

Epidemiological Report

Accidental tetanus

Historic Series 2010 – 2021

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BRIEF HISTORY OF INJURY/DISEASE

Tetanus was one of the deadliest diseases of the initial period of Brazil as a nation, victimizing mainly slaves and newborns. Before the campaigns to promote better hygiene conditions in the second half of the 19th century, the disease had already started to decline in the country, possibly with the move from farms to more populated areas, reducing contact with soil and organic material. It is speculated that the mechanization of the field also played an important role (the rural worker walked around the land plowing the soil and, in front of them, the plow was pulled by horses or oxen. Thus, contact with soil contaminated by feces was inevitable.

In the 1980s, the annual average of accidental tetanus cases in the state of São Paulo (SSP) corresponded to the annual average of the disease in the United States as a whole. The improvement of hygiene conditions and, mainly, the vaccination of pregnant women and adults, produced a sharp reduction in the number of occurrences in São Paulo. Above all, there is a reduction in the proportion in females, probably as a result of the universal vaccination of pregnant women.

It would not be appropriate to distribute tetanus cases by probable site of infection (PSI), as no surveillance measures exist to be adopted in this regard. The main aspects to be analyzed should be previous vaccination and post-injury prophylaxis. However, unfortunately, filling in these data in the accidental tetanus epidemiological investigation forms is very flawed. In relation to the vaccine, except perhaps in the case of children, no effort is made to verify whether the patient has been vaccinated and, if not, why this occurred and whether it can be corrected. On the other hand, in relation to the treatment of the wound that served as a gateway for the causative agent, there is a general lack of knowledge on how to complete the form. Many understand that the item refers to the treatment of the disease and respond that the patient received serum or tetanus immunoglobulin for the healing process and not for prophylaxis. This incorrect filling prevents the action of surveillance in places where there is not an adequate approach to injuries to avoid tetanus.

ETIOLOGICAL AGENT

The etiologic agent is *Clostridium tetani*, a sporulated gram-positive bacillus. Bacillus spores remain for long periods in soil, plants and objects. When they enter the body through a wound and encounter anaerobic conditions, they switch to their active form, producing a toxin (tetanospasmin) that affects the nervous system, leading to the signs and symptoms of tetanus. *C. tetani* infection does not produce immunity and the patient who had the disease needs to be immunized.

TRANSMISSION MODE

Tetanus is a serious, non-contagious infectious disease. There is no possibility of person-to-person transmission. The *C. tetani* spore does not actively penetrate the skin, requiring the presence of a solution of continuity in the skin or mucosa, that is, it needs to be introduced and find anaerobic conditions (absence of oxygen). Therefore, puncture wounds, which take the spore to deeper layers, and infected wounds, which provide anaerobiosis, are the most opportune for contagion. As puncture wounds are also more common in the lower limbs, it created an urban legend that tetanus would be due to holes in the foot with a rusty nail. The non-oxidized one can also contain spores, although the rusty one is more likely to be contaminated. In addition, burns (fireworks, for example), plant thorns, open fractures, animal bites, and even bad teeth, can serve as a gateway. Any injury should remind the healthcare professional to ask if the tetanus vaccination is up to date.

EPIDEMIOLOGICAL SITUATION

As previously mentioned, the annual number of tetanus cases has been falling in the SSP, especially among women. Table 1 shows the autochthonous confirmations of accidental tetanus from 2010 to 2021 by likely municipality of infection.

Table 1. Autochthonous confirmed cases in the SSP from 2010 to 2021 by year of onset of symptom (OS) and probable municipality of infection (LPI).

PSI	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
350160 AMERICANA	1	0	0	0	0	0	0	0	0	0	0	0	1
350250 APARECIDA	0	0	1	0	0	0	0	0	0	0	0	0	1
350320 ARARAQUARA	0	0	0	0	1	0	0	0	1	0	0	0	2
350410 ATIBAIA	4	0	0	0	1	0	1	0	0	0	0	0	6
350460 BADY BASSITT	0	0	0	0	0	0	0	0	0	0	0	1	1
350510 BARBOSA	0	0	0	1	0	0	0	0	0	0	0	0	1
350530 BARRA BONITA	0	0	0	0	0	0	0	0	0	1	0	0	1
350550 BARRETOS	1	2	0	1	1	1	0	0	0	0	0	0	6
350590 BATATAIS	0	0	0	0	0	0	0	0	1	0	0	0	1
350600 BAURU	0	1	0	1	0	0	0	0	0	0	0	0	2
350610 BEBEDOURO	0	1	1	0	0	0	0	0	0	0	0	0	2
350650 BIRIGUI	0	0	0	1	0	0	0	0	0	0	0	0	1
350750 BOTUCATU	0	0	0	0	1	1	0	0	0	0	0	0	2

