Epidemiological profile of serious and fatal accidents at work in the southern macro-region of Santa Catarina

Perfil epidemiológico dos acidentes de trabalho graves e fatais na macrorregião sul de Santa Catarina

Perfil epidemiológico de los accidentes de trabajo graves y mortales en la macrorregión sur de Santa Catarina

RESUMO

Objetivo: Analisar a frequência e tipificação de acidentes de trabalho graves e fatais notificados na Macrorregião Sul de Santa Catarina no período de 2015-2019. Método: Pesquisa quantitativa, retrospectiva e descritiva, através de dados do Sistema de Informação de Agravos de Notificação - SINAN e do Sistema de Informação de Mortalidade - SIM, além dos dados coletados referentes às ações de Vigilância em Saúde do Trabalhador - VISAT dos 45 municípios da macrorregião sul catarinense. Resultados: Houve predomínio de acidentes de trabalho graves em homens, de raça branca e de trabalhadores da construção civil. Conclusão: No período estudado ocorreram 2.288 acidentes de trabalho graves notificados e 176 óbitos notificados. Houve aumento significativo nos anos de 2018 e 2019 em comparação aos anteriores. Não há interação entre as vigilâncias, o que dificulta a realização de ações voltadas aos aspectos condicionantes e determinantes dos acidentes de trabalho graves e fatais, que são em sua maioria evitáveis.

DESCRITORES: Acidentes de trabalho; Notificação de acidentes de trabalho; Epidemiologia.

ABSTRACT

Objective: To analyze the frequency and typification of serious and fatal work accidents reported in the Southern Macro-region of Santa Catarina in the period 2015-2019. Method: Quantitative, retrospective and descriptive research, through data from the Notifiable Diseases Information System - SINAN and from the Mortality Information System - SIM, in addition to data referring to the actions of Occupational Health Surveillance - VISAT of the 45 municipalities of the Southern Santa Catarina macro-region. Results: There was a predominance of serious work accidents in men, of white race and construction workers. Conclusion: In the studied period, there were 2,288 serious work accidents reported and 176 reported deaths. There was a significant increase in the years 2018 and 2019 compared to the previous years. There is no interaction between surveillance, which makes it difficult to carry out actions aimed at conditioning and determining aspects of serious and fatal work accidents, which are mostly preventable.

DESCRIPTORS: Accidents at work; Notification of accidents at work; Epidemiology.

RESUMEN

Objetivo: Analizar la frecuencia y clasificación de los accidentes de trabajo graves y mortales notificados en la Macrorregión Sur de Santa Catarina en el período 2015-2019. Método: Investigación cuantitativa, retrospectiva y descriptiva, utilizando datos del Sistema de Información de Enfermedades de Declaración Obligatoria - SINAN y del Sistema de Información de Mortalidad - SIM, además de los datos recopilados referentes a las acciones de Vigilancia en Salud Ocupacional - VISAT de los 45 municipios del sur de Santa Catarina macrorregión. Resultados: Predominaron los accidentes de trabajo graves en hombres, caucásicos y trabajadores de la construcción. Conclusión: Durante el período de estudio, hubo 2.288 accidentes de trabajo graves notificados y 176 muertes notificadas. Hubo un aumento significativo en los años 2018 y 2019 en comparación con años anteriores. No existe interacción entre las vigilancias, lo que dificulta la realización de actuaciones encaminadas a condicionar y determinar aspectos de los accidentes de trabajo graves y mortales, que en su mayoría son evitables.

DESCRIPTORES: Accidentes de Trabajo; Notificación de accidentes de trabajo; Epidemiología.

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INTRODUCTION

Although described in the Federal Constitution of 1988, it only occurred with the enactment of the Organic Law on Health, (8080/90 - article 6th paragraph 3rd), which states that workers' health is "a set of activities intended, through epidemiological surveillance and health surveillance actions, the promotion and protection of workers' health".[1].

With a view to ensuring the implementation of workers' health actions and their financing by the Union, in 2002, with Ordinance 1679, the National Network for Comprehensive Occupational Health Care - RENAST was created in an attempt to link health initiatives to prevention, promotion, assistance and rehabilitation of workers.[2]

In 2005, with the publication of ordinance 2437/GM, efforts were made to strengthen Worker's Health actions by strengthening the Worker's Health Reference Centers - CEREST and integrating Worker's Health actions - ST (Saúde do Trabalhador) through some strategies such as adequacy and expansion of the number of CEREST, inclusion of workers' health actions in primary care, surveillance actions, institution of sentinel networks as technical support and characterization of sentinel municipalities. [3]

Workers' health was only implemented as a health policy after the publication of Ordinance 1823/12, which instituted the National Workers' and Workers' Health Policy (PNSTT - Política Nacional de Saúde do Trabalhador e da Trabalhadora) which brought to light the role of the SUS in effecting integrality and equity of access for the entire working population in the country, defining the principles, guidelines and strategies to be observed by the three spheres of government in the SUS. [4]

Occupational Health is the field of Public Health whose object of study and intervention is production-consumption relations and the health-disease process of people and, in particular, of workers. Based on this premise, interventions should seek to transform productive processes, in the sense of making them health promoters, not illness and death, in addition to guaranteeing comprehensive health care for workers, taking into account their inclusion in production processes. [5]

The "Worker's Health in Primary Care" protocol states that the Records in the technical literature demonstrate that the Primary Care and Family Health Strategy teams recognize, on a daily basis, work-related health problems, but find it difficult to manage these injuries and diseases and to develop interventions on the productive processes that generate damage to health and the environment in the territories under their health responsibility.

