

LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



LSHTM Research Online

Calvert, C; Ronsmans, C; (2013) The contribution of hiv to pregnancy-related mortality: a systematic review and meta-analysis. AIDS (London, England), 27 (10). pp. 1631-9. ISSN 0269-9370 DOI: <https://doi.org/10.1097/QAD.0b013e32835fd940>

Downloaded from: <http://researchonline.lshtm.ac.uk/617521/>

DOI: <https://doi.org/10.1097/QAD.0b013e32835fd940>

Usage Guidelines:

Please refer to usage guidelines at <http://researchonline.lshtm.ac.uk/policies.html> or alternatively contact researchonline@lshtm.ac.uk.

Available under license: <http://creativecommons.org/licenses/by-nc-nd/2.5/>

<https://researchonline.lshtm.ac.uk>

Supplementary Files – File S1

PUBMEB SEARCH STRATEGY

Search 1: HIV terms

HIV OR “human immunodeficiency virus” OR AIDS OR “acquired immunodeficiency syndrome” OR HIV/AIDS OR HIV[MeSH] OR “HIV Infections”[MeSH] or “acquired immunodeficiency syndrome”[MeSH]

Search 2: Maternal/pregnancy terms

matern* OR pregnan* OR childbirth OR intrapartum OR intra-partum OR postpartum OR post-partum OR puerperal OR puerperium OR parturition OR “expectant mother” OR “expectant mothers” OR “maternal health services”[MeSH] OR “delivery, obstetric”[MeSH] OR parturition[MeSH] OR pregnancy [MeSH] OR “Delivery, Obstetric”[MeSH] OR “postpartum period”[MeSH]

Search 3: Objective 1 specific terms (mortality)

mortalit* OR fatalit* OR “fatal outcome” OR death OR deaths OR death[MeSH] OR mortality[MeSH]

Search 4: Objective 2 specific terms (obstetric complications)

morbidity* OR “pregnancy complication” OR “complication of pregnancy” OR “obstetric complication” OR “obstetric labor complication” OR “obstetric labour complication” OR “adverse pregnancy outcome” OR ((postpartum OR post-partum) AND (haemorrhage OR hemorrhage)) OR ((obstetric) AND (haemorrhage OR hemorrhage)) OR hemorrhage OR “vaginal bleeding” OR ((antepartum OR ante-partum) AND (haemorrhage OR hemorrhage)) OR dystocia OR ((obstructed OR prolonged) AND (labour OR labor)) OR “retained placenta” OR “pregnancy induced hypertension” OR hellp OR eclampsia OR preeclampsia OR “pre-eclampsia” OR “gestational diabetes” OR “abruptio placent*” OR “placental abruption” OR “placenta previa” OR “placenta praevia” OR “ruptured uterus” OR sepsis OR septic OR septicemia OR septicemic OR endometritis OR “puerperal infection” OR “near miss” OR “near-miss” OR “caesarean section” OR c-section OR “caesarian section” OR “cesarean section” OR anaemia OR anemia OR “iron deficien*” OR “obstetric labor complications”[MeSH] OR “pregnancy complications”[MeSH] OR hemorrhage[MeSH] OR “postpartum haemorrhage”[MeSH] OR “uterine inversion”[MeSH] OR “uterine hemorrhage”[MeSH] OR dystocia[MeSH] OR “placenta, retained”[MeSH] OR “hypertension, pregnancy-induced”[MeSH] OR “hellp syndrome”[MeSH]

Terms] OR eclampsia[MeSH] OR pre-eclampsia[MeSH] OR "diabetes, gestational"[MeSH] OR "abruptio placentae"[MeSH] OR "placenta previa"[MeSH] OR "uterine rupture"[MeSH] OR sepsis[MeSH] OR "cesarean section"[MeSH Terms] OR "anemia"[MeSH Terms]

Search 5: Objective 3 specific terms (HIV disease progression)

