Tracking poison ingestion deaths for South Africa: The need for access to timely reliable data

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The President of South Africa addressed the nation on 15 November 2024 regarding the rise in food-borne illnesses and related child deaths. In the absence of a clear profile of injury deaths from official cause-of-death data, we used empirical, nationally representative surveys from 2017 and 2020/21 to analyse poisoning deaths. For children (aged 0 - 17 years), deaths from poison ingestion increased in 2020/21 for Gauteng Province, and became more prominent in KwaZulu-Natal, Eastern Cape and Mpumalanga provinces. Adults (≥18 years) showed similar developments, but on a larger scale. Among children in 2020/21, poison ingestion deaths were mostly unintentional (274 cases). Adults had higher proportions for suicide-related poisoning, but unintentional poisoning deaths (791 cases) accounted for 43.8% in males and 32.5% in females. Overall, pesticides were the most common cause of poisoning deaths in children (42%) and adults (29%). A promising intervention is that suspected agricultural or stock remedy poisoning, as a notifiable medical condition (NMC), should now be reported to the NMC Surveillance System within 24 hours. For a rapid public health response to the country's burden of disease, we call on the government for a collaborative approach, to improve the quality and timeliness of death notification data, and to implement electronic capturing of deaths nationally.

Keywords: poison ingestion deaths, pesticide, notifiable medical condition, injury mortality, cause of death, South Africa

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On Friday 15 November 2024, South African (SA) President Cyril Ramaphosa addressed our nation in response to the increase in food-borne illnesses and related child deaths across all provinces. He reported a total of 890 such incidents since September 2024, with 22 children dying after eating contaminated food, reportedly purchased at informal spaza shops and street vendors, with Gauteng and KwaZulu-Natal provinces the most affected. The National Institute for Communicable Diseases was able to identify through scientific testing that the deaths of six children in Naledi, Soweto, could be attributed to a pesticide known as terbufos. This organophosphate chemical is registered in SA for agricultural use only, but is known to be sold informally in townships to control rats.[1] While recent media and political attention has rightly focused on child poisonings, our analysis of national non-natural mortality data reveals a simultaneous picture of increasing adult poisoning deaths, highlighting a broader public health concern. This article provides a descriptive analysis of both child and adult poisoning deaths in SA, using available injury mortality survey data, which provide evidence of an earlier increase in poisoning deaths for all ages.

SA's official national cause-of-death data are unable to provide a clear profile of injury deaths, as they do not specify the manner of death.[2] We were, however, able to utilise empirical nationally representative survey data for 1 January to 31 December 2017,[3] and for 1 April 2020 to 31 March 2021, to coincide with the COVID-19 lockdown period.[4] The data were retrospectively collected from postmortem folders from a sample of non-natural/injury deaths from 65 mortuaries in 8 provinces,[3,4] and from the Western Cape provincial health department for all injury deaths electronically and routinely captured from 16 mortuaries. Information on province, age, sex and the 'apparent' manner of death (homicide, suicide, unintentional, transport and undetermined) was captured. Mechanisms of injury included, i.e. firearm, hanging, poisoning, burns, road traffic accident, etc., according to International Statistical Classification of Diseases (ICD-10) coding standards.[5] These data were weighted to provide a nationally representative annual estimate of injury mortality.

A provincial analysis of poison ingestion for children aged 0 - 17 years during 2017 and 2020/21 (Fig. 1A) indicates an increase in deaths for Gauteng Province in the 2020/21 survey. Poison ingestion deaths were also prominent in the KwaZulu-Natal, Eastern Cape and Mpumalanga provinces across both survey time points. For adults aged ≥18 years (Fig. 1B), there was an increase in poison ingestion deaths for the Eastern Cape and Gauteng provinces across the two surveys. In addition, deaths in the Western Cape, KwaZulu-Natal and Mpumalanga provinces were more prominent for adults.

The President's address stated that all deaths for children aged ≤12 years should be notified within the notifiable medical condition surveillance system.[6] Overall for children, most poison ingestion deaths occurred in the 0 - 4 and 13 - 17-year age groups (Table 1). Poison ingestion deaths for children aged 0 - 4 years and 5 - 12 years were mostly unintentional, with no large sex difference for the youngest age group. For those aged 5 - 12 years, there were 1.7 males for every female unintentional poisoning death.