Thus, it is necessary to qualify the look and support the professionals of the Primary Care teams and Family Health Strategy Teams, so that they recognize the user as a worker and work as a determinant of the health-disease situation of the population in the territory under their responsibility and guarantee institutional support, specialized and pedagogical to the teams, through health surveillance and matrix support actions (CRAVEIRO et.al., 2016). A serious accident at work is an event that occurs during work activity, or at the service of the employer, which involves bodily injury, death, or loss of function, in such a way as to incapacitate for work, whether temporarily or permanently. [6]

In order to plan occupational health actions, it is necessary to carry out an analysis of the health situation of the working population, including health promotion actions. It is necessary to know the profile of the working population so that it is possible to identify the problems and needs, so that it can support decision-making and the establishment of priorities for strengthening the SUS to face working conditions that favor the health-disease process. [7]

Given the above, it is clear the need for municipalities to organize and articulate Worker Health Surveillance actions - VISAT (Vigilância em Saúde do Trabalhador), with a view to reducing the number of serious and fatal accidents at work in their territory, integrating health, epidemiological and environmental surveillance actions, together with the Health Care Network (HCN), since workers who have accidents and/or suffer from work-related injuries are already treated in a fragmented way in the existing health services, and the organization of actions to face these events must be carried out through mapping and analysis of epidemiological data, available in official databases.

METHOD

This research was carried out with the approval of the Ethics and Resear-

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ch in Human Beings Committee of the University of Extremo Sul Catarinense under opinion nº4,298,358. It has a descriptive and retrospective study with data from the Notifiable Diseases Information System - SINAN and Mortality Information System - SIM. Epidemiological data from the municipalities of the Southern Macroregion of Santa Catarina, which encompass the regions of Laguna, Tubarão, Criciúma and Araranguá, and a semi-structured questionnaire were used to assess the actions carried out by the surveillance services in the municipalities.

Epidemiological data of serious and fatal accidents at work from the 45 municipalities of the Southern Macroregion of SC were used, contained in the databases of the Notifiable Disease Information System (SINAN - Sistema de Informação de Agravos de Notificação) and data on work-related deaths in the Mortality Information System (SIM - Sistema de Informação de Mortalidade), occurred between the years 2015 and 2019, in order to characterize a sampling in the period of 5 years, in addition to a collection instrument to identify the existence of surveillance actions in Occupational Health carried out by the municipalities. Municipalities that did not have epidemiological data during the period studied, or did not sign the FICF for data collection about the actions carried out by surveillance, were excluded.

Numerous attempts were made, however, of the 45 municipalities, only 34 responded to the questionnaires. Considering that the Pandemic situation was declared in the year 2020, and that the surveillance had all eyes on facing the Coronavirus, it is estimated that for this reason not all municipalities responded to the questionnaire.

Two data collection instruments were used, the first was related to the collection of variables necessary for the analysis of epidemiological data. The second collection instrument was a structured and self-administered questionnaire with the aim of verifying whether the surveillance services in the municipalities of the southern macro-region of Santa Catarina carry out any intervention when they are aware of the serious and fatal accidents at work notified in the SIM and SINAN.

Data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 21.0 software. Quantitative variables were expressed as mean and standard deviation, and qualitative variables as frequency and percentage.

RESULTS

In the period from 2015 to 2019, object of this study, 2,288 serious and fatal accidents at work were notified in the municipalities that are part of the sou-

Table 1. Distribution of serious and fatal accidents at work reported on SINAN from 2015 to 2019. Sulcatarine macro-region. Brazil (2020).

	n (%) n = 2288
Year of accident	
2015	336 (14,7)
2016	225 (9,8)
2017	333 (14,6)
2018	639 (27,9)
2019	755 (33,0)

Source: Research data, 2020.

Table 2. Distribution of data regarding sex, race and education of the injured workers. Southern Santa Catarina macro-region. Brazil (2020).

	n (%) Years				
	2015 (n=336)	**2016 (n=225)**	**2017 (n=333)**	**2018 (n=639)**	**2019 (n=755)**
Gender					
Male	293 (87,2)	201 (89,3)	290 (87,1)	564 (88,3)	664 (87,9)
Female	43 (12,8)	24 (10,7)	43 (12,9)	75 (11,7)	91 (12,1)
Race					
White	296 (88,1)	211 (93,8)	304 (91,3)	555 (86,9)	672 (89,0)
Black	18 (5,4)	9 (4,0)	18 (5,4)	46 (7,2)	40 (5,3)
Brown	19 (5,7)	2 (0,9)	9 (2,7)	30 (4,7)	25 (3,3)
Yellow	1 (0,3)	-	-	-	1 (0,1)
Indigenous	-	1 (0,4)	-	2 (0,3)	-
Ignored	2 (0,6)	2 (0,8)	2 (0,6)	6 (1,0)	17 (2,2)
Education					
Incomplete 1st to 4th grade of Elem School	25 (7,4)	28 (12,4)	22 (6,6)	20 (3,1)	37 (4,9)

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thern macro-region of Santa Catarina (Table 1).

DISCUSSION

It is observed that there was an increase in the number of notifications in the years 2018 and 2019, which may be a reflection of the training carried out by CEREST in Criciúma from August 2017.

Before this period, the service underwent changes, especially in 2016, when the service team was dismantled, culminating in the removal of the coordinator. In view of this, it was the year with the lowest number of notifications compared to other years.

