Skilled

childbirth care

B

Comprehensive emergency

obstetric cre **(*CEmOC*)**

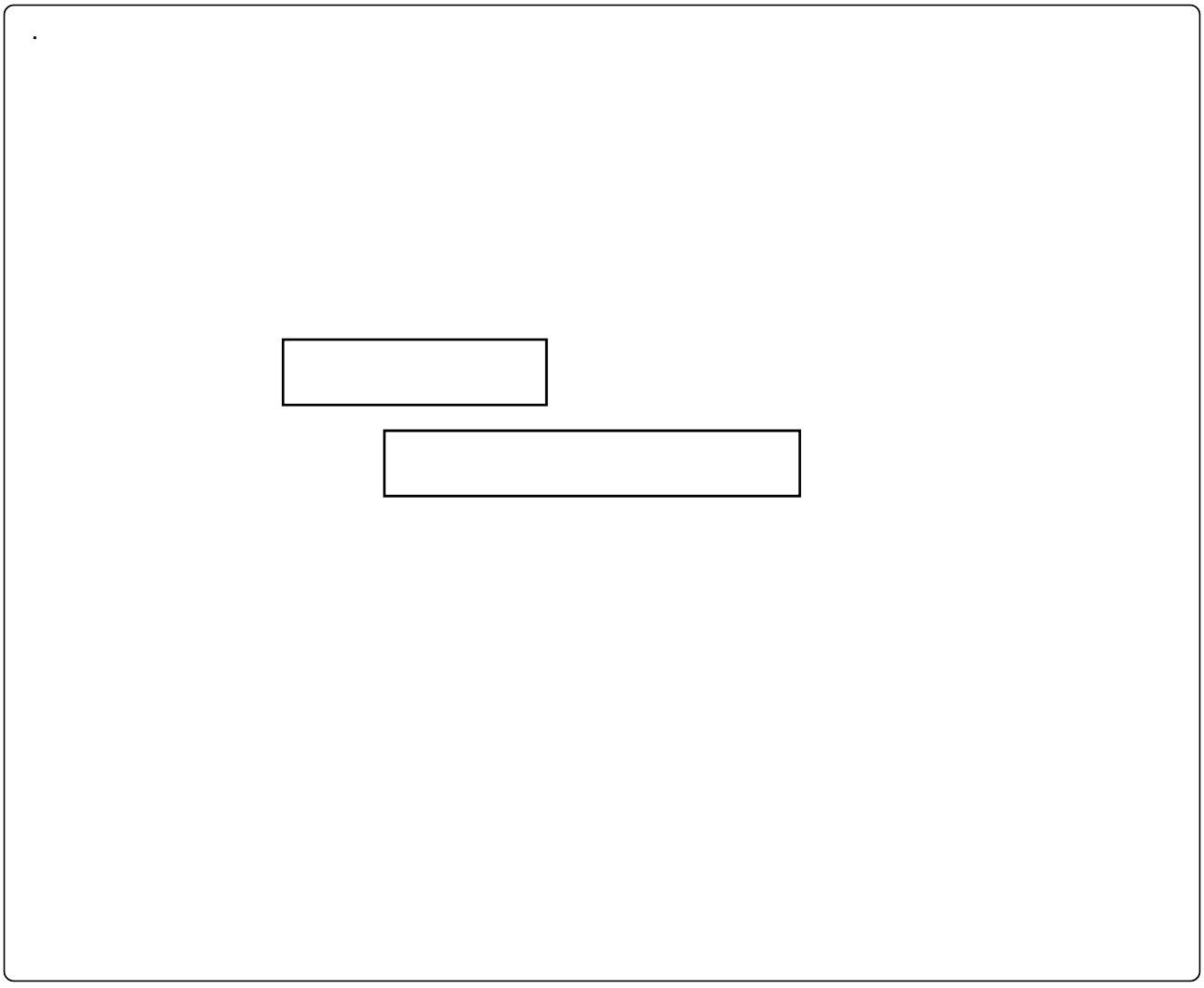
Basic emergency obstetric care

(*BEmOC*)

Searches for intervention evidence

Inclusion/exclusion criteria

.



perinatal death

all

Comparison group *cause mortality* *intrapartum-related neonatal death*

“

” “ ”