“CD4 lymphocyte count” OR “CD4 count” OR (HIV AND “disease progression”) OR “HIV severity” OR “aids defining” OR “AIDS-related opportunistic Infections” OR “kaposi's sarcoma” OR lymphoma OR “wasting syndrome” OR cachexia OR “pneumocystis carinii” OR tuberculosis OR tb OR “symptomatic HIV” OR “opportunistic infection” OR “opportunistic infections” OR “CD4 lymphocyte count”[MeSH] OR “AIDS-related opportunistic Infections”[MeSH] OR "lymphoma"[MeSH] OR "cachexia"[MeSH] OR "tuberculosis"[MeSH]

Search 6: Objective 4 specific terms (HIV incidence)

seroconversion OR incidence OR "incidence"[MeSH] OR "HIV infections/transmission"[MeSH]

FINAL SEARCH: (#1 AND #2 AND (#3 OR #4 OR #5 OR #6))

EMBASE SEARCH STRATEGY

Search 1: HIV terms

HIV OR human immunodeficiency virus OR HIV infections OR AIDS OR acquired immunodeficiency syndrome OR HIV/AIDs OR exp human immunodeficiency virus/ OR exp human immunodeficiency virus infection/ OR exp acquired immune deficiency syndrome/

Search 2: Maternal/pregnancy terms

matern* OR mother* OR pregnan*OR childbirth OR intrapartum OR intra-partum OR postpartum OR post-partum OR puerperal OR puerperium OR parturition OR expectant mother* OR exp expectant mother/ OR exp birth/ OR exp childbirth/ OR exp pregnancy/ OR exp delivery/

Search 3: Objective 1 specific terms (mortality)

mortalit*OR maternal mortality OR fatalit* OR fatal outcome OR death* OR exp mortality/ OR exp maternal mortality/ OR exp fatality/ OR exp death/

Search 4: Objective 2 specific terms (obstetric complications)

morbidity* OR pregnancy complication OR complication of pregnancy OR obstetric complication OR obstetric labor complication OR obstetric labour complication OR adverse pregnancy outcome OR ((postpartum OR post-partum) AND (haemorrhage OR hemorrhage)) OR ((obstetric) AND (haemorrhage OR hemorrhage)) OR hemorrhage OR vaginal bleeding OR ((antepartum OR ante-partum) AND (haemorrhage OR hemorrhage)) OR dystocia OR ((obstructed OR prolonged) AND (labour OR labor)) OR retained placenta OR pregnancy induced hypertension OR hellp OR eclampsia OR preeclampsia OR pre-eclampsia OR gestational diabetes OR abruptio placent* OR placental abruption OR placenta previa OR placenta praevia OR ruptured uterus OR sepsis OR septic OR septicemia OR septicemic OR endometritis OR puerperal infection OR near miss OR near-miss OR caesarean section OR c-section OR caesarian section OR cesarean section OR anaemia OR anemia OR iron deficien* OR exp morbidity/ OR exp maternal morbidity/ OR exp pregnancy complication/ OR exp labor complication/ OR exp postpartum hemorrhage/ OR exp bleeding/ OR antepartum hemorrhage/ OR exp obstetric hemorrhage/ OR exp dystocia/ OR exp retained placenta/ OR exp maternal hypertension/ OR exp HELLP syndrome/ OR exp "eclampsia and preeclampsia"/ OR exp pregnancy diabetes mellitus/ OR exp placenta previa/ OR exp uterus rupture/ OR exp sepsis/ OR exp septic shock/ OR exp septicemia/ OR exp endometritis/ OR exp puerperal infection/ OR exp cesarean section/ OR exp anemia/ OR exp iron deficiency anemia/

Search 5: Objective 3 specific terms (HIV disease progression)

CD4 lymphocyte count OR CD4 count OR HIV disease progression OR HIV severity OR aids defining OR AIDS-related opportunistic Infections OR kaposi's sarcoma OR lymphoma OR wasting syndrome OR cachexia OR pneumocystis carinii OR tuberculosis OR tb OR symptomatic HIV OR opportunistic infection* OR exp CD4 lymphocyte count/ OR exp disease course/ OR exp AIDS related complex/ OR exp kaposi sarcoma/ OR exp lymphoma/ OR exp wasting syndrome/ OR exp cachexia/ OR exp pneumocystis carinii/ OR exp tuberculosis/ OR exp opportunistic infection/