Complete 1st to 4th grade of ESI	22 (6,5)	14 (6,2)	11 (3,3)	33 (5,2)	40 (5,3)
Complete 5th to 8th grade of ES	73 (21,7)	55 (24,4)	42 (12,6)	80 (12,5)	96 (12,7)
Complete ESI	34 (10,1)	25 (11,1)	27 (8,1)	78 (12,2)	74 (9,8)
Incomplete High School	43 (12,8)	25 (11,1)	32 (9,6)	92 (14,4)	99 (13,1)
Complete High School	92 (27,4)	52 (23,1)	112 (33,6)	217 (34,0)	255 (33,8)
Incomplete Higher education	15 (4,5)	1 (0,4)	6 (1,8)	8 (1,3)	15 (2,0)
Complete Higher education	10 (3,0)	6 (2,7)	9 (2,7)	18 (2,8)	27 (3,6)
Ignored	22 (6,6)	19 (8,5)	72 (21,6)	93 (14,5)	112 (14,9)

ES: Elementary School;
Source: Research data, 2020.

Table 3. Distribution of data regarding occupation, situation in the labor market, branch of economic activity (CNAE), outsourcing. Southern Santa Catarina macro-region. Brazil (2020)

	n (%)				
	Years				
	2015 (n=336)	2016 (n=225)	2017 (n=333)	2018 (n=639)	2019 (n=755)
Occupation					
Agents, assistants and administrative assistants	8 (2,4)	2 (0,9)	3 (0,9)	12 (1,9)	37 (4,9)
Civil works helpers	13 (3,9)	8 (3,6)	18 (5,4)	17 (2,7)	17 (2,3)
Production line feeders	7 (2,1)	7 (3,1)	5 (1,5)	2 (0,3)	5 (0,7)
Woodworkers and the like	10 (3,0)	13 (5,8)	17 (5,1)	22 (3,4)	19 (2,5)
Industrial machine maintenance mechanics	8 (2,4)	6 (2,7)	2 (0,6)	13 (2,0)	28 (3,7)
Automotive maintenance mechanics	12 (3,6)	3 (1,3)	10 (3,0)	22 (3,4)	13 (1,7)
General cargo vehicle drivers	7 (2,1)	5 (2,2)	14 (4,2)	21 (3,3)	15 (2,0)
Steam and utility machine operators	29 (8,6)	14 (6,2)	10 (3,0)	14 (2,2)	21 (2,8)
Trade operators in stores and markets	9 (2,7)	5 (2,2)	3 (0,9)	11 (1,7)	18 (2,4)
Multipurpose agricultural producers	15 (4,5)	17 (7,6)	10 (3,0)	7 (1,1)	9 (1,2)
Workers extracting solid minerals	2 (0,6)	3 (1,3)	8 (2,4)	21 (3,3)	18 (2,4)
Masonry structural workers	33 (9,8)	32 (14,2)	25 (7,5)	45 (7,0)	56 (7,4)
Electrical installation workers	6 (1,8)	1 (0,4)	6 (1,8)	16 (2,5)	19 (2,5)
Workers assembling wooden, metal and composite structures in civil works	9 (2,7)	10 (4,4)	3 (0,9)	17 (2,7)	24 (3,2)
Metal alloy welding and cutting workers	12 (3,6)	1 (0,4)	6 (1,8)	21 (3,3)	22 (2,9)
Domestic service workers in general	8 (2,4)	1 (0,4)	3 (0,9)	9 (1,4)	14 (1,9)
Ceramists (preparation and fabrication)	2 (0,6)	1 (0,4)	2 (0,6)	12 (1,9)	15 (2,0)
Wood splitting machine operators	3 (0,9)	1 (0,4)	2 (0,6)	7 (1,1)	3 (0,4)
Others	137 (40,5)	80 (36,7)	165 (49,6)	340 (53,2)	351 (46,3)
No BCO family	6 (1,8)	13 (5,8)	21 (6,3)	10 (1,6)	51 (6,8)

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Situation in the labor market					
Retired	5 (1,5)	5 (2,2)	2 (0,6)	1 (0,2)	5 (0,7)
Self-employed	70 (20,8)	60 (26,7)	46 (13,8)	88 (13,8)	111 (14,7)
Unregistered employee	20 (6,0)	15 (6,7)	23 (6,9)	34 (5,3)	61 (8,1)
Registered employee	225 (67,0)	128 (56,9)	226 (67,9)	478 (74,8)	529 (70,1)
Statutory public service	1 (0,3)	1 (0,4)	3 (0,9)	3 (0,5)	11 (1,5)
Freelance worker	-	-	8 (2,4)	14 (2,2)	14 (1,9)
Ignored	7 (2,1)	7 (3,1)	13 (3,3)	7 (1,1)	10 (1,3)
Outros	8 (2,3)	9 (4,0)	12 (4,2)	14 (2,1)	14 (1,7)
CNAE					
Public administration in general	-	-	2 (0,6)	-	2 (0,3)
Aquaculture and related services	1 (0,3)	1 (0,4)	2 (0,6)	2 (0,3)	2 (0,3)
Wholesale trade of goods in general (non-specialized)	2 (0,6)	-	-	-	1 (0,1)
Retail and wholesale trade of parts and accessories for motor vehicles	-	2 (0,9)	2 (0,6)	1 (0,2)	2 (0,3)
Mineral coal extraction	-	-	3 (0,9)	3 (0,5)	4 (0,5)
Iron and steel foundation	-	-	-	-	2 (0,3)
Works of other types	-	2 (0,9)	7 (2,1)	1 (0,2)	-
Not informed	313 (93,2)	206 (91,6)	243 (73,0)	575 (90,0)	709 (93,9)
Others	20 (5,9)	14 (6,2)	74 (22,2)	57 (8,8)	33 (4,3)
Outsourcing					
No	312 (92,9)	193 (85,8)	275 (82,6)	580 (90,8)	593 (78,5)
Does not apply/ Ignored	20 (6,0)	29 (13,9)	50 (15,0)	48 (7,6)	141 (18,6)
Yes	4 (1,1)	3 (1,3)	8 (2,4)	11 (1,6)	21 (2,8)

Other occupations were not described because they did not have significant values for analysis.
Subtitle: BCO - Brazilian Classification of Occupations.
Source: Research data, 2020.

