








The vulnerability of community health workers to biological risk

A vulnerabilidade de agentes comunitários de saúde frente ao risco biológico

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ABSTRACT

The objectives were to identify occupational exposure of community health workers to biological material; to characterize the means of exposure, organic secretions and circumstances involved; to describe the behaviors adopted, and verify the participation of these workers in training on biological risk and biosafety. Descriptive cross-sectional study. Participants comprised 80 workers of the 89 members of family health teams from a sanitary district of the municipality of Goiânia. Results: 23 (28.8%) reported occupational exposure and 10 (43.5%) reported more than one exposure. Most exposures involved saliva on intact skin or mucous membrane. Less than half reported participating in any form of training that addressed biological risk and biosafety. The community health workers were exposed to biological material and they were predominantly unprepared. Public policies for these workers must clearly observe biological risk and its control as a strategy guideline, provide worker protection, and ensure this subject is included in the education of community health workers.

Descriptors: Community Health Workers; Occupational Exposure; Communicable Disease Control; Containment of Biohazards; Information Dissemination.

RESUMO

Os objetivos foram identificar as exposições ocupacionais a material biológico entre agentes comunitários de saúde; caracterizar os modos de exposição, as secreções orgânicas e as circunstâncias envolvidas; descrever as condutas adotadas e verificar a participação desses trabalhadores em capacitações sobre risco biológico e biossegurança. Estudo transversal descritivo. Participaram 80 agentes dos 89 integrantes de equipes de saúde da família de um distrito sanitário do município de Goiânia. Resultados: 23 (28,8%) referiram exposição ocupacional, 10 (43,5%) citaram mais de uma exposição. A maioria envolveu saliva em pele íntegra ou em mucosa. Menos da metade deles referiu participação em capacitações abordando risco biológico e biossegurança. Agentes comunitários de saúde foram expostos a material biológico e, predominantemente, não estavam preparados. Políticas públicas direcionadas a estes trabalhadores devem contemplar claramente o risco biológico e seu controle para direcionar estratégias, conferir proteção trabalhista e garantir a incorporação desta temática na formação desse grupo.

Descritores: Agentes Comunitários de Saúde; Exposição Ocupacional; Controle de Doenças Transmissíveis; Contenção de Riscos Biológicos; Disseminação de Informação.

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INTRODUCTION

In Brazil, primary health care (PHC) consists mainly of basic family health units (BFHU or “UBSF” in Portuguese). The family health teams (FHT or “ESF” in Portuguese) are composed of professionals from several areas, including community health workers (CHWs), which are fundamental for the team because of the link they establish between health workers and the assisted families⁽¹⁻²⁾.

CHWs are a major workforce in primary care, totaling 274,441 workers certified by the Ministry of Health and present in 5,486 municipalities in Brazil⁽³⁾. Despite the high number and importance of CHWs in public health care, few studies have focused on understanding the risks involved in the work practice of these professionals.

The unique characteristics that involve the services of CHWs create a different reality from that of other health care professionals, including inherent occupational risks, considering that CHWs mostly make home visits in communities to monitor all the individuals and families under their responsibility⁽²⁾.

In the family health strategy, CHWs are responsible for the following: enrolling families in their micro-area, up-dating family registration, providing guidelines to the families on the use of the health care services available to them, following-up through home visits for all individuals in their care (mothers, infants, children, adolescents, elderly people, people in mental distress, people with drug addiction, gays, lesbians, and transgender people, women, men), integrating the community and health care teams, developing health promotion, disease prevention, and health inspection activities, and conducting some technical health procedures, such as measuring blood pressure, capillary blood glucose axillary temperature, and clean wound dressing techniques⁽¹⁻²⁾.

