Review Article

The Economic Burden of Abortion and Its Complication Treatment Cares: A Systematic Review

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Abstract

Objective: Abortion related procedures contribute to a significant economic burden because it resulted in prolonged hospital stays for patients. We aimed to gather available evidence on the economic burden of abortion and post-abortion complication treatment cares worldwide.

Materials and methods: PubMed, Web of Science, Scopus, and Embase databases were searched through November 2019. Two researchers independently conducted the quality assessment and data extraction process. The latest web-based tool adjusted the estimates of costs expressed in one specific currency and price year into a specific target currency (the year 2016 $US).

Results: Totally, 2082 records were retrieved and 32 studies were deemed eligible for qualitative synthesis. The mean total costs per patient with abortion or post-abortion care ranged from $23 to $564. The annual costs ranged from 189,000 $US to 134 million $US.

Conclusion: Abortion and post-abortion care impose a substantial economic burden on society. Understanding the burdensome of abortion or pregnancy termination among policymakers provides vital information and enables informed decisions to be made to establish health care priorities and allocating scarce resources.

Keywords: Abortion; Miscarriage; Cost of Illness; Economic Burden of Disease; Review

Introduction

Despite recent advances in contraceptive methods promotion, unsafe abortion and post-abortion complications remain potentially health concern and result in significant morbidity and mortality (1). Of the estimated 211 million pregnancies occur annually, about 46 million of them end in induced abortion (2). Approximately 60% of 46 million induced abortions is carried out under safe conditions. Hence, 18 million induced abortions annually are performed by persons without the necessary skills or in an environment lacking the minimal medical standards and are therefore unsafe (3). In addition to the risk of death because of unsafe abortion (around 350 per 100,000 cases of abortion), the non-fatal complications contribute significantly to the global burden of abortion. Women pay heavily for unsafe abortions and post-abortion complications, not only with their health and their lives but also financially (4, 5).

Abortion related procedures contribute to a significant

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economic burden because it resulted in prolonged hospital stays for patients (6, 7). In Africa and Latin America, the annual cost of care for women with unsafe abortion or post-abortion complications treatment is 159 and 333 million $US, respectively (8). The burden of these cares is also substantial in other parts of the world. Such as Bangladesh with an additional 1.6 million $US impose on the health care system (9).

Although limited studies on the economic burden of abortion care from Asia are available, the cares and guidelines for the management of pregnancy termination procedures do not differ greatly from Western counterparts. Accordingly, the cost of these cares in Asia would be a significant economic burden on society and the health care system. Nevertheless, these studies have not been assessed in terms of methodological aspects and thus there is a great variation in the methods. So, a systematic review of the available literature on economic burden of abortion and post-abortion complications would provide important insight to relevant stakeholders to create awareness and to implement an effective strategy to reduce the burden associated with these cares.

Materials and methods

Literature search strategy: PubMed, Web of Science, Scopus, and Embase databases were searched through November 2019 to obtain the required data. Keywords or medical subject heading terms used in the search strategy were as follows: "Cost of illness" or "Cost-benefit analysis" or "Health expenditure" or "Cost and cost analysis" and "Abortion" or "Miscarriage" or "Aborted fetus". Also, the search strategy developed using Boolean operators (Table 1). There was no restriction in the year of the published studies. A reference list of the identified articles was manually explored to retrieve probably related articles. The duplicated articles were removed.

Table 1: Search strategy in databases

Strategy
((Abortion * [Title/Abstract] [MeSH Terms] OR Miscarriage * [Title/Abstract] OR "aborted fetus" * [Title/Abstract] [MeSH Terms]) AND (Cost * [Title/Abstract] OR "cost and cost analysis" * [Title/Abstract] [MeSH Terms] OR "Health expenditure" [MeSH Terms] OR "cost benefit analysis" [MeSH Terms] [Title/Abstract]))

Study selection and Eligibility criteria: The retrieved articles were then assessed for eligibility based on the inclusion and exclusion criteria. The English language original studies were eligible for inclusion if they presented the cost of illness, healthcare expenditure or resource utilization that stated as direct or indirect costs of abortion-related care. Review articles, conference abstracts, editorials, commentaries, cost-effectiveness analysis, cost-utility analysis, cost-benefit analysis of abortion-related intervention studies were excluded from this review. Then, to have multiple rounds of relevance screening and to reduce bias, screening and data extraction were performed by two reviewers independently and in the case of uncertainty about retrieved articles, we carried a discussion with the third researcher until a consensus was reached.