EPIDEMIOLOGICAL REPORT OF THE ACCIDENTAL TETANUS SURVEILLANCE
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PSI	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
350760 BRAGANCA PAULISTA	0	0	0	0	0	0	0	2	1	0	0	0	3
350780 BRODOSQUI	0	0	0	0	0	0	0	0	0	0	0	1	1
350925 CAJATI	0	0	0	0	0	1	0	0	0	0	0	0	1
350950 CAMPINAS	0	1	1	0	0	1	1	0	0	0	1	0	5
351020 CAPÃO BONITO	0	0	1	0	0	0	0	0	0	0	0	0	1
351050 CARAGUATATUBA	0	1	0	0	0	0	0	0	0	0	0	0	1
351060 CARAPICUIBA	0	0	0	1	0	1	0	0	0	0	0	1	3
351110 CATANDUVA	0	0	0	0	0	0	1	0	0	0	0	0	1
351120 CATIGUÁ	1	0	0	0	0	0	0	0	0	0	0	0	1
351200 COLINA	0	0	0	0	0	0	1	0	0	0	0	0	1
351210 COLÔMBIA	0	1	0	0	0	0	0	0	0	0	0	0	1
351300 COTIA	0	0	0	1	0	0	0	0	0	0	0	0	1
351340 CRUZEIRO	0	0	0	1	0	0	0	1	0	0	0	0	2
351350 CUBATÃO	1	0	0	0	0	0	0	0	0	0	0	0	1
351360 CUNHA	0	0	0	0	0	0	0	0	0	0	2	0	2
351550 FERNANDÓPOLIA	0	0	0	0	1	0	0	0	0	0	0	0	1
351620 FRANCA	0	1	1	1	0	0	0	2	0	0	0	0	5
351640 FRANCO DA ROCHA	0	1	0	0	0	0	0	0	1	0	0	0	2
351670 GRAÇA	0	0	0	0	0	1	0	0	0	0	0	0	1
351840 GUARATINGUETÁ	0	0	0	0	0	1	0	0	0	0	0	0	1
351870 GUARUJÁ	0	0	0	1	0	0	0	0	0	0	1	0	2
351880 GUARULHOS	1	0	0	0	0	0	1	0	0	0	0	0	2
351907 HORTOLÂNDIA	0	1	0	1	0	1	0	0	0	1	0	0	4
351960 IBITINGA	0	0	0	1	0	1	0	0	0	0	0	0	2
351970 IBIÚNA	0	0	0	0	1	0	0	0	0	0	0	0	1
352050 INDAIATUBA	0	0	1	0	0	0	0	0	0	0	0	0	1
352190 ITAJOBÍ	0	0	1	0	0	0	0	0	0	0	0	0	1
352220 ITAPECERICA DA SERRA	0	0	0	0	0	0	0	1	0	0	0	0	1
352270 ITÁPOLIS	1	0	0	0	0	0	0	0	0	0	0	0	1
352320 ITARARÉ	0	0	0	0	0	0	0	0	1	0	0	0	1
352340 ITATIBA	0	1	1	0	0	0	0	0	0	0	0	1	3
352410 ITUVERAVA	0	0	0	0	0	1	0	0	0	1	0	0	2