Search 6: Objective 4 specific terms (HIV incidence)

seroconversion OR incidence OR exp seroconversion/ OR exp incidence/ OR exp disease transmission/

FINAL SEARCH: (#1 AND #2 AND (#3 OR #4 OR #5 OR #6))

POPLINE SEARCH STRATEGY

Search 1: HIV terms

(HIV/"human immunodeficiency virus" / AIDS / "acquired immunodeficiency syndrome" / "HIV Infections")

Search 2: Maternal/pregnancy terms

(matern* / pregnan* / childbirth / intrapartum / intra-partum / postpartum / post-partum / puerperal / puerperium / parturition / "expectant mother" / "expectant mothers")

Search 3: Objective 1 specific terms (mortality)

(mortalit* / fatalit* / death*)

Search 4: Objective 2 specific terms (obstetric complications)

(morbidity* / "pregnancy complication" / "obstetric complication" / "obstetric labor complication" / "obstetric labour complication" / "adverse pregnancy outcome" / "postpartum haemorrhage" / "postpartum hemorrhage" / "obstetric haemorrhage" / "obstetric hemorrhage" / hemorrhage / "vaginal bleeding" / "anteartum haemorrhage" / "anteartum hemorrhage" / dystocia / "obstructed labour" / "obstructed labor" / "prolonged labour" / "prolonged labor" / "retained placenta" / "pregnancy induced hypertension" / hellp / eclampsia / preeclampsia / "pre-eclampsia" / "gestational diabetes" / "abruptio placent*" / "placental abruption" / "placenta previa" / "placenta praevia" / "ruptured uterus" / sepsis / septic / septicemia / septicemic / endometritis / "puerperal infection" / "near miss" / "near-miss" / "caesarean section" / c-section / "caesarian section" / "cesarean section" / anaemia / anemia)

Search 5: Objective 3 specific terms (HIV disease progression)

("CD4 lymphocyte count" / "CD4 count" / "HIV disease progression" / "HIV severity" / "aids defining" / "AIDS-related opportunistic Infections" / "kaposi's sarcoma" / lymphoma / "wasting syndrome" / cachexia / "pneumocystis carinii" / tuberculosis / tb / "symptomatic HIV" / "opportunistic infection**")

Search 6: Objective 4 specific terms (HIV incidence)

(seroconversion / incidence)

FINAL SEARCH (advanced search in title/keywords and abstract)

(HIV/"human immunodeficiency virus" / AIDS / "acquired immunodeficiency syndrome" / "HIV Infections") & (matern* / pregnan* / childbirth / intrapartum / intra-partum / postpartum / post-partum / puerperal / puerperium / parturition / "expectant mother" / "expectant mothers") & ((mortalit* / fatalit* / death*) / (morbidity* / "pregnancy complication" / "obstetric complication" / "obstetric labor complication" / "obstetric labour complication" / "adverse pregnancy outcome" / "postpartum haemorrhage" / "postpartum hemorrhage" / "obstetric haemorrhage" / "obstetric hemorrhage" / hemorrhage / "vaginal bleeding" / "ante-partum haemorrhage" / "ante-partum hemorrhage" / dystocia / "obstructed labour" / "obstructed labor" / "prolonged labour" / "prolonged labor" / "retained placenta" / "pregnancy induced hypertension" / hellp / eclampsia / preeclampsia / "pre-eclampsia" / "gestational diabetes" / "abruptio placent**" / "placental abruption" / "placenta previa" / "placenta praevia" / "ruptured uterus" / sepsis / septic / septicemia / septicemic / endometritis / "puerperal infection" / "near miss" / "near-miss" / "caesarean section" / c-section / "caesarian section" / "cesarean section" / anaemia / anemia) / ("CD4 lymphocyte count" / "CD4 count" / "HIV disease progression" / "HIV severity" / "aids defining" / "AIDS-related opportunistic Infections" / "kaposi's sarcoma" / lymphoma / "wasting syndrome" / cachexia / "pneumocystis carinii" / tuberculosis / tb / "symptomatic HIV" / "opportunistic infection**") / (seroconversion / incidence))

