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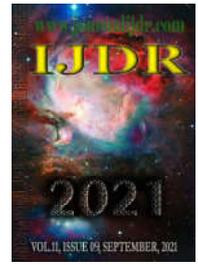
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REVIEW ARTICLE

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## FACTORS ASSOCIATED WITH UNDERREPORTING OF WORK ACCIDENTS IN THE INFORMATION SYSTEM ON NOTIFIABLE DISEASES (SINAN): SCOPE REVIEW

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### ABSTRACT

This is a scope review that aims to map the underreporting of Work Accidents in the Information System on Notifiable Diseases. A search was performed in the databases: CAPES Thesis and Dissertations Catalog; Science Direct; Virtual Health Library and in the Cochhrane Lybrary and Embase databases, with thefollowing eligibility criteria: studies evaluating the notification of work accidents from 2017 to 2021. Mostof the studies found presented a quantitative methodology, with only one being nationwide. From thesestudies, it was noticed that the underreporting of work accidents is associated with the lack of awareness andtraining of health professionals regarding the importance of notification. Therefore, it is necessary to seek alternatives aimed at improving work processes, enabling conditions for professionals to perform thenotification in a timely and appropriate manner.

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## INTRODUCTION

Since ancient times, with the beginning of the labor practice, workers have been subjected to risks, being affected by accidents and diseases related to the performance of their duties. However, it was only after the Industrial Revolution that there was an increase in the concern with the health of this public, once the number of diseases, situations that resulted in disability and even deaths resulting from work became increasingly greater due to the rigorous activities to which workers were subjected.(FRANZ E CARGNIN, 2018). In 2019, with the update of the notification form of the Information System on Notifiable Diseases (SINAN), it is now considered an Occupational Accident (AT) every non-natural occurrence comprised by accidents and violence, which generate bodily injury or functional disturbance, and may cause temporary and permanent loss or reduction of capacity for work, and even death.

Such accidents can also be considered as typical, when they occur in the work environment or during the exercise of the function or when the worker is at the service of the employer or still representing its interests; or as commuting accidents, being those that occur on the way between home and the work place.(BRASIL, 2006). When such an event occurs with children or adolescents under 18 years old, it is classified as a serious occupational accident, which can lead to incapacity for normal activities for more than 30 days; permanent incapacity to work; incurable disease; permanent weakness of limb, sense or function; loss or disablement of limb, sense or function; permanent deformity; accelerated labor and/or abortion; fractures, amputations, dislocations or severe burns; fainting caused by asphyxia; electric shock; injury that can lead to hypothermia; and hospitalization for more than 24 hours (BRASIL, 2006). AT generates a great impact on the morbidity and mortality of the population. Worldwide, every 15 seconds a worker dies as a result of an accident or illness related to his/her professional activity, which is equivalent