Table 4. Location of the accident, type of accident (typical or route) and the International Classification of Diseases - ICD - Cause of Accident Code (from V01 to Y98).

	n (%)				
	Year				
	2015 (n=336)	**2016 (n=225)**	**2017 (n=333)**	**2018 (n=639)**	**2019 (n=755)**
Local de ocorrência do acidente					
Local de ocorrência do acidente	216 (64,3)	117 (52,0)	221 (66,4)	464 (72,6)	507 (67,2)
Instalações do contratante	52 (15,5)	45 (20,0)	61 (18,3)	85 (13,3)	146 (19,3)
Via pública	32 (9,5)	31 (13,8)	26 (7,8)	61 (9,5)	83 (11,0)
Instalações de terceiros	33 (9,8)	29 (12,9)	18 (5,4)	24 (3,8)	13 (1,7)
Domicílio próprio	3 (0,9)	3 (1,3)	7 (2,1)	5 (0,8)	-
Ignorado					
Tipo de acidente	288 (85,7)	189 (84,0)	268 (80,5)	563 (88,1)	610 (80,8)
Típico	45 (13,4)	34 (15,1)	54 (16,2)	70 (11,0)	136 (18,0)
Trajeto	3 (0,9)	2 (0,9)	11 (3,3)	6 (1,0)	9 (1,2)

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	ICD-10				
Apertado, colhido, comprimido ou esmagado dentro de ou entre objetos	39 (11,6)	7 (3,1)	23 (6,9)	33 (5,2)	58 (7,7)
Contato com outras máquinas e com as não específicas	58 (17,3)	60 (26,7)	69 (20,7)	172 (26,9)	173 (22,9)
Impacto causado por objeto lançado, projetado ou em queda	26 (7,7)	11 (4,9)	31 (9,3)	122 (19,1)	149 (19,7)
Motociclista traumatizado em colisão com um automóvel [carro], "pickup" ou caminhonete	11 (3,3)	16 (7,1)	13 (3,9)	25 (3,9)	32 (4,2)
Outras quedas de um nível a outro	5 (1,5)	11 (4,9)	11 (3,3)	18 (2,8)	28 (3,7)
Queda de ou para fora de edifícios ou outras estruturas	12 (3,6)	13 (5,8)	10 (3,0)	28 (4,4)	13 (1,7)
Queda em ou de um andaime	12 (3,6)	8 (3,6)	8 (2,4)	12 (1,9)	16 (2,1)
Queda no mesmo nível por escorregão, tropeção ou passos em falsos	4 (1,2)	4 (1,8)	9 (2,7)	26 (4,1)	26 (3,4)
Outros	169 (50,2)	95 (42,1)	159 (47,8)	203 (31,7)	260 (34,6)

CNAE: National Classification of Economic Activity (Classificação Nacional de Atividade Econômica)
ICD: International Classification of Diseases
Source: Research data, 2020.

Table 5. ICD code of injury, affected body part, evolution of the case and issuance of the Occupational Accident Report-CWA.

	n (%)				
	Year				
	2015 (n=336)	2016 (n=225)	2017 (n=333)	2018 (n=639)	2019 (n=755)
Main affected body part					
Head	43 (12,8)	20 (8,9)	27 (8,1)	49 (7,7)	45 (6,0)
Hand	142 (42,3)	86 (38,2)	120 (36,0)	266 (41,6)	317 (42,0)
Lower Limb	39 (11,6)	37 (16,4)	45 (13,5)	68 (10,6)	71 (9,4)
Upper Limb	57 (17,0)	28 (12,4)	49 (14,7)	88 (13,8)	132 (17,5)
Foot	17 (5,1)	13 (5,8)	30 (9,0)	77 (12,1)	106 (14,0)
All body	12 (3,6)	5 (2,2)	9 (2,7)	16 (2,5)	13 (1,7)
Chest	8 (2,4)	15 (6,7)	18 (5,4)	32 (5,0)	24 (3,2)
Ignored	1 (0,3)	-	-	1 (0,2)	1 (0,1)
Other	17 (4,9)	21 (9,4)	35 (10,6)	42 (6,5)	46 (6,1)
Secondary affected body part					
Head	7 (2,1)	5 (2,2)	8 (2,4)	12 (1,9)	13 (1,7)
Hand	7 (2,1)	5 (2,2)	1 (0,3)	16 (2,5)	14 (1,9)
Lower Limb	21 (6,3)	10 (4,4)	15 (4,5)	18 (2,8)	42 (5,6)
Upper Limb	14 (4,2)	16 (7,1)	21 (6,3)	26 (4,1)	25 (3,3)
Chest	11 (3,3)	5 (2,2)	9 (2,7)	11 (1,7)	17 (2,3)
Ignored	257 (76,5)	165 (73,1)	241 (72,4)	618 (81,1)	611 (81,0)
Other	19 (5,5)	19 (8,8)	38 (11,4)	62 (5,9)	33 (4,2)
Tertiary affected body part					
Abdomen	2 (0,6)	1 (0,4)	3 (0,9)	3 (0,5)	3 (0,4)
Hand	3 (0,9)	2 (0,9)	3 (0,9)	3 (0,5)	4 (0,5)
Lower Limb	5 (1,5)	2 (0,9)	7 (2,1)	10 (1,6)	5 (0,7)

