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## MAPPING THE GLOBAL SCIENTIFIC RESEARCH OF INFANT HOMICIDE: A DESCRIPTIVE SCOPING REVIEW

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### ABSTRACT

*This review describes research on the homicide of infants (aged 0-1 year), pertaining to victim and perpetrator characteristics. A search of eighteen databases, yielded fifty-three included articles, of which, thirty-nine were cases studies, two qualitative, and twelve quantitative. The diversity of study methods and shortage of robust, dedicated studies prevented adequate synthesis of the findings. This review, therefore, encourages the development of more targeted research focused on the homicide of infants.*

**Keywords:** *Homicide; infanticide; neonaticide; perpetrator; scoping review; victim.*

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### INTRODUCTION

Infant homicide (used synonymously with infanticide. Defined as the killing of a child under one year of age) is a global public health concern. The level of child killing in a country is a proxy indicator of the effectiveness of the child protection system (Mathews, Jamieson, Lake & Smith, 2014: 99; Pinheiro, 2006: np). Similarly, infant mortality is a key indicator for the development and health status of a country (Liu, Johnson, Cousens, Perin, Scott, Lawn, Rudan, Campbell, Cibulskis, Li, Mathers & Black, 2012: 2159) and child homicide should be a part of this. However, many countries, especially Low and Middle Income Countries (LMIC), do not collect or analyse data on child homicides (the killing of a child under the age of 18 years) (Abrahams, Mathews, Martin, Lombard, Nannan & Jewkes, 2016: 3-4) as an indicator of child health.

Despite poor data from LMIC, a 13-year review (1999-2011) conducted by Razali, Kirkman, Ahmad and Fisher (2014: 5) in Malaysia found an infanticide rate fluctuating from 4.8 per 100 000 live births (2007) to 9.1 per 100 000 live births (2011). Two African studies reported significantly higher rates, with a Tanzanian study conducted by Outwater, Mgaya, Campbell, Becker, Kinabo and Menick (2010: 248) reporting the highest neonaticide (defined as the killing of a neonate on the day of its birth (Resnick, 1970: 58)) rate of 27.7 per 100 000 live births. While, the South African study, conducted by Abrahams, Mathews, Martin, Lombard, Nannan and Jewkes (2016: 5) reported a neonaticide rate of 19.6 per 100 000 live births and an infanticide rate of 28.4 per 100 000 live births. In contrast, the few incidence studies that have been done from developed settings, have shown that infanticide/neonaticide rates range from 2.1 to 6.9 per 100 000 live births (Porter & Gavin, 2010: 100).

The homicide incidence is often derived from routine data sources, which is also often unavailable in developing settings. In addition, routine data sources have a limitation as it tends to underestimate fatal child abuse/neglect. This is because the younger the child, the greater the likelihood that the death may be coded as 'accidental' or 'sudden infant death'. This has led several

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researchers (for example: Browne & Lynch, 1995: 313) to postulate that some fatal child abuse cases remain unrecognised. This is also tied to the difficulty in determining the cause of infant deaths, since routine surveillance systems tend to have a poor ability to record homicides that are a result of deliberate neglect or omission of care. More importantly, data on perpetrator and victim characteristics, which is critical for the development of targeted interventions, is frequently missing from routine surveillance systems. This is especially true in developing settings, where routine administrative data are not well established (Abrahams et al, 2016: 3-4). Recently, in response to improving access to data, the South African Police Service (SAPS) signed an agreement with Statistics South Africa to assist with the calculation of crime statistics. SAPS has also adapted their crime categories to address the different homicide categories. However, it is likely that the homicide of all children under the age of 18 years will be placed into one category, and that the age categories, such as that of infanticide (0-1 year), will not be delineated.

Although reviews have been conducted on the causes of infanticide, such as the review conducted by Porter and Gavin (2010) and Pitt and Bale (1995), additional infanticide research has been published since. To the best of our knowledge, this article is the first review of this age group that includes all perpetrators and all methodological frameworks, focusing particularly on victim and perpetrator characteristics. Thus, in this article, we present a scoping review of the homicide of infants (aged 0-1 year), with the aim to synthesise information on:

- 1) the description of the research regarding infant homicide (such as the year of publication, the country the study was conducted in, the study time period, the article's perspective, and the study design/approach);
- 2) the victim and perpetrators' characteristics;
- 3) the perpetrators' childhood and intimate relationship characteristics; and
- 4) the motive/circumstances surrounding the crime.

## **METHODS**

### **Search strategy**

Data were compiled following the PRISMA guidelines (an evidence-based minimum set of items for reporting in reviews) (Moher, Liberati, Tetzlaff & Altman, 2009: 267). Eighteen databases (Appendix 1) were used to identify all studies published from first recorded/published study until 31 December 2014. Appendix 2 shows the search terms. The review was registered at PROSPERO (Registration number: CRD42016051473) on 15 November 2016.

### **Included and excluded studies**

The review aimed to provide a description of the data on infanticide and, therefore, included all methodological frameworks. We were also mindful of the notion that a focus on qualitative studies would have largely included case studies. We also highlight that, although we included quantitative studies, the focus was not on prevalence, as this was covered in another review in which we were involved (a pilot, multi-disciplinary child death review project in South Africa).

Eligible studies met the following criteria:

- 1) published in English;
- 2) reported on an original research study (had its own primary data);
- 3) the victim was aged between zero and one (infanticide and neonaticide cases); and
- 4) reported on completed homicides (homicide attempts excluded).

Studies were excluded if:

- 1) the victim was over the age of one;
- 2) was not published in English;
- 3) did not have its own primary data (for example: reviews and newspaper reports)
- 4) did not differentiate between attempted and completed homicides, only reported on attempted homicides, or homicidal ideation; and
- 5) did not separate the under-one-year homicides from the under-eighteen-year results.

### **Abstract and full text screening**

The first and second authors independently screened 8 046 abstracts and any discrepancies were resolved by discussion with the fourth author. The resulting 707 full texts were independently screened by the first and fourth authors and any discrepancies were resolved by discussion with the second author. In total, fifty-three studies were included (Figure 1).

### **Quality appraisal**

The included studies were assessed by utilising an adapted version (as used by Adams & Savahl, 2017: 294) of the Evaluation Tool for Qualitative Studies (Long & Godfrey, 2004: 186-187) and for Quantitative Studies (Long, Godfrey, Randall, Brettle & Grant, 2002: 30-37) (Appendix 3). The adapted checklist was selected because of its clarity, simplicity and thorough approach to appraisal without being too prescriptive. The assessment was completed with the understanding that no single set of guidelines can be completely definitive. By applying these criteria, it was observed that no papers were uniformly poor. Therefore, none of the studies were excluded based on the quality appraisal.

