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Trend of morbimortality due to labor accidents in the civil construction sector, 2009 to 2017

Tendência da morbimortalidade por acidentes do trabalho no setor da construção civil, 2009 a 2017

Tendencia de morbimortalidad por accidentes laborales en el sector de la construcción civil, 2009 a 2017

RESUMO

Objetivos: Descrever a tendência da morbimortalidade por acidentes do trabalho no setor da construção civil no estado da Paraíba, 2009 a 2017. Métodos: Trata-se de estudo ecológico de séries temporais com base nos registros de acidentes do trabalho protocolados no Instituto Nacional do Seguro Social. A população corresponde ao número médio anual de vínculos ao Instituto Nacional do Seguro Social, acobertado pelo seguro de acidente do trabalho. Na análise de tendência, foi utilizado o método de regressão linear simples, com nível de significância de 5%. Resultados: Observou-se tendência significativa de decréscimo na taxa de incidência de acidentes do trabalho ($R^2=0,7625$; $p<0,05$) e tendência de comportamento estável para a taxa de mortalidade ($R^2=0,02162$; $p>0,05$) e da letalidade ($R^2 = 0,0055$; $p>0,05$). Conclusão: Os achados mostram a necessidade de fortalecer o conjunto de ações preventivas nos canteiros de obra, com atuação intersetorial e com participação do movimento sindical representativo da categoria.

DESCRIPTORES: Saúde do Trabalhador; Comunicação de Acidentes de Trabalho; Construção Civil

ABSTRACT

Objectives: To describe morbimortality trend due to labor accidents in the civil construction sector, in the state of Paraíba, 2009 to 2017. Methods: It is an ecological study of time series based on the labor accidents records filed in the National Institute of Social Security. The population corresponds to the average annual number of the National Institute of Social Security bonds, covered by labor accident insurance. In the trend analysis, the simple linear regression method was used, with a significance level of 5%. Results: There was a significant downward trend in the incidence rate of labor accidents ($R^2=0.7625$; $p < 0.05$) and a trend of stable behavior for the mortality rate ($R^2 = 0.02162$; $p > 0, 05$) and lethality rate ($R^2 = 0.0055$; $p > 0.05$). Conclusion: The findings show the need to strengthen the set of preventive actions at the construction sites, with intersectoral action and with the participation of the representative union movement of the category.

DESCRIPTORS: Occupational Health; Labor Accident Registry; Civil Construction.

RESUMEN

Objetivos: Describir la tendencia de la morbilidad y mortalidad por accidentes de trabajo en el sector de la construcción civil en el estado de Paraíba, de 2009 a 2017. Método: Se trata de un estudio ecológico de series de tiempo basado en los registros de accidentes laborales archivados en el Instituto Nacional de Seguridad Social. La población corresponde al número medio anual de contratos con el Instituto Nacional de Seguridad Social, cubiertos por el Seguro de Accidentes de Trabajo. En el análisis de tendencias se utilizó el método de regresión lineal simple, con un nivel de significancia del 5%. Resultados: Hubo una tendencia descendente significativa en la tasa de incidencia de accidentes laborales ($R^2 = 0,7625$; $p < 0,05$) y una tendencia de comportamiento estable para la tasa de mortalidad ($R^2 = 0,02162$; $p > 0,05$) y letalidad ($R^2 = 0,0055$; $p > 0,05$). Conclusión: Los hallazgos muestran la necesidad de fortalecer el conjunto de acciones preventivas en obras de construcción, con acción intersectorial y con la participación del movimiento sindical representante de la categoría.

DESCRIPTORES: Salud Ocupacional; Comunicación de accidentes laborales; Construcción civil.

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INTRODUCTION

The civil construction sector (CCS) is considered one of the highlights of the national economy, as it is a strong generator of labor. 1 In recent years, this sector has been driven by public and private investments under the Growth Acceleration Program (PAC), as well as by incentives generated under the Federal Government's housing program "Minha Casa Minha Vida", which increased gross domestic product (GDP) in 2010 to 7,5%, the highest in the last 25 years. 2 In the same year, the number of jobs in the CCS in the state of Paraíba also increased, as well as leading the rate of formal employment in 2011. 3

Due to the exponential growth in employability of the CCS with the incorporation of thousands of workers, it consequently reflects in the morbidity and mortality profile of workers. Since this sector presents various forms of organization of the work process, it depends a lot on physical, manual work, without many restrictions on the recruitment of workers, who start to perform exhausting and dangerous activities. 4,5 These are situations in the configuration of work in different PAC works. 6 To illustrate, official Brazilian Social Security data show an increase of approximately 116% between 2006 and 2012 in the number of occupational accidents (OA) in the CCS. 4