The 13 - 17-year age group had more poisoning deaths among females overall, where nearly two-thirds were related to suicide. Males 13 - 17 years old accounted for 39.9% and 50.9%, respectively, of unintentional and suicide-related poisonings.

For adults ≥18 years, poison ingestion deaths were mostly related to suicide for both sexes, with a higher proportion noted for females

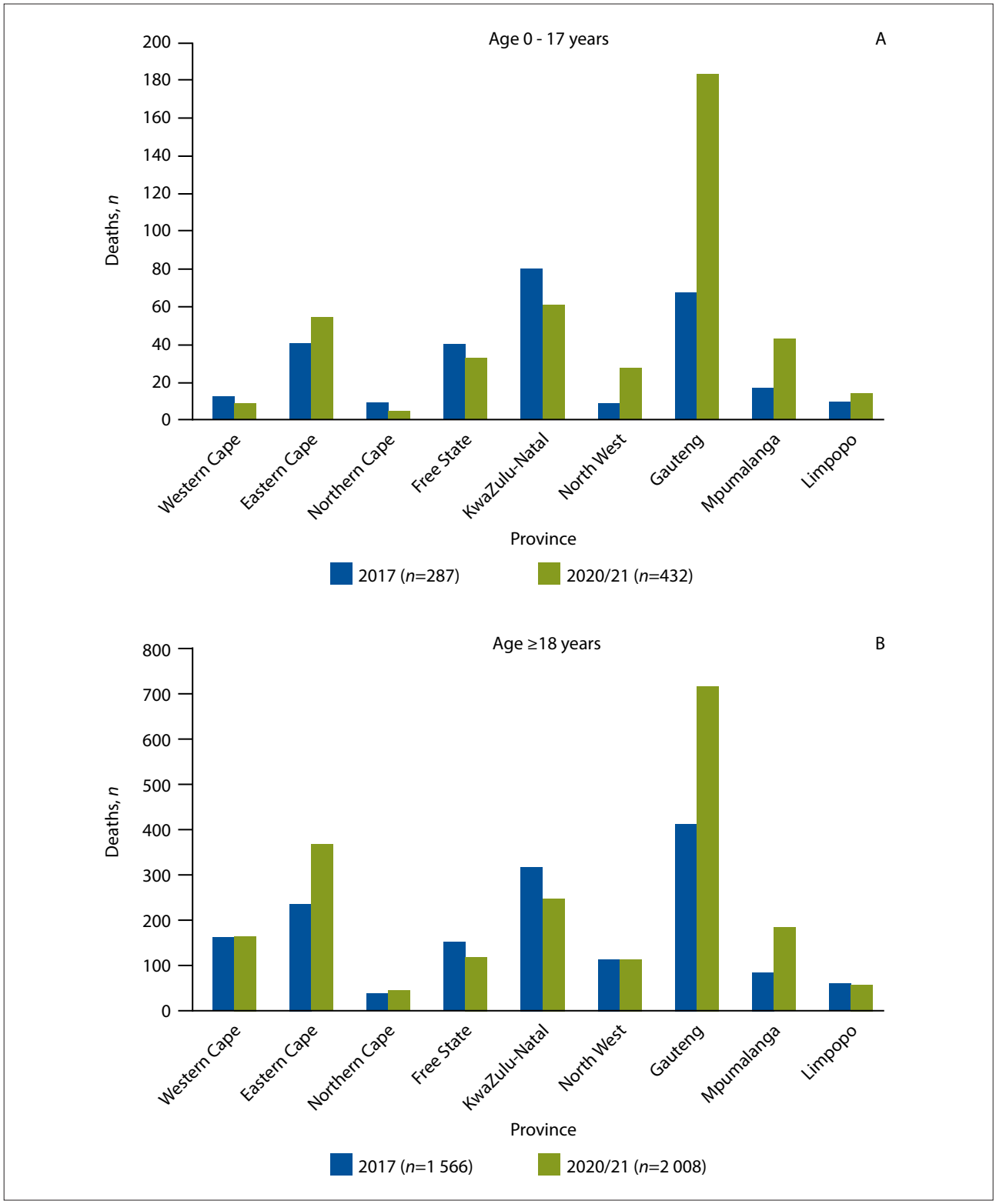

Fig. 1A and B. Poison ingestion deaths by province, for A: age 0 - 17 years and B: age ≥18 years, for 2017 and 2020/21. Note the difference in scale for the two graphs.