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PSI	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
352470 JAGUARIÚNA	0	0	0	0	0	0	0	0	0	0	1	0	1
352510 JARDINÓPOLIS	1	0	0	0	0	0	0	0	0	0	0	0	1
352530 JAÚ	0	0	1	0	0	0	0	0	0	0	0	0	1
352690 LIMEIRA	0	0	0	1	0	0	0	1	1	0	1	0	4
352710 LINS	0	0	0	0	0	0	1	1	0	0	0	0	2
352730 LOUVEIRA	0	1	0	0	0	0	0	0	0	0	0	0	1
352900 MARÍLIA	0	0	0	0	0	0	0	0	0	1	0	0	1
352920 MARTINÓPOLIS	0	0	1	0	0	0	0	0	0	0	0	0	1
352990 MIRACATU	0	0	0	0	0	0	0	0	1	0	0	0	1
353020 MIRANTE DO PARANAPANEMA	0	0	0	0	0	0	0	0	0	0	1	0	1
353060 MOGI DAS CRUZES	0	0	0	0	1	0	1	0	0	0	0	0	2
353070 MOGI GUAÇU	0	0	0	1	0	0	0	0	0	0	0	0	1
353080 MOGI MIRIM	0	0	0	0	0	0	0	0	0	0	1	0	1
353240 NAZARÉ PAULISTA	0	0	0	0	0	0	0	0	1	0	0	0	1
353340 NOVA ODESSA	0	0	0	0	0	0	1	0	0	1	0	0	2
353350 NOVO HORIZONTE	0	0	0	0	1	0	0	0	0	0	0	0	1
353440 OSASCO	1	0	1	0	0	1	0	0	0	0	1	0	4
353600 PARAPUÃ	0	0	0	0	1	0	0	0	0	0	0	0	1
353640 PAULICÉIA	0	0	1	0	0	0	0	0	0	0	0	0	1
353650 PAULÍNIA	0	0	0	0	0	1	0	0	0	0	0	0	1
353700 PEDREGULHO	0	0	0	0	0	0	1	0	0	0	0	0	1
353730 PENÁPOLIS	0	0	0	0	0	0	0	1	0	0	0	0	1
353760 PERUÍBE	0	0	2	0	0	0	0	0	0	0	0	0	2
353910 PIRAPORA DO BOM JESUS	2	0	0	0	0	0	0	0	0	1	0	0	3
354100 PRAIA GRANDE	1	0	1	0	1	0	0	0	0	0	0	0	3
354140 PRESIDENTE PRUDENTE	0	0	1	1	0	0	0	0	0	0	0	0	2
354160 PROMISSÃO	0	0	0	0	0	0	0	0	0	1	0	0	1
354220 RANCHARIA	1	0	0	0	0	0	0	0	0	0	0	0	1
354240 REGENTE FEIJÓ	0	1	0	0	0	0	0	0	0	0	0	0	1
354270 RESTINGA	0	0	0	2	0	0	0	0	0	0	0	0	2
354300 RIBEIRÃO BRANCO	0	0	0	0	0	0	0	0	0	0	0	1	1
354330 RIBEIRÃO PIRES	0	2	0	1	0	0	0	0	0	0	0	0	3

