Injuries and Deaths Associated with Nursery Products Among Children Younger than Age Five

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Executive Summary

U.S. Consumer Product Safety Commission (CPSC) staff presents in this report statistics based on the most recently available information regarding injuries and deaths associated with nursery products among children younger than the age of 5 years.[1]

Emergency Department-Treated Injuries:

- In 2018, there were an estimated 59,000 emergency department-treated injuries associated with (*i.e.*, in use at the time of incident), but not necessarily caused by, nursery products among children younger than age 5 years. This translates to an injury rate of an estimated 298 injuries per 100,000 children under the age of 5 years.[2] This estimate of emergency department-treated injuries is based on the non-incidental[3] injuries *only*.

- High chairs, cribs/mattresses, infant carriers, and strollers/carriages were associated with 66 percent of the total estimated injuries. Falls were the leading cause of injury; and the head, followed by the face, was the body part injured most frequently. A diagnosis of internal organ injury, contusion/abrasion, or laceration was associated with a majority of the injuries.

- Non-incidental data-based analysis was completed for the first time using 2015 data. With the completion of this report, such analyses are now available for 2015, 2016, 2017, and 2018 injury data. A trend analysis, based on the 3 years 2016 – 2018 or the 4 years 2015 – 2018, did not display any statistically significant trend. A longer-term trend analysis is not presented at this time because the annual estimates of injuries associated with nursery products in years before 2015 were based on all in-scope data, not just non-incidental data. The 5-year trend analysis will be resumed in the future when additional non-incidental data become available.

Fatalities:

- CPSC staff has reports of 320 deaths during the 3-year period from 2014 to 2016—an annual average of 107 deaths—associated with (*i.e.,* in use at the time of incident), but not necessarily caused by, nursery products among children younger than age 5.

- Cribs/mattresses, playpens/play yards, bassinets/cradles, infant carriers, and portable baby swings were associated with 84 percent of the fatalities reported.

- Causes of death included positional asphyxia, strangulation, and drowning, among others. In some instances, the fatalities were attributed to the product; in other cases, the fatalities resulted from a hazardous environment in or around the product.

CPSC staff has evaluated the incidents characterized in the annual reports on nursery products for many durable infant and toddler products, along with previously and subsequently reported incidents, to assess the

[1] Not all of these incidents are addressable by an action the CPSC could take; however, it was not the purpose of this report to evaluate the addressability of the incidents, but rather, to update estimates of emergency department-treated injuries and to quantify the number of fatalities reported to CPSC staff.
[2] The population data for the denominator is available at the Census Bureau website: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2016_PEPAGESEX&prodType=table
[3] The association of an incident/injury with a nursery product is *incidental* if the occurrence of the incident/injury is considered not dependent on the presence of that nursery product in the incident scenario. See Appendix for examples.

efficacy of voluntary standards. These evaluations have supported the staff's work with standards development organizations to refine these standards, as well as their briefing packages for notices of proposed rulemaking (NPRs) and final rules that are required by the Danny Keysar Child Product Safety Notification Act, section 104 of the Consumer Product Safety Improvement Act of 2008 (CPSIA).[4] In fiscal year (FY) 2019, the Commission issued an NPR for baby gates/barriers and issued final rules establishing new standards for stationary activity centers and high chairs. The rule on high chairs also took effect in FY 2019. The Commission also issued revised rules on full-size cribs, strollers/carriages, baby bouncer seats, baby bath seats, and infant bath tubs. Staff evaluations of voluntary standards for crib bumpers, crib mattresses, and infant inclined sleep products, among others, are under way.

[4] There is some overlap between the products covered by this report and the products subject to rules issued under section 104 of the CPSIA. However, this report covers some nursery products that do not fall under section 104.

Introduction

This report presents nursery product-related injury estimates for 2018,[5] as well as comparisons with historic injury estimates. Detailed information on deaths associated with nursery products that reportedly occurred during the 3-year period from 2014 to 2016 is also presented. Note that reporting is ongoing, and the number of reported fatalities may change.