(63.7%). A high proportion of unintentional poison ingestion deaths was noted, however, for adult males (43.8%) and females (32.5%).

For the 2020/21 survey, we specifically collected the type of poison ingested, to collect information on alcohol-related poisoning, as alcohol sales restrictions for the lockdown period led to the formulation of home-brews,[7] some of which were reported to have harmful toxic effects.[8] This was only recorded from the representative sample of injury deaths in mortuaries across eight of the provinces. Hence, for unintentional deaths, a high proportion of the type of poison ingested was unknown (26.8%), largely from the Western Cape Province, which did not include the 'poison type' as part of routine data capture within the database.

Table 1. Poison ingestion by age, sex and apparent manner of death, 2020/21 (*N*=2 438)

	Apparent manner of death, *n* (%)				
Age (years)	**Unintentional**	**Suicide**	**Homicide**	**Undetermined**	**Total, *n* (%)**
0 - 4					
Male	76 (87.3)	0 (0.0)	4 (4.8)	7 (7.9)	87 (100)
Female	66 (91.3)	0 (0.0)	4 (6.1)	2 (2.6)	72 (100)
5 - 12					
Male	38 (91.5)	0 (0.0)	4 (8.5)	0 (0.0)	41 (100)
Female	22 (64.8)	7 (20.8)	3 (8.9)	2 (5.5)	34 (100)
13 - 17					
Male	21 (39.9)	27 (50.9)	3 (5.7)	2 (3.5)	52 (100)
Female	52 (35.6)	91 (62.1)	0 (0.0)	3 (2.3)	146 (100)
≥18*					
Male	539 (43.8)	635 (51.7)	20 (1.7)	35 (2.9)	1 230 (100)
Female	252 (32.5)	494 (63.7)	9 (1.2)	21 (2.7)	776 (100)
Total					
Male	673 (47.8)	662 (46.9)	31 (2.2)	44 (3.1)	1 410 (100)
Female	392 (38.1)	592 (57.6)	16 (1.6)	28 (2.7)	1 028 (100)

*Two cases were of undetermined sex.

Table 2. Type of poison ingested by apparent manner of death, 2020/21 (*N*=2 440)

	Apparent manner of death, *n* (%)				
Poison type	**Unintentional**	**Suicide**	**Homicide**	**Undetermined**	**Total, *n* (%)**
0 - 17 years					
Pesticide	118 (43.1)	44 (35.4)	16 (90.8)	2 (9.5)	180 (41.6)
Tablet overdose	15 (5.6)	33 (26.8)	0 (0.0)	0 (0.0)	49 (11.3)
Paraffin	18 (6.7)	2 (1.5)	0 (0.0)	0 (0.0)	20 (4.7)
Traditional medicine	13 (4.9)	0 (0.0)	0 (0.0)	2 (11.7)	15 (3.5)
Poisonous plant	8 (2.9)	5 (4.3)	0 (0.0)	0 (0.0)	13 (3.1)
Alcohol	6 (2.2)	2 (1.5)	0 (0.0)	0 (0.0)	8 (1.8)
Household cleaner	5 (2.0)	3 (2.1)	0 (0.0)	0 (0.0)	8 (1.9)
Other*	16 (5.9)	3 (2.4)	2 (9.2)	3 (19.0)	24 (5.5)
Unknown	73 (26.8)	32 (26.0)	0 (0.0)	9 (59.8)	115 (26.6)
Total	274 (100.0)	124 (100.0)	18 (100.0)	16 (100.0)	432 (100.0)
≥18 years					
Pesticide	217 (27.4)	334 (29.6)	12 (41.5)	9 (15.4)	572 (28.5)
Tablet overdose	66 (8.4)	327 (28.9)	2 (5.1)	2 (3.6)	397 (19.8)
Paraffin	3 (0.4)	7 (0.7)	0 (0.0)	0 (0.0)	11 (0.5)
Traditional medicine	35 (4.5)	1 (0.1)	2 (5.7)	0 (0.0)	38 (1.9)
Poisonous plant	17 (2.2)	7 (0.7)	0 (0.0)	0 (0.0)	24 (1.2)
Alcohol	109 (13.7)	15 (1.3)	0 (0.0)	0 (0.0)	123 (6.1)
Household cleaner	2 (0.2)	12 (1.1)	1 (3.4)	0 (0.0)	15 (0.8)
Other†	72 (9.1)	80 (7.1)	1 (3.4)	8 (13.5)	161 (8.0)
Unknown	271 (34.2)	346 (30.6)	12 (40.8)	38 (67.6)	667 (33.2)
Total	792 (100.0)	1 130 (100.0)	29 (100.0)	56 (100.0)	2 008 (100.0)