### **Data extraction and analysis**

The first author extracted the data from the fifty-three included studies, and this was double-checked by the fourth author. The extracted data is presented in four tables. The qualitative and quantitative studies were reviewed and analysed separately. The researchers were mindful of what emerged from each set of data and this informed the extraction of data from each study. The analysis followed a process of reading and rereading each article.

Regarding the qualitative studies, tables were utilised to show thematic domains that were developed. Thereafter, the relevant data from each study was extracted and appropriately matched in the tables, thereby constituting a cyclical process. Studies were subsequently exposed to multiple checks for new emerging themes and thus, new categories were added to the tables. Under each relevant heading explicitly stated quantitative data were extracted and added to each table. Implicitly stated quantitative data were calculated to obtain proportions and then entered into tables.

Tables below are presented by:

- 1) a description of the included studies;
- 2) the quantitative studies;
- 3) the victim and perpetrator characteristics;
- 4) the circumstances surrounding the crime; and
- 5) Lastly, the qualitative and quantitative data are presented separately, yet in the same table.

## RESULTS

Table 1: Description of the 53 included studies

Author	Publication year	Country	Study data time period	Paper's perspective	Study design/ approach
Achakzai & Kasi	2007	N/R*	N/R	Psychological	Case study
Anderson, Sisask & Varnik	2011	Estonia	N/R	Psychological	Case study
Atkins, Grimes, Joseph & Liebman	1999	United States of America (USA)	Crime committed in 1997	Legal and psychological	Case study
Becroft & Lockett	1997	New Zealand	Crimes committed between 1980-1993	Medical forensics	Case study
Beyer, Mack & Shelton	2008	USA	Crimes committed between 1992-2005	Criminology	Quantitative
Bohnert, Perdekamp, & Pollak	2004	Germany	N/R	Medical forensics and legal	Case study
Briggs & Briggs	2000	Venezuela	Crime committed in 1992	Legal and cultural	Case study
Briggs & Cutright	1994	USA	Data collected: 1965-1988	Statistical analysis with an economic perspective of homicide data	Quantitative
Brookman & Nolan	2006	United Kingdom (UK)	Data collected: 1995-2002	Medical forensics/ crime	Quantitative
Bucove	1968	USA	N/R	Psychological	Case study
Drakeford & Butler	2010	UK	Crime committed in 2005	Social Work	Case study
Domenici, Toni, Spinetti, Rocchi & Presciuttini	2008	Italy	N/R	Medical forensics	Case study
Fiala & LaFree	1988	USA	Data collected: 1965-1975	Epidemiology	Quantitative
Gaillard, Breuil, Doche, Romeuf, Lemeur, Prevosto & Fanton	2011	France	N/R	Medical forensics	Case study
Gartner	1990	Canada	Data collected: 1950-1980	Public health	Quantitative
Gartner	1991	Canada	Data collected: 1965-1980	Public health	Quantitative
Gous & Roos	2005	South Africa	N/R	Psychological	Case study
Green & Manohar	1990	USA	N/R	Psychological	Case study
Hughes	1990	USA	Crimes committed between 1978-1984	Psychological	Case study
Hunnicut & LaFree	2008	USA	Data collected: 1945-1998	Epidemiology	Quantitative
Kahana, Penner, Nachman & Hiss	2005	Israel	N/R	Multidisciplinary approach	Case study
Kauppi, Kumpulainen, Vanamo, Merikanto & Karkola	2008	Finland	Data collected: 1970-1994	Psychological	Case study
Kaye, Borenstein & Donnelly	1990	USA	Crimes committed between 1911-1983	Psychological	Case study
Korbin	1986	USA	N/R	Psychological	Qualitative
Kunst	2002	USA	N/R	Psychological	Case study
Large, Nielssen, Lackersteen & Smith	2010	Australia	Data collected: 1987-2001	Epidemiology	Quantitative
Lee, Li, Kwong & So	2006	Hong Kong	N/R	Medical forensics	Case study
Mendlowicz, Rapaport, Mecler, Golshan & Moraes	1998	Brazil	Data collected: 1900-1995	Epidemiology/ public health	Quantitative
Minne	2009	UK	N/R	Psychological	Case study
Mishra, Ramachandran, Kumar, Tiwari, Chopra, Datta & Saili	2014	India	N/R	Cultural/social	Case study
Mitchell & Davis	1984	USA	Data collected: 1959-1981	Medical forensics	Case study
Nesca & Dalby	2011	Canada	N/R	Psychological	Case study
Overpeck, Brenner, Trumble, Trifiletti & Berendes	1998	USA	Data collected: 1983-1991	Epidemiology/ public health	Quantitative
Palermo	2002	USA	N/R	Psychological	Case study
Paluszny & McNabb	1975	USA	N/R	Psychological	Case study

<b>Piercecchi-Marti, Louis-Borrione, Bartoli, Sanvoisin, Panuel, Pelissier-Alicot &amp; Leonetti,</b>	2006	France	N/R	Medical forensics	Case study
<b>Radano</b>	2007	USA	N/R	Psychological	Case study
<b>Rahman, Grellner, Harry, Beck &amp; Lauriello</b>	2013	USA	N/R	Psychological	Case study
<b>Ribe &amp; Changsri</b>	2008	USA	N/R	Medical forensics	Case study
<b>Riley</b>	2005	USA	N/R	Biopsychosocial	Qualitative
<b>Sadoff</b>	1995	USA	N/R	Psychological	Case study
<b>Saunders</b>	1989	USA	Crimes committed between 1987-1988	Psychological	Case study
<b>Sauvageau, Belley-Coôté &amp; Racette</b>	2007	Canada	N/R	Medical forensics	Case study
<b>Scherer &amp; Scherer</b>	2007	Brazil	N/R	Psychological	Case study
<b>Silva, Leong, Dassori, Ferrari, Weinstock &amp; Yamamoto</b>	1998	USA	N/R	Psychological	Case study
<b>Shelton, Muirhead &amp; Canning</b>	2010	USA	Crimes committed between 1992-2006	Crime/justice	Quantitative
<b>Simpson &amp; Stanton</b>	2010	New Zealand	N/R	Psychological	Case study
<b>Sorenson, Wiebe &amp; Berk</b>	2002	USA	Data collected: 1960-1998	Epidemiology/ public health	Quantitative
<b>Stanton &amp; Simpson</b>	2001	New Zealand	N/R	Psychological	Case study
<b>Turner &amp; Jumbelic</b>	2003	USA	N/R	Medical forensics	Case study
<b>Valença, Mendlowicz, Nascimento &amp; Nardi</b>	2011	Brazil	Crime committed in 1987	Psychological	Case study
<b>Von Wurmb-Schwark &amp; Schwark</b>	2009	Germany	N/R	Medical forensics	Case study
<b>Wilkins</b>	1984	UK	N/R	Psychological	Case study
* N/R refers to cases in which this characteristic was not reported by author.					