AFRICAN INDEX MEDICUS SEARCH STRATEGY

HIV terms:

HIV, human immunodeficiency virus, AIDS, acquired immunodeficiency syndrome

Maternal/pregnancy terms:

Maternal, Pregnancy, childbirth, intrapartum, intra-partum, postpartum, post-partum, puerperal, puerperium, parturition

Searches conducted:

1. Maternal HIV
2. Pregnancy HIV
3. Puerperium HIV
4. Maternal human immunodeficiency virus
5. Maternal AIDS
6. Pregnancy AIDS
7. Maternal acquired immunodeficiency syndrome
8. Pregnancy acquired immunodeficiency syndrome
9. Puerperium acquired immunodeficiency syndrome

Supplementary Information – Table S1

Table S1. Summary of studies of HIV and pregnancy-related mortality

Reference	Study design	Study Setting	Study Population	ART Available	Prevalence of HIV ²	Definition of pregnancy-related mortality ³	Risk of pregnancy-related death amongst HIV+ women per 100,000 women (<i>total number of HIV+ women</i>)	Risk of pregnancy-related death amongst HIV- women per 100,000 women (<i>total number of HIV- women</i>)	Risk Ratio (95% CI)	Attributable Risk per 100,000 women (95% CI)	Population Attributable Fraction
Black <i>et al.</i>, 2009[12]	Retrospective Cohort	A single tertiary hospital in Johannesburg, South Africa (2003-2007)	All women with known HIV status who gave birth; any maternal deaths during pregnancy until 42 days postpartum included	Both	20.7%	Maternal Death	776 ⁴ (7,605)	124 ⁴ (13,694)	6.25 (3.65-10.71)	652 (446-857)	52.1%
Chilongozi <i>et al.</i>, 2008[33]	Prospective Cohort (from an RCT)	Multiple hospitals and antenatal clinics in Malawi (Blantyre and Lilongwe) and Zambia (Lusaka) (2001-2003)	All HIV+ women enrolled and 1 HIV- woman enrolled for every 5 HIV+ women; followed up from between 20 and 24 weeks of pregnancy to 12 months postpartum	No	NA	Pregnancy-related death	1824 (1,864)	0 (367)	13.64 (0.84-221.19)	1832 (1164-2501)	NA

Coley et al., 2001[15]	Prospective Cohort	Three hospitals and one clinic in Dar es Saalam, Tanzania (1995-1997)	HIV+ women recruited from control arm of an RCT and HIV- women from psychosocial study; followed up from between 12 and 27 weeks of pregnancy until delivery	No ¹	13.1%	Pregnancy-related death	760 (526)	206 (486)	3.70 (0.41-32.95)	555 (-290-1399)	26.1%
De Groot et al., 2003[13]	Retrospective Cohort	A single high risk obstetric unit in Bloemfontein, South Africa (2001)	All HIV+ women and 2 HIV- controls for every HIV+ women enrolled from a high risk obstetric unit; all information extracted from medical records and no information on follow-up time given	No ¹	30.1% in 2001 in Free State Province [a]	“Maternal death”, unclear	3704 (81)	1176 (170)	3.15 (0.54-18.47)	2528 (-1893-6948)	39.3%
Figueroa-Damian, 1999[32]	Prospective Cohort	Institute of Perinatology in Mexico City, Mexico (1989-1997)	44 HIV+ women and 2 controls for every HIV+ women, match on age and socioeconomic status; followed up from enrolment in pregnancy to the end of delivery	Both	No estimate available	“Maternal death”, unclear	2273 (44)	0 (88)	5.93 (0.25-142.74)	2273 (-3197-7742)	NA
Khan et al., 2001[14]	Retrospective Cohort	A single tertiary hospital in Durban, South Africa (1996-1998)	Total number of deliveries to HIV+ and HIV- women was calculated based on reported HIV prevalence and no. of deliveries in hospital; HIV status of maternal deaths (up to 1 year postpartum) known through HIV tests	No ¹	29.4%	Maternal death (including late maternal deaths)	202 (14,849)	280 (35,669)	7.21 (3.52-14.74)	174 (100-248)	64.6%