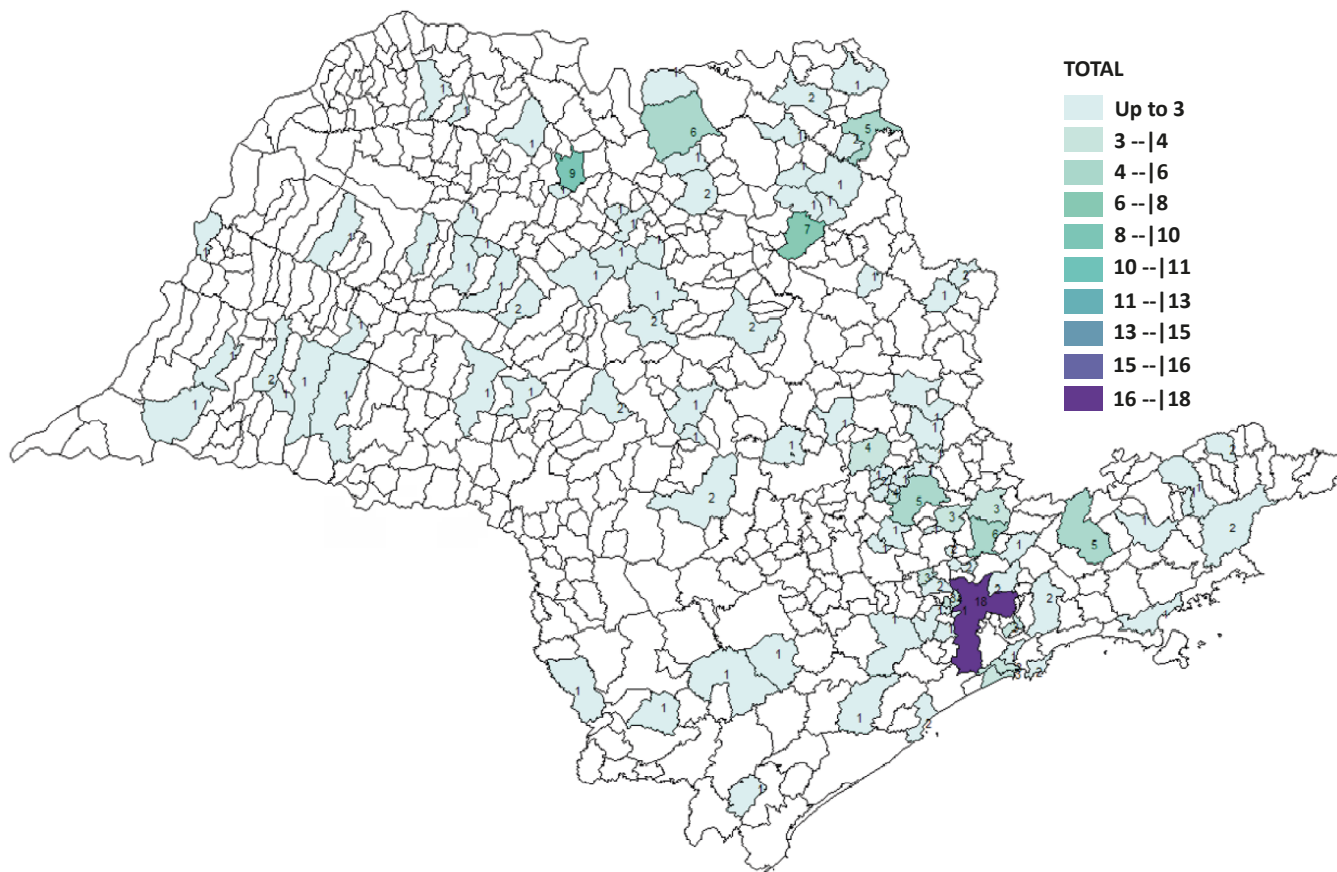
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PSI	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
354340 RIBEIRÃO PRETO	1	0	0	1	0	2	1	0	1	0	0	1	7
354390 RIO CLARO	0	1	0	0	0	0	0	0	0	0	0	0	1
354490 SALES OLIVEIRA	0	0	0	1	0	0	0	0	0	0	0	0	1
354520 SALTO	0	0	0	0	0	1	0	0	0	0	0	0	1
354560 SANTA ADÉLIA	0	1	0	0	0	0	0	0	0	0	0	0	1
354760 SANTA ROSA DE VITERBO	0	0	1	0	0	0	0	0	0	0	0	0	1
354730 SANTANA DE PARNAÍBA	0	0	0	0	1	1	0	0	0	0	0	0	2
354770 SANTO ANASTÁCIO	0	0	0	0	1	0	0	0	0	0	0	0	1
354800 SANTO ANTÔNIO DE POSSE	0	0	0	1	0	0	0	0	0	0	0	0	1
354940 SÃO J OAQUIM DA BARRA	0	0	0	0	0	1	0	0	0	0	0	0	1
354970 SÃO JOSÉ DO RIO PARDO	0	0	0	0	0	0	1	0	0	0	0	0	1
354980 SÃO JOSÉ DO RIO PRETO	2	2	0	1	1	1	0	0	1	0	0	1	9
354990 SÃO JOSÉ DOS CAMPOS	0	0	0	0	2	1	0	0	0	0	1	1	5
355020 SÃO MIGUEL ARCANJO	0	0	0	0	1	0	0	0	0	0	0	0	1
355030 SÃO PAULO	0	4	2	4	1	2	2	1	1	0	0	1	18
355040 SÃO PEDRO	0	0	0	0	0	0	0	1	0	0	0	0	1
355100 SÃO VICENTE	0	0	0	0	0	1	0	0	1	1	0	0	3
355240 SUMARÉ	0	0	0	0	0	0	0	1	0	0	0	0	1
355280 TABOÃO DA SERRA	0	0	0	0	0	0	0	1	0	0	0	0	1
355340 TANABI	0	0	0	0	0	0	0	0	1	0	0	0	1
355360 TAPIRATIBA	0	0	0	0	0	0	0	1	1	0	0	0	2
355410 TAUBATÉ	0	0	0	0	0	0	0	0	1	0	0	0	1
355610 VALENTIM GENTIL	0	0	0	0	0	1	0	0	0	0	0	0	1
355630 VALPARAÍSO	0	1	0	0	0	0	0	0	0	0	0	0	1
355650 VÁRZEA PAULISTA	0	0	2	0	0	0	0	0	0	0	0	0	2
355715 ZACARIAS	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	19	24	21	25	17	23	13	14	15	8	10	10	199

Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

Figure 1 shows the cases of accidental tetanus distributed by the probable municipalities of infection. The occurrences are divided, practically, for all the cities of the state, showing that the probable site of infection does not influence the suspicion of a case of tetanus.