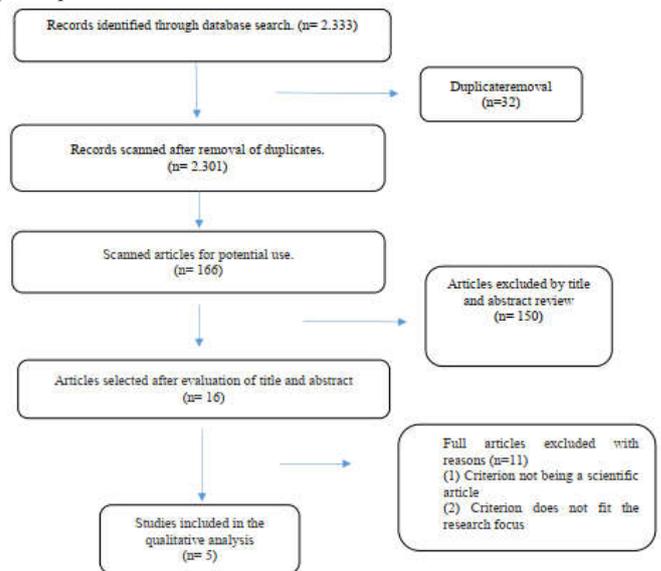
to 6,300 deaths per day and approximately 2.3 million deaths per year. In this same interval of time, 860,000 people are injured on the job every day, corresponding to 313 million AT victims every year, data released in a report by this organization in 2014, but which are still current (ILO, 2014). In Brazil, according to data made available in the Virtual Health Library of the Ministry of Health, in the year 2018 there were 477,415 AT, of which 2,022 were fatal. In the period from 2012 to 2018, 16,455 deaths were recorded. (BRASIL, 2021). Therefore, one way to improve strategies for the prevention of work-related diseases is through the collection of data that will allow us to evaluate the profile of the work performed and the possible risks. Preventive actions are indispensable, since they allow the protection of workers and the very survival of these workers and their families, thus contributing to social and economic development. For this, it is necessary to obtain true and accurate information about the diseases, such as the characteristics of workers and their functions, which will allow the Reference Centers for Workers' Health (CEREST) and the Health Care Network (RAS) to act to prevent accidents and to promote health in a targeted way, in addition to providing guidance for protection against the risks arising from their activities, perform maintenance and recovery of their health status and rehabilitation for work, whether individual or collective. (FRANZ E CARGNIN, 2018).

From the moment the relationship between a disease or accident with work is proven, they are subject to compulsory notification in the SINAN, as provided by ordinance No. 777/GM of April 28, 2004 (BRASIL, 2004). This system is considered one of the main instruments of data regarding injuries to public health, which notified 608,441 serious and fatal accidents at work in the country between the years 2007 and 2017 (SOUZA, 2020). Although occupational diseases have been compulsorily reported in sentinel units since 2004, it was only in 2007 that it was possible to begin typing these notifications into Sinan-Net, and it only became universal in 2014. (GALDINO; SANTANA E FERRITE, 2017). The effective use of this information system allows the realization of the dynamic diagnosis of the occurrence of an event in the population; it can provide subsidies for causal explanations of the diseases of compulsory notification, in addition to indicating risks to which people are subject, thus contributing to the identification of the epidemiological reality of a given geographical area (BRASIL, 2019). The notifications in SINAN aim to collect, transmit and disseminate data routinely generated by the Epidemiological Surveillance System of the three spheres of government (Municipal, State and Federal), through a computerized network, to support the investigation process and provide subsidies for the analysis of information on diseases of compulsory notification (SOUZA, 2020). However, it is necessary to emphasize that in developing countries there are still high mortality rates from ATF, suggesting difficulty in the articulation of preventive actions by the management due to the extensive under-recording of cases. The negligence regarding the registration of occupational accidents, especially fatal accidents, contributes to the ignorance of the real dimension of this event, which, most of the time, is perfectly predictable and preventable, thus impairing actions at the levels of health care, public safety and social protection via social security (RODRIGUES AND SANTANA, 2019). Considering this, a scoping review was conducted to systematically map the research done in this area, as well as to identify any existing gaps in knowledge about the under-recording of occupational accidents in SINAN. Thus, the following research question emerged: "What are the factors associated with the underreporting of Occupational Accidents in SINAN?" The current study aims to analyze what are the main factors associated with the underreporting of Work Accidents.