Data extraction and analysis: Important information on the studies' methods and key findings was retrieved from the articles using a standard electronic form. This information included the year of a study conducted, country, study design, sample size, abortion type, type of cost, and per case cost or annual cost of an abortion. The mentioned information summarized in table 1. The latest web-based tool adjusted the estimates of costs expressed in one specific currency and price year into a specific target currency (the year 2016 $US). Studies that did not state the year of cost calculation, the costs calculated based on a year before the publication year.

Quality assessment: A critical quality assessment was conducted using the indicators obtained and used by an author in the same economic burden of a disease review study on candidemia and invasive candidiasis (10). This tool has 15 indicators and the highest obtainable score for each study quality assessment was 14 (Table 2).

Results

Description of identified articles: Totally, 2082 articles were initially identified from various databases. About 272 articles were duplicated and were removed. Of the remaining 1810 articles, 1662 were excluded given the irrelevant titles and abstracts, leaving 148 articles eligible for full-text review. Another 109 studies were further excluded after reviewing the full text of the retrieved articles. Out of 39 remaining articles, six articles were economic evaluation studies and two articles were review articles. Finally, 31 articles were included in this systematic review (Figure 1).

Characteristics of the studies: The year of studies ranged from 1973 to 2017. The characteristics of the 31 studies included in this review were summarized in Table 1.

Table 2: Quality assessment tool

Criteria		
	General	
1	Is the definition clear and precise?	1 = The definition of the type of diabetes considered is clear and all the morbidities and co-morbidities considered are listed. 0 = The definition is vague and do not include any details of all the morbidities and co-morbidities considered.
2	Which complications the authors have included?	1 = More than 4 complications are considered and specified. 0.5 = Up to 3 complications are considered for each patient but they are not specified. 0 = No complications are considered or if they are considered there is no clear documentation in their inclusion.
	Sample	
3	Are sources for population data reliable?	1 = Self-assessment and questionnaire are confirmed by hospital records or hospitals and practitioners' bills. 0.5 = The only sources of data are questionnaire and self-assessment. 0 = The sources of data are not defined or are subject to a number of biases.
4	The period of study is appropriate?	A period of evaluation is considered appropriate if is equal or more than 6 months for prevalence-based studies and consider more than 1 year for incidence-based studies.
	Costs	
5	Does the study include the relevant costs?	1 = The costs included are relevant for the objective of the study (minimum of 80% of the costs included in the section costs of this table). 0.5 = The inclusion of the costs is partial. 0 = There are missing a large number of costs that should be included or there is no specification of the costs included.
6	Are the inclusion of the costs appropriate for the objective of the study?	1 = Considering the aim, all the necessary type of costs is included. (for ex for the evaluation of direct costs of a drug treatment all the costs borne by the patients directly and by the health care are included). 0.5 = Only partial relevant costs are included. There are missing of some important costs related to the aim of the study. 0 = Although the study aim is to consider a general cost of disease or a cost of drug or complications there are included only a category of costs (for ex direct costs).
7	Has the Disease severity Index been used?	1 = Yes 0 =No
8	Is adequate documentation and justification given for cost components, data and sources, assumptions and methods?	1 = Detailed justifications are given for all the approach and methods adopted. The exclusion and inclusion of categories of cost and data are well motivated. All the sources are documented 0.5 = Partial justification is given for the methods and approach adopted. There is limited or absence of justifications for the inclusion or exclusion of costs. The documentation is scarce and not precise. 0 = Absence or minimal presence of documentation and justification
9	Are important limitations discussed regarding the cost components, data, assumptions and methods?	1 = All the most important limitations are discussed. In same cases some minor limitation is discussed. 0.5 = One or only not important limitations are discussed. 0 = There is no discussion around the limitations of the study.
	Methods	
10	Is the data representative of the study population?	1 = Prevalence-based 0.5 = Incidence based 0 = No definition of the approach considered
11	Was the approach appropriate?	1 = Bottom-up approach 0.5 = Top down approach 0 = No approach defined/ or impossibility to infer the approach employed
12	Is the estimation method of the cost of diabetes appropriate?	1 = Incremental costs method 0.5 = Total disease cost 0 = No methods designed or impossibility to retrieved a clear method from the study
13	Are the deviation standard and the means calculated?	1 = Both, standard deviation and means are calculated 0.5 = Only one of them is calculated 0 = None of them is calculated
14	Is a sensitivity analysis performed?	1 = The sensitivity analysis is performed and the results are clearly shown 0.5 = Some linear regression method is employed to correlate the variables 0 = No sensitivity analysis or linear regression are performed
15	Which statistical methods are used	1 = The statistical analysis is performed with consistent statistical formulas. The formulas used should non-parametrical statistical hypothesis test.