The fifty-three infant homicide studies that met the inclusion criteria are summarised in Table 1. Studies were published from 1968 until 2014 with the majority published after the 2000s. The fifty-three studies represent 16 countries. Most were published from developed settings (classification is based on the United Nation's classification of developed versus developing countries): USA, New Zealand, Germany, UK, Italy, France, Canada, Israel, Finland, Australia, and Hong Kong. Six studies were from developing settings: Estonia, Venezuela, South Africa, India, and Brazil. The longest research period was from a study in Rio de Janeiro, and included data from judicial records, covering a total of ninety-five years. For many studies, the period of study was not stipulated. Furthermore, the two most common perspectives from which studies were conducted were psychological and forensic medical. Most publications were case studies, which arose out of clinical settings, where the author(s) were the perpetrators' psychologists/psychiatrists. In three case studies, the authors performed the post mortem on the deceased infant. Most papers described single cases, with eleven papers reporting on two or more cases. Twelve studies used a quantitative approach, from a public health/epidemiological perspective, using country level mortality data (routine administrative data). Only two studies used a qualitative approach, with individual interviews with child homicide perpetrators. Korbin (1986: 331) used a retrospective design and Riley's (2005: 6) study was exploratory. While, Korbin (1986) did not report on the number of interviews and length, Riley (2005: 7) conducted two interviews per participant, lasting between two to three hours each.

**Table 2: Quantitative (n=12) study methods and findings**

Author (Year)	Aim/hypotheses	Data collection methods	Number of participants/homicides/countries	Data analysis methods	Main findings pertaining to 0-1 age group
<b>Beyer et al (2008)</b>	Determine neonaticidal victim and perpetrator characteristics	Offenders identified through Federal Bureau of Investigation's (FBI) database, Violent Criminal Apprehension Program, Lexis Nexus, and Internet searches (1992-2005)	40 female perpetrators and 41 infant deaths	Descriptive/frequency statistics	Refer to Table 3&4
<b>Briggs &amp; Cutright (1994)</b>	Developed models of structural characteristics for child homicide	Collected cross-national child homicide data (1965-1988)	21 developed countries	Multivariate analysis	1. Increasing social insurance expenditure decreases infant homicide rates. 2. Increased divorce rates and societal integration associated with infant homicide rates. 3. Greater female labour force participation increases infant homicide. 4. Increased culture of violence increases infant homicide.
<b>Brookman &amp; Nolan (2006)</b>	Explore recorded infanticide cases in England and Wales	Collected data through Home Office Homicide Index (1995-2001)	298 infant homicides	Descriptive/frequency statistics	Refer to Table 3&4
<b>Fiala &amp; LaFree (1988)</b>	To use child homicide cross-national data to develop societal models of child abuse	Collected cross-national child homicide data (1965-1975)	18 countries	Regression analysis	Results for: Lesser-developed countries: 1. Greater female labour force participation associated with higher homicide rates. 2. Higher female participation in tertiary education, and higher ratio of women to men in professional jobs, associated with lower homicide rates. 3. Gross national product growth is positive yet significant for children under 1. Results for: More-developed countries: 1. Women's labour force participation positive effect on homicide rate. 2. Women's higher social status reduces homicide rate.
<b>Gartner (1990)</b>	Develop and test models of cross-national and temporal variation in homicide rates using victimisation data	Collected cross-national child homicide data (1950-1980)	18 countries	Multivariate analysis	1. Infant homicide rate decreased. Yet, infant homicide rates are highest out of all child age groups in each nation, except USA, Sweden and Italy. 2. Nations with high wartime battle deaths have higher infant homicide rate
<b>Gartner (1991)</b>	Examine relationship between family structure and infant homicide victimisation rates in 17 developed nations	Collected cross-national child homicide data (1965-1980)	17 countries	Multivariate analysis	1. Infant homicide rates higher with high rate of births to teenage mothers. 2. Lower welfare spending, greater female labour participation, and history of wars associated with higher infant homicide rate.
<b>Hunnicutt &amp; LaFree (2008)</b>	Expand and replicate four previous studies to gain understanding of infant homicide at cross-national level	Collected cross-national child homicide data (1945-1998)	39 countries included in descriptive analysis and 27 countries included in regression analysis	Descriptive and regression analysis	1. Increased female labour force participation increases infant homicide rates. 2. Increase income inequality increases infant homicide.
<b>Large et al (2010)</b>	Examine association between rates of infant homicide, suicide, and other homicide	Used World Health Organisation and Centre for Disease Control mortality statistics (1987-2001)	Included 48 countries (total of 12837 infant homicides)	Linear regression analysis	Infant homicide rate significantly associated with total homicide and total suicide rate.

<b>Mendlowicz et al (1998)</b>	Hypothesis: harsh conditions prevent neonaticidal women from having and raising children	Cases in which mothers murdered child on first day after birth in Rio de Janeiro (1900- 1995) identified retrospectively through search in judicial files	53 mothers responsible for the death of 72 newborns	T-test and chi-square test	Refer to Table 3&4
<b>Overpeck et al (1998)</b>	Assess timing of deaths and risk factors for infant homicide	Collected birth and death data in USA (1983-1991)	2776 infant homicides	Bivariate and multivariate stratified analyses	Refer to Table 3&4
<b>Shelton et al (2010)</b>	Examine legal outcomes for neonaticide offenders, identify variables influencing conviction/sentencing, and compare USA legal response to other developed nations	Offenders identified through FBI's database, FBI's Violent Criminal Apprehension Program, FBI National Academy graduates, LexisNexis, and internet searches (1992-2006)	44 female perpetrators responsible for 45 infant deaths	Descriptive and frequency analysis	Refer to Table 3&4
<b>Sorenson et al (2002)</b>	Hypothesis: legalising abortion reduces infant homicide	USA child mortality data obtained from National Centre for Health Statistics (1960-1998)	9090 infants killed	Estimated transfer function models	Abortion legalisation limited effect on reducing infant homicide

Table 2 summarises the aims, methods, and findings of all the twelve quantitative studies. A limitation of national mortality studies is the lack of perpetrator data, such as age and sex data. The five studies with detailed perpetrator and victim data (that is, studies not using administrative data) are presented in tables 3 and 4.

Six studies collected cross-national data from multi-country databases. Briggs and Cutright (1994: 3), Fiala and LaFree (1988: 432), Gartner (1991: 231), and Hunnicutt and LaFree (2008: 46) found that greater female labour force participation increased infanticide rates. Briggs and Cutright (1994: 4) found that increasing social insurance expenditure also decreased infanticide rates. Likewise, Gartner (1991: 232), who used data on welfare spending, found lower expenditure was associated with higher homicide rates.