It is noteworthy that the CCS is considered by excellence, an extremely dangerous activity worldwide. 7,8 In Brazil, it has also "been one of the branches of economic activity with the highest risk of fatal and non-fatal accidents." 8 Therefore, the mortality rate from OA in the CCS recorded in Brazil in 2009, was 18,6 deaths per 100.000 workers, corresponding to double the rate

recorded in the same year in the United States, which was 9,7 per 100.000 workers and much higher than the European Union rate. 1

It is evident that the incidence and mortality from OA in Brazil has significantly decreased in recent years, 9 however it remains high in relation to the CCS. In fact, the mortality rate from OA in Brazil in 2017 was 5,21 deaths per 100.000 workers linked to the National Social Security Institute (INSS - Instituto Nacional do Seguro Social), while in the CCS the rate was 11,76 deaths per 100.000. 10 Thus, "the first sector in the country, in the ranking of permanent disability, the second in deaths, second only to land transport and the fifth in leaves of more than 15 days", 10 thus impacting the health of workers, Social Security and the unified health system (SUS), 11 that is, the OA in the CCS express a social, economic and public health problem.

Certainly, the epidemiological scenario of morbidity and mortality due to OA in the CCS, signals existing deficiencies in occupational health protection policies and the extreme need for government action. According to the World Health Organization (WHO) and the World Bank, the absence of public policies aimed at preventing accidents can lead to an increase in morbidity and mortality from accidents. 12 In this context, the study can support decision-making in health and safety at work and assess policies to protect workers' health. Given the above, this study aims to describe the trend of morbidity and mortality due to occupational accidents in the CCS in the state of Paraíba, 2009 to 2017.

METHODS

This is an ecological time-series study

based on records of AT and deaths resulting from OA, filed with the INSS, through the communication of occupational accidents (CAT - comunicação de acidente de trabalho) and those determined by the Social Security Epidemiological Nexo (NTEP - Nexo Técnico Epidemiológico Previdenciário), 13 that occurred in the CCS in the state of Paraíba, from 2009 to 2017. The OA and deaths resulting from OA that occurred in the CCS in the state of Paraíba between 2009 and 2017, in workers linked to the INSS, covered by the SAT, were included in this study. The sample consisted of 3.656 OA and 43 deaths. In this study, the OA comprises the total number of accidents by reason: typical, commuting accident and work-related illness.

To calculate the incidence and mortality rate, the population exposed to risk was used as the denominator, corresponding to the average annual number of workers in the CCS in the state of Paraíba, linked to the INSS, covered by the SAT, 13 Calculation formulas 1 and 2. For lethality, the number of AT registered with CAT and NTEP was used as the denominator and the number of deaths resulting from AT was used as numerator, in calculation formula 3.

Formula 1. To calculate the incidence rate:

$$= \frac{\text{number of occupational accidents registered with CAT and NTEP}}{\text{annual average number of CCS workers linked to the INSS covered by the SAT}} \times 1.000$$

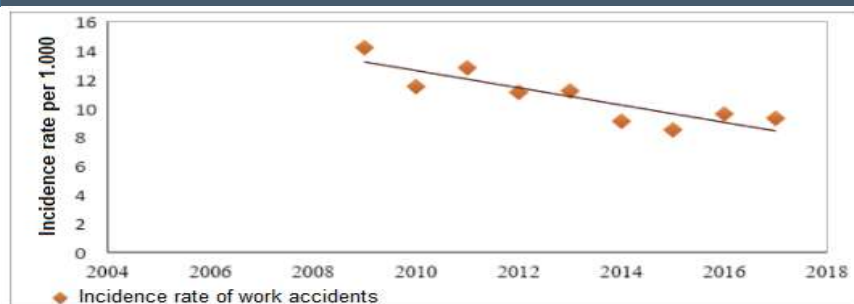
Formula 2. for calculating the mortality rate:

$$= \frac{\text{number of deaths resulting from occupational accidents}}{\text{annual average number of CCS workers linked to the INSS covered by the SAT}} \times 100.000$$

Formula 3. for the lethality rate:

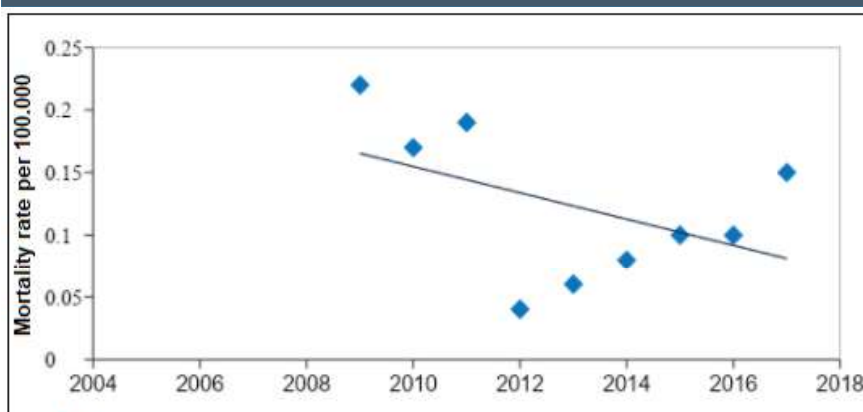
$$\frac{\text{number of deaths from occupational accidents}}{\text{number of work accidents registered with CAT and NTEP}} \times 1.000$$

Graph 1: Trend in the incidence rate (per 1.000 workers) for occupational accidents in the CCS registered with the INSS, in the state of Paraíba, 2009 to 2017



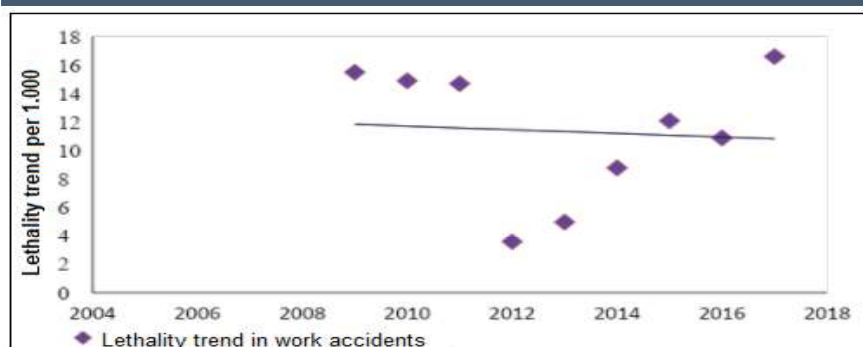
Fonte: Dados da pesquisa.

Graph 2: Trend in the mortality rate (per 100.000 workers) due to occupational accidents in the CCS registered with the INSS, in the state of Paraíba, 2009 to 2017



Fonte: Dados da pesquisa.

Graph 3: Trend in the fatality rate (per 1.000 accidents) due to occupational accidents of the CCS, registered with the INSS, in the state of Paraíba, 2009 to 2017.



Fonte: Dados da pesquisa.

For the analysis of the temporal trend of each of the studied variables, a simple linear regression model was used: $(Y = \beta_0 + \beta_1 X)$, with a significance level of 5% due to ease of interpretation. In the modeling, the dependent variable (Y) was the incidence, mortality and lethality rate, the years (X) were considered as explanatory variables. The F test of the analysis of variance was also performed, through which the p value of significance and adequacy of each traced model was obtained.

The statistical analyzes of the data were carried out with the Microsoft 2016 software. The database was collected from the "AEAT INFOLOGO" application, which has secondary data on OA, available on the DATAPREV page. This justifies the absence of submission of the study to the Research Ethics Committee, due to the public and administrative nature of the data.

RESULT

The results indicate a decreasing trend in the incidence rate of OA in the CCS in Paraíba between 2009 and 2017. The linear regression model ($y = -0,5983x + 1215,3$; $R^2=0,7625$; $p=0,002$) showed a declining trend in the incidence rate ($R^2=0,76$; $p<0,05$), with a linear decline around 0,60 AT per 1.000 workers per year. The explanatory power of the model was 76% ($R^2=0,7625$) over the annual variation in incidence rates (graph 1). The average rate over the period investigated was 10.8 AT per 1,000 workers, expressing an oscillation in the incidence rate between 2009 and 2017 from 14,2 per 1.000 workers in 2009 to 9,3 in 2017 (Table 1).

As for mortality, a trend of stable behavior was identified in the mortality rate due to OA in the CCS in Paraíba between 2009 and 2017. The linear regression model ($y = -0,0105x + 21,26$; $R^2 = 0,2162$; $p=0,205$) showed a trend of stable behavior in the OA mortality rate, with a linear decline of 0,0105 deaths per 100.000 workers per year. The model was capable of 22% of the annual variation in OA mortality rates (graph 2). Over the period, the average

Table 1: Average number of workers linked to the CCS INSS, number of occupational accidents and deaths, incidence rate, mortality, lethality, Paraíba (2009 to 2017)

