

Research Article

# Child Abuse Incidences Per Child Year Predicted from the Available Average Incidence Combined with Foreign Incidences Per Child Year: Towards a New Policy

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## Abstract

Child abuse is a worldwide recognized serious problem. Reliable child abuse incidences, preferably per child year, are fundamental for a sound detection and prevention program. Unfortunately, in most countries where child abuse data is available, incidences are not determined per child year but as an average over the child age range. In this paper we suggest a possible "next-best" solution for deriving child abuse incidences per child year when only an average value is available in an area or country. As method, we combined the country's measured average incidence with available (foreign) incidences per child year. The country's next-best incidences per child year will be estimated from its average, multiplied by the foreign incidences per child year divided by the foreign average. As results, we calculated the next-best Dutch age-dependent incidences by combining the Dutch average value with US and Ontario age-related incidences. We found comparable results for infants above 1 year and marked differences for children <1 year, likely due to cultural differences between the US and Ontario. In conclusion, next-best age-related child abuse incidences are obtainable in large areas or countries by choosing a smaller but representative region, the latter estimated from Ontario-data as  $\geq 210,000$  inhabitants, and establishing as perfectly as possible the optimal infra structure. A future perspective towards a new policy could be to initiate and stimulate this approach in the various European Union and United Nations Convention on the Rights of the Child member states.

## Keywords

Child Abuse, Incidence Per Child Year, Age-Average Incidence, Age-Dependent Data

## 1. Introduction

Child abuse is a worldwide recognized serious problem because it may have a long-lasting negative effect on the child's psycho-social development and can jeopardize the well-being of

the child's whole family. The American Child Abuse Prevention and Treatment Act [1] defines child abuse and neglect as: "Any recent act or failure to act on the part of a parent or caretaker

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which results in death, serious physical or emotional harm, sexual abuse or exploitation; or an act or failure to act, which presents an imminent risk of serious harm". Children do not only risk abuse or neglect in the family, but can also become a victim of violence in the public domain, for example, in schools. Children who are living in alternative care after a removal from the family home have a higher risk to become victims of abuse or neglect [2]. The United Nations Convention on the Rights of the Child (UN-CRC) Committee [3], underlines the importance of data collection on child abuse to improve the quality and effectiveness of the child protection system [2]. Knowledge of reliable incidences of child abuse, preferably for each child year between <1 and 18 years, is therefore fundamental for a sound government policy and legal system that focuses on prevention and intervention [4]. Such data is a valuable resource for policy-makers, child welfare practitioners, researchers, and other concerned citizens, and is critically important to improving child welfare outcomes (from [5]).

Unfortunately, in most countries where child abuse data is available, incidences are not determined for each child year but as an average over 18 child years during the measurement period. A consequence is that possible age-related incidence deviations, if present, will remain unnoticed. In the Netherlands, for example, child abuse incidences are averaged over all 18 child years [6-9],

or over 7 child years [10]. The data are obtained from the responses to various checklists, which were developed to easily assess child abuse for children visiting Medical Centers. These checklists consisted of 5 to 9 questions and when 1 or more questions were answered deviant, called a positive result, child abuse suspicion occurs and the case will be further evaluated by the hospital-based child abuse specialized team.

The objectives of this paper are as follows. First, to suggest a possible "next-best" solution for deriving child abuse incidences for each child year when only an average incidence measured over an age period is available. Second, to demonstrate this method for the Dutch situation; and, third, to suggest how this method could become a practical scheme for child abuse incidence assessment, e.g. within the European Union and UN-CRC member states.

## 2. Methods

### 2.1. Proposed Method

The method includes 4 phases: A, B, C and D.