Gartner (1991: 238) also looked at reproductive data and reported that higher infanticide rates were associated with higher teenage pregnancies. In a single country study, Sorenson et al (2002: 239) also reported on reproductive factors, as they sought to determine the association between legalising abortion and infant homicide rates. The authors examined 1960-1998 USA mortality data and found that legalising abortion did not have a significant association with infanticide.

Finally, Large et al (2010: 87), examined rates of suicide and infant homicide. The authors observed a positive association between infanticide and suicide rates within countries, postulating that infant homicide and suicide share some risk factors.

**Table 3: Victim and perpetrator characteristics from the case study (n=39), qualitative (n=2), and quantitative (n=5) studies**

CASE AND QUALITATIVE STUDIES						
Author (Year)	Victim sex (n=88)	Victim age (n=88)	Cause of death (n=88)	Perpetrator relationship to victim (n=88)	Perpetrator age (n=88)	Perpetrator employment (n=88)
Achakzai & Kasi (2007)	Male (1)	Newborn (1)	Stabbing (1)	Mother (1)	27 (1)	N/R (1)
Anderson et al (2011)	Female (1)	7 months (1)	Strangulation (1)	Father (1)	33 (1)	Unemployed (1)
Atkins et al (1999)	Female (1)	Newborn (1)	Placed baby in a bag (1)	Mother (1)	17 (1)	Student (1)
Becroft & Lockett (1997)	Male (1) Female (4)	6 weeks (1) 3 months (1) 8 months (2) 9 months (1)	Suffocation (5)	Caregiver (1) Mother (1)	N/R (2)	Nanny (1) N/R (1)
Bohnert et al (2004)	Females (3)	2 weeks (1) 7 weeks (1) 11 weeks (1)	Asphyxiation (3)	Father (1) Mother (1)	26 (1) N/R (1)	N/R (2)
Briggs & Briggs (2000)	Female (1)	Newborn (1)	Suffocation (1)	Mother (1)	16 (1)	Nanny (1)
Bucove (1968)	Male (1)	Newborn (1)	Unknown* (1)	Mother (1)	36 (1)	N/R (1)
Drakeford & Butler (2010)	Female (1)	4 months (1)	Fatal Child Abuse (FCA) (1)	Stepfather (1) Mother (1)	21 (1) N/R (1)	N/R (2)
Domenici et al (2008)	Unknown (1)	Newborn (1)	Baby thrown into bin (1)	Mother (1)	N/R (1)	N/R (1)
Gaillard et al (2011)	Female (1)	1 month (1)	Poisoned (1)	Mother (1)	N/R (1)	N/R (1)
Gous & Roos (2005)	Female (1)	7 months (1)	Suffocation (1)	Mother (1)	27 (1)	Unemployed (1)
Green & Manohar (1990)	N/R (1)	Newborn (1)	Drowning (1)	Mother (1)	23 (1)	Secretary (1)
Hughes (1990)	Male (1) Female (1)	1 month (1) 9 months (1)	Pneumonia left untreated (did not believe in medicine) (2)	Father (2) Mother (2)	N/R (4)	N/R (4)
Kahana et al (2005)	Female (1)	Newborn (1)	Asphyxiation (1)	Mother (1)	21 (1)	Worked in fields (1)
Kauppi et al (2008)	Male (4) Female (6)	Newborn (1) 1 month (2) 2 months (1) 4 months (1) 5 months (2) 7 months (2) 8 months (1)	Drowning (4) Suffocation (2) Cut baby throat (1) Pushed baby under car (1) FCA (1) Set house on fire (1)	Mother (10)	Mean age of the mothers: 28.5 years (10)	Skilled workers (7) White-collar workers (3)
Kaye et al (1990)	Male (2) N/R (2)	Newborn (4)	Poisoned (1) Strangulation (1) Stabbing (1) FCA (1)	Father (4)	26 (1); 32 (1); 35 (1); 36 (1)	N/R (4)
Korbin (1986)	Male (2) Female (1) N/R (1)	5 months (1) 8 months (1) 11 months (2)	FCA (2) Unknown (2)	Mother (4)	N/R (4)	Nurse (1) N/R (3)
Kunst (2002)	Female (1)	7 days (1)	Stabbing (1)	Mother (1)	19 (1)	N/R (1)
Lee et al (2006)	Male (1) Female (3)	Newborn (4)	Strangulation (2) Placed baby in bin (1) Drowning (1)	Mother (4)	13 (1); 17 (1); 22 (1) Unknown (1)	N/R (4)
Minne (2009)	Female (1)	9 weeks (1)	Poisoned (1)	Mother (1)	28 (1)	N/R (1)
Mishra et al (2014)	Female (2)	Newborn (2)	Strangulation (2)	Mother (2)	25 (1); 27 (1)	N/R (2)
Mitchell & Davis (1984)	N/R (2)	Newborn (2)	Drowning (2)	Mother (2)	19 (1); 27 (1)	N/R (2)
Nesca & Dalby (2011)	N/R (1)	Newborn (1)	Strangulation (1)	Mother (1)	19 (1)	N/R (1)

<b>Palermo (2002)</b>	Male (3)	Newborn (1) 3 months (1), 1 year (1)	Suffocation (1) FCA (1) Drowning (1)	Father (2) Mother (1)	20 (1); 34 (1) Unknown (1)	Unemployed (1) Self-employed (1) Unknown (1)
<b>Paluszny &amp; McNabb (1975)</b>	Male (1)	4 months (1)	FCA (1)	Sister (1)	6 (1)	N/A (1)
<b>Piercecchi-Marti et al (2006)</b>	Female (1)	6 months (1)	Dehydration/ starvation (1)	Father (1) Mother (1)	N/R (2)	N/R (2)
<b>Radano (2007)</b>	Female (1)	5 weeks (1)	Asphyxiation (1)	Mother (1)	N/R (1)	School teacher (1)
<b>Rahman et al (2013)</b>	Male (1)	4 months (1)	Starvation/ dehydration (1)	Father (1) Mother (1)	26 (1) 29 (1)	Fitness trainer (1) Unemployed (1)
<b>Ribe &amp; Changsri (2008)</b>	Female (1)	4 months (1)	FCA (1)	Father (1) Mother (1)	23 (1) Unknown (1)	Employed (1) Unemployed (1)
<b>Riley (2005)</b>	N/R (9)	Newborn (9)	Suffocation (8) Drowning (1)	Mother (9)	17 (1); 18 (2); 20 (1); 23 (1); 27 (1); 28 (1); 29 (1); 38 (1)	N/R (9)
<b>Sadoff (1995)</b>	Male (1) N/R (1)	Newborn (1) 2 months (1)	Baby placed in cupboard (1) Suffocation (1)	Mother (2)	18 (1); 26 (1)	Student (1) Unknown (1)
<b>Saunders (1989)</b>	Male (3) Female (2) N/R (2)	Newborn (7)	Infant placed in bin (1) Exposure (2) Drowned (3) Set on fire (1)	Child's uncle (1) Mother (6)	14 (1); 17 (1); 18 (1); 19 (2); 28 (2)	N/R (7)
<b>Sauvageau et al (2007)</b>	Male (1)	Newborn (1)	Asphyxiation and exposure (1)	Mother (1)	N/R (1)	N/R (1)
<b>Scherer &amp; Scherer (2007)</b>	Male (1)	8 months (1)	Suffocation (1)	Mother (1)	29 (1)	Unemployed (1)
<b>Silva et al (1998)</b>	Female (1)	Newborn (1)	Cut baby up into pieces (1)	Mother (1)	18 (1)	N/R (1)
<b>Simpson &amp; Stanton (2010)</b>	Male (2)	4 weeks (1) 6 weeks (1)	FCA (1) Cut baby's throat (1)	Mother (2)	19 (1) 24 (1)	N/R (2)
<b>Stanton &amp; Simpson (2001)</b>	Female (2) N/R (1)	2 months (1) 3 months (1) 8 months (1)	Smothering (3)	Mother (1)	Early 20s (1)	Unemployed (1)
<b>Turner &amp; Jumbelic (2003)</b>	Male (1)	7 months (1)	Stun gun (1)	Foster mother (1)	N/R (1)	Foster mother (1)
<b>Valença et al (2011)</b>	Male (1)	1 year (1)	Threw baby out window (1)	Mother (1)	43 (1)	N/R (1)
<b>Von Wurmb-Schwark &amp; Schwark (2009)</b>	Female (1)	Newborn (1)	Drowning (1)	Mother (1)	32 (1)	N/R (1)
<b>Wilkins (1984)</b>	N/R (1)	Newborn (1)	Placed infant in cupboard (1)	Mother (1)	28 (1)	Unemployed (1)