Nursery Product-Related Emergency Department-Treated Injury Estimates

Beginning with the 2016 report, the injury estimates in annual nursery products reports are based on non-incidental emergency department-treated injuries.[6] The association of an incident/injury with a nursery product is incidental if the occurrence of the incident/injury is considered not dependent on the presence of that nursery product in the incident scenario. For example, if a child gets stung by a bee or gets bitten by a dog while in an infant stroller, the stroller's involvement in the incident is considered incidental. The fact that the child was in a stroller had no bearing on the incident. Although such incidents are retained in the NEISS database to provide analysts the flexibility and discretion to include or exclude them, the exclusion of incidental injury cases aligns more closely with the way CPSC staff has prepared the CPSIA section 104 rulemaking packages for the Commission. Now that most of the nursery products discussed in this report have a mandatory rule in place, staff believes that annual estimates based on the non-incidental data will provide a better tool for gauging the efficacy of the various standards.

An estimated 59,000 nursery product-related injuries among children younger than 5 years old were treated in U.S. hospital emergency departments (ED) in 2018. Table 1 shows the estimated injuries and the corresponding injury rates for the latest 3 years, as well as the annual averages for this 3-year period. Staff did not observe a trend in injury estimates over the 2016 to 2018 period (p-value of 0.633). The attached Appendix provides annual estimates for 2014 through 2018, as well as more detail about the data-selection processes.

Table 1: Estimated Emergency Department-Treated Injuries to Children Younger than Age Five Associated with Nursery Products: 2016–2018

Calendar Year	Estimated Injuries	Estimated Injury Rates per 100,000 Children[2]
2016	62,300	313
2017	61,400	308
2018	59,000	298
2016 – 2018 Average	60,900	306

Source: NEISS, CPSC.
Note: Estimates rounded to the nearest 100. The average calculation is based on unrounded injury estimates. For all three years, 2016-2018, the estimates were derived based on non-incidental data only.

[5] The source of the injury estimates is the National Electronic Injury Surveillance System (NEISS), a statistically valid surveillance system for collecting injury data. NEISS injury data are gathered from the emergency departments of hospitals selected as a probability sample of all the U.S. hospitals with emergency departments. The surveillance data gathered from the sample hospitals enable CPSC staff to make timely national estimates of the number of injuries associated with specific consumer products.
[6] These estimates are based on data with all in-scope product codes, *except* incidental injury cases. Cases where a nursery product was present in the incident scene but played an insignificant role in the sequence of events that led to the injury were considered incidental. The methodology used was similar to historical estimates before 2015. The first report following the transition can be seen at R. Chowdhury, "Injuries and Deaths Associated with Nursery Products Among Children Younger than Age Five," CPSC, December 2016, https://www.cpsc.gov/s3fs-public/Nursery%20Products%20Annual%20Report%202016.pdf.

Falls were the leading cause of all nursery product-related injuries reported through NEISS for 2018, similar to previous years. About 72 percent of the total injuries involved the head and the face, which were the body parts injured most frequently. Internal organ injuries, contusions/abrasions, or lacerations were the diagnoses in about 73 percent of the NEISS-reported injuries.

Table 2 shows the breakdown of injury estimates by different product categories for 2018, along with the injury estimates for 2017, for comparison purposes. As in 2017, there were more than 30 product codes associated with the injury estimates in 2018. The associated products have been aggregated into 13 product categories that align with standards development activities as in 2017. The top four categories: high chairs, cribs/mattresses, strollers/carriages, and infant carriers, were associated with 66 percent of the total estimated injuries.

There was a non-statistically significant decrease from an estimated total of 61,400 injuries in 2017 to 59,000 injuries in 2018. Notable changes in injury estimates in specific product categories between the 2 years were two increases and three decreases. The increases were in infant carriers (increased from 7,800 to 8,200) and changing tables (increased from 2,700 to 4,200); the latter was statistically significant (p-value of 0.038). The notable decreases were in playpens/play yards (decreased from 2,400 to 1,900), portable baby swings (decreased from 2,400 to 1,800), and strollers/carriages (decreased from 10,500 to 7,600). The decrease in strollers/carriages was statistically significant with a p-value of 0.010.