## MATERIALS AND METHODS

This is a scoping review using what the Joanna Briggs Institute (JBI) recommends for the construction of this type of study, based on the five stages established (ARKSEY AND O'MALLEY, 2007): 1) identification of the research question; 2) identification of relevant studies; 3) study selection; 4) data mapping and 5) grouping,

summarizing and reporting the results. To construct this review, they were guided by the recommendations of the PRISMA-ScR (PRISMA extension for Scoping Review) checklist (TRICCO; LILLIE; ZARIN, O'BRIEN; COLQUHOUN; LEVAC; et al, 2018). In this, the acronym Population, Concept and Context - PCC - was used to construct the research question, where P is occupational accidents, the C (concept) is about underreporting/underrecording/ omission of registration, and the C (context) is about the Information System on Notifiable Diseases. From this, the following problem question is presented: "What are the factors associated with the underreporting of Work Accidents in SINAN?" The descriptors in health sciences (DECS) "notification", "accident", "work", "health information system" and MeSH "work", "accidents", "notification", "health information system" were used. To construct a detailed and individual search strategy, the following combinations with the Boolean operators were used: "work accident" OR "occupational accident" AND system AND information AND notification for the English language search, and "work accident" AND notification AND "information system" for the Portuguese language search. It was considered as inclusion criteria to be research available in full and with free access in the CAPES Theses and Dissertations Catalog; Science Direct; Virtual Health Library - VHL; and CochhraneLybrary and Embase databases. Selected in Portuguese and English languages, published from 2017 until July 12, 2021. Ministerial technical notes and legislation related to the theme will also be included. For exclusion criteria, we proposed review articles, letters to the editor, personal opinion of authors, book chapters, abstracts of meetings and absence of data related to underreporting of occupational accidents in the Information System of Notifiable Diseases. The software Mendeley (Elsevier, London, UK) was used to manage the references found and to carry out the exclusion of duplicate articles. The selection of studies was carried out in two stages. In the first step, two reviewers independently evaluated the titles and abstracts of citations from all databases. Articles that did not fit the inclusion criteria were excluded. In the second stage, the same reviewers independently applied the inclusion criteria to the full-text readings of the articles. Another reviewer critically reviewed the list of selected studies. Any disagreement in the two stages was resolved when both authors reached consensus. If there was no consensus, a third author participated in the final decision.



Picture 1. Flowchart of literature search and article selection

## RESULTS

A total of 2,333 references were initially retrieved from the five electronic databases, and 32 articles were replicated. After applying the inclusion criteria, we identified 166 articles. After reading the title and abstract in order to select articles pertinent to the theme, we considered 16 articles as potentially relevant for full reading.