**QUANTITATIVE STUDIES**

<b>Author (Year)</b>	<b>Victim sex (n=3213)</b>	<b>Victim age (n=3213)</b>	<b>Cause of death (n=3213)</b>	<b>Perpetrator relationship to victim (n=3211)</b>	<b>Perpetrator age (n=3211)</b>	<b>Perpetrator employment (n=3211)</b>
<b>Beyer et al (2008)</b>	Male (23) Female (18)	Newborn (41)	N/R (41)	Mother (40)	Mean age: 21 years (12-42 years) (40)	Unknown (40)
<b>Brookman &amp; Nolan (2006)</b>	Male (170) Female (128)	0 months - 1 years (298)	Suffocation (51) FCA (17) Poisoning (4) Neglect (14) Drowning (7) Exposure (6) Unknown (199)	Father (112) Mother (104) Unknown (82)	Mean age: 26 years (298)	N/R (298)
<b>Mendlowicz et al (1998)</b>	N/R (53)	Newborn (53)	N/R (53)	Mother (53)	15-19 years (12) 20-24 (28) 25-29 (8) 30-34 (3) > 44 (1) unknown (1)	Domestic worker (48) Dressmaker (2) Unemployed (3)

<b>Overpeck et al (1998)</b>	N/R (2776)	0 months - 1 year (2776)	FCA (1693) Suffocation/ strangulation (282) Drowning (120) Firearms (84) Neglect (81) Arson (64) Stabbing (58) Unknown (394)	Mother (2776)	< 15 year (27) 15-16 (162) 17-19 (684) 20-24 (1063) > 25 (840)	N/R (2776)
<b>Shelton et al (2010)</b>	Male (25) Female (20)	Newborn (45)	Asphyxiation (27) FCA (4) Stabbing (2) Exposure (5) Unknown (6)	Mother (44)	Mean age: 20.91 years (12-42 years) (44)	Student (21) Employed (16) Unemployed (7)
* Unknown refers to cases in which this characteristic was explicitly stated as unknown by the author						
** N/R = not reported						

Table 3 provides the victim and perpetrator characteristics from the case, qualitative and the five quantitative studies. Overall, eighty-eight victims and eighty-eight perpetrators were reported by the case and qualitative studies. These studies reported on cases where victims were mainly newborns and perpetrators were mainly mothers. Most infant victims were females, largely killed by strangulation, asphyxiation, smothering or suffocation. These qualitative studies showed that some perpetrators were mainly in their twenties and were unemployed. Perpetrator Socio-Economic Status (SES) information (not reported on in Table 3) was provided and showed that perpetrators were mainly from a low and middle SES background.

A total of 3 213 victims and 3 211 perpetrators were reported by the five quantitative studies. Not all victim and perpetrator variables were reported by all studies (this is shown in Table 3) since unknowns or not reported (nr). These studies did, however, show that infants were mainly male. Two quantitative studies did not specify exact victim ages, besides that the children were between the ages of 0-1. The three quantitative studies that reported on the exact victim's age were focused on neonaticides. Further, fatal child abuse was reported as a cause of death, with limited detail on specifics. Where the specifics were provided, authors explained that infants died in similar manners, that is of head injuries. As with the qualitative studies, most quantitative studies included only mothers in their sample.

Only one study included maternal and paternal perpetrators in the sample and reported more paternal perpetrators than maternal perpetrators. However, this study also reported many cases where the identity of the perpetrator was unknown. Furthermore, three of the five quantitative studies reported on the mean age of the perpetrators. The means were 21, 26 and 20.9 years respectively. Two studies reported on perpetrator age categories and reported that the 20-24-year age group was most common. Perpetrator employment data from the quantitative studies was limited, with most studies not reporting on this. The three studies reporting on employment showed that perpetrators were mainly domestic workers or students. Finally, two quantitative studies showed perpetrators mainly stemmed from a low SES.

**Table 4: Perpetrators’ childhood and intimate relationship characteristics and circumstances surrounding the crime from the case study (n=39), qualitative (n=2), and quantitative (n=5) studies**