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Upper limb	3 (0,9)	3 (1,3)	10 (3,0)	5 (0,8)	10 (1,3)
Chest	4 (1,2)	-	3 (0,9)	1 (0,2)	5 (0,7)
Ignored	307 (91,4)	208 (92,5)	279 (83,8)	594 (93,0)	715 (94,7)
Other	12 (3,5)	9 (4,0)	28 (8,4)	23 (3,4)	13 (1,7)
Injury ICD					
Traumatic amputation at wrist and hand level	46 (13,7)	38 (16,9)	36 (10,8)	57 (8,9)	78 (10,3)
Forearm wound	6 (1,8)	-	5 (1,5)	3 (0,5)	-
Head injury	9 (2,7)	-	2 (0,6)	9 (1,4)	3 (0,4)
Wrist and hand injury	43 (12,8)	20 (8,9)	14 (4,2)	31 (4,9)	23 (3,0)
Wounds involving multiple body regions	6 (1,8)	1 (0,4)	2 (0,6)	2 (0,3)	3 (0,4)
Fracture at wrist and hand level	23 (6,8)	21 (9,3)	43 (12,9)	155 (24,3)	174 (23,0)
Leg fracture, including ankle	9 (2,7)	21 (9,3)	19 (5,7)	41 (6,4)	46 (6,1)
Forearm fracture	8 (2,4)	10 (4,4)	15 (4,5)	33 (5,2)	50 (6,6)
Fracture of skull and facial bones	7 (2,1)	3 (1,3)	4 (1,2)	7 (1,1)	7 (0,9)
Femur fracture	7 (2,1)	9 (4,0)	4 (1,2)	7 (1,1)	15 (2,0)
Foot fracture (except ankle)	7 (2,1)	9 (4,0)	10 (3,0)	56 (8,8)	77 (10,2)
Wrist and hand crush injury	8 (2,4)	4 (1,8)	9 (2,7)	13 (2,0)	3 (0,4)
Superficial trauma of the wrist and hand	18 (5,4)	-	2 (0,6)	4 (0,6)	11 (1,5)
Others	139 (41,2)	89 (39,7)	168 (50,5)	254 (34,5)	265 (35,2)
Case evolution					
Healing	42 (12,5)	13 (5,8)	41 (12,3)	51 (8,0)	47 (6,2)
Permanent partial disability	42 (12,5)	31 (13,8)	30 (9,0)	41 (6,4)	50 (6,6)
Temporary disability	233 (69,3)	147 (65,3)	197 (59,2)	495 (77,5)	597 (79,1)
permanent total disability	5 (1,5)	3 (1,3)	2 (0,6)	-	6 (0,8)
Death due to serious work accident	11 (3,3)	17 (7,6)	20 (6,0)	24 (3,8)	18 (2,4)
Death from other causes	-	-	2 (0,6)	1 (0,2)	2 (0,3)
Ignored	2 (0,6)	9 (4,0)	39 (11,7)	27 (4,2)	32 (4,3)
Others	1 (0,3)	4 (1,8)	2 (0,6)	-	3 (0,4)
CWA					
No	176 (52,4)	95 (42,2)	90 (27,0)	97 (15,2)	75 (9,9)
Yes	93 (27,7)	52 (23,1)	91 (27,3)	86 (13,5)	67 (8,9)
Does not apply/ Ignored	67 (19,9)	78 (34,7)	152 (45,6)	456 (71,3)	613 (81,2)

The other option was not described because it did not have significant values for analysis.
Caption: ICD - International Classification of Diseases, CWA - Communication of Work Accidents.
Source: Research data, 2020.

In 2006, the Ministry of Health published the Differentiated Complexity Protocol, entitled Notifications of Fatal, Serious and Child and Adolescent Occupational Accidents, which still serves as a subsidy for understanding the Notification of Occupational Accidents in SINAN. This protocol describes that several studies demonstrate the lack of an information system that demonstrates the accidents at work, especially in the working population that is not a contributor to Social Security. Thus, the lack of knowledge about the existence of accidents at work, impacts on the lack of organization of responses by the Unified Health System, mainly with regard to their prevention, and brings to light the importance of considering work as a determinant of health for a given population. [8]

The importance of notification comes from the provision of information from standardized forms, which demonstrate the impact of accidents at work on individuals' lives, bringing injuries and aspects associated with the origin of accidents. Notifications of injuries on SINAN must be carried out by the municipality that identified the injury,

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regardless of whether it is the municipality where the worker lives, as well as the typing of data in the notification and investigation forms that must be carried out by the notifying municipality. After properly feeding the system, the data from the notification forms must be processed as soon as the case is identified, followed by the feeding of complementary data to the case, that is, the investigation that has a period of 15 days to be fed. Editing data or supplementing them can only be carried out by the municipality of residence. [8]

It is also observed that accidents at work are notifiable, that is, mandatory, there is no well-defined flow of information exchange between the municipalities involved. [9] As for the notifications made by each municipality, a large part of the accidents were reported in municipalities that have hospitals, given that there is a possibility that the search for the worker who is a victim of a serious work accident is more evident in the hospital environment, as shown in a study carried out in the state of Paraná, 40.5% required treatment in a hospital environment. [9]

It is observed, therefore, that the municipality that most reported accidents at work in the southern macro-region of Santa Catarina was Criciúma, considering that it is the municipality with the largest Economically Active Population (EAP) and also a reference in hospital care for the region, as it has 3 hospital units and an Emergency Care Unit (UPA), in addition to having a Reference Center for Occupational Health-CEREST. [10]

When considering the sex of the affected individuals, it is clear that there was a predominance of serious accidents at work in the male population, white, with complete high school education.

