. This map represents the formation of global spatial clusters that correlate areas where the average of indicator 41 is near or far (high/low). Nevertheless, this map (Box map) does not indicate statistically significant correlations between clusters.

In order to compare the value of each area with its neighbor, Local Indicators of Spatial Association (LISA) were used in the local autocorrelation function. As a result, in Figure 3, we verified the presence of statistically significant clusters. In most of the map (blank areas), the areas do not correlate
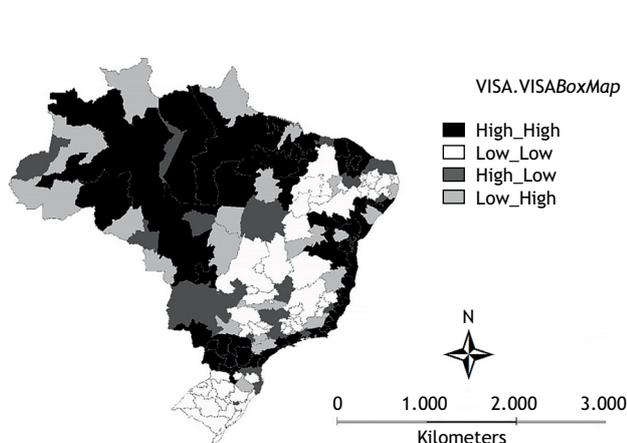
Indicator 41

■ 28.56 ~ 40.00
■ 40.00 ~ 51.43
▨ 51.43 ~ 62.85
▨ 62.85 ~ 74.28
□ 74.28 ~ 85.72
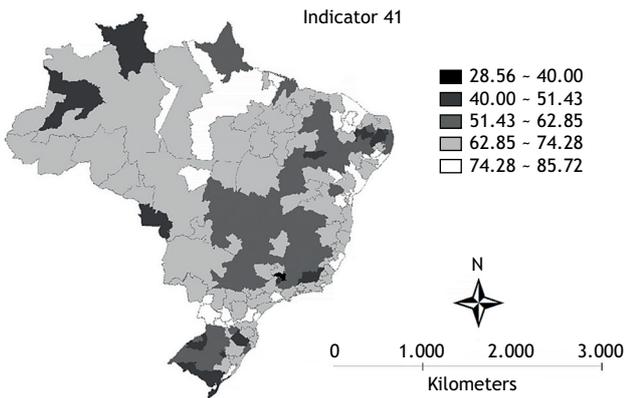
Source: SIA/SUS – Datasus/MS.

Figure 1. Spatial distribution of indicator 41 in the Intermediate Regions

statistically. Only in the North region (Belém, Imperatriz and Bacabal) and in some areas of the South (Maringá, Paranaguá, Pato Branco, Ponta Grossa, Umuarama, Cascavel, Guarapuava and Curitiba), Southeast (Santos) and Northeast (Crateús and Ilhéus) there are clusters that indicate correlation between the areas. This result may suggest that in these areas the cities share planning actions in the implementation of procedures listed in indicator 41 or there are state/local guidelines that favored the implementation of these actions and their recording.

The presence of high-high clusters in the South region of Brazil, specifically in the state of Paraná, can be explained by the action of the State Health Department to make available and implement strategies to favor the decentralization of health surveillance actions in the cities. In a search on the department's website, we found documents and examples of initiatives that support local surveillance services.

Figure 3 also shows the existence of a large part of the map with non-significant correlations, suggesting that the goal established

for indicator 41 is scattered about the 161 regions we analyzed in this study. There is no uniformity regarding the indicator in these regions. This can be explained by the diversity of conditions that exist in the cities of these regions to perform health surveillance actions and to record them in SIA/SUS.

CONCLUSIONS

Through the RIAU one can learn the profile of indicator 41 and infer that these actions registered in SIA/SUS are still in the process of implementation and setup in virtually all Brazilian cities, with the purpose of achieving effective decentralization of health surveillance actions in the country.

As limitations for this study, we verified that SIA/SUS has some weaknesses, like sub-records, with cities that do not record data on their health surveillance procedures in the system. Other limitations are related to the incipient use of spatial analysis tools in the quantitative studies in the area of health surveillance and the possibility that this data is being entered into SIA/SUS by professionals from other areas in many cities.