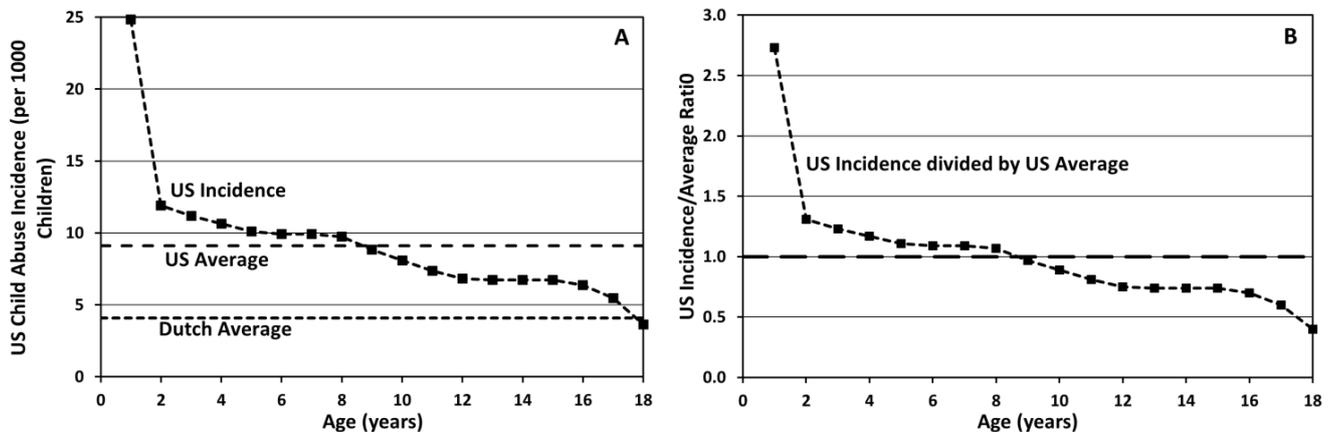


Figure 1. A: US child abuse incidences and average value (Table 1 [5]) and the 18-year averaged Dutch child abuse incidence [10]; B: The US Incidence/Average ratios (Table 1).

Phase A combines 2 child abuse incidence data. The first is from the area or country where only an average child abuse incidence is available over the range of child ages, say 18 years. Below, we will use the Dutch situation. The second is from another area or country where child abuse incidences are available per child year, over 18 years here too.

Phase B uses, first, the average value of the 18 age incidences of a country or area with age related data. Second, the key parameter is the factor that the incidence in a certain year, say between 1 and 18 child years, differs from the average value. As an example, the 2016 child abuse US average incidence is 9.1/1000, and the child abuse incidence at e.g. year

2 is 11.2/1000 [5] (see Table 1 and Figure 1A). So, the factor between the incidence in year 2 and the 18 year average thus is  $11.2/9.1 = 1.23$ . This factor then is determined for all 18 age years, see Table 1 and Figure 1B. Below, we use "Incidence/Average Ratio" for this factor (Figure 1B).

Phase C determines the so-called "next-best" Dutch child abuse incidences for each child year. First, it assumes that the Incidence/Average Ratios, here from the US, are identical to the Dutch Incidence/Average Ratios. Then, the Dutch incidences per child year are equal to the US-Incidence/Average Ratios multiplied by the Dutch available 18-year averaged value, see Figure 2.

Phase D provides the equations:

$$\text{US Incidence/Average Ratio (age)} = \frac{\text{US Incidence (age)}}{\text{US Average Incidence}} \tag{1}$$

The method assumes that the *US Incidence/Average Ratio* also applies to the Dutch case, or,

$$\text{Dutch Incidence/Average Ratio (age)} = \frac{\text{Dutch Incidence (age)}}{\text{Dutch Average Incidence}} = \frac{\text{US Incidence (age)}}{\text{US Average Incidence}} \tag{2}$$

In other words, the percentage of variations around the US and Dutch average incidences are taken equal. The Dutch next-best child abuse incidences per child age, denoted as *DutchNextBestIncidence (age)*, then becomes

$$\text{DutchNextBestIncidence (age)} = (\text{DutchAverageIncidence}) \times [\text{US Incidence/Average Ratio (age)}] \tag{3}$$

More general, if age-related data are available from other countries or country areas, the US data can be replaced by data from that other country. Below we also include data from Ontario, Canada, see [Figure 2 \[11\]](#).