The history of immigration from the south of the country, including the state of Santa Catarina, strongly affects the predominance of the white race among the accidents at work reported on SINAN in the period, corroborating the study by Scussiato et. al [11], who described that in the period from 2007 to 2010, the white population that suffered accidents at work in the state of Paraná was 70.3%. Emphasizing that this data is a reflection of the population extract itself and its social and geographic representations and the distribution of this characteristic. By way of example, when comparing this working population to that of the state of Bahia, for example, in which the predominance is of the black race. According to IBGE data from the last 2010 census, in Santa Catarina 83.9% of the population is white, 12.6% brown, 2.9% black, 0.4% yellow, and 0.3% indigenous (IBGE, 2010) corroborating the data of this research.

A study carried out in Santa Catarina from 2008 to 2017 described that most accidents in the textile sector, for example, occurred with men, although the sector employs more than half of women. This is due to the fact that men develop activities that involve more machinery, while women develop more manual activities. [12]

The National Policy for Comprehensive Health of the Black Population of 2017, describes that in terms of race/color, according to the National Health Policy of 2013, accidents at work in Brazil in individuals aged 18 or over, predominantly men, 4.6% black, 3.7% brown and 2.9% white. [13] However, it is worth noting that regional and population characteristics influence these scenarios from state to state.

In a study carried out on accidents at work, regarding education, it describes that there was a predominance of accidents at work in individuals with high school education 21.5%, demonstrating a relationship with the data found in this research, which were 30.38% of accidents with secondary schooling in the studied macro-region. [14]

When analyzed within a more regionalized context, it is clear that the occupation of Solid Mineral Extraction Workers recorded 52 serious work accidents in the period. However, the contingent of workers in this specific function is small compared to other productive sectors. In Turkey, in 2013, when analyzing work accidents, in groups considered more dangerous such as mining and construction, the odds ratio for the occurrence of accidents was 4.81 and 2.35, much higher than in environments considered not so dangerous, such as an office, for example. [15]

One study describes that civil construction workers perceive the risks of this activity on a daily basis based on empirical learning, also elucidated by the risk of falling and that many reported having already witnessed fatal and serious accidents. However, they identify that the risks are not completely eliminated and that the use of personal protective equipment does not completely prevent the occurrence of accidents, in addition to bringing a certain limitation and making it difficult to perform some tasks. [16]

The SINAN form has 13 options for filling in the situation in the labor market, it being essential that the filling is related to the occupation at the time of the accident, namely: Registered employee with a formal contract, Unregistered employee, Self-employed/self-employed, Statutory public servant, CLT public servant, Retired, Unemployed, Temporary work, Cooperative, Independent worker, Employer, Others and Ignored, with a higher prevalence of workers registered with a formal contract, totaling 70.1% of all notifications in 2019. [17]

As for the labor situation, most individuals had a formal work regime, that is, workers whose hiring is carried out by the Consolidation of Labor Laws-CLT. In Bahia, from 2007 to 2012, 27% of serious work accidents occurred in individuals who worked on their own. [18]

In the southern macro-region, serious accidents at work in self-employed or self-employed workers were 14.7% in 2019, showing a slight increase compared to the previous year, which was 13.8%. During the study period, 375 workers were autonomous/self-employed, equivalent

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to 16.4%; 153 employees, equivalent to 6.7% and 36 independent workers, representing 1.57%.

Self-employment tends to be carried out in improvised environments, sometimes exposing the family to health risks and dangers, in addition to being unprotected from a labor and social security point of view. It is important to point out that the social security coverage to which the worker is entitled in case of contribution, is quite variable in the country, considering the formality indexes and employment and unemployment rates. [19]

This research demonstrated that in the southern macro-region of Santa Catarina, this data is almost not completed in the SINAN investigation form, 2,046 (89.6%) of this field were not informed, which makes epidemiological analysis very difficult, especially in the case of such a vast database that covers a macro-region of 45 municipalities.

The research found 1,587 accidents at work throughout the period that were registered employees with a formal contract, however, only 350 Communications of Accident at Work - CWA were registered, which is equivalent to 22.05%. Of these, 900 were described as "Ignored", which is equivalent to 56.7%. The option "Not applicable" was 37, equivalent to 2.33%, completed as "No" there were 299, equivalent to 18.8%. There is a low rate of completion of this field, making it difficult to complete the form and further analyzes of this specific section of information.

Cavalcante (2016), describes the importance of issuing the CWA as data that makes public the existence of accidents by companies and that workers fear losing their jobs, although when removed by the sickness benefit, they still receive 91% of the contribution salary, motivating them not to look for the CWA.

Although this study does not demonstrate a high number of outsourced work, it is necessary to question the quality of filling out the investigations. Does the health professional know how to differentiate direct work from outsourced work? Is there enough knowledge about it? In addition, it is important to emphasize that, as outsourcing is a situation that makes workers more vulnerable to the risks of accidents at work, this epidemiological data serves to carry out a more in-depth analysis of the real scenario in which workers find themselves.