Table 1. Selected Review Articles

Author / year	Title	Database / Magazine	Objective	Type of Survey	Final considerations
Galdino A., Santana V. S., Ferrite S. 2017	Quality of data recording on fatal occupational accidents in Brazil	Embase Revista de Saúde Pública	To evaluate the quality of the registration of data on fatal occupational accidents in Brazil in the Mortality Information System (SIM) and the Severe Occupational Accident Notification Information System (Sinan-AT), analyzing the spatial and temporal distribution between 2007 and 2012.	Descriptive analysis of secondary data.	The quality of filling out fields of interest for the recognition of cases of fatal work accidents is weak in the SIM, but has been gradually improving. In Sinan-AT, the quality of the records was better than in the SIM and has been improving markedly.
Dazini, Paula de Oliveira; Lima, Rafaela Caetano Horta de; Goulart, Thais Pereira; Moreira, Guilherme Guimarães; Almeida, Balbid Vitor de Assis. 2017	Diseases and injuries at work in Minas Gerais from 2008 to 2012 / Work diseases and injuries in Minas Gerais from 2008 to 2012	BVS Revista Baiana de Saúde Pública LILACS, Coleção SUS, CONASS	To conduct a descriptive analysis of data on work-related diseases or injuries notified in Minas Gerais, Brazil through SUS information systems available at DATASUS.	Ecological, exploratory, descriptive, quantitative, retrospective study, supported by secondary data base analysis.	There was still a large under-registration in the information systems, especially in the Notification Aggregates Information System, although the variables analyzed have been growing.
Rodrigues, Alana Barbosa; Santana, Vilma Sousa. 2019	Fatal work accidents in Palmas, Tocantins, Brazil: missed opportunities of information / Fatal work accidents in Palmas, Tocantins, Brazil: missed opportunities of information	BVS Revista Brasileira de Saúde Ocupacional LILACS-Express	To estimate the under-recording of fatal occupational accidents (FTA) in the information systems of the Ministry of Health, State Secretariat of Public Safety (SSP), Ministry of Labor and Secretariat of Social Security, from 2007 to 2015, in Palmas, Tocantins.	Case series study, based on secondary data.	The best performance in terms of registration is in the SIM. Extensive under-registration was observed in all other sources. ATF mortality records are underestimated. Actions to improve registration, especially in SIH-SUS, RAIS, SISCAT, SSP, followed by SINAN and SIM, are necessary.
Zack, Bruna Tais; Ross, Claudia; Gouvêa, Leda Aparecida Vanelli Nabuco de; Tonini, Nelsi Saete. 2020	Major accident at work: epidemiological profile in a western Paraná municipality	BVS Saúde Debate LILACS-Express	To know the epidemiological profile of serious occupational accidents in a municipality in western Paraná in the period 2014-2018.	Quantitative, retrospective, descriptive research.	The results obtained regarding the profile of severe occupational accident notifications in the municipality of Cascavel (PR), converge with the statistics available at state and national levels and with results from other scientific studies conducted in various regions of Brazil. It is noteworthy that, as a limitation, there was the underreporting of the grievance, especially from Sinan in relation to SIM.
Souza, Denise Coelho De. 2020	Epidemiological and operational pattern of surveillance of worker health problems in health information systems in the state of Ceará from 2010 to 2018	Catálogo de Teses e Dissertações Biblioteca Depositária: Repositório UFC	To evaluate the epidemiological and operational pattern of the surveillance of injuries to workers' health in the health information systems in the State of Ceará between the years 2010 and 2018.	Ecological design with observation of longitudinal and spatial temporal variation.	The study contributes to the knowledge of the reality and situational diagnosis of the epidemiological and operational aspects related to the health problems of workers in the state of Ceará, giving support to the surveillance of workers' health (VISAT) to be able to plan and propose the realization of interventions that may be necessary.

Table 2. Focus of the analyzed studies

Focus	Methodology
Epidemiological (temporal and spatial analysis) and operational pattern of surveillance of worker health problems in the Health Information Systems.	Quantitative
Quality of the data record on fatal work accidents in Brazil in SINAN, by analyzing spatial and temporal distribution.	Qualitative
Proportion of municipalities with notified cases of work-related diseases or injuries.	Quantitative
Profile of workers notified by serious work-related accidents to SINAN	Quantitative
Series of ATF cases recorded in SINAN	Quantitative

Source: developed by the authors.

The studies were read and submitted to the eligibility criteria, and of these, 11 were excluded (2 for being simple abstracts for congress presentation and 9 for not addressing issues concerning the underreporting of occupational accidents). This article is part of a Master's thesis (MEPGES), as part of the requirements for obtaining the title of Master in Management Policies by the Ceara State University (UECE). The studies selected for this review are detailed in the following table 1. All five articles included in the review presented mostly a quantitative methodology (80%; 4), with only one of the selected studies having a qualitative approach. It was observed

that 2 studies evaluated the notifications of occupational accidents in a 5-year time lapse (2008-2012 and 2014-2018), 1 study evaluated data from a 6-year interval (2007-2012), and 2 studies evaluated the notification records from a 9-year period. Regarding the places where the studies were developed and the population measured, it was found that 1 study considered the entire Brazilian population, 2 studies evaluated the state population (Ceará and Minas Gerais), and 2 studies evaluated cities (Palmas - TO and Cascavel - PR). The investigation of the 5 texts allowed the identification of the main focus of each publication, which were arranged in Table 2.