In view of the above, the contribution of this study to the subject in question is relevant, since there is a shortage of research on health surveillance procedures in Brazilian cities, as well as their spatialization through themed maps.

Finally, we suggest conducting new studies to evaluate the recording of health surveillance information in SIA/SUS. These studies may help us better understand the process of decentralization of health surveillance actions to the cities, which seems to be an essential process for the improvement of the population's health conditions.

RIAU.IND41*MoranMap*

□ Not significant
■ High_High
■ Low_Low
▨ High_Low
▨ Low_High
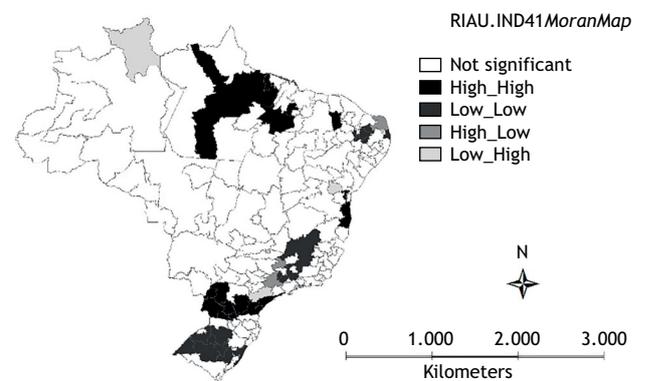
Source: SIA/SUS – Datasus/MS.

Figure 3. Spatial distribution of indicator 41 clusters, with LISA statistically significant (MoranMap). Intermediate Regions of Urban Articulation of Brazil, 2014.

VISA.VISA*BoxMap*

■ High_High
□ Low_Low
▨ High_Low
▨ Low_High

Source: SIA/SUS – Datasus/MS.

Figure 2. Spatial distribution of the indicator 41 clusters, BoxMap.

REFERENCES

1. Eduardo MBP. Vigilância sanitária. São Paulo: Faculdade de Saúde Pública de São Paulo; 1998. (Série Saúde e cidadania).

2. Souto AC. A vigilância sanitária no Brasil 1976-1994. São Paulo: Sociedade Brasileira de Vigilância de Medicamentos; 2004.

3. Costa EA. Vigilância sanitária: proteção e defesa do consumidor. São Paulo: Sociedade Brasileira de Vigilância de Medicamentos; 2004.

4. O'Dwyer G, Reis DC, Silva LL. Integralidade, uma diretriz do SUS para a vigilância sanitária. Cien Saúde Coletiva. 2010;15 (supl.3):3351-60. https://doi.org/10.1590/S1413-81232010000900010

5. De Seta MH, Dain S. Construção do Sistema Brasileiro de Vigilância Sanitária: argumentos para debate. Cien Saúde Coletiva. 2010;15(supl.3): 3307-17. https://doi.org/10.1590/S1413-81232010000900002

6. Lucchese G. Descentralização e modelo sistêmico: o caso da vigilância sanitária. Cien Saúde Coletiva. 2010;15(2):3020-6. https://doi.org/10.1590/S1413-81232010000900003

7. Ferraro AH, Costa EA, Vieira-da-silva LM. Imagem-objetivo para descentralização da Vigilância Sanitária em nível municipal. Cad Saúde Pública. 2009;25(10):2201-17. https://doi.org/10.1590/S0102-311X2009001000011

8. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Portaria Nº 323, 5 de julho de 2010. Excluir da Tabela de Procedimentos, Medicamentos e OPM do SUS os procedimentos. Diário Oficial União. 6 jul 2010.

9. Ministério da Saúde (BR). Portaria nº 1.378, de 9 de julho de 2013. Regulamenta as responsabilidades e define diretrizes para execução e financiamento das ações de Vigilância em Saúde pela União, Estados, Distrito Federal e Municípios, relativos ao Sistema Nacional de Vigilância em Saúde e Sistema Nacional de Vigilância Sanitária. Diário Oficial Uião. 10 jul 2013.