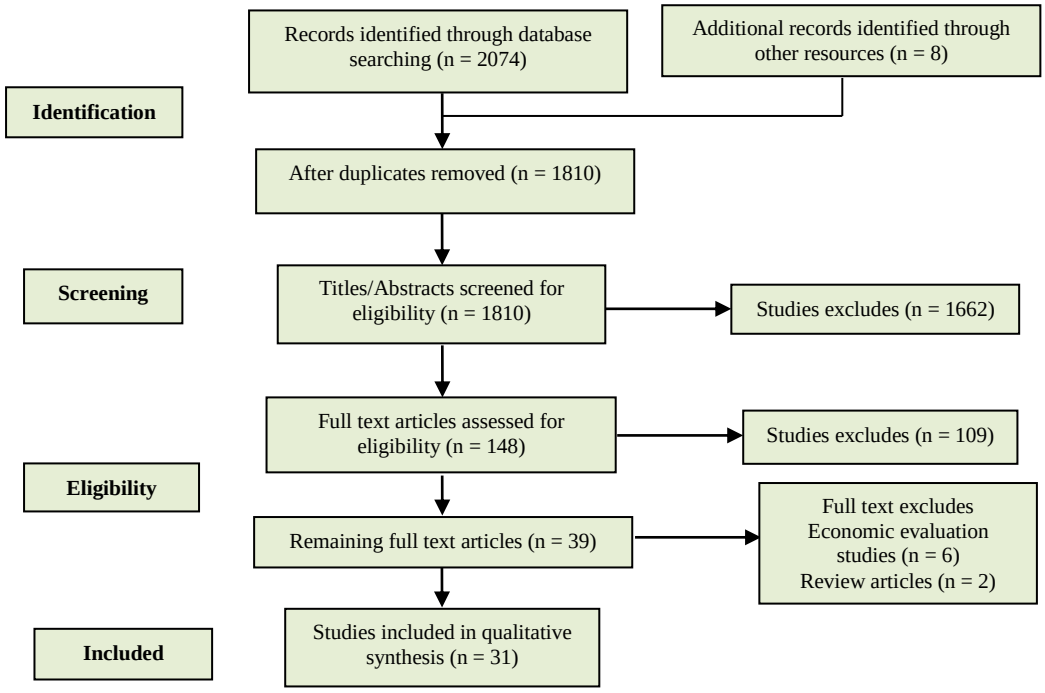

Figure 1: Electronic search and screen out strategy using PRISMA 2009 flow diagram.

Sixteen studies were estimated the costs associated with unsafe abortion care. Eight studies were estimated at safe abortion costs and almost all of them conducted in the United States. Remaining seven studies reported safe as well as unsafe abortion and post-abortion cares costs.