Kourtis et al., 2006[30]	Retrospective Cohort	20% of all community hospitals in the USA (1994 and 2003)	All HIV+ and HIV- pregnant women between 15-44 years of age who were hospitalised; all information extracted from medical records and no information on follow-up time given	Yes	0.14%	Pregnancy-related death	299 (12,378)	14 (8,784,767)	21.38 (15.43-29.64)	285 (189-381)	2.8%
Kumar et al., 1995[27]	Prospective Cohort	A single tertiary hospital in Manipur, India (1992-1993)	160 HIV+ women and 160 HIV- mothers (matched for age and parity); followed up from less than 28 weeks of pregnancy to 42 days postpartum	No	0.3% in 1992 in all urban areas of India [b] ²	Maternal death	6000 (150)	0 (152)	19.25 (1.13-327.84)	6000 (2023-9977)	5.2%
Le Coeur et al., 2005[16]	Census	Pointe Noire, Republic of Congo (2001)	Total number of deliveries to HIV+ and HIV- women was calculated based on the total number of live and still births and assuming a HIV prevalence 6.3%; HIV status of maternal deaths (up to 42 days postpartum) known through HIV tests	No ¹	6.3%	Pregnancy-related	1813 (386)	471 (5734)	3.85 (1.69-8.79)	1343 (0-2686)	15.2%
Lepage et al., 1991[22]	Prospective Cohort	A single hospital in Kigali, Rwanda (1988-1989)	All HIV+ women and an equal number of HIV- women matched for age and parity. Women had to have lived for at least 6 months in a district within a diameter of <10 Km from the hospital and delivered	No	30.3%	Maternal death	0 (215)	463 ⁴ (216)	0.33 (0.01-8.17)	-463 (-1738-812)	NA

			a live newborn; follow-up from delivery to 15 days postpartum								
Leroy et al, 1998[5]	Prospective Cohort	A single tertiary hospital in Kigali, Rwanda (1992-1993)	All HIV+ women and a equivalent number of HIV- women matched for age who attended the antenatal clinic for 2 days each week, who were resident in Kigali and who wished to deliver in the hospital; followed up from 21-28 weeks of gestation to 42 days postpartum	No	34.4%	Pregnancy-related	824 (364)	274 (365)	3.01 (0.31-28.79)	550 (-522-1623)	40.9%
Lionel et al, 2008[28]	Retrospective Cohort	A single hospital in Vellore, India (2000-2002)	All HIV+ and HIV- women; all information extracted from medical records and no information on follow-up time given	Yes	0.5%	“Maternal death”, unclear	917 (109)	125 (23,277)	7.36 (1.01-53.58)	793 (-998-2583)	3.1%
Louis et al, 2007[31]	Prospective Cohort	19 different academic medical centres in the USA (1999-2002)	All women having a c-section with a gestational age of >20 weeks at delivery and who delivered an infant of at least 500g birth weight with known HIV status; only look at mortality around delivery	Yes ¹	0.69%	“Maternal death”, unclear	794 (378)	61 (54,281)	13.05 (4.02-42.38)	733 (-162-1628)	7.7%
Maiques-Montesinos et al., 1999[29]	Retrospective Cohort	A single maternity hospital in Valencia, Spain (1987-1996)	All HIV+ women having a c-section and a sample of HIV- women undergoing c-section matched for indication for c-section, stage of labour, number of foetuses and date	No	0.49%	“Maternal death”, unclear	2222 (45)	0 (90)	5.93 (0.25-142.84)	2222 (-3130-7575)	2.4%

of delivery; all information
 extracted from medical records and
 no information on follow-up time
 given