10. Ministério da Saúde (BR). Portaria nº 475, de 31 de março de 2014. Estabelece os critérios para o repasse e monitoramento dos recursos financeiros federais do Componente da Vigilância Sanitária do Bloco de Financiamento de Vigilância em Saúde, para Estados, Distrito Federal e Municípios, de que trata o inciso II do art. 13 da Portaria nº 1.378/GM/MS, de 9 de julho de 2013. Diário Oficial União. 1 abr 2014;Seção 1:27.

11. Ministério da Saúde (BR). Secretaria de Gestão Estratégica e Participativa. Departamento de Articulação Interfederativa. Caderno de diretrizes: objetivos, metas e indicadores 2013-2015. Brasília, DF: Ministério da Saúde; 2013. (Série Articulação Interfederativa, vol 1).

12. Instituto Brasileiro de Geografia e Estatística - IBGE. Divisão urbano regional. Brasília, DF: Instituto Brasileiro de Geografia e Estatística; 2013.

13. Solla JJSP, Costa EA. Evolução das transferências financeiras no processo de descentralização da vigilância sanitária no SUS. Rev Baiana Saúde Pública. 2007;31(1):161-77.

14. Cohen MM. Dilemas do processo de gestão descentralizada da vigilância sanitária no Estado do Rio de Janeiro. Physis. 2009;19(3):867-901. https://doi.org/10.1590/S0103-73312009000300018

15. Cohen MM, Moura MLO, Tomazelli JG. Descentralização das ações de Vigilância Sanitária nos municípios em Gestão Plena, Estado do Rio de Janeiro. Rev Bras Epidemiol. 2004;7(3):290-301. https://doi.org/10.1590/S1415-790X2004000300007

16. Araújo DG, Melo MBa, Brant L, Viana FC, Santos MA. Os desafios da implantação do Plano Diretor de Vigilância sanitária em um contexto municipal. Saúde Soc. São Paulo. 2013;22(4):1154-66. https://doi.org/10.1590/S0104-12902013000400017

17. Bastos AA, Costa EA, Castro LLC. Trabalho em saúde: vigilância sanitária de farmácias no município de Salvador (Bahia, Brasil). Ciênc Saúde Colet. 2011;16(5):2391-400. https://doi.org/10.1590/S1413-81232011000500008

18. Costa EA. Fundamentos da vigilância sanitária. In: Costa EA, organizador. Vigilância sanitária: temas para debate. Salvador: EDUFBA. 2009; p.11-36.

19. Garibotti V, Hennington EA, Selli L. A contribuição dos trabalhadores na consolidação dos serviços municipais de vigilância sanitária. Cad Saúde Pública 2006;22(5):1043-51. http://ddoi.org/10.1590/S0102-311X2006000500017

20. Marangon MS, Scatena JHG, Costa EA. Vigilância sanitária: estratégias para sua descentralização em Mato Grosso, 1996-2005. Ciênc Saúde Colet. 2010;15(3):3587-601. https://doi.org/10.1590/S1413-81232010000900034

21. Marangon MS, Scatena JHG, Costa EA. A descentralização da vigilância sanitária no município de Várzea Grande, MT (1998-2005). Rev Adm Pública. 2009;43(2):457-9. https://doi.org/10.1590/S0034-76122009000200009

22. Tibúrcio CLC, Vidal Jr PO. Avaliação das ações de vigilância sanitária em um município do Recôncavo da Bahia. Vigil Sanit Debate. 2013;1(3):19-26. https://doi.org/10.3395/vd.v1i3.26

23. Kranz LF, Bordin R, Rosa RS. Ações executadas pelas vigilâncias sanitárias municipais do Estado do Rio Grande do Sul, 2010-2014. Vigil Sanit Debate. 2016;4(1):104-12. https://doi.org/10.3395/2317-269x.00638

24. Ministério da Saúde (BR), Fundação Oswaldo Cruz. Introdução à estatística espacial para a saúde pública. Brasília, DF: Ministério da Saúde; 2007. (Série Capacitação e atualização em geoprocessamento em saúde, vol 3).

Conflict of Interest

Authors have no potential conflict of interest to declare, related to this study's political or financial peers and institutions.