### 2.2. US Child Abuse Incidences Per Child Year

We will first use the child abuse data for every child year that are yearly published by the US Department of Health & Human Services, Children’s Bureau Administration on Children, Youth and Families, Administration for Children and Families (<https://www.acf.hhs.gov/cb/data-research/child-maltreatment>), e.g. in 2016 ([5] their Tables 3-5, page 41). The Children's Bureau was created in 1912 by 17th USA president William Howard Taft. Their objective is "to collect nationally standardized child abuse and neglect incidences. The data have been provided every year since 1991 and are collected from child welfare agencies in the 50 states, the Commonwealth of Puerto Rico, and the District of Columbia". All these states have child abuse and neglect reporting laws that mandate certain professionals and institutions refer suspected maltreatment to a child protective services agency (reproduced from [5]). Data are presented of neglect, physical abuse, sexual abuse, sex trafficking, and child fatalities.

The USA child abuse data in 2016 are presented In [Table 1](#) for each child year [5]. The *US Age-Averaged Incidence* for all children <18 years was 0.0091.

**Table 1.** First row: The 2016 US general abuse incidences per 1000 children ([5] page 22, Exhibit 3-G), average value 0.0091. Second row: the US Incidence/Average Ratio, Eq. 1.

Age	US Child Abuse Incidence per 1000 children (Average 9.1/1000)	US Incidence / Average Ratio
<1	24.8	2.73
1	11.9	1.31
2	11.2	1.23
3	10.6	1.17

Age	US Child Abuse Incidence per 1000 children (Average 9.1/1000)	US Incidence / Average Ratio
4	10.1	1.11
5	9.9	1.09
6	9.9	1.09
7	9.7	1.07
8	8.8	0.97
9	8.1	0.89
10	7.4	0.81
11	6.8	0.75
12	6.7	0.74
13	6.7	0.74
14	6.7	0.74
15	6.4	0.7
16	5.5	0.6
17	3.6	0.4

### 2.3. Ontario Child Abuse Incidences Per Child Year

We will next use The Ontario Incidence Study of Reported Child Abuse and Neglect-2018 (OIS-2018), which is the sixth provincial Canadian study to examine the incidence of reported child maltreatment and the characteristics of the children and families investigated by child protection services in Ontario [11]. The OIS-2018 tracked 40,477 child maltreatment-related investigations (37,922 investigations involving children <1 to 15 years old and 2,555 investigations involving 16 and 17 years old) conducted in a representative sample of 18 child welfare service agencies across Ontario during a 3 months period in the fall of 2018. In 2018, the total number of children <18 years was around 2,680,000 (from Internet). The outcomes were presented in their Table 5-1A for children between <1 year to 15 years, and in their Table 5-1B for children of 16 and 17 years. In these Tables, the number of

investigations for females and males are presented separately, and also their maltreatment rates per 1000 children. The general maltreatment rate then was calculated as follows. For example, for children <1 year, 684 investigations were performed for females, with an abuse incidence of 10.39/1000, and 844 for males with a 12.25/1000 incidence. The overall outcome for <1 year then was  $(684 \times 0.01039 + 844 \times 0.01225) / (684 + 844) = 11.4 / 1000$ . The outcomes are summarized in Table 2.

**Table 2.** First row: The 2018 Ontario general abuse incidences per 1000 children ([11] pages 42 and 43), average value 0.01533. Second row: the Ontario Incidence/Average-Ratio, Eq. 1.