During their work activities, CHWs are exposed to physical, chemical, biological, ergonomic, and mental health risks⁽⁴⁾; however, studies suggest that the perception of CHWs regarding these risks is limited⁽⁵⁾. The most widely discussed biological risk in the literature among CHWs is exposure to *Mycobacterium tuberculosis* since their activities include identifying respiratory symptoms, resulting in a high prevalence of latent and active infection by *M. tuberculosis* among CHWs⁽⁶⁾.

Few studies have been conducted on biological risk among CHWs, probably due to limited insight into the tasks performed by these workers and their non-recognition as at-risk for exposure to biological material because they work outside the health care unit⁽¹⁻²⁾. Studies have shown, however, that CHWs are exposed to biological material in a wide range of situations, such as percutaneous injuries with needles, transportation of sharp-edged waste in plastic bags or PET bottles from the home to the unit, cuts from broken cans and toilet seats, aiding the elderly at bath time, and wound care⁽⁷⁾,

several of which are not regulated CHWs activities and, therefore, constitute a greater risk of exposure to biological material.

In light of these situations, this study was proposed to understand the means of exposure of CHWs to human biological material in their practice and the training they have received to control biological risk. The results may help support preemptive interventions for biological risk based on the specific characteristics of the work performed by CHWs.

The objectives were to identify the occupational exposures of CHWs to biological material, characterize the means of exposure, organic secretions, and the circumstances involved, describe the behaviors adopted, and verify the participation of these workers in training on biological risk and biosafety.

METHODOLOGY

This is an exploratory, cross-sectional, descriptive study conducted between September and December 2015, in the municipality of Goiânia (state of Goiás, Brazil), which is divided into seven health districts to optimize decentralization of municipal health management. To carry out this research, a sanitary district was chosen for convenience, composed of nine primary care units, currently called family health centers (FHCs).

The population was composed of all 89 CHWs of the family health teams at the FHCs of the selected sanitary district, with the exclusion of those who were not working at the time of data collection.

Data were collected after approval by the Research Ethics Committee (protocol No. 1.012.706/2015, research registration No. 41413015.6.0000.5078), using a self-applied questionnaire, prepared according to the literature related to exposure to biological material in health practices⁽⁸⁻⁹⁾. The content and form of the questionnaire were previously evaluated by three specialists on the subject (professionals with expertise in the prevention and control of infections associated with health care, with a doctor's title). After the suggested adjustments, the instrument was subjected to a pilot test, in which it was completed by five CHWs of an FHC in another sanitary district, to refine the instrument according to the objectives proposed in the study. The questionnaire assessed sociodemographic data, knowledge about content related to biological risk, occupational exposure to biological material, means of exposure, biological material involved in exposures, and adopted post-exposure behaviors. The instrument was applied by two previously qualified nurses and a research assistant.

For operationalization purposes, the managers of the CHWs were initially contacted to obtain the nominal list of CHWs working on-site and the dates and times of the

FHS meetings. The questionnaires were completed before or immediately after the team meetings.

On the scheduled days and times, a member of the research team visited the family health center, approached the CHWs, in a group, explained the objectives of the study, and invited them to participate. Their acceptance was formalized once they signed the informed consent statement. Subsequently, the questionnaires were handed to the participants and collected after the response time (approximately 30 minutes). The CHWs who were absent on the days of the meetings were invited later, during their work shift, according to the described steps.

The descriptive analysis of the data, after encoding the variables, was performed with the software SPSS for Windows version 20.0, presented in absolute numbers and frequencies.

RESULTS

Of the 89 CHWs working at the study site, five were on leave or vacation, four refused to participate, and 80 accepted, corresponding to 89.9% of the intended population. Of these 80 workers, 23 (28.8%) reported occupational exposure to biological material, 10 of which (43.5%) were exposed more than once, totaling 58 exposures. Thirteen (56.6%) CHWs suffered only one accident (56.5%), while, for the others, the

number of workers exposed and the number of accidents were two (8.7%), twice; one (4.3%), three times; two (8.7%), four times; two (8.7%), five times; one (4.3%), six times; and two (8.7%), seven times.