Table 2: Estimated Emergency Department-Treated Injuries to Children Younger than Age Five By Type of Nursery Product: 2017–2018

PRODUCT CATEGORY	ESTIMATED EMERGENCY DEPARTMENT-TREATED INJURIES	
	2017	2018
TOTAL	61,400	59,000
High Chairs	12,300	12,100
Cribs/Mattresses	11,100	10,900
Strollers/Carriages**	10,500	7,600
Infant Carriers (Excludes Motor Vehicle Incidents)	7,800	8,200
Changing Tables**	2,700	4,200
Baby Gates/Barriers	3,000	2,900
Portable Baby Swings	2,400	1,800
Baby Bouncer Seats	2,500	2,600
Baby Walkers/Jumpers/Exercisers	3,800	3,400
Playpens/Play Yards	2,400	1,900
Baby Bottles/Warmers/Sterilizers	---[7]	---[7]
Bassinets/Cradles	---[7]	---[7]
Baby Baths/Bath Seats/Bathinettes	---[7]	---[7]
Other[8]	1,700	1,600

Source: NEISS, CPSC. Estimates are rounded to the nearest 100.
Note: The injury estimates may not add up to the total due to rounding and because two or more nursery products are sometimes associated with a single injury. "**" annotated product categories underwent a statistically significant change from 2017 to 2018.

[7] The injury estimates are not presented because they fail to meet standard reporting criteria for NEISS which require that the estimated number of injuries be 1,200 or higher, the sample size be 20 or larger, and the coefficient of variation be less than 33 percent.
[8] In both 2017 and 2018, the "Other" category included: pacifiers/teething rings, diapers (excluding diaper rash cases), night lights, potty chairs/training seats, harnesses, and safety pins. In 2017, the "Other" category also included rattles and crib mobiles, while in 2018, it included diaper pails.

Deaths Associated with Nursery Products

Although all of the Commission's databases are used to identify nursery product-related deaths, death certificates are a major source of information for this analysis. As this report was being written, the Commission's death certificates database was at least 99 percent complete for each year in the period from 2014 through 2016. The deaths reported here are from 2014 through 2016, the latest 3-year time frame with sufficiently available information, similar to previous annual reports.[9]

Table 3 provides a summary of nursery product-related reported deaths (total and average annual) for 2014 through 2016, along with data previously reported for 2013 through 2015, for comparison purposes. Reporting is ongoing, and the number of reported fatalities may change. Moreover, these reports are anecdotal and do not constitute a statistical sample or a complete count of nursery product-related deaths. As such, CPSC staff strongly discourages drawing any inferences based on the year-to-year increase or decrease shown in the reported data.

CPSC staff has received reports of a total of 320 deaths—an annual average of 107 deaths—associated with nursery products during this period. About 33 percent (107 total, or an annual average of 36) were associated with cribs/mattresses. Playpens/play yards accounted for 20 percent (63 total, or an annual average of 21) of the reported deaths. Bassinets/cradles were associated with 18 percent (a total of 59 or an annual average of 20) of the reported deaths, while infant carriers were associated with 9 percent (a total of 29 or an annual average of 10) of the reported deaths. Portable infant swings accounted for 3 percent (a total of 11 or an annual average of four) of the reported deaths. The remaining 51 reported fatalities were associated with a range of products, including infant inclined sleep products, baby bouncers, infant strollers/carriages, baby bath/bathinettes, baby gates/barriers, high chairs, changing tables, and a variety of other sleep-products (for *e.g.*, toddler beds), seating products (for *e.g.*, floor seats), and miscellaneous products.

For certain incident scenarios in which direct product involvement or failure was not evident, consultation with staff from the CPSC's Directorate for Engineering Sciences was necessary to determine the most appropriate product category to place the fatalities in. Details of the methodology are provided in the attached Appendix.