Age	Ontario Child Abuse Incidence per 1000 children (Average 15.33/1000)	Ontario Incidence / Average Ratio
<1	11.4	0.745
1	10.4	0.681
2	16.3	1.064
3	12.8	0.834
4	16.5	1.077
5	17.4	1.136
6	20.2	1.312
7	17.7	1.157
8	22.1	1.441
9	18.3	1.191
10	15.3	0.997
11	18.9	1.231
12	15.3	0.995
13	16.6	1.083
14	14.1	0.922
15	15.9	1.036
16	11	0.718
17	6.9	0.382

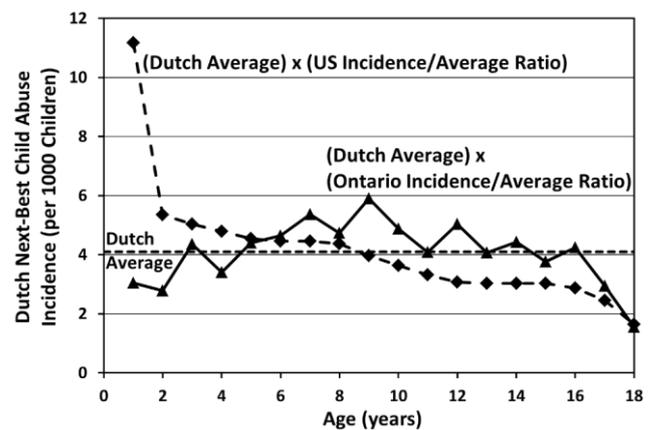
### 2.4. Dutch 18 Year Average Child Abuse Incidence

For the Dutch average outcome, we will use the checklist results from Hoedeman et al [10], because it combined the outcomes of all children included in 4 previous Dutch studies [6-9]. The checklists consisted of 5 or 3 (the "reduced model") items, and their aim was to develop an improved checklist by integrating the various items of the 3 other checklists. A total of 24,963 children of all ages out of the 4 studies were included here [6-9], of which 868 showed a positive result

(17.5%) and 102 received a child abuse diagnosis, thus the Dutch Age-Averaged Incidence was  $102 / 24,963 \approx 0.00409$ .

### 3. Results

Figure 2 provides the 2 next-best Dutch child abuse incidences, from Eq. 3, respectively combined with the US and the Ontario data as provided in Tables 1 and 2. The differences of the 2 outcomes are remarkable for children under 1 year, demonstrating the need for the age-related and age-averaged areas to include inhabitants as comparable as possible.



**Figure 2.** The resulting 2 next-best Dutch child abuse incidences from the Dutch 18-year averaged incidence [10], multiplied respectively by US and Ontario Incidence/Average Ratios.

### 4. Discussion

Data collection and analysis of abuse incidences per child year require a professional organization with proper funding, designed to facilitate multidisciplinary cooperation that combines science and practice. Unfortunately, such organizations are rarely available. However, reliable child abuse incidences for each age year could possibly be obtained in large areas or countries where an averaged incidence is available, by choosing a smaller but representative region and applying the method explained in this paper. We will describe two study designs for collection of age-related abuse incidences that are possibly examples of a proper organization, the US and Ontario.

For completeness, we previously used physical child abuse data from the Dutch-speaking part of Belgium (Flanders and Brussels) [12], because such data is not available in the Netherlands. These Belgian child abuse incidences of 2021 [13], were provided as the number of children that were reported to 2 collaborating Child Abuse Expertise Centers as victim of child abuse, however, not for each child year but in age-periods of 3 years.

## 4.1. US Study Design

US data, e.g [5], are derived from a voluntary national data collection and analysis program to make available state child abuse and neglect information. In practice, agencies of Child Protection Services (CPS) receive referrals involving children, part of them were screened in for a CPS response, part of them were screened out. CPS agencies provide services to children and their families, both in their homes and in foster care. Reports of alleging child abuse and neglect are submitted by professionals including teachers, police officers, lawyers and social services staff. Most reports were from educational personnel, legal and law enforcement personnel, and social services personnel. One-fifth were submitted by nonprofessionals, including friends, neighbors, and relatives.