The circumstances in which the accidents occurred were: waste disposal, help at bath time, diaper change, support during walking, digital puncture, screening for childcare and first aid care, one of which was reported as spontaneous abortion (the CHW covered his hands with a bag and removed the fetus from the toilet) and another as a convulsive crisis (the CHW placed his hand in the user's mouth during the crisis to prevent him from biting his tongue). Events also occurred during home visits, including vomiting episodes of users, wounds on the hands of users, feces and/or sputum near the CHW, or saliva expelled during dialogue.

Figure 1 shows the type of biological material involved according to the means of exposure.

Six workers suffered exposure to blood and the majority (5/83.3%) were exposed to this biological material more than once. Of the 18 CHWs who were exposed to saliva, seven (38.8%) suffered two or more exposures to this fluid. Ten professionals were exposed to other types of biological material (vomit, sputum, urine, and feces). As for the circumstances of the exposures, 33 (56.9%) CHWs were engaged in activities considered regulated at the time of exposure, 17 (29.3%)

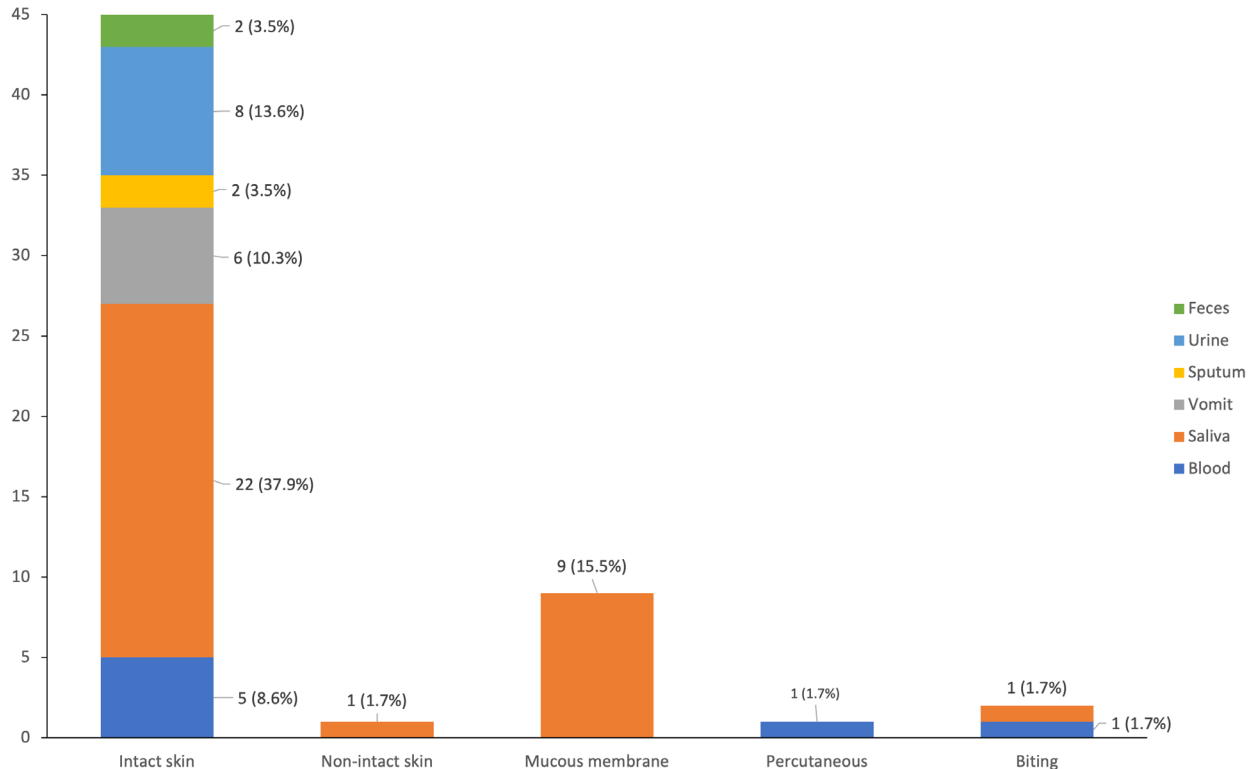


Figure 1. Distribution of bodily fluids involved in occupational exposures (n=58) to biological material among community health workers of the family health centers, according to the type of exposure. Goiânia, GO, Brazil, 2015.

were performing non-regulated activities, and eight (13.8%) did not respond.