CASE AND QUALITATIVE STUDIES				
Author (Year)	Childhood abuse/issues (n=88)	Marital status (n=88)	Perpetrator a victim of Intimate Partner Violence (IPV) prior to homicide (n=88)	Motive/circumstances surrounding the crime (n=88)
Achakzai and Kasi (2007)	N/R (1)	Married (1)	N/R (1)	Mental illness (1)
Anderson et al (2011)	Physical abuse (1)	Married (1)	No (1)	Gambling debts, recently contracted HIV, & dismissed from army (1)
Atkins et al (1999)	Sexual abuse (1)	Relationship (1)	Yes (1)	Unwanted child (1)
Becroft & Lockett (1997)	N/R (2)	N/R (2)	N/R (2)	Mental illness (2)
Bohnert et al (2004)	N/R (2)	Married (2)	N/R (2)	Child care too strenuous (2)
Briggs & Briggs (2000)	Sexual abuse (1)	Single (1)	N/R (1)	Concealed pregnancy (1)
Bucove (1968)	None (1)	Married (1)	N/R (1)	Unwanted child (1)
Drakeford & Butler (2010)	N/R (2)	Relationship (2)	N/R (2)	N/R (2)
Domenici et al (2008)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
Gaillard et al (2011)	N/R (1)	N/R (1)	N/R (1)	N/R (1)
Gous & Roos (2005)	Physical abuse and neglect (1)	Single (1)	N/R (1)	Baby did not make her life better as expected (1)
Green and Manohar (1990)	Physical abuse (1)	Relationship (1)	N/R (1)	Pregnancy out of wedlock (1)
Hughes (1990)	N/R (4)	Married (4)	N/R (4)	No intent to kill - did not believe in medicine as part of religious cult (4)
Kahana et al (2005)	N/R (1)	Single (1)	N/R (1)	N/R (1)
Kauppi et al (2008)	Emotional abuse (10)	Married (10)	Yes (1) Unknown (9)	Mental illness (10)
Kaye et al (1990)	N/R (4)	Married (3) Unknown (1)	N/R (4)	Father felt own poor health will result in his death leaving no one to provide for his child (1) Unwanted child (3)
Korbin (1986)	Emotional abuse (1) Sexual abuse (1) Abandonment (1) Physical abuse (1)	Married (1) Relationship (1) Unknown (2)	N/R (4)	Did not want a boy (1) Drug abuse (1) Child would not eat breakfast (1) Unknown (1)
Kunst (2002)	Neglect and abuse (1)	Single (1)	Yes (1)	Mental illness (1)
Lee et al (2006)	Sexual abuse (1) Unknown (3)	Married (1) Relationship (1) Single (1) Unknown (1)	N/R (4)	Concealed pregnancy (2) Unwanted child (1) Unknown (1)
Minne (2009)	Physical abuse, neglect, rejection (1)	Single (1)	No (1)	Mental illness (1)
Mishra et al (2014)	N/R (2)	Married (2)	N/R (2)	Stigma of having another daughter (2)
Mitchell & Davis (1984)	N/R (2)	Single (2)	N/R (2)	N/R (2)
Nesca & Dalby (2011)	None (1)	Single (1)	No (1)	N/R (1)
Palermo (2002)	N/R (3)	Single (1) Relationship (1) Married (1)	N/R (3)	Lack of support (1) Baby would not stop crying (1) Mental illness (1)
Paluszny & McNabb (1975)	Physical abuse (1)	Single (still a child) (1)	N/A (1)	Only a child when she killed her brother: abused while growing up and believed her brother was stealing her mother’s affection (1)

<b>Piercecchi-Marti et al (2006)</b>	N/R (2)	Married (2)	N/R (2)	N/R (2)
<b>Radano (2007)</b>	N/R (1)	Married (1)	N/R (1)	Mental illness (1)
<b>Rahman et al (2013)</b>	N/R (2)	Married (2)	N/R (2)	Mental illness (2)
<b>Ribe and Changsri (2008)</b>	N/R (2)	Relationship (2)	Yes (2)	N/R (2)
<b>Riley (2005)</b>	N/R (9)	Single (7) Divorced (1) Married (1)	Yes (3) No (6)	Unwanted child (9)
<b>Sadoff (1995)</b>	N/R (2)	Married (1) Unknown (1)	N/R (2)	Concealed pregnancy (1) Mental illness (1)
<b>Saunders (1989)</b>	N/R (7)	N/R (7)	N/R (7)	N/R (7)
<b>Sauvageau et al (2007)</b>	N/R (1)	N/R (1)	N/R (1)	N/R (1)
<b>Scherer &amp; Scherer (2007)</b>	N/R (1)	Married (1)	N/R (1)	Mental illness (1)
<b>Silva et al (1998)</b>	None (1)	Single (1)	No (1)	Concealed pregnancy (1)
<b>Simpson &amp; Stanton (2010)</b>	Physical and sexual abuse (1) Unknown (1)	Married (2)	Yes (1) No (1)	Child would not eat his dinner (1) Mental illness (1)
<b>Stanton &amp; Simpson (2001)</b>	N/R (1)	Married (1)	No (1)	Mental illness (1)
<b>Turner &amp; Jumbelic (2003)</b>	N/R (1)	N/R (1)	N/R (1)	Wanted child to stop crying (1)
<b>Valença et al (2011)</b>	N/R (1)	Single (1)	No (1)	Mental illness (1)
<b>Von Wurmb-Schwark &amp; Schwark (2009)</b>	N/R (1)	N/R (1)	N/R (1)	N/R (1)
<b>Wilkins (1984)</b>	N/R (1)	Single (1)	N/R (1)	N/R (1)
<b>QUANTITATIVE STUDIES</b>				
<b>Author (Year)</b>	<b>Childhood abuse/ issues (n=3211)</b>	<b>Marital status (n=3211)</b>	<b>Perp a victim of IPV prior to homicide (n=3211)</b>	<b>Motive/circumstances surrounding the crime (n=3211)</b>
<b>Beyer et al (2008)</b>	N/R (40)	Single (34) Married (5) Widowed (1)	Yes (2) No (38)	Unwanted child (40)
<b>Brookman &amp; Nolan (2006)</b>	N/R (298)	N/R (298)	N/R (298)	N/R (298)
<b>Mendlowicz et al (1998)</b>	N/R (53)	Single (43) Married (6) Widowed (2) Unknown (2)	N/R (53)	N/R (53)
<b>Overpeck et al (1998)</b>	N/R (2776)	Single (1626) Married (1150)	N/R (2776)	N/R (2776)
<b>Shelton et al (2010)</b>	N/R (44)	Single (22) Married (6) Unknown (16)	N/R (44)	Unwanted child (44)

Table 4 presents the perpetrators’ childhood and intimate partner relationship information, as well as information on the circumstances surrounding the crime. The qualitative studies reported that some offenders had endured childhood abuse. These studies also reported that more than half of the perpetrators were married, and that some of these offenders reported Intimate Partner Violence (IPV) victimisation. Moreover, an unwanted child was a common reason for the murders. Again, additional perpetrator information was reported by the studies, not shown in Table 4. These qualitative studies showed that fewer perpetrators were aware that they were pregnant (with the incident murder case) compared to those who admitted to concealing their pregnancy.

The quantitative studies did not report on relationship factors. For example: on childhood abuse histories or pregnancy concealment. One quantitative study reported on IPV experiences and noted that most offenders reported an absence of IPV. Finally, the quantitative studies

reporting on the motive were neonaticide studies, and these reported that an unwanted child was a common reason for the murders.