Intrapartum-related

neonatal mortality

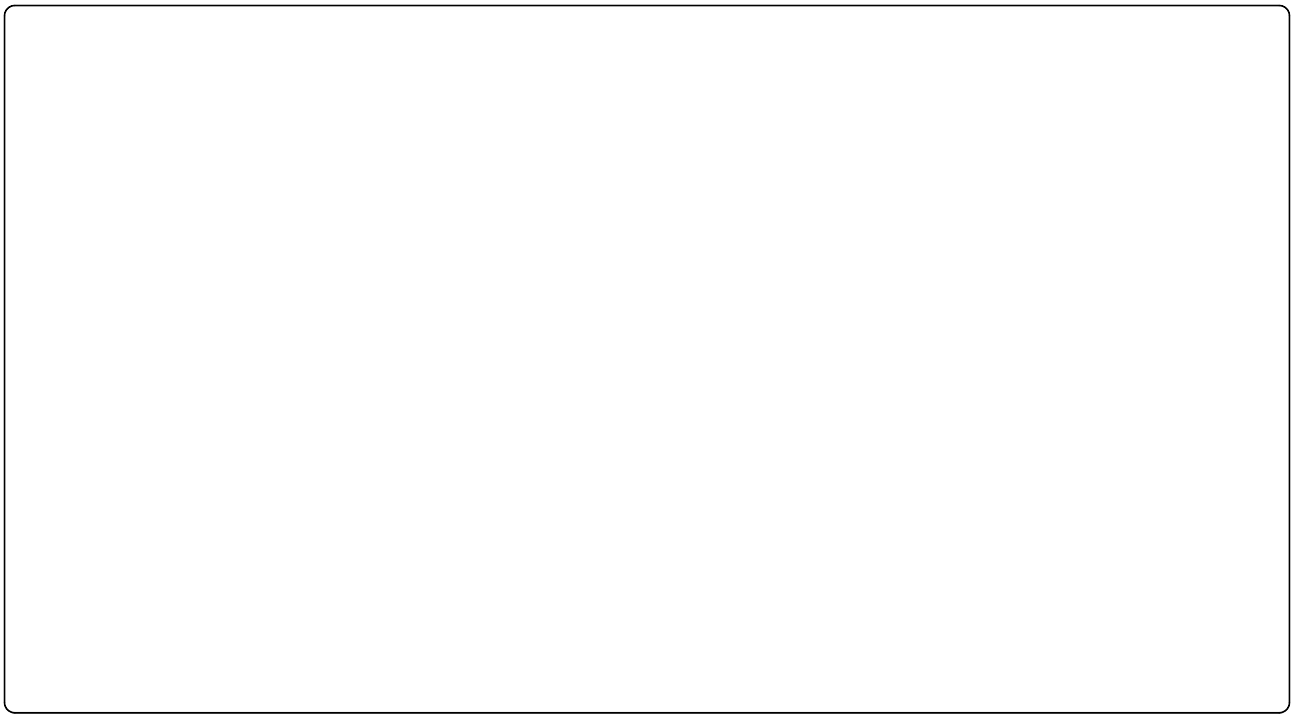
Neonatal encephalopathy NE

Outcome definitions

neonatal death

early neonatal death “

" Hypoxic Ischemic Encephalopathy

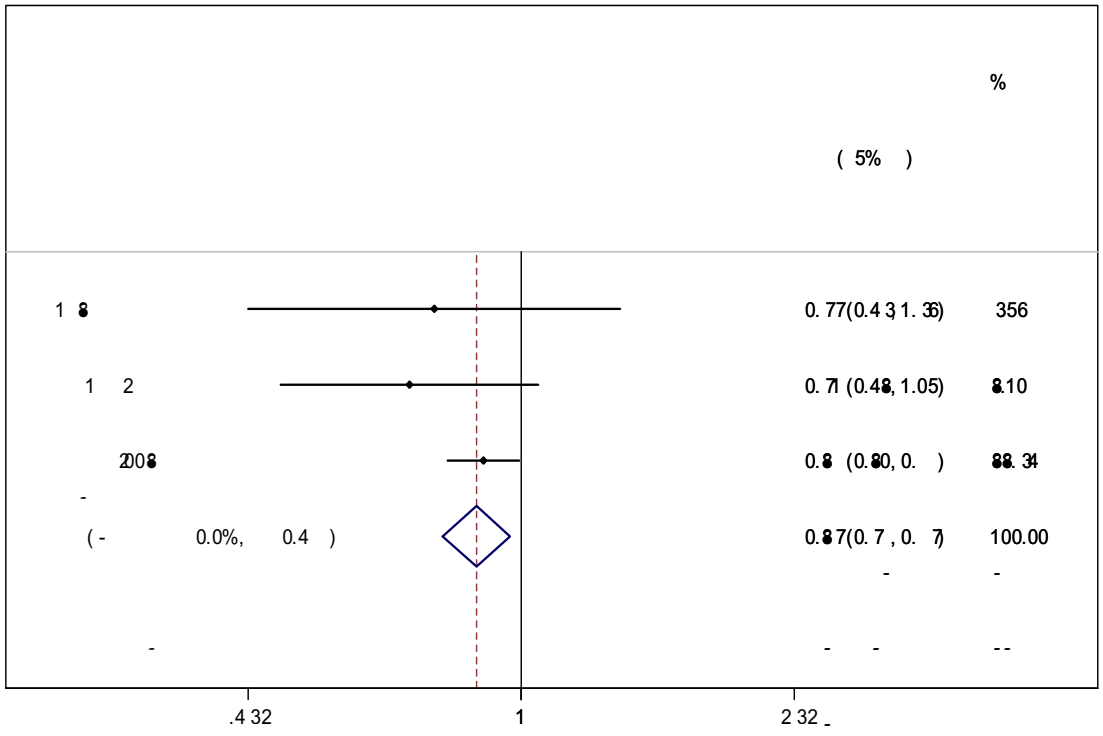


Author	Study Years	Setting	Study Design	Intervention definition	Concurrent interventions	Intervention Coverage	Total Births A) Endline B) Baseline	Outcomes	Effect on outcome RR/OR (95% CI)
Ronsmans 2010[37]	1987-2005	Matlab, Bangladesh	Observational cross-sectional	1987-1996: skilled home birth care w/midwives providing antenatal care, basic obstetric care (labor monitoring), essential newborn care; 1996 onwards facility based birth with BEmOC (partograph, active management 3rd stage, antibiotics, management preeclampsia). Highest level care received (BEmOC, CEmOC, vs no skilled care)	Antepartum care, Essential newborn care, Strengthening of referral and transport systems	CEmOC 0.5% in 1987 to 11.7% in 2005 BEmOC 4.7% in 1987 to 40.9% in 2005	CEmOC 3084; BEmOC 9954; No skilled Care 40177	1) ENMR 2) Stillbirth	1)CEmOC aOR 2.69 (2.16-3.37) BEmOC aOR 1.47 (1.27-3.37) 2) CEmOC aOR 6.61(5.62-7.79) BEmOC aOR 1.51 (1.31-1.73)