Figure 2 shows the post-exposure conduct adopted by CHWs. It was found that in 29.3% of cases, the CHWs washed the site with soap and water.

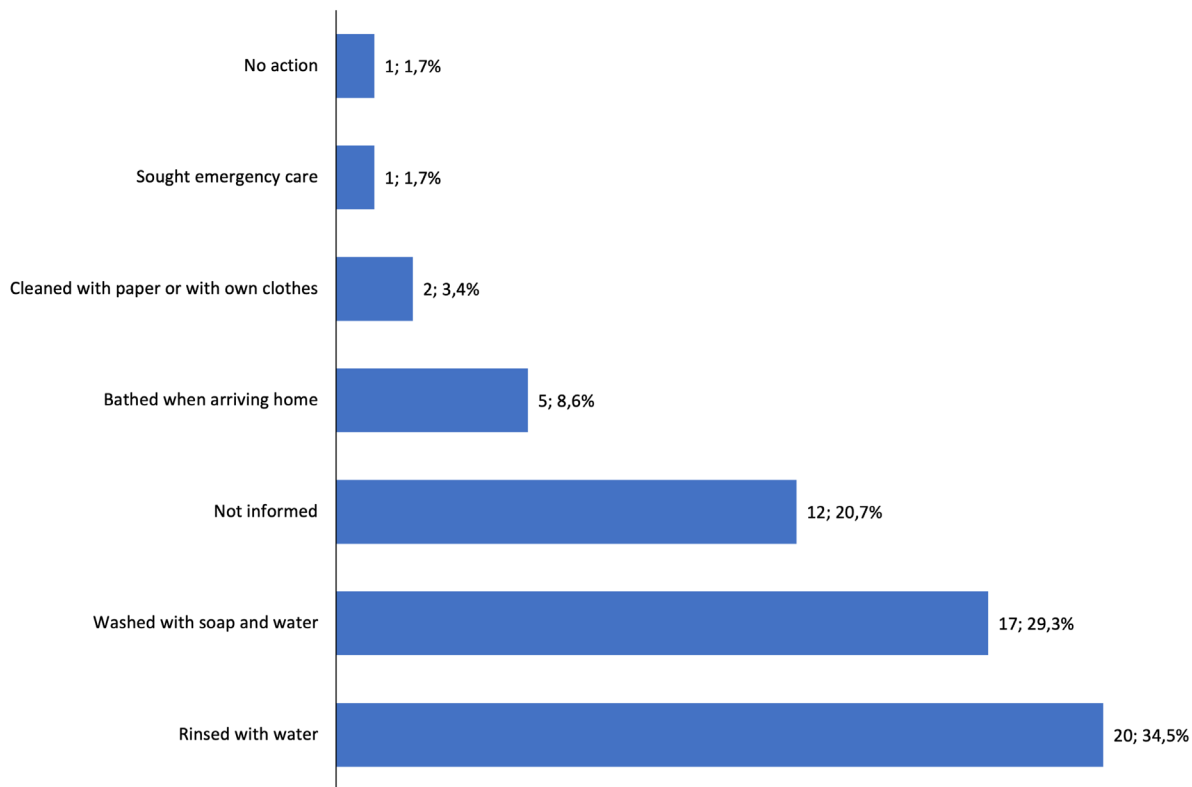


Figure 2. Post-exposure to biological material conduct adopted by community health workers of family health centers (n=58). Goiânia, GO, Brazil, 2015.