[9] These deaths do not constitute a statistical sample of known probability and do not necessarily include all nursery product-related deaths that occurred during the 2014–2016 period. However, they do provide at least a minimum number for deaths associated with nursery products during that time. Furthermore, the number of reported incidents may change in the future should staff receive additional reports.
In addition, the number of fatalities for each product/group of products presented in this and previous annual nursery product reports are not expected to match the number of fatalities presented in any rulemaking packages on the same product/group of products because of the difference in the data inclusion criteria applied. See Methodology section of the Appendix for the process used in this report.

Table 3: Reported Deaths Among Children Younger than Age Five
By Type of Nursery Product

PRODUCT CATEGORY	TOTAL DEATHS		AVERAGE ANNUAL DEATHS	
	2013-2015	2014-2016	2013-2015	2014-2016
TOTAL	*298*	320	99	107
Cribs/Mattresses	*105*	107	*35*	36
Playpens/Play Yards	52	63	17	21
Bassinets/Cradles	60	59	20	20
Infant Carriers (Excludes Motor Vehicle Incidents)	*29*	29	*10*	10
Portable Baby Swings	5	11	2	4
Infant Inclined Sleep Products[10]	*6*	10	2	4
Baby Bouncer Seats	8	7	3	2
Strollers/Carriages	8	6	3	2
Baby Baths/Bath Seats/Bathinettes	7	6	2	2
Baby Gates/Barriers	4	5	1	2
High Chairs	2	2	1	1
Changing Tables	1	2	<1	1
Baby Walkers/Jumpers/Exercisers	0	0	0	0
Other[11]	11	13	4	4

Source: CPSC epidemiological databases: Consumer Product Safety Risk Management System (CPSRMS) and NEISS from 2014 to 2016 for reported deaths.
Deaths for 2013-2015, which are shown in italics, represent changes since publication of the previous annual report, due to availability of additional information.
Note: The average annual deaths do not add up to the total due to rounding.

A closer look at the top product categories with the largest numbers of reported deaths provides some insight into the hazard patterns. Between 2014 and 2016, these product categories were associated with 84 percent of the reported fatalities; for the earlier period (2013-2015), they accounted for 88 percent of the total reported fatalities.

Between 2014 and 2016, 107 deaths were associated with cribs/mattresses. This includes two new fatalities in 2015, which were reported to have occurred since publication of the previous annual report. The majority of these deaths were associated with a cluttered sleep environment (the presence of extra bedding, such as pillows, blankets, and/or comforters, with 12 incident scenarios specifically mentioning the presence of crib bumper pads) in the crib, which led to asphyxiation of the infant. Approximately 11 percent of the 107 deaths resulted from a range of hazards associated with the crib, including incomplete assembly; missing, broken, or nonfunctioning components; ill-fitting mattress; or ineffective crib repairs. Some of these incidents occurred in, or on, older, reassembled, recalled, or secondhand cribs. Another 11 percent of crib

[10] Beginning with the annual report published in 2018, the Infant Inclined Sleep Products group is presented in a row of its own in Table 3. These products come with one or more inclined sleep surface adjustment positions for the seat back that are greater than 10 degrees, but do not exceed 30 degrees. Specific examples are infant hammocks, recliner seats, and nappers, among other products.
[11] Of the 13 deaths in this category in 2014–2016, seven deaths were associated with products used in the sleep environment that are not among the product categories listed in Table 3. Among the seven, a portable youth bedrail, an infant lounging pillow, an in-bed sleeper, and a collapsible, fabric travel bed were involved in one death each; and toddler beds (product code 4082) were involved in three deaths. In addition to the seven deaths, there were two drowning deaths where an infant was left unattended on a non-bathing baby seat (product code 4074) in a water-filled tub; two asphyxiation deaths, one on a teether, and one on a baby bottle nipple; one death in a rocker, where an infant, left unattended for a protracted period of time, was found in a chin-to-chest position; and an additional death where the decedent was described to have been found on a "crib was situated on a changing table." Upon careful review of the last case, staff concluded that the product was some undetermined nursery product small enough to be positioned on top of a changing table.
See: https://www.cpsc.gov/s3fs-public/Nursery%20Products%20Annual%20Report%202018.pdf p.8, for a list of products associated with deaths in the "Other" category in 2013−2015.

fatalities involved the presence of hazardous crib surroundings. Examples include: strangulations from nearby cords or strings; suffocations from plastic bags located in close proximity to the crib; asphyxiations due to co-sleeping with other children in the crib; and one case of hyperthermia resulting from a broken thermostat in the infant's sleep area.