The municipality of residence does not necessarily represent the same municipality where the accident occurred, nor does it mean to be where the company or place of employment is located, in cases of typical accidents that occur on their premises. Sometimes, the municipality of occurrence may be the same as where you live, however this information is important to identify where the accident itself occurred, in the case of accidents occurring at the contractor's facility, in order to trigger an alert for the Health Surveillance team to act.

Although the worker's health is described in the protocol, it is not even mentioned in the law that implements the Health Assistance Network, in 2010, being defined as a kind of organizational arrangement of actions and health services, in order to guarantee the comprehensive care of the individual. [20] Subjectively, it is understood that the worker's health is inserted in a not so clear way, which does not allow the integration between the different areas of the assistance network, which includes everything from basic care, specialties and hospital care.

The work itself is part of people's social organization, being one of the determinants of the health conditions of a population. In this way, the dialogue between those involved is so important in order to map the conditions of work accidents in a regionalized way. [20]

The most frequent type of accident was typical, with 1,918 accidents, representing 83.8% of the sample, followed by the commuting accident with 339 which is equivalent to 14.8% and the ignored option were 31 accidents, being 1.4% of the studied population.

The International Classification of Diseases - ICD of cause of accident ICD 10, includes the group that goes from V01 to Y98. All were described according to the constant code in the database. This data makes it possible to verify what caused the serious accident at work.

Although the classification describes in a methodological and scientifically accepted way, for a more in-depth analysis of the cause of the accident itself, it is necessary to clearly understand how it occurred, which is possible through the complementary information field and Summary description of how the accident/activity occurred / causes/ conditions/ object/ agents that contributed directly or indirectly to the occurrence of the accident.

Place of occurrence, contractor's premises, where 1,525 serious work accidents occurred, which is equivalent to 66.6%, followed by public roads, which were 389 accidents, which are equivalent to 17%; typical accidents were 1,918, equivalent to 83.8%, followed by commuting accidents, 339, equivalent to 14.8%.

Regarding the ICD of the cause, it was possible to identify the most frequent ones: Contact with other machines and non-specific ones (532 -23.3%); Impact caused by thrown, projected or falling object (339 -14.8%); Squeezed, picked, compressed or crushed inside or between objects (160 -7.0%); Motorcyclist injured in collision with a car, pick-up truck or truck (97 -4.2%); Falling from or out of buildings or other structures (76 -3.3%); Other falls from one level to another (73 - 3.2%); Fall on the same level due to slipping, tripping or false steps (69 -3.0%); Fall on or from scaffolding (56 -2.4%).

It is important to highlight that of the total number of notifications, 805 observation fields were not filled in, that is, without a description of what happened, which may hinder a more detailed analysis of accidental events from this perspective.

The SINAN investigation form

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makes it possible to fill in different parts of the body that were affected during the serious work accident, divided into three sections.

In the analysis, it was possible to verify that the most affected primary parts were: Hand (931- 40.7%); Upper limb (354 – 15.5%); Lower limb (260 – 11.4%); Foot (243 – 10.6%). Most affected minor parts: Ignored (1,892 – 82.7%); Other (171 – 7.5%); Lower limb (106 -4.6%) and upper limb (102 – 4.5%). Tertiary Body Part: Ignored (2.103-91.9%); Upper limb (31 -1.4%) and Lower limb (29 - 1.3%).

In a retrospective descriptive study, carried out at the Hospital das Clínicas of the Faculty of Medicine of Ribeirão Preto, University of São Paulo (HC-FMRP-USP), in 2000, involving data on accidents involving hands, of the total number of trauma cases, 27.6 % were related to hand trauma. Of the cases linked to Orthopedics and Traumatology, the incidence of accidents in the hand corresponded to 42.5%, of which 24% were technical-level professionals who worked with tools, such as joiners, carpenters, mechanics and masons. [21]

As for the ICD of the injury, it was possible to identify those that occurred the most: Fracture at the wrist and hand level (416-18.2%) was the most frequent, even showing an increase over the period, followed by traumatic amputation at wrist and hand level (255-11.1%); Foot fracture (except ankle) (159-6.9%); Leg fracture, including ankle (136 - 5.9%); Wrist and hand injuries (131-5.7%); Forearm fracture (116-5.1%).

As for the evolution of the cases, it was possible to identify that the vast majority was temporary disability (1669-72.9%), followed by permanent partial disability (195-8.5%), cure (194-8.5%) and ignored (109-4.8%).

In the period from 2012 to 2019, the cities of Criciúma with 174.4 million reais, Araranguá 43.2 (mi) and Tubarão 134.1 (mi), together added a cost of 351.7 million, between the benefits of Sickness Allowance due to an accident at work (B91) and Sickness Allowance due to an accident at work (B91). According to the Digital Observatory for Health and Safety at Work, of the Public Ministry of Labor (MPT). [20]

It is worth mentioning that the financing of social security is integrated between public authorities and society, in order to guarantee the rights related to social assistance, social security itself and health, as provided for in article 194 of the Federal Constitution of 1988. [22] In this way, it is important to emphasize that the "expenses" with benefits arising from accidents at work are financed by the collective, that is, the whole society pays the bill.

As for the issuance of CWA, it is worth mentioning that according to table 5, 1,586 serious accidents at work were identified in which workers were registered with a formal contract (69.3%), however, when analyzing the issuance of the Work Accident Report - CWA, it is observed that 1,237 cases had the Ignored option, that is, 54.1% of this field was marked, which means that there was no search for this information by the professional who filled out the SINAN investigation form. The option: "not applicable" (129) equivalent to 5.6%. Another relevant data was that 533 (23.2%) of the workers did not have the CWA issued, only 389 (17%) were marked as "yes", that is, they had access to the CWA.