Year	Average no. of links	No. of accidents from work	Incidence Rate (1.000 links)	No. of deaths	Mortality rate (100.000 links)	Lethality rate (1.000 acidentes)
2009	27.386,50	388	14,2	6	0,22	15,5
2010	35.003,67	404	11,5	6	0,17	14,9
2011	42.594,92	545	12,8	8	0,19	14,7
2012	50.513,75	562	11,1	2	0,04	3,6
2013	54.059,83	606	11,2	3	0,06	5,0
2014	50.454,58	457	9,1	4	0,08	8,8
2015	48.197,25	412	8,5	5	0,10	12,1
2016	38.400,92	368	9,6	4	0,10	10,9
2017	32.597,08	302	9,3	5	0,15	16,6
Average	42.134,28	449	10,8	4,8	0,12	11,3

Source: Research data.

rate was 0,12 deaths per 100.000 workers. Setting a sweep in the mortality rate from 2009 to 2017 from 0,22 deaths per 100.000 workers to 0,15 deaths per 100.000 workers (Table 1).

In relation to lethality, there was a trend of stable behavior in the fatality rate for OA in the CCS in Paraíba between 2009 and 2017 ($R^2 = 0,0055$; $p > 0,05$). The Simple Linear Regression Model ($y = -0,1267x + 266,32$; $R^2 = 0,0055$; $p = 0,848$), with a linear increase of 0,12 of deaths per year. The explanatory capacity of the model was 0,55% over the annual variation of lethality rates resulting from OA (Graph 3). The annual average lethality rate was 11,3%, ranging from 15,5% in 2009 to 16,6% in 2017.

DISCUSSION

In this study, there was a significant downward trend in the incidence rate and stability in mortality and mortality from OA in the CCS in the state of Paraíba in the period analyzed from 2009 to 2017, a finding similar to those of other studies 1,16 demonstrated a decline in accidents in the CCS in the period 2009-2018 in Brazil and 2009-2017 in Santa Catarina.

The factors observed as contributors to these trends in this study were the responses of the heterogeneity of actions carried out in this period by various institutions,

such as: Regional Superintendence of Labor and Employment in Paraíba (SRTE/PB), Public Ministry of Labor (MPT - Ministério Público do Trabalho), Occupational Health Reference Centers (CERESTs), employers' and workers' unions.

One of the hypotheses for these findings would also be in the responses of the structuring actions of the Regional Standing Committee on Working Conditions and Environment in the Construction Industry of Paraíba (CPR-PB), an example of the implementation of the Electric Accident Reduction Program (PRAE - Programa de Redução de Acidentes Elétricos), which managed to banish deaths from shock at construction sites in Paraíba 17 and because of this relevance in the prevention of work accidents, it was indicated as a model to be followed within the scope of PAC actions. 17 Another evidence is that there may have been a greater investment in worker safety and health by employers.

It is noteworthy that studies show that the CCS is a complex productive sector that points to the serious public health problem of non-fatal work accidents. 1,18,19 In 2009 alone, 33.762 tax actions were carried out at the CCS. 1,20 With the Minha Casa, Minha Vida program, more than 103.000 workers were incorporated into the CCS throughout the country in the second half of 2009. 21 In this context,

it consequently reflects on the safety and health of workers. This, perhaps, is a great challenge for the institutions that monitor and promote workers' health.

With a view to safeguarding workers, in 2009, the SRTE/PB and the MPT intensified inspections at the CCS, in order to investigate possible irregularities at the construction sites. 22 A study has shown, as contributing factors to the decline in the incidence of occupational accidents and mortality, such as improved working conditions and underreporting of accidents. 9

Despite the study's social security limitations and the fact that it is exclusively workers covered by the SAT, it is concluded that the findings are relevant epidemiological indicators to support decision-making in health and safety of workers at the CCS. In view of this new situation in the world of work, during the COVID-19 pandemic and the 2017 Labor Reform, which increased the working day and reduced time for meals and rest. 23 These are situations that can have negative impacts such as a drop in productivity, an increase in the number of work accidents and a reduction in the quality of life of workers. 24

CONCLUSION

It is concluded that the findings show a significant downward trend in the inci-

dence rate and stability in mortality and mortality from OA in the CCS in the state of Paraíba in the period analyzed from 2009 to 2017. With an average of 449 OA cases per year. The findings also show that even with the efforts of institutions in the promotion and safety of workers' health, accidents still constitute a public health problem in the CCS.

Given the above, the need to intensify the set of preventive actions at construction sites is reiterated, with more effectiveness of public policies aimed at worker health, which are strengthened by multidisciplinary, interdisciplinary, intersectoral action and with the participation of social control, as well as the trade union movement representing the category. Finally, the im-

portance of new studies involving the entire working population, both formal and informal, is also highlighted, especially in the small works of the CCS in Paraíba.

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