The Total cost of abortion and post-abortion cares: Five studies (9, 17, 27, 28, 31) in this systematic review estimated total annual costs associated with abortion care. The annual costs ranged from 189,000 $USin Ghana (27) to 134 million $US in the United States (31).The rest of the included studies estimated the mean total costs per patient ranged from $23 in Kenya and Mexico (35) to $564 in the United Kingdom (29). Only two studies (11, 33) conducted a full cost analysis considered direct, indirect and opportunity cost through a societal perspective.

Cost components: Studies itemized different cost components. Four studies (22, 30, 32, 34) considered out-of-pocket payment by the patients. Only one study (26) estimated the visits and follow-up costs in the analysis. Only one study (28) reported the federal and budget fiscal allocation for abortion care. Also, only one study (40) estimated abortion diagnosis services costs. Other studies considered a range of direct medical resources costs, indirect costs, staff, and human resource costs, medicines, and consumables costs. No one of the studies considered the morbidity costs in their cost analysis.

Quality analysis: The mean score for the studies included in this systematic review was 9.2 and ranged from 5.5 to 13. Only three studies (34, 36, 37) clearly defined and separately reported the safe or unsafe abortion care costs. All studies mentioned the considered cost components. Only one study (29) divided the medical and surgical costs of an abortion. Most studies did not provide adequate details on the method of cost calculation. All studies applied a retrospective study design. Only one study (9) employed the incremental cost method. Most of the included studies performed a linear regression method for sensitivity analysis (Table 3).

Discussion

To the best of our knowledge, this is the first systematic review summarizing the studies estimated the costs and economic burden of abortion and post-abortion care. We focused on describing the detail of the adopted methodology and cost components of included studies. Our review revealed that the studies considered various cost components. Our systematic review showed that all included studies revealed fundamental economic impacts associated with abortion and post-abortion care. The annual costs of abortion and post-abortion care ranged from 189000 $US to 134 million $US. Also, the mean total costs per patient ranged from $23 to $564.

Table 3: Characteristics of cost of illness studies for abortion or post-abortion cares

Author	Year	Country	Abortion type	Sample size	Cost items	Costs	EPPI* ($US 2016)	Quality appraisal
Babigumira (11)	2011	Uganda	Unsafe	362000	Average societal cost per induced abortion	Mean $177	$191	9
Benson (12)	2015	Malawi	Unsafe	1207	Surgical costs of treating unsafe abortion complications	Mean $128	$129	7.5
Benson (13)	2012	Nigeria	Unsafe	865	Direct costs of post-abortion cares	Mean $79	$83	11
Diamond (14)	1973	Hawaii	Unsafe	3643	Hospital, personal funds or loans	Mean $350	$877	8
Ilboudo (15)	2016	Burkina Faso	Unsafe	449	Direct and indirect costs in secondary And tertiary hospitals	Mean $36.5 for secondary and $45.86 for tertiary hospital	$36.5 $45.86	12
Johnston (16)	2007	United States	Unsafe	Not reported	Post-abortion complications cares	Mean $44.87	$51	12.5
Johnston (9)	2010	Bangladesh	Unsafe	70098	Average annual incremental cost	1.6 million$ annually	1.76 million $	8.5
Kay (17)	1997	South Africa	Unsafe	Not reported	Post-abortion complications cares	1.24 million$ annually	1.76 million $	8
Konje (18)	1992	Nigeria	Unsafe	230	Hospital provided services	Mean $223.11	$350	6.5
Levin (19)	2009	Mexico	Unsafe	Not reported	Opportunity cost from health system perspective	Mean $186	$207	12.5
Naghma (20)	2011	Pakistan	Unsafe	100	Post-abortion complications treatment	Mean $70	$75	5.5
Paul (21)	2015	Sierra Leone	Unsafe	3379	Personnel time and amounts of supplies and medications	Mean $68	$68	6
Sundaram (22)	2013	Uganda	Unsafe	517	Post-abortion complications out of pocket payments	Mean $49	$51	7.5
Vlassoff (23)	2014	Uganda	Unsafe	560	Direct costs	Mean $131	$133	10.5
Vlassoff (24)	2015	Rwanda	Unsafe	18300	Inputs, labor, hospitalization	Mean $93	$94	13
Vlassoff (25)	2009	Africa and Latin America	Unsafe	2770	Post-abortion complications cares	Mean $83 in Africa and $94 in Latin America	$92 $104	7
Afable (26)	2007	United States	Safe	389	Visits and follow up	Mean $346	$396	9.5
Asante (27)	2004	Ghana	Safe	14412	Current practice cost of providing services	Annually $151,114	$189 000	8
Gold (28)	1991	United States	Safe	Not reported	Federal and states, Public funding	Annually 65 million$	104 million $	8.5
Hughes (29)	1996	United Kingdom	Safe	251 surgical and 185 medicals	Staff, consumable materials	397 Euro surgical vs. 347 Euro medical	$564 $493	11
Jones (30)	2013	United States	Safe	639	Out-of-pocket paid by woman	Mean $382	$397	10.5
Nestor (31)	1984	United States	Safe	187997	States and federal budget	Annually 67 million$	134 million $	9
Roberts (32)	2014	United States	Safe	725	Out-of-pocket payment for abortion	$474	$484	12