Pursuant to Law 8213 of 1991, which provides for Social Security Benefit Plans and other provisions, in its article 22 it describes that the company or domestic employer must report the accident at work to the Social Security until the first working day of the occurrence, and in case of death immediately to the competent authority. [23]

Of the 45 municipalities that make up the southern macro-region of Santa Catarina, only 32 municipalities responded to the questionnaire. Only 21 municipalities refer cases of serious and fatal accidents at work to municipal health surveillance, 65.6% of which, only 17 municipalities, equivalent to 53.1%, reported carrying out intervention actions on the part of health surveillance. It is worth mentioning that given the due proportions, each municipality must plan surveillance actions, based on the guidelines already established by the Ministry of Health and its guiding documents.

Attention to organizational conditions and the perspective of the practical operation of workers in their contexts is essential. [24] A study carried out in 2020 in the same state of SC, showed that there is a lack of planning in health surveillance in relation to workers' health, where only 8.9% of inspectors in the state of Santa Catarina reported routinely carrying out surveillance actions in workers' health, that is, planned. [25] In practice, the feeding of information systems data is only an obligation imposed by ministerial ordinances, being carried out by professionals, usually not trained, and with little capacity for data analysis.

Some of the difficulties faced by professionals were: the current pandemic situation, difficulty in accessing companies, difficulty in filling out the investigation form by hospital professionals, communication to the work safety technician in the municipality, there are no cases of deaths due to fatal accidents in the municipality so far and notification by the hospitals.

It is observed that in the event of serious accidents at work, there is an urgent need for measures to improve the various dimensions of work environments. [24] Although some surveillances perform actions in an attempt to mitigate the damage caused by accidents, there is no well-defined flow of actions to be taken by them, or which actions should be taken.

In the state of Paraná, for example, when a serious work accident is identified in the hospital environment, it must initiate the notification using the SINAN serious work accident notification form, after that, the local health surveillance, which has access to this information, will start investigating the

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event, preparing a technical report describing the occurrence and the measures taken or necessary to take place in the work environment where the accident occurred. After this action, the Regional Health Department or CEREST evaluate the information contained in the report, concluding the investigation and notification to establish the relationship between what happened and work. [10]

VISAT actions by municipal surveillance agencies with the support of CEREST seem to be the way to incorporate these actions, however, it is necessary that inspectors also have the necessary knowledge to act in this area, due to the complexity involved in different types of work environments. The authors Madeira and Longen (2020) highlight that matrix support in health is a good alternative for technical support, given that there are already experiences that have shown that Primary Care has great potential to identify the needs of workers in their daily lives. [25]

In a study carried out on the knowledge of primary health care professionals, the objective was to identify the knowledge about the health surveillance process, with VISAT being the least cited. Only Occupational Medicine and Occupational Health actions were described, to the detriment of workers' health actions as an existing public policy, which could demonstrate that there is still a lack of knowledge of health professionals about health surveillance strategies as a whole. [25,26]

Health Surveillance encompasses several actors within the Health Care Network, one of the pillars being epidemiological surveillance, which is defined as a set of actions to know, detect and prevent changes in the determining and conditioning factors of health, be it individual or collective. Thus, the production and analysis of information are essential to subsidize the epidemiological monitoring of a municipality or region, requiring the definition of priorities for carrying out health actions, in addition to evaluating interventions in a methodological way. [5, 27]

Interventions in workers' health must seek to transform workplaces, in the sense of making them promoters of health, and not of illness and death, in addition to guaranteeing comprehensive health care for workers, considering their insertion in production processes. [5,27, 28]

In everyday practice, the health of workers in the SUS still faces several challenges, among which the "human resources" factor, which could be called the human factor, stands out as an essential element for paradigm shifts. Like CEREST in the southern region of Santa Catarina, which gradually came to be dismantled over the years, even after receiving various financial resources and justifying its importance recognized even at the highest levels with bodies in the area at regional levels, state and national, for carrying out projects and works that directly and indirectly benefit hundreds of formal and informal workers.

CONCLUSION

Through this research, it was possible to perceive that in the southern macro-region of Santa Catarina, the CNAE is almost not completed in the SINAN investigation form, and 2,046 (89.4%) of this field were not informed, which considerably complicates the epidemiological analysis, especially emphasizing the involvement of such a vast database that covers a macro-region of 45 municipalities.

Considering the data found regarding the cause, type of injury and evolution of the cases, it is possible to state that we still need extensive vigilance in the work environment, especially when it comes to protecting machinery and training workers to handle it. As well as, surveillance actions must be strengthened in civil construction, be it industry, or independent/self-employed workers. For this, it is necessary to have a matrix in Occupational Health with the involvement of Primary Health Care. Due to the high number of non-issuance of the CWA, it is understood the need for continuous training of health professionals to notify and investigate serious and fatal accidents at work, in order to fill in the documents in the most reliable and correct way possible, in addition to guiding the worker in the pursuit of the social right guaranteed by the issuance of the Work Accident Report, following the individual outcome of each case.

Unfortunately, this study found that although workers' health has already made many advances over the years, there is still much to be achieved. Especially when there is no interaction between surveillances, which makes it difficult to carry out actions aimed at the conditioning and determining aspects of serious and fatal accidents at work, which are mostly preventable.

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