Playpens/play yards were associated with 63 deaths between 2014 and 2016. A majority of the deaths was due to asphyxiation, where the infant suffocated on a blanket/pillow/other soft bedding placed inside the play yard. The presence of a hazardous environment in or around the product, such as easy access to window coverings or baby monitor cords, use of ill-fitting, non-original mattresses and sofa cushions in the play yards, or co-sleeping arrangements with other infants in the play yard, were associated with some of the deaths. A few of the fatalities involved faulty products.

Between 2014 and 2016, staff identified 59 deaths associated with bassinets/cradles. The majority of these deaths were associated with extra bedding, with pillows involved in many of the suffocation deaths. A few of the bassinet-related deaths involved product failure and/or the presence of hazardous surroundings around the bassinet.

Twenty-nine deaths associated with infant carriers were identified during 2014-2016. This includes one new fatality in 2015, which was reported to have occurred since publication of the previous annual report. Placement of the infant in the carrier in a hazardous manner was the most common scenario. Examples include an infant, unrestrained, left unsupervised for an extended period, often on top of a blanket/pillow/other soft bedding, who subsequently got into a compromised position, resulting in death; an infant, partially restrained in the seat with shoulder straps only, who slid forward in the seat and strangled at the chest clip; and an infant positioned improperly in a carrier on the caregiver's body, which led to suffocation. Some fatalities resulted from carriers tipping over when placed on nonrigid surfaces, trapping the infant inside.

Finally, between 2014 and 2016, portable baby swings were associated with 11 deaths. Most of the incident reports described infants, usually unrestrained, rolling over to a prone position; occasionally, soft bedding was also placed in the swing seat. A couple of incidents described misinstallation of the product, creating a hazardous situation that ultimately led to the fatality. For example, one scenario described the failure to clamp the swing seat to the swing base; when the seat toppled over, the unrestrained decedent was found face down on the carpet with the seat on top of him.

The hazard patterns described indicate that although a nursery product was involved, many of the fatalities were not directly caused by failures of the product.

Appendix

Methodology

Injuries (Non-Incidental Data Only):

- Database: NEISS from 01/01/2018 through 12/31/2018.
- Product codes: 1500–1558, excluding 1550.[12]
- Age of victim: 0 through 4 years.
- Screened to ensure that no motor vehicle incidents were included.
- All cases of diaper rash were excluded.
- All cases associated with in-scope product codes were included; however, if the official diagnosis indicated that no injury had been sustained, the case was excluded.
- If the product's involvement was incidental, such as a child getting stung by a bee or getting bitten by a dog while in an infant stroller, the case was excluded.
- If a child suffered a medical crisis (*e.g.*, choking on food) while seated in a high chair or gained access to adult medication by climbing on a crib, the case was excluded.
- If a child was injured by other young children (*e.g.*, pulled out of an infant swing by a young sibling), the case was excluded.

Based on the non-incidental data only, trend analysis for 2016 – 2018 shows no statistically significant trend (p-value=0.633). An additional 4-year trend analysis using non-incidental data for 2015 – 2018 also fails to show any statistically significant trend (p-value=0.898).

No 5-year trend analysis is presented here because analyses for years prior to 2015 were based on *all in-scope data*, while 2015 through 2018 were based on in-scope non-incidental data only. Once the transition to non-incidental data is complete for the latest available 5-year window, the longer term trend analyses will resume.

Deaths:

- Databases: CPSRMS and NEISS from 01/01/2014 through 12/31/2016; date of extraction was 05/07/2019.