Regarding the content of training, the CHWs were asked if it had addressed five topics on the biological risk that are considered indispensable, namely vaccination, use of personal protective equipment (PPE), hand sanitizing, and accidents involving biological material and waste of the health services. Among the 38 CHWs who received training on biological risk, only one (2.6%) reported training on all the topics mentioned and 13 (34.2%) stated training had covered a single topic. Training on biological risk mostly addressed vaccination (29/76.3%), use of PPE (23/60.5%), and hand sanitizing (17/44.7%), while the least addressed topics were accidents with biological material (10/26.3%) and waste from health services (4/10.5%).

DISCUSSION

The number of CHWs participating in this study is similar to that of studies conducted specifically with these professionals in Brazil^(7,10).

The majority (72/90.0%) of the CHWs reported having received training and 38 (52.8%) reported that the training addressed some topic(s) related to biological risk and biosafety. Of these participants, nine (31.1%) were exposed to biological material.

Regarding the safety and health of CHWs, in addition to the scarcity of research on the subject, government initiatives are also not expressive. Only recently, the Ministry of Health included in regulations the importance of observing safety and health actions in the execution of CHW activities, specifically, the use of PPE and occupational health tests for CHWs⁽¹⁻²⁾.

The results of this study indicate the need to address the occupational health and safety of CHWs from the perspective of biological risk, considering that 28.8% (23) of the participants reported occupational exposure to biological material during work activities. It is noteworthy that almost half (43.5%) reported more than one exposure. This finding raises the question of whether re-exposure may result from a lack of knowledge on the risks involved in activities that are not part of the assigned tasks of CHWs, which further reinforces the absence of biosafety-related content in the education of CHWs⁽¹¹⁾.

Neglect concerning the biological risk to which CHWs are exposed during their work activities is reflected in the

lack of standardized training and refresher courses of CHWs observed in this study. Apparently, the topics mentioned were included in isolated training, which results in varying conducts regarding risk. The literature reveals that CHWs recognize the importance of updating for their daily work and some independently enroll in health care training and refresher courses⁽¹²⁾.

The potentiality of biological risk in the work of CHWs was demonstrated through the 58 exposures mentioned, most of which involved saliva and blood. Saliva is a bodily fluid with a lower risk of contamination than blood⁽¹³⁾. However, it should not be considered risk-free biological material, as it can link potentially infectious microorganisms such as herpesviruses and hepatitis A and E viruses⁽¹³⁻¹⁴⁾.

Other viruses of clinical importance possibly transmitted by saliva include H1N1, which causes Influenza A, a potentially fatal disease⁽¹⁵⁾, and the novel coronavirus (Sars-CoV2), called COVID-19, which recently triggered a global pandemic. COVID-19 has a wide clinical spectrum ranging from mild influenza to the most severe forms of pneumonia, manifested by acute respiratory distress syndrome. This virus is transmitted by droplets, aerosols, and contact⁽¹⁶⁾. CHWs are constantly moving within their work areas and may visit up to 1,000 families a month, which exposes them to the virus given their frequent exposure to saliva, as shown here. Once infected, they can become transmitters and spread the virus in their micro-area, which further reinforces the importance of using masks in their daily work.

They can also be exposed to *Mycobacterium tuberculosis*, for example, through the identification of symptomatic respiratory patients and when monitoring directly observed therapy, since this pathogen is eliminated from the airways of the infected host through coughing, speech, or sneezing⁽⁶⁾.

Although contact with blood represented 12.1% of the reported exposures, it is important to consider that blood poses a greater risk of infection, especially in cases of percutaneous exposure⁽¹⁷⁾. This type of exposure is related to approximately 37% of hepatitis B virus (HBV) infections, 39% of hepatitis C virus (HCV) infections, and 4.4% of human immunodeficiency virus (HIV) infections among health workers, worldwide⁽¹⁷⁾. Moreover, in the context of CHWs who, until 2017, did not perform regulated activities that involved risk of exposure to blood, these accidents reveal the performance of tasks outside their range of professional activities, thus increasing occupational risks.