Berglund 2010[44]	2003-2004	3 Maternity Hospitals; Ukraine	Observational before-after	Training all maternity staff (obstetricians, neonataologists, midwives, anesthesiologists) in 2 week WHO "Effective Perinatal Care" program, including use of partogram, emergency obstetric and neonatal care (resuscitation).	Anesthesia; neonatal resuscitation & special care, thermoregulation	All maternity staff in 3 hospitals	A) 1696 B) 2439	1) ENMR	No significant effect
Hounton 2008 [38,39,52]	2001-2005	Rural Ouargaye and Diapaga districts, Burkina Faso	Quasi-experimental						

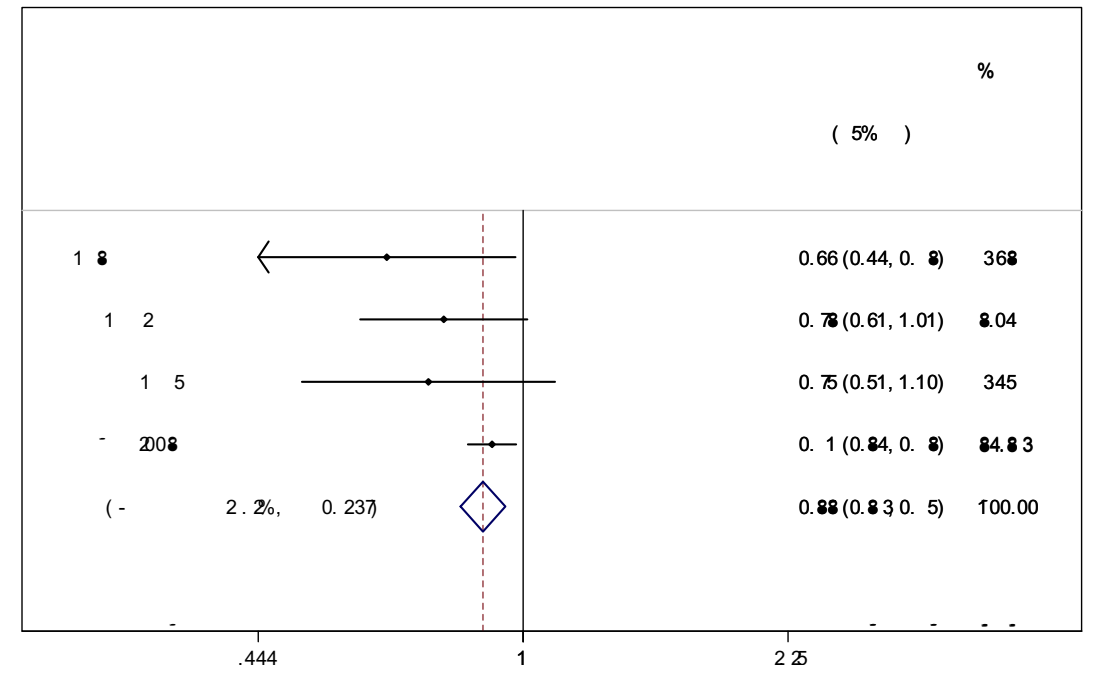
Author	Study Years	Country	Setting	Study Design	Primary Intervention	Concurrent Interventions	Intervention Coverage	Total N A) Intervention B) Comparison	Outcomes Measured	Effect on outcome (95% CI)
Ronsmans 2008[50]	1975-1999	Matlab, Bangladesh	Rural, 1987-1996 SBA at home	Quasi-experimental (†use of before-after data in pooled anlaysis)	Posting of midwives in villages to increase skilled home birth (antenatal, basic obstetric, care including labor monitoring, essential newborn care) until 1996. After 1996, facility based strategy with upgrading of health centers in basic obstetric care (partograph use, active management 3rd stage, antibiotics, magnesium)	Strengthening referral systems, Transport to BEMOC or CEmOC	25% of births attended by SBA during home birth period	A) 19085 (ICDDR,B 1989-1995) B) 22821 (ICDDR,B 1982-1988)	1) IPR-NMR 2) NMR † 3) ENMR†	