## **DISCUSSION AND RECOMMENDATIONS**

This review has shown that a great deal of infant homicide research stems from case studies. It has also highlighted the challenges in collating data on infanticides due to the lack of dedicated studies. It is, therefore, not surprising that there is a reliance on administrative data to quantify the problem. However, inherent in this is the issue of under counting and misreporting of infanticides, especially within countries with poor monitoring systems. This review shows that in many settings, certain data is often incomplete and lacking, such as whether the perpetrator was a victim of childhood abuse and/or whether he/she was a victim of IPV prior to the homicide. This is concerning as it limits the evidence base needed for developing effective prevention measures.

Although this review has shown that the murder of infants is an international phenomenon, only six studies (mainly qualitative) were from developing countries. This was partly expected, given the fact that, as we acknowledged in the introduction, many low-and-middle income countries (LMIC), do not capture data on child homicides (Liu et al, 2012: 2160). The shortage of good quality data from developing settings is partly due to the possible lack of resources and well-established homicide monitoring systems, a factor common in LMICs (Abrahams et al, 2016: 3-4). Although a monumental task, we recommend increased investment in data systems, including systems to facilitate an improved linkage of different data sources. For example, a pilot, multi-disciplinary child death review project was initiated to close the above gap in South Africa.<sup>1</sup> The authors reported that the project has been effective in improving the identification of child homicides, identifying modifiable causes of death, and using these findings to strengthen policy and service provision (Mathews, Martin, Coetzee, Scott, Naidoo, Brijmohun & Quarrie, 2016: 1-5).

The review also highlighted the intersection of several characteristics serving as risk factors for infanticide. For example: it was found that a greater female labour force participation increased infant homicide. This was confirmed by studies stemming from both developed and developing settings and across many years: Briggs and Cutright (1994: 3); Fiala and LaFree (1988: 432); Gartner (1991: 231); and Hunnicutt and LaFree (2008: 46). The authors explained that female labour force participation is an indirect measure of perceived economic pressure (Briggs & Cutright, 1994: 4). This is because when mothers move into the labour force out of economic necessity, they tend to receive little childcare/household support. Thus, employment may increase family stress, which may increase the likelihood of taking this stress out on children (child abuse). In other words, rates of infanticide may increase when there are conflicts between the need for employment and maternal roles. This also suggests that employment may be a double-edged sword in these situations. On the one hand, mothers move into the economic sphere out of necessity, but on the other hand, being employed presents its own challenges. Consequently, these ambiguous stressful situations could serve as fertile grounds for breeding violence against their own children. For example: a recent South African qualitative study, amongst parents convicted of child homicide, showed that some mothers experienced a lack of financial support from male partners. They maintained that their financial strain worsened with the birth of their children, which then contributed to the homicide. However, this finding was not restricted to the homicide of the 0-1 age group, yet, this may provide a glimpse into the context of such homicides (Dekel, Abrahams & Andipatin, 2018: np).

Our review also supports the finding within a review by Brookman and Nolan, (2006) that parents committed most of the infanticides. We observed that our included qualitative studies, tended to focus on maternal infanticides. The single quantitative study that included both paternal and maternal perpetrators (which explored all recorded cases of infanticide for the period 1995-2002 and noted offenders, victims, and offense characteristics), found fathers were the main perpetrators. However, this study was restricted to the UK, and reported many unknowns regarding the identity of the perpetrator (Brookman & Nolan, 2006: 872). Further, this review alludes to the notion that there is a tendency for infanticide research to focus on women/mothers. Some have stated that the reason for this focus is because, overall, mothers are the primary perpetrators of this age group homicide (for example: Friedman & Resnick, 2009: 10). This could be expected given our finding that most children killed were newborns. Nevertheless, future research should ensure that fathers are not neglected as a research focus in infanticide studies.

The age of the infant has been identified as a risk factor. Within both the qualitative and quantitative studies, it was found that the murdered children appeared to be mainly newborns. Thus, our study seems to confirm the finding by Abrahams et al's (2016: 5-8) South African child homicide study that, amongst children under one, the first hours and days of life may be the time point of highest risk for being murdered. However, caution should be exercised in this interpretation. This is because, three of the five quantitative studies only focused on neonaticides. The two studies that included all infants between the ages of zero and one year, did not specify exact victim ages. Nonetheless, we encourage positive parenting interventions. Two noteworthy examples include: Firstly, South Africa's Parent Centre's Parent-Infant Home Visiting Project, which has been evaluated through randomised control trials and has shown positive outcomes (Cooper, Tomlinson, Swartz, Landman, Molteno, Stein, McPherson & Murray, 2009: 1); and secondly, Uganda's REAL Fathers mentoring program. The post-assessment trial revealed a significant reduction in the use of physical punishment to discipline children (Bacchus, Colombini, Contreras Urbina, Howarth, Gardner, Annan, Ashburn, Madrid, Levtoov & Watts, 2017: 140-147).

Finally, an absence of reproductive services has been associated with increased homicide rates (Kalist & Molinari, 2006: 614), since reproductive services generally help vulnerable mothers. Sorenson et al (2002: 239), postulated that legalising abortion would decrease infanticides. However, they observed that this legalisation had a limited effect on reducing infanticide. Our review also found that the primary motive for an infanticide, within both the quantitative and qualitative studies, was an unwanted infant, again alluding to a high rate of unwanted pregnancies going to term. This finding was, however, mainly supported by studies stemming from developed settings. Nevertheless, Abrahams et al's (2016: 9), research in South Africa, also found a high rate of unwanted pregnancies going to term. The authors noted that this was remarkable given that the country has liberal abortion laws and reasonably good contraception services. Thus, it may allude to a failure in maternal and reproductive health services within such settings. It may also highlight the judgement and stigma (from both health care providers and society) at large, which is often present, resulting in many women avoiding the use of these services (Jewkes, Abrahams & Mvo, 1998: 1790).

In the event of unwanted infants/unwanted pregnancies going to term, we encourage health service points, such as hospitals and clinics, to install baby hatches. This will allow mothers/parents, without entering the hospital, to anonymously place their infant at those hospital hatch drop off points. Alternatively, hospitals could allow women to give birth anonymously and free of charge, as enacted in some European countries. Klier, Grylli, Amon, Fiala, Weizmann-Henelius, Pruitt and Putkonen (2012: 428) evaluated the effectiveness of the anonymous delivery

law in Austria on the frequency of neonaticide and found a reduction in neonaticides. Prior to the new law, the neonaticide rate was 7.2 per 100 000 births, and after the enactment of this law dropped to 3.1 per 100 000 births. Although in this respect caution should be exercised, since this is only one study in a particular (developed) setting. But we do recommend that policy makers consider these options for the reduction of neonaticide and infanticide.

Currently, social service and public health approaches are not meeting society's needs to prevent infanticide and neonaticide. Hence, a continued global effort to conduct robust research on infanticide and to have well-established homicide monitoring systems would provide an invaluable database to assist in the prevention of such crimes.