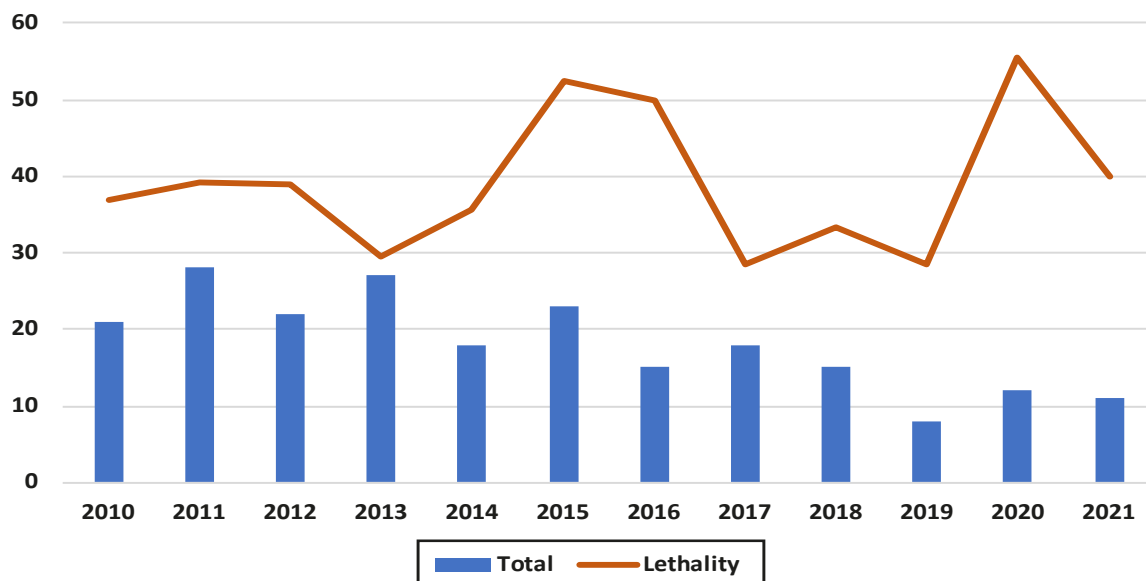
Figure 1. Autochthonous confirmed cases of accidental tetanus in the SSP from 2010 to 2021* by probable municipality of infection.



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

[Graph 1](#) shows the number of cases (n) and lethality (%) of accidental tetanus from 2010 to 2021. It can be noted that the annual number has been falling sharply in the SSP, but lethality remains quite high. In the pandemic years, with the occupation of specialized ICUs by COVID cases, lethality increased even more.

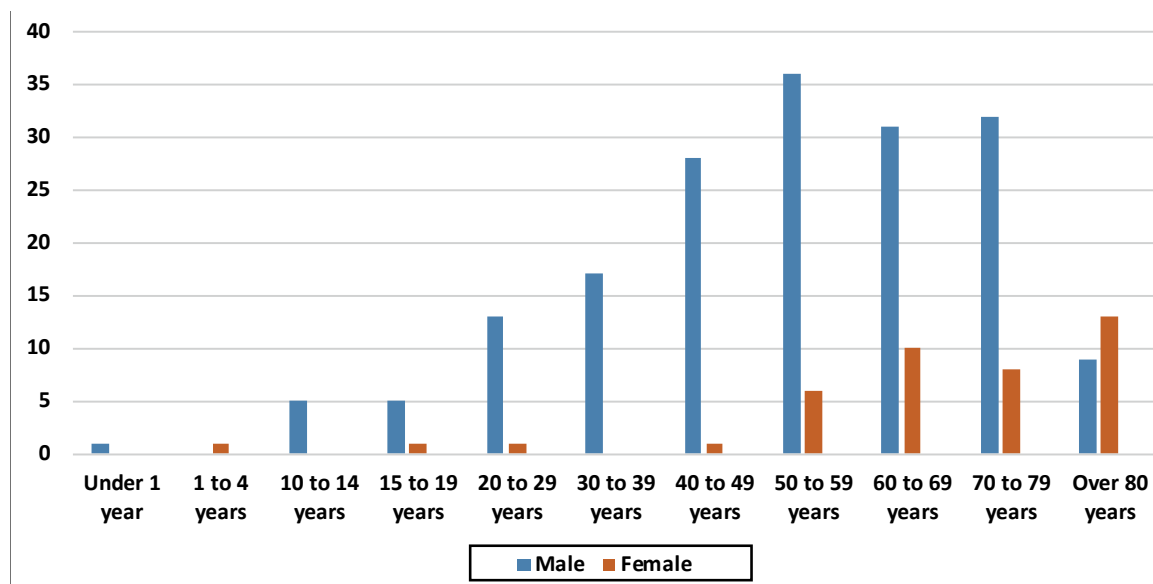
Graph 1. Number of cases and case fatality of accidental tetanus in the SSP from 2010 to 2021.*