McDermott et al., 1996[18]	Prospective Cohort	Four antenatal clinics in Mangochi District, Malawi (1987-1989)	All HIV+ and HIV- women; followed up from their first antenatal visit to 6 weeks postpartum	No ¹	16.5% in 1994 [c] ²	Pregnancy-related	735 (272)	346 (3,472)	2.13 (0.48-9.48)	390 (-644-1424)	15.7%
Mmiro et al., 1993[23]	Prospective Cohort	A University hospital in Kampala, Uganda (1988-1990)	All HIV+ women and a random 10% sample of HIV- women who lived within 15km of Mulago and agree to deliver in the hospital; followed up from pregnancy until discharge after delivery	No ¹	27.7%	Pregnancy-related	898 (557)	143 (697)	6.26 (0.73-53.40)	754 (-78-1586)	59.3%
Nathoo et al., 2004[19]	Prospective Cohort	A single tertiary hospital in Harare, Zimbabwe (1991-1995)	384 HIV+ women and 374 HIV- mothers (matched for age) enrolled; followed up from delivery to 6 weeks postpartum	No ¹	32.0% in 1995 [d] ²	Pregnancy-related	562 (356)	275 (363)	2.04 (0.19-22.39)	286 (-659-1232)	25.0 %
Nuwagaba-Biribonwoha et al., 2006[24]	Prospective Cohort	A single hospital in Kampala, Uganda (2002-2004)	132 HIV+ and 399 HIV- nulliparous and uniparous women enrolled; followed up from 36 weeks of pregnancy to 6 weeks postpartum	Yes	8.5% in 2002 [e] ²	Pregnancy-related	1527 (131)	254 (394)	6.02 (0.55-65.80)	1273 (-885-3431)	29.9%

Ryder <i>et al.</i>, 1994[17]	Prospective Cohort	A single hospital in Kinshasa, Democratic Republic of Congo (1986-1987)	All HIV+ women, and a sample of HIV- women matched for age and parity to each HIV+ women recruited; followed up from active labour to 1 year postpartum	No ¹	5.5%	Pregnancy-related	3239 (247)	0 (314)	21.59 (1.25-372.30)	3239 (932-5545)	53.1%
Sewankambo <i>et al.</i>, 2000[25]	Prospective Cohort	Rakai, Uganda (1994-1997)	All households in 56 communities located on secondary roads eligible for inclusion in cohort and HIV tests; continuous follow-up, but not clear what time period women were considered at risk of "maternal death"	No	16.1%	"Maternal death", unclear	1687 (415)	310 (2,582)	5.44 (1.98-14.93)	1377 (120-2634)	41.7%
Temmermann <i>et al.</i>, 1994[26]	Prospective Cohort	A single health centre in Nairobi, Kenya (1989-1991)	All HIV+ women, and a sample of HIV- women matched for age and parity to each HIV+ women recruited; followed up from less than 28 weeks of pregnancy to 6 weeks postpartum	No ¹	8.8%	Pregnancy-related	1269 (315)	0 (311)	8.89 (0.48-164.36)	1270 (-110-2650)	41.0%
Ticconi <i>et al.</i>, 2003[20]	Retrospective Cohort	A single tertiary hospital in Centenary Zimbabwe (2000-2001)	All woman with known HIV status; followed up from discharge from hospital during pregnancy to the end of pregnancy	No ¹	8.3%	"Maternal death", unclear	30488 (82)	2102 (904)	14.51 (8.35-25.19)	28386 (18378-38394)	52.9%

Zvandasara et al., 2006[21]	Prospective Cohort (from an RCT)	14 maternity clinics and hospitals in Greater Harare, Zimbabwe (1997-2000)	All HIV+ and HIV- women were recruited if neither they or their baby had a life-threatening condition, the baby was not from a multiple birth or had a birth weight<1500g; followed up from within 96 hours of delivery to 1 year postpartum	No ¹	30.0% in 2000 [d] ²	Pregnancy-related	3726 (3,999)	280 (8,577)	13.32 (8.67-20.46)	3446 (2849-4044)	78.7%
------------------------------------	----------------------------------	--	--	-----------------	--------------------------------	-------------------	--------------	-------------	--------------------	------------------	-------

¹Information was not supplied in the published paper so whether antiretroviral treatment should have been available was based on the study dates and study location; for two studies it was not clear from the study dates and location whether ART would be available so the information was inferred from the literature.