  Information available from CPSRMS and NEISS on incidents that have not been investigated is often incomplete or provides insufficient information on the hazard scenario. If these incident reports are investigated at a later date, or as other associated reports come in, the initial information is corroborated or contradicted, and the fatality numbers reported may change.
- Product codes: 1500–1558, excluding 1550[12]; 4074 for *children's chairs*, 4075 for *portable youth bed rails*, and 4082 for *toddler beds*.
- Age of victim: 0 through 4 years.
- Screened to ensure no duplicates were included; all records of the same incident that were reported through different data sources were associated and included as a single report.
- Miscoded products were recoded correctly. A common example was a play yard miscoded as a crib.
- As with the emergency department-treated injuries, deaths involving certain products were grouped together. For instance, baby baths and bathinettes were counted together with bath seats; exercisers were counted with baby walkers and jumpers; and as noted above, any extra-bedding-in-crib incidents were counted with cribs, while extra-bedding-in-play yard incidents were counted with play yards.

[12] Product code 1550 (*Infant and Toddler Play Centers excluding Jumpers, Bouncers, and Exercisers)* represents a toy, not a nursery product.

- Careful screening was performed to determine if cases were in scope or out of scope. An example of an out-of-scope case would be an incident where no direct or circumstantial information was available to determine *how* the death occurred or if Sudden Infant Death Syndrome was the only information available from the official report(s).

  In some cases that were considered in scope, the death was not associated directly with the nursery product. However, hazards in the vicinity of the product, often created inadvertently by caregivers, led to the deaths. For instance, extra bedding inside the crib or plastic bags which were within easy reach of the crib, have led to some deaths. These deaths have been included with crib deaths. Similarly, clutter and extra bedding inside the play yard or placement of the play yard within easy reach of a window blind cord have led to some fatalities. These have been counted with play yard deaths. While these deaths were not due strictly to product failure, they highlight some common misconceptions and oversights in the use of these products, and therefore, were included.

  Any report to the CPSC of a nursery product-related incident that occurred outside of the United States was excluded.

Historical Data

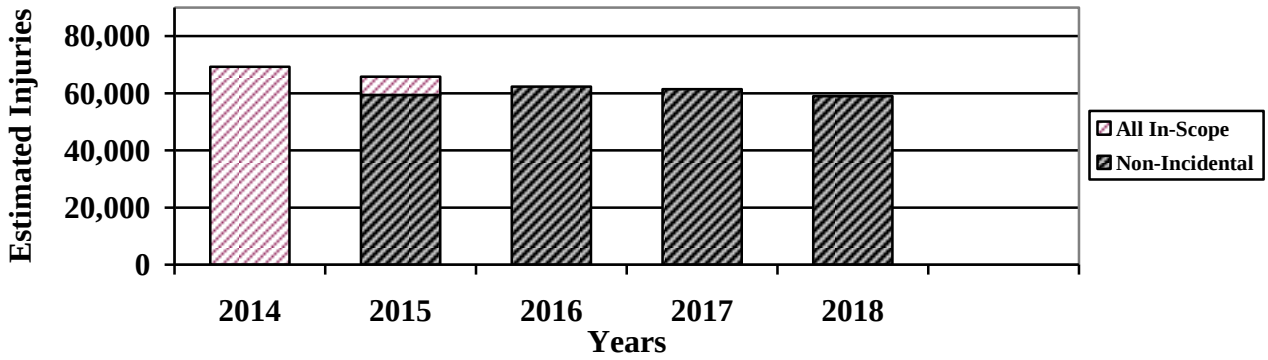
Table 4 presents the estimates based on non-incidental data only (2016-2018), while Figure 1 presents the estimates for both all in-scope data (2014-2015) and non-incidental data (2015-2018).

Table 4: Nursery Product-Related Emergency Department-Treated Injury Estimates: 2016-2018 (Non-Incidental Injury Data Only)

Calendar Year	Estimated Injuries	95% Confidence Interval
2016	62,300	41,700 – 82,800
2017	61,400	42,700 – 80,100
2018	59,000	38,400 – 79,600

Source: NEISS, CPSC. Estimates rounded to nearest 100.

Figure 1: Nursery Product-Related Emergency Department-Treated Injury Estimates: 2014 – 2018



Source: NEISS, CPSC. Estimates are rounded to nearest 100.
Note: The darker shaded portion of the 2015 bar represents the injury estimate using only the non-incidental data.