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

Graph 2 shows the distribution of cases by sex and age group, demonstrating what has already been mentioned above: the small number of occurrences with women of childbearing age is probably due to the vaccination of this segment to prevent neonatal tetanus.

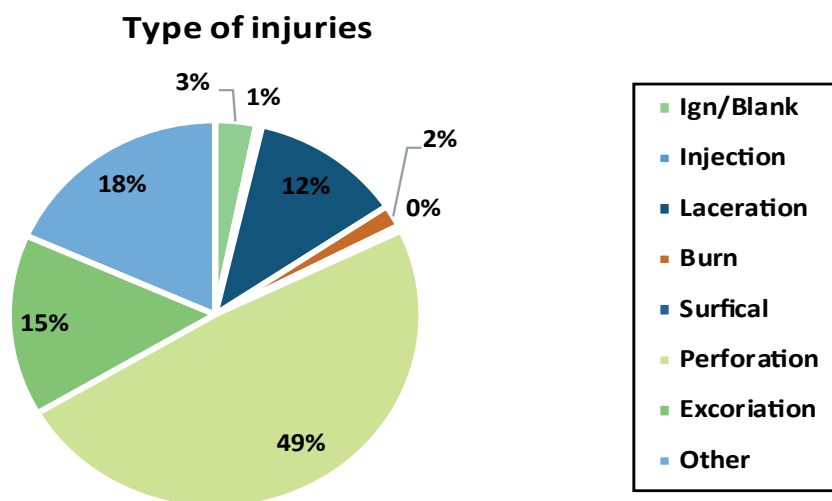
Graph 2. Distribution of confirmed cases of accidental tetanus in the SSP from 2010 to 2021* by sex and age group.



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

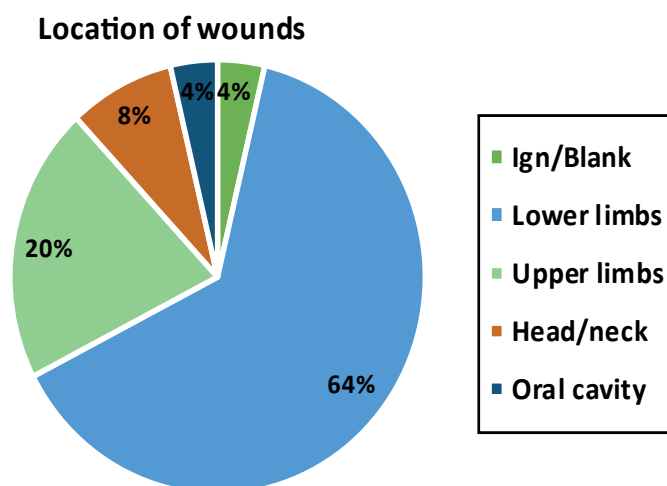
Graphs 3 and 4 present the type of lesion and the site identified as a gateway to *C. tetani*. It can be noted that, although perforation in the lower limbs is the most common entry point, the other contamination accesses cannot be neglected.