- a)Pointe Noire, Congo in 2001: No ART treatment based on the UNAIDS data accessed on 31st May 2012 at <http://www.unaids.org/en/regionscountries/countries/democraticrepublicofthecongo/>
- b) Greater Harare, Zimbabwe in 2000: No ART treatment based on the UNAIDS data accessed on 31st May 2012 at <http://www.unaids.org/en/regionscountries/countries/zimbabwe/>
- c)Bloemfontein, South Africa in 2001: No ART treatment based on the UNAIDS data accessed on 7th July 2012 at <http://www.unaids.org/en/regionscountries/countries/southafrica/>

²Sources of HIV prevalence, when this information was not provided in the paper:

- a)UNAIDS. South Africa: Epidmiological Factsheets on HIV/AIDs and Sexually Transmitted Infections 2004.
- b) UNAIDS. India: Epidmiological Factsheets on HIV/AIDs and Sexually Transmitted Infections 2004.
- c)UNAIDS. Malawi: Epidmiological Factsheets on HIV/AIDs and Sexually Transmitted Infections 2004.
- d) UNAIDS. Zimbabwe: Epidmiological Factsheets on HIV/AIDs and Sexually Transmitted Infections 2004.
- e)UNAIDS. Uganda: Epidmiological Factsheets on HIV/AIDs and Sexually Transmitted Infections 2004.

³Definition of maternal death classified as “maternal death” if incidental deaths were excluded; as “pregnancy-related” if incidental deaths were not excluded or they only used the term death and as “Maternal death, unclear” if they use the term maternal death but do not define this in the paper

⁴Use number of live births as dominator rather than number of women

Supplementary Information – Table S2

Table S2. Methodological quality assessment for each of the studies included in the systematic review

Reference	Quality Criteria				
	Loss to follow up	Adjustment for confounders	Definition of pregnancy-related death	Ascertainment of maternal death	Selection of comparison group
Black <i>et al.</i>, 2009[12]	Inadequate: 28% of deaths had known HIV status	Inadequate: No adjustment for confounders	Adequate: All deaths of women at the facility during pregnancy or within 42 days of childbirth	Inadequate: Hospital record review	Adequate: Include all women with known HIV status for a single facility
Chilongozi <i>et al.</i>, 2008[33]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Inadequate: No adjustment for confounders	Adequate: All pregnancy related deaths up to one year postpartum	Adequate: Prospective cohort study	Inadequate: Unclear on exact selection methods; however no HIV- women were selection from one of the study sites
Coley <i>et al.</i>, 2001[15]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Inadequate: No adjustment for confounders	Adequate: Any death before delivery	Adequate: Prospective cohort study	Inadequate: HIV+ and HIV- women were recruited from different studies
De Groot <i>et al.</i>, 2003[13]	Adequate: 53 (17%) women were excluded after study groups were selected (due to HIV status unknown (n=6), discharge before delivery (n=45) and abortion (n=2))	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women were observed	Inadequate: Hospital record review	Adequate: HIV+ and HIV- women enrolled from the same study site
Figueroa-Damian, 1999[32]	Inadequate: Insufficient information provided	Adequate: Match for age and socio-economic status	Adequate: Any death before delivery	Adequate: Prospective cohort study	Inadequate: Unclear on exact selection methods; HIV-infected women were recruited from a Department of Infectious