A federal-state partnership is the core component of the National Child Abuse and Neglect Data System (NCANDS). It was established by the Children's Bureau to encourage scholars to use existing child maltreatment data in their research. NCANDS acquires data sets from national data collection efforts and from individual researchers, prepares the data and documentation for secondary analysis, and disseminates the data sets to qualified researchers who have applied to use the data. Each state designates one person to be the NCANDS state contact. These state contacts from all 52 states work with the Children's Bureau and the NCANDS Technical Team to uphold the high-quality standards associated with NCANDS data. NCANDS Technical Team members provide one-on-one technical assistance to states to assist with data mapping, construction, extraction, and data submission and validation. Upon receipt of data from each state, a technical validation review is conducted to assess the internal consistency of the data and to identify probable causes for missing data.

## 4.2. Ontario Study Design

The Ontario Incidence Study (OIS) [11], reflects a provincial effort by a group of child welfare service providers, researchers, and policy makers committed to improving services for children and families who are served by them. Child welfare workers completed a standardized online data collection instrument. Weighted provincial, annual estimates were derived based on these investigations. The primary objective of the OIS is to provide reliable estimates of the scope and characteristics of child abuse and neglect investigated by child welfare services in Ontario. The OIS was funded by Ontario's Ministry of Children, Community and Social Services.

## 5. Conclusions and Future Perspectives

Since building an infra structure for proper data collection and analysis of age-related child abuse incidences in large areas or countries takes time, if ever possible, deriving age-related incidences by a next-best method can be a possible solution when only an age-averaged value is available.

The remarkable different results for children below 1 year in using US and Ontario age-related incidences (Figure 2) are unrelated to our method but are, in our opinion, merely a consequence of cultural differences between the US and Ontario. Based on Ontario in 2018, with about 14,310,000 inhabitants and about 2,680,000 children <18 (data from Internet), the size of the smaller region can be estimated as follows. From [11], (pages 42 and 43, their Tables 5-1A and 5-1B), about 158,500 children were investigated within a period of 3 months. Thus, the fraction of children that were investigated was about  $158,500/2,680,000 \approx 0.059$ , so the amount of inhabitants of the smaller region then is at least  $0.059 \times 14,310,000 \approx 844,000$  inhabitants. However, assuming that an investigation period of 1 year rather than 3 months is an option, the smaller area could be 4-times smaller, say including about  $844,000/4 \approx 210,000$  inhabitants and investigating about  $158,500/4 \approx 40,000$  children.

Importantly, the need to improve data collection, analysis, dissemination and use, could not be more urgent today, in part because countries collect a lot more data than they publish. Nevertheless, based on what has been learned, even greater efforts are required to improve data in order to effectively combat child maltreatment [14]. Global monitoring requires comparable statistics and collaboration within the international community. Countries across Europe already collect data that are largely comparable, as demonstrated by the DataCare project [15].

Finally, the "next-best" approach of obtaining reliable child abuse incidences per child year for large areas or countries could possibly become an interesting approach for member states of the European Union and the United Nations Convention on the Rights of the Child [3], which was the first international instrument to explicitly recognize children as human beings with innate rights, ratified by 197 countries in 1989, including all EU member states.

## Abbreviations

CPS	Child Protection Services
EU	European Union
NCANDS	National Child Abuse and Neglect Data System
OIS	Ontario Incidence Study
UN-CRC	United Nations Convention on the Rights of the Child

## Author Contributions

**Marianne Vlaming:** Conceptualization, Investigation, Methodology, Writing - original draft, Writing - review and editing

**Martin J. C. van Gemert:** Conceptualization, Investigation, Methodology, Visualization, Writing - original draft, Writing - review and editing

**Pieter J. J. Sauer:** Methodology, Writing - review and editing

All authors have read and agreed to the published version of the manuscript.

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## Conflicts of Interest

The authors declare no conflict of interest.

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