Graph 3. Percentage of different types of injuries considered as gateways to accidental tetanus cases in the SSP from 2010 to 2021.*



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

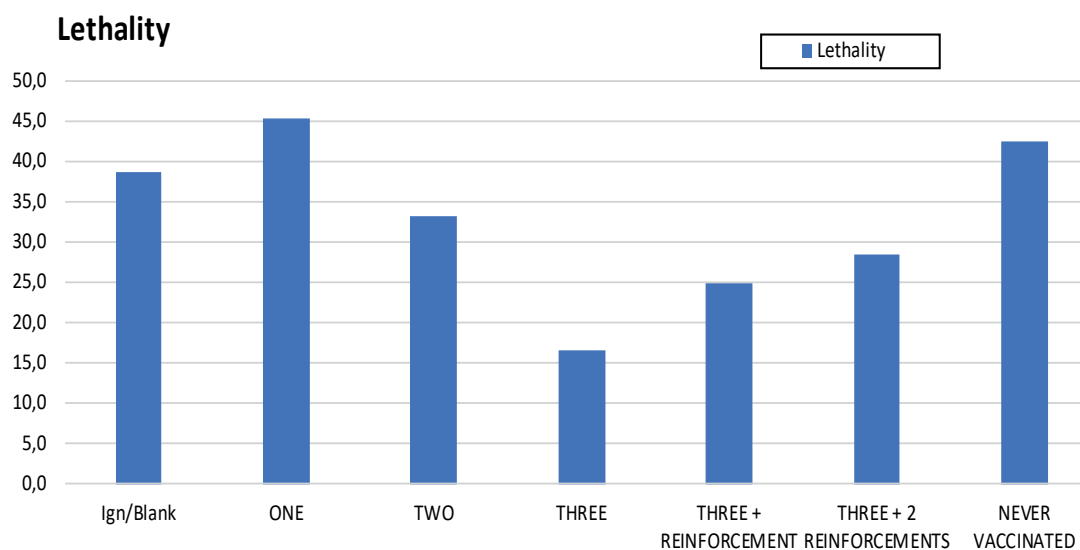
Graph 4. Percentage of the various locations where the injury occurred considered the gateway to accidental tetanus cases in the SSP from 2010 to 2022.*



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

Graph 5 shows the distribution of tetanus lethality according to previous vaccination.

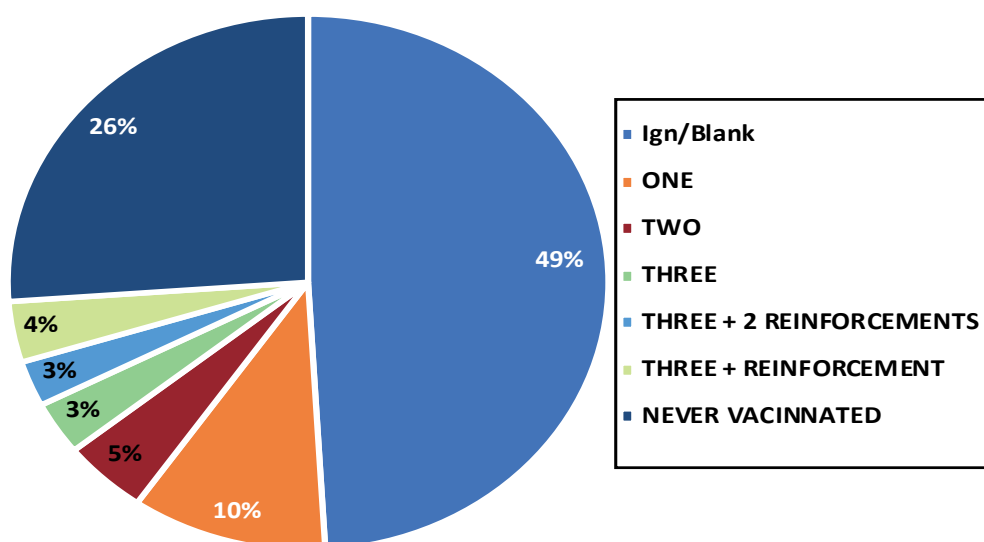
Graph 5. Tetanus lethality according to number of vaccine doses received before illness in the SSP from 2010 to 2021.*



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

Graph 6 presents the percentages of patients with confirmed tetanus who had received doses of the vaccine before the illness. The analysis is significantly impaired because the vaccination status was unknown in more than half of the cases.

Graph 6. Confirmed cases of accidental tetanus distributed according to previous immunization against the disease.



Source: SINANNET/CVE/DVZOO. *Provisional data until May 4, 2022.

It is important to note that, as expected, almost 80% of confirmed cases occurred in patients who had never been vaccinated or did not know if they had received any doses. However, it is also important to note that 3% of patients with confirmed tetanus had received three initial doses and two more as a booster.

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