## **LIMITATIONS**

Our review is not without limitations. A key limitation is the missing data, which hampered the ability to form a more complete understanding of infanticide. It also highlights that the murder of infants should be better documented.

Then, it is important to consider the generalisability of the research, since most studies arose out of clinical settings and from developed countries. Further, the inclusion of a wide variety of study designs enabled a vast contribution of data to be included. This meant that statistical pooling of results by meta-analysis was not possible due to the heterogeneity of study design and methods. This made comparison between studies difficult. Also, comparisons are drawn from studies with different sample sizes, methodologies and data sources. Thus, a further limitation is that a descriptive approach was selected rather than a quantitative approach (for example: a meta-analysis). A final limitation is the exclusion of prevalence studies.

## **CONCLUSION**

This review contributes to the small body of knowledge on infant homicide as it included all methodological frameworks and included all perpetrators, attempting to provide as much detail as possible on victim and perpetrator characteristics. In this way, our review contributes to the field since it attempts to provide a more complete picture of infant homicide. Some of our key findings are that a great deal of infant homicide research stems from developed settings and from case studies, highlighting the shortage of dedicated, robust research, which also prevents generalisation. Lastly, the review found that there is a tendency for infanticide research to focus on women/mothers. Thus, this is possibly why we also found that the first hours and days of life may be the time point of highest risk for a homicide (infant murder) to occur. Future research should include men/fathers. The prevention of homicide is an important policy goal in every country and the prevention of infanticides is a crucial part of this aim.

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## **ENDNOTES**

1. Child Death Reviews (CDRs) use an intersectoral approach to understand and prevent child deaths. This particular project's pilot study was initiated in 2014 by the Children's Institute in collaboration with the Division of Forensic Medicine, University of Cape Town for the Western Cape and the Forensic Pathology Services, KwaZulu-Natal Department of Health for KwaZulu-Natal. The CDR teams facilitated a co-ordinated response between the police, forensic pathology services, prosecution authorities, paediatricians, and social services in the management of child deaths.

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### **APPENDIX 1: LIST OF SEARCHED DATABASES**

Medline, Global Health, Embase, PsycINFO, Social Policy, Popline, Web of Science, LILACS, Medcarib, ADOLEC, Cumulative Index to Nursing and Allied Health Literature [CINAHL], Biosis Citation index, KCI-Korean Journal Database, SciELO citation Index, Western Pacific Region Index Medicus (WPRIM), Index Medicus for the WHO Eastern Mediterranean Region (IMEMR), International Bibliography of Social Sciences IBSS

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### **APPENDIX 2: SEARCH TERMS USED**

("perpetrators" or "perpetrator" or "offender" or "offenders" or "aggressor" or "aggressors" or "father" or "fathers" or "mother" or "mothers" or "parent" or "parents" or "brother" or "brothers" or "sister" or "sisters" or "aunt" or "aunts" or "uncle" or "uncles" or "grandmother" or "grandmothers" or "grandfather" or "grandfathers" or "grandparent" or "grandparents" or "stranger" or "strangers" or "acquaintance" or "acquaintances" or "friends" or "friend" or "partner" or "partners" or "victim-offender relationship" or "victim offender relationship" or "victim-offender relationships" or "victim offender relationships" or "ex-partners" or "ex-partner" or "husband" or "husbands" or "wife" or "wives" or "couple" or "couples" or "boyfriend" or "girlfriend" or "spouse" or "spouses" or "lover" or "spousal" or "boyfriends" or "girlfriends" or "relative" or "relatives" or "family member" or "family members" or "maternal" or "parental") AND ("siblicide" or "neonaticide" or "Infanticide" or "fratricide" or "victim-perpetrator relationship" or "victim perpetrator relationship" or "sororicide" or "family homicide" or "familicide" or "filicide" or "fratricides" or "family murder" or "family homicide suicide" or "familicy" or "family suicide" or "fatal child abuse" or "infant baby dumping" or "child abuse murders" or "child abuse fatalities" or "child abuse fatality" or "parental homicide" or "parental homicides" or "parents who kill" or "mothers who kill" or "fathers who kill" or "grandparents who kill" or "uncles who kill" or "siblings who kill" or "aunts who kill" or "brothers who kill" or "sisters who kill" or "family murder" or "family killing" or "adolescent homicide" or "adolescence homicide" or "adolescent murder" or "adolescence murder" or "adolescent killing" or "adolescence killing" or "child murder" or "child homicide" or "child killing" or "children murder" or "children killing" or "children homicide" or "sibling murder" or "sibling killing" or "sibling homicide" or "infant murder" or "infant killing" or "infant homicide" or "toddler killing" or "toddler murder" or "toddler homicide" or "young adult murder" or "young adult killing" or "young adult homicide" or "sister murder" or "sister killing" or "sister homicide" or "brother murder" or "brother homicide" or "brother killing" or "boy murder" or "boy killing" or "boy homicide" or "girl murder" or "girl killing" or "girl homicide" or "child abandonment" or "infant abandonment" or "toddler abandonment" or "girl abandonment" or "baby abandonment" or "homicide death rates in childhood" or "unnatural sudden infant death" or "unnatural sudden infant deaths" or "childhood homicide" or "childhood homicides" or "child killers" or "fatal maltreatment")

### APPENDIX 3: ADAPTED APPRAISAL TOOL FOR QUALITATIVE AND QUANTITATIVE STUDIES

Review Area	Key Question	Yes/ No
<b>1. STUDY OVERVIEW</b>		
Details	Author, title, source, year	
Purpose	Aim/s of study mentioned?	
Key findings	Are key findings mentioned?	
Evaluative summary	Are strengths and weaknesses of study mentioned?	
<b>2. STUDY, SETTING, SAMPLE AND ETHICS</b>		
Type of Study	Type of study mentioned?	
Study Setting	Setting mentioned?	
Sample	Sample and population specified?	
	Is sample appropriate for study aim/s?	
<b>3. ETHICS</b>		
	Ethics committee approval obtained?	
	Informed consent obtained?	
	Ethics issues been appropriately addressed?	
<b>4. DATA COLLECTION</b>		
Appropriateness of data collection method	Data collection method appropriate for study aim/s?	
Data collection process	Is data collection process adequately described?	
Reflexivity/ validity	Reflexivity/ validity discussed/ addressed?	
<b>5. DATA ANALYSIS</b>		
	Data analysis mentioned and adequately described?	
	Data analysis technique appropriate for study aim/s?	
	Adequate evidence provided to support results/findings?	
<b>5. POLICY AND PRACTICE IMPLICATIONS</b>		
	Findings interpreted within context of other studies and theory?	
	Conclusions justified given context of study?	
	Recommendations given for future research?	
<b>DECISION (INLCUDE/EXCLUDE)</b>		
	Include	
	Exclude	

(Source: Long et al, 2002; 2004).

FIGURE 1: Records identified through database searching