## DISCUSSION

The occurrence of an accident at work can generate repercussions beyond the injured person; there can be a reduction in productivity with a consequent financial impact not only to the employing company, but also to the public system because they are responsible for providing financial assistance. Improved working conditions, safe sector practices, and technical guidance for the correct use of instruments and/or individual protection equipment can be considered important measures to prevent this complication. It is known the need to notify the health problems listed in the ministerial directives to monitor the health situation of a population. In the field of worker's health, there are specific diseases that, for their registration/notification, it is necessary to establish the link, that is, the relationship between the disease and the work. Unfortunately, this notification may not be seen as a priority and is not carried out due to the type of contract the worker has, punctuating here the informal ones. Corroborating this statement, it is brought that informality and the precariousness of information systems may tend not to demonstrate the real accidents at work when it comes to those happened to professionals without regulation (ZACK; ROSS; GOUVÊA E TONINI, 2020).

The importance of the qualification of the record that will allow visibility actions to the worker's health policy is reinforced. Notifying these events is essential to program interventions for the surveillance of workers' health (VISAT), serving as a tool for public health evaluation. Among the activities that make up the VISAT, we can list the awareness and training of professionals regarding the notifications of AT (SOUZA, 2020). The manual (SESA, 2017) on the use of SINAN NET points out that for a record in the SINAN database to be considered of good quality, it must have some characteristics, such as being complete (for this it must contain all diagnosed cases), be reliable because it will present the original data that are recorded by the health units, not present duplicity, have filled out and consistent fields. For this, we also bring here what can be considered completeness according to this manual, because it is known that not filling it out completely can result in not computing this data in the indicators. So, the completeness of the records is understood as the degree to which the field is filled out (as an example, the proportion of reported cases without filling out the occupation field is cited). The fields that identify the notification, characterize the individual, and those necessary for the calculation of indicators should be evaluated as a priority. Even with the arguments that show the relevance of monitoring AT information, there is underreporting, which makes it difficult to know the reality of the working class in this regard.

Some of the causes, according to the studies found in this review, are the fragmentation of information systems, the lack of proximity of health professionals to these instruments, especially those in the area of worker's health, the unfamiliarity of the professionals involved with the instruments used in the notification of the grievance, and the silent and slow evolution of work-related diseases, which makes it difficult to establish a causal link between work and health. In addition, the situation is aggravated by the lack of knowledge on the part of some professionals in relation to work-related diseases, the companies' refusal of reports, the certificates signed by general practitioners, the working conditions (precarious work relations, work overload, excessive bureaucracy, and low salaries), the lack of knowledge on the part of some professionals in relation to work-related diseases, and the low salaries of the workers, excessive bureaucracy and low wages), which impact the quality of filling out the notification instruments, the large number of workers without a stable bond, which leads to a high turnover in health units, and, nevertheless, the lack of support related to continuing education (SOUZA, 2020; RODRIGUES E SANTANA, 2019; ZACK; ROSS; GOUVÊA E TONINI, 2020). The authors also reported that under-recording and under-reporting in the information systems presented indicate that the professionals may have difficulties in monitoring the epidemiological investigation form of the AT, in terms of the conclusion of the reported case that informs whether there was a cure

or death. It should be considered that many patients may die a few days after the accident and not be registered. There is the possibility of omission that the work accident resulted in death. This omission occurs due to the ignorance of health service professionals, the Medico-Legal Institute (IML), and the Death Verification System (SVO) about the correct completion of the Death Declaration (DO), as well as the non-recognition of the importance of these documents for the worker's health. The improvement of the SINAN and SIM information is a fundamental step for the implementation of effective measures of prevention and control of occupational accidents (SOUZA, 2020). The findings of a study (SOUZA, 2020) conducted in 2020 in the state of Ceará indicate that the physicians of the region did not fill out the field that relates the death to the AT in the occurrences due to external causes in the DO, and thus there was no subsequent investigation with the family members of the worker who died about his or her work practice at the time of the accident. The under-enumeration of cases also influences the quality of information, interfering with the amplitude of mortality estimates.