*Other for 0 - 17 years: includes methylated spirits, nyaope, battery acid and 'other'.
†Other for ≥18 years: includes injection overdose, brake fluid, methylated spirits, nyaope, battery acid and 'other'.

Among children aged 0 - 17 years, the most common reported type of poisoning was via pesticide for each apparent manner of death, and accounted for 41.6% overall (Table 2).

For adults ≥18 years (Table 2), pesticide was also the most common type of poisoning, accounting for 28.5% overall, with relatively similar proportions for unintentional deaths (27.4%) and suicide (29.6%). Alcohol-related poisoning accounted for nearly 14% of unintentional poisoning deaths, and tablet overdoses were mostly suicide-related.

Poison ingestion accounted for <5% of all injury deaths and was the focus of this analysis, to highlight its emergence as a public health concern predating 2024. This analysis excludes poisoning by gassing, which accounted for <0.5% of injury deaths for 2020/21. Our survey captured detailed information on the manner and mechanism of injury death, addressing gaps in the official national cause-of-death data. We highlighted pesticide poisoning as an important public health concern affecting both children and adults.

Intermittent surveys cannot detect emerging public health trends for prompt intervention. This underscores the need for timely and reliable official cause-of-death data. Tracking of poisoning and other injury-related deaths requires the routine electronic capturing of the manner and mechanism of death, in line with the current ICD-10 coding standards.[5] An investigation into the rise in food-borne illnesses and related child deaths revealed unsafe storage practices for food and products such as pesticides at spaza shops. Additional data, such as incident location, are essential for targeted injury prevention initiatives and comprehensive public health monitoring.

In conclusion, this public health issue most likely went undetected owing to competing priorities for the prevention of injury deaths. SA's pressing childcare priorities, such as child abuse and child murders, some of which are reflected in our data, have taken precedence for the attention of child protection workers and policy advocates. Likewise, for adults, the magnitude of violence and road traffic deaths have overshadowed other concerns, shaping the priorities of intervention strategies. Our findings illustrate the urgent need to enhance surveillance systems for poisoning, enabling targeted interventions and the development of stronger evidence-based policies.[9] Additionally, they highlight the importance of enforcing regulatory protocols for the sale and packaging of hazardous substances, to protect adults and children alike.

In response to this public health concern, the circular issued by the National Department of Health (signed on 28 November 2024) states that as a notifiable medical condition (NMC), suspected agricultural or stock remedy poisoning (and food-borne illnesses) should be notified within 24 hours. We urge clinicians to submit information on suspected poisonings to the NMC Surveillance System using their app, or to email/fax the paper form, for the relevant health service to respond.

For a rapid public health response, and for routine monitoring of the country's burden of disease, we call on the government for a collaborative approach, to invest and commit to strengthening the quality of official national cause-of-death data, by including 'manner of death' on the death notification form.[2,10,11] In addition, we call for timely access to death data through electronic capturing of deaths nationally.

Report suspected cases within 24 hours, to the NMC Surveillance System:
Electronically: web-based at NMC – login or download the mobile app.
Paper-based: email captured information on the NMC form to NMCSurveillanceReport@nicd.ac.za or fax to 086 639 1638.
NMC hotline number: +27 (0)72 621 3805.
Source: Dr S S S Buthelezi, National Department of Health, circular 28 November 2024.

Data availability. Requests for access to a de-identified dataset can be referred to the corresponding author for consideration. Availability of data used in the study would be subject to permission by the Health Research Ethics Committee and provincial authorities that approved the original study. A period of 24 months after publication of the main study results should elapse before requests are made, to allow the authors to publish substudies and further analyses.

Declaration. None.

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Conflicts of interest. None.

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