Some procedures currently governed by the new national policy of primary care ("PNAB") such as capillary blood glucose measurement, and clean wound dressing techniques⁽¹⁾ directly expose them to the risk of contact with blood and other bodily fluids, for which CHWs have not received training. This is aggravated by the fact that exposure often occurs far from the supervision of nurses since these procedures are

performed during home visits. This is a worrisome scenario regarding the health of these workers.

The remaining exposures (31.0%) involved other human secretions such as urine, feces, sputum, and vomit, none of which pose a high risk of contamination for HBV, HCV, and HIV, except when there is the presence of associated blood⁽⁹⁾. In contrast, the literature indicates that this biological material can transmit tuberculosis bacillus, hepatitis A and E viruses^(14,17-19), and SARS-CoV-2⁽¹⁶⁾. Therefore, it is essential to assess the risk of all exposures and carefully analyze the context of the accident.

With the exception of sputum, which can be transported by CHWs in a closed container to the health unit, according to their functions in the national tuberculosis control program, exposure to feces, urine, and vomit indicate the performance of unregulated activities, which, associated with lack of knowledge of the risks involved in contact with biological material, increase the vulnerability of CHWs to infections. In this context, a literature review highlighted the role of CHWs in the active search for symptomatic respiratory patients for tuberculosis control. The authors pointed out the need to change the approach of training offered to these workers, considered overly technical and without the critical vision needed for the resolution of cases and appropriate referrals⁽²⁰⁾.

In addition, the forms of contact of occupational accidents among CHWs were also evaluated in the present study, revealing that 77.6% of exposures were cutaneous, on intact skin. It is known that this route poses a lower risk of contamination and, consequently, constitutes an accident of lower severity⁽¹³⁾. However, the most relevant factor is the evidence that the mucous membrane exposure was the second most frequent among the reported exposures (15.5%). Mucous membranes are important entry routes of microorganisms, especially when in the presence of blood⁽⁹⁾, as revealed in case reports of occupational seroconversion by HIV after contact with contaminated blood in the ocular mucous⁽²¹⁾. This route is also relevant for SARS-CoV-2 infection⁽¹⁶⁾.

It should be noted that 29.3% of the CHWs were exposed to unregulated activities, that is, not provided for in regulations for this profession⁽¹⁻²⁾. Despite the issuance of Law No. 13,595 of January 5, 2018, on the performance of CHWs, the delimitations of CHW activities are not clear⁽¹⁻²⁾ and several CHWs carry out activities that are not part of their assigned tasks⁽²²⁾.

The CHWs often performed care-related activities involving biological material, including those related to direct care, such as helping users bathe, changing diapers, making digital punctures, and first aid. Activities for which the CHWs do not have technical training is a sign of inexperience and, due to this lack of knowledge, should be considered reckless. There is a consensus that the best way to minimize risks is through the use of biosafety measures, such as standard

precautions (hand sanitizing, use of PPE, environmental control, and article processing) and precautions based on the mode of transmission, both of which are recommended in any form of health care⁽²³⁾. These measures can be adapted according to the scenario of professional performance, and can be applied to the practice of CHWs; however, it should be recognized that CHWs are exposed to biological risk daily, as revealed in this study.