Studies focused on this issue are limited and difficult to be conducted due to the difficulties related to the identification of all cases, mainly due to the lack of interrelation in the multiple sources of available data, since the systems are fed separately (GALDINO; SANTANA AND FERRITE, 2017; ZACK; ROSS; GOUVÊA AND TONINI, 2020). So, the need for the systems to talk to each other for their correct completion is unique, which will help in the effectiveness of the investigation of the cause of these diseases. During the investigation process for the establishment of a causal link and subsequent notification of AT, the SIM or the DO itself (when it comes to ATF) is used, but unfortunately these can be incomplete and, as a 'chain reaction,' the SINAN form will also be incomplete. Besides the systems mentioned, others also deal with information pertinent to workers' health, such as the Hospital Information System of the Unified Health System (SIH-SUS), Annual Social Information List (RAIS), and the Work Accident Communication Information System (SISCAT). These do not deal with direct data on AT, however, they discuss certain aspects about the theme and some of them must be filled depending on the evolution of the accident case (RODRIGUES AND SANTANA, 2019).

When reflecting on strategies directed for the reduction of barriers linked to underreporting, we observe that the infrastructure, the number of professionals needed to support this demand (GALDINO; SANTANA AND FERRITE, 2017), as well as their training are extremely important factors in solving this problem. According to a study (LAMY; DAZINI; GOULART E LIMA, 2017), conducted in the state of Minas Gerais in 2017, the increase in the capillarity of the ESF teams in the municipalities, as well as the training of primary care teams under the SUS are pointed out as alternatives aimed at reducing the numbers of underreporting, also focusing on the Workers' Health Reference Centers (CEREST). Corroborating with this perception, research (SOUZA, 2020) conducted in Ceará considers as one of the factors related to the growth in the number of notifications the actions focused on permanent education in Worker's Health in the period from 2013 to 2017. Evaluating the region of Jaguaribe in specific, it was noticed an expressive increase in the years 2017 (11.5%) and 2018 (16.1%), compared to the year 2010 that presented the lowest average percentage (0.5%), a fact that the author associates to the trainings conducted by the Center for Reference in Health, Work and Environment (CERESTA) of Limoeiro do Norte and the Workers' Health Reference Center (CEREST) of Aracati in order to develop in professionals the ability to relate the grievance to work, making them aware of the importance of reporting in SINAN. In this way, to reflect on the need to reduce the occurrence of occupational accidents is to show sensitivity to these workers, who deal with daily risks and work hard seeking better living conditions so that at the end of the day they have their rights guaranteed. By notifying, we hope to stimulate actions, policies, or strategies to improve these work environments, thus giving quality service.

## CONCLUSION

To work with the notification of diseases in occupational health it is necessary to understand the work mechanisms and inherent factors of each service that can lead to accidents. However, for this to occur, knowledge is needed on the part of professionals who serve the working class and with a sensitive look at this issue, so that the visibility and offer of care to the category can be guaranteed, because the non-occurrence of the notification leads to difficulties in implementing actions of VISAT. It is necessary to search for alternatives that aim at the improvement of work processes, enabling conditions for the professionals who are responsible for notifying compulsory diseases and illnesses in SINAN to do so in a timely and appropriate manner.

It must be recognized that the notification is essential to the health surveillance system, since the data generated with greater accuracy becomes an instrument that will enable the improvement of the quality of the population's health. The current trend towards informality in labor relations, added to the lack of integration of information systems, tend to mask the real numbers of accidents at work, especially when related to unregulated workers. The managers need to launch strategies that promote the overcoming of existing deficits in the health equipment, the place where the diseases and illnesses are received, as well as it is necessary for the health professionals to be careful in the handling of information, since it is directly linked to the protection of the population's health. This review points out that it is necessary to advance in new research that presents national estimates of underreporting of AT, enabling greater visibility and initiatives in the context of the National Policy on Worker's Health.

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