Table 3: Characteristics of cost of illness studies for abortion or post-abortion cares (continue)

Author	Year	Country	Abortion type	Sample size	Cost items	Costs	EPPI* ($US 2016)	Quality appraisal
Van Bebber (33)	2006	United States	Safe	212	Direct and direct non-medical and productivity losses of time	Mean $351	$412	12.5
Ilboudo (34)	2015	Burkina Faso	Safe and unsafe	305	Out-of-pocket payment	Mean 89 (75 in US $) unsafe, and 56 (50 in US $) safe	$90 $56.5	7.5
Johnson (35)	1993	Kenya and Mexico	Safe and unsafe	173	Medicines, staff, hospitalization and medical Instrument	Mean $15.25	$23.4	7
Leone (36)	2016	Zambia	Safe and unsafe	112	Direct costs	Mean $54 for safe and $72.36 for unsafe abortion	$54 $72.3	8
Parmar (37)	2017	Zambia	Safe and unsafe	107	Direct costs per service	Safe abortion $39 and unsafe$56	$38 $54	11
Prada (38)	2013	Colombia	Safe and unsafe	102000	Total direct and indirect costs	Mean $429	$446	6.5
Vlassoff (39)	2012	Ethiopia	Safe and unsafe	52600	Total direct and indirect costs	Mean $36.21	$38.3	9.5
Henshaw (40)	2009	Nigeria	Safe and unsafe	2093	Medical Diagnosis and Treatment cost	Mean $38.5	$43	10

*The 'CCEMG – EPPI-Centre Cost Converter' (v.1.6 last update: 29 April 2019) is a free web-based tool for adjusting estimates of cost expressed in one currency and price year to a specific target currency and price year.

The United States has the maximum amount of mean out-of-pocket payments as well as the maximum annual cost of care associated with abortion, $484 and 134 million $US, respectively. This may be because of better accessibility to the related cares, availability of different health care programs, or spurred demand by these programs for health care services (41, 42). This review can be useful to inform health policymakers on the current status of the economic burden of pregnancy termination cares. Also, it advocates increasing the awareness of the public to recognize abortion and post-abortion cares as a burdensome illness. A limitation of this systematic review was the inclusion of only English evidence because of our limited capacity to understand non-English languages. To improve and facilitation the comparison, and interpretation of economic burden findings, we recommend the need to develop a guidance handbook for conducting and reporting the economic burden of abortion and pregnancy termination procedures.

Conclusion

Despite the variation in methodologies and considered cost components in studies reviewed, there is a consensus which can be drawn that abortion and post-abortion cares impose a substantial economic burden on society. Understanding the magnitude of the costs of abortion or pregnancy termination among policymakers provides vital information for identifying areas of need for future research and enables informed decisions to be made to establish health care priorities and allocating scarce resources.

Conflict of Interests

Authors have no conflict of interests.

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