According to some situations reported by the CHWs, it is noted that many cases of exposure to biological material could have been avoided and/or minimized with the use of gloves and masks. One example would be to recommend the use of masks by CHWs when one member or all the members of a visited household present intense cough and/or persistent sneezing or when someone in the household has a suspected or confirmed diagnosis of a micro-organism of respiratory transmission, such as *Mycobacterium tuberculosis*⁽²³⁾. These recommendations could be established as standard procedure and include the use of masks for all CHWs when they enter the home of a user, in all home visits, and the use of a PFF2 (N95) mask when patients have suspected or diagnosed microorganisms transmitted by aerosols. However, the use of PPE is based on the presumed risk that the activity poses to the worker. Therefore, workers must recognize the risks to which they are exposed in order to decide whether to use PPE, and these elements of judgment are not accessible to CHWs who receive no training on biological risk.

It is also believed that the recommendations and preventive measures of respiratory etiquette widely disseminated in 2009 during the influenza H1N1 virus epidemic and currently reinforced in the pandemic caused by Sars-CoV2 should be observed to minimize the occupational transmission of microorganisms among CHWs. Some of these guidelines, applicable to both workers and users, are the following: maintain a safe distance (minimum of one meter), avoid very close contact (hugs and social kissing); avoid touching mucous membranes of the eye, nose, and mouth; use disposable tissues for nasal hygiene; cover mouth and nose when sneezing or coughing, and sanitize hands frequently^(15,23).

Moreover, simple measures such as guidelines on respiratory etiquette could reduce occupational biological risk among CHWs. However, the current situation reveals the paradox that workers who are mainly responsible for promoting health and prevention are unprepared to adopt safety measures regarding the risk or exposure to biological material, which compromises their health.

When workers are exposed to biological material, they must follow a series of procedures to reduce the risk of transmission of infectious microorganisms and diseases. The first step is to take care of the exposed area by thoroughly washing the site with water and neutral soap, when exposure is cutaneous or percutaneous, and washing with water or saline solution,

when exposure is to the mucous membranes⁽²⁴⁾. According to the CHWs who suffered occupational exposure to biological material, few followed the indicated steps, which once again demonstrates their unpreparedness when dealing with these situations. Furthermore, this issue is directly related to the reportedly low participation in training on biological risk.

Similarly, a study aimed at characterizing the risks among workers of the family health strategy found that, of the 282 participants from various areas, 101 (34.8%) were CHWs who had not received training on issues involving worker health in this context of care. Moreover, according to the study, 261 (92.6%) reported an accident with biological material in the last five years⁽²⁵⁾. As verified here, knowledge on biological risk was limited to only a few topics, even among the workers who reported having received training.

If workers are unaware of the risk, they cannot perceive it and become more vulnerable. Similarly, if workers are not trained on biosafety measures and basic behaviors regarding accidents involving biological material, they do not know how to prevent an accident or minimize the consequences of exposure⁽²⁴⁾. When they are unaware, they do not notify, and without real data, how is intervention possible? Thus, training is considered critical and content must include the subject of biological risk in a language workers can understand, focused on the particular work of CHWs.

The limitation of this study is its local-level scope, but the findings presented here converge to a minimally explored factor, namely the vulnerability of CHWs to biological risk in their work practice.

Consequently, the team of researchers returned to the site to provide guidelines to the groups of CHWs participating in the research based on the study results. This feedback is a social responsibility since the identified problem endangers the health and safety of CHWs and, therefore, requires immediate intervention.

CONCLUSION

The situational diagnosis presented here reveals the biological risk to which CHWs are exposed, as 1/4 of the participants reported occupational exposure to biological material and performance of unregulated activities, and less than half reported training in biological risk and biosafety. There is a shortage of studies on this subject with this population and there is much to be investigated, such as the monitoring of workers victims of accidents with biological material, the conduct of CHWs during home visits in which the individual and/or family present some infectious microorganisms, and the serological status of CHWs.

The evidence presented in this study can serve as a starting point for the planning and implementation of administrative measures for occupational health and safety of CHWs,

considering biological risk, including training and refresher courses directed at the reality of the practice of CHWs. In this sense, public policies for CHWs must clearly observe biological risk and its control in order to support these strategies and ensure labor and worker protection from exposure to biological material and the inclusion of this subject in training for CHWs.

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