					Diseases, but do not state where HIV-uninfected women were recruited from
Khan <i>et al.</i>, 2001[14]	Inadequate: Over 50% of deaths had unknown HIV status	Inadequate: No adjustment for confounders	Adequate: All deaths of women at the facility during pregnancy or within 1 year of childbirth	Inadequate: Hospital record review	Adequate: Include all women with known HIV status for a single facility
Kourtis <i>et al.</i>, 2006[30]	Inadequate: Insufficient information provided	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women were observed	Inadequate: Hospital discharge data from national database	Adequate: Include all hospitalised, pregnant women with known HIV status
Kumar <i>et al.</i>, 1995[27]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Adequate: Match for age and parity	Adequate: Maternal deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same study site
Le Coeur <i>et al.</i>, 2005[16]	Adequate: Over 90% of deaths had known HIV status	Inadequate: No adjustment for confounders ¹	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: All deaths identified in city mortuary	Adequate: Capture all women in Pointe Noire
Lepage <i>et al.</i>, 1991[22]	Inadequate: Between delivery and 15 days postpartum 21% of HIV+ women were lost to follow-up	Adequate: Match for age and parity	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same study site
Leroy <i>et al.</i>, 1998[5]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Adequate: Match for age and parity	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same study site
Lionel <i>et al.</i>, 2008[28]	Inadequate: Insufficient information provided	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women were observed	Inadequate: Hospital record review	Adequate: All women from study hospital enrolled
Louis <i>et al.</i>, 2007[31]	Inadequate: Insufficient information provided	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women were observed	Inadequate: Data came from the Maternal-Fetal Medicine Units Network Caesarean registry	Adequate: All women enrolled
Maiques-Montesinos <i>et al.</i>,	Inadequate: Insufficient information provided	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women	Inadequate: Hospital record review	Adequate: HIV+ and HIV- women enrolled from the same study site

1999[29]			were observed		
McDermott <i>et al.</i> , 1996[18]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Inadequate: No adjustment for confounders	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: All women enrolled
Mmiro <i>et al.</i> , 1993[23]	Inadequate: Insufficient information provided	Inadequate: No adjustment for confounders	Inadequate: States that woman were followed up through pregnancy until discharge after delivery –insufficient information.	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same study site
Nathoo <i>et al.</i> , 2004[19]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Adequate: Match for age	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: All women enrolled before being tested for HIV
Nuwagaba-Biribonwoha <i>et al.</i> , 2006[24]	Adequate: Less than 10% of HIV+ and HIV- women loss to follow-up	Inadequate: No adjustment for confounders	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same hospital
Ryder <i>et al.</i> , 1994[17]	Inadequate: More than 20% of HIV+ women loss to follow-up	Adequate: Match for age and parity	Adequate: All pregnancy related deaths up to one year postpartum	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same hospital
Sewankambo <i>et al.</i> , 2000[25]	Inadequate: About 25% of the study cohort loss to follow-up	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women were observed	Inadequate: Death data collected from household census; not clear how data on pregnancy was collected	Adequate: All women from study area enrolled
Temmermann <i>et al.</i> , 1994[26]	Inadequate: More than 20% of HIV+ and HIV- women loss to follow-up	Adequate: Match for age and parity	Adequate: All pregnancy related deaths up to 42 days postpartum	Adequate: Prospective cohort study	Adequate: HIV+ and HIV- women enrolled from the same antenatal clinics
Ticconi <i>et al.</i> , 2003[20]	Inadequate: Insufficient information provided	Inadequate: No adjustment for confounders	Inadequate: No information on the period of pregnancy in which women were observed	Adequate: Prospective cohort study	Adequate: All women with known HIV status enrolled from study hospital
Zvandasara <i>et al.</i> , 2006[21]	Adequate: Just over 10% of HIV+ and HIV- women loss to follow-up	Inadequate: No adjustment for confounders	Adequate: All pregnancy related deaths up to one year postpartum	Adequate: Prospective cohort study	Adequate: All women enrolled before being tested for HIV

¹This study presented the adjusted the rate ratio comparing mortality rates in HIV-infected with uninfected for age; however, to enable the data to be pooled with the other studies information was only extracted on the risk ratio, using number of pregnant women for the denominator, rather than number of women years