5 GRADE

	Study Quality					Summary of Findings				
				Directness		Endline		Baseline		
No of studies	Design	Limitations	Consistency	Generalizability to Population of Interest	Generalizability to intervention of interest	Events	Births	Events	Births	Relative Risk (95% CI)
Neonatal Mortality(Intrapartum-related): Low outcome specific quality										
1 [50]	Quasi-experimental	Several interventions								



F. . 6 Meta-analysis of effect of skilled birth attendance in the community on neonatal or perinatal outcomes (Effect on Early Neonatal Mortality Rate).



F. . 7 Meta-analysis of effect of skilled birth attendance in the community on neonatal or perinatal outcomes (Effect on Perinatal Mortality Rate).

Author	Study years	Setting	Study Design	Intervention definition	Concurrent interventions	Intervention Coverage	Total N (A=intervention/ endline; B=control/ baseline)	Outcomes	Effect on outcome RR/OR (95% CI)
O'Rourke[66]	1991	Rural Guatemala	Before-after comparison	3-month hospital-based training program for TBAs - identification of obstetric emergency and referral; encouragement to attend hospital deliveries; strengthening relationships between TBAs and hospital staff		Studied only those patients who were sucessfully referred	A) 465; B) 39	1) PMR among referred infants*	RR 0.73
Greenwood et al. [86]	1983	Rural Gambia	Before-after comparison	TBA training in intervention villages within a comprehensive primary care program; 10 week training courseantenatal-postnatal care, referral signs; distribute clean birth kit and malaria prophylaxis	Introduction of comprehensive primary health care program, transport improvements	65%	A) 1159 B) 659	1) NMR; 2) PMR	1) RR 0.66; 2) RR 0.92
Janowitz et al. [74]	1984-85	Rural NE Brazil	Cross-sectional	TBA training especially in recognition of childbirth complications and referral. Non-randomized comparison of trained TBAs with high case load (>29 births per year) versus unattended home births	Establishment of "mini-maternities" with telephones for TBA births.	55%	A) 906; B) 118	1) NMR	RR 0.60
Jokhio et al. [65]	1998	Rural Pakistan, Larkana,	Cluster RCT	TBA training in antepartum, intrapartum, postpartum, and neonatal care; distribution of clean delivery kits; referral for emergency obstetrical care.	Lady health workers also trained to support TBA and link community-health center services.	74%	A) 10114; B) 9443	1) PMR; 2) NMR; 3) SBR	1) aOR 0.71 (0.62-0.83); 2) aOR 0.70 (0.59-0.82); 3) aOR 0.69 (0.57-0.83)
Excluded from present review – [65]				1984-TdrsectiTdr [65]1(B)04 2.3eal.ExcTJ /T1.1 1 Tf -6.43700.526d (93904 2.3eBMC9)7(2)PutStwee-1966 Td (39999524))-328http://wwTJ 0w.bi(bidTJ)110e/1471TJ 0-248/11/S3/wee					

Overall level of evidence

Results of Delphi process

D

Effect of Comprehensive Emergency Obstetric Care
Cause specific mortality to act on:
Intrapartum related neonatal deaths

Quality of input evidence:
Very Low –

Health Program, Bill and Melinda Gates Foundation, Seattle WA, USA. [5]MRC Maternal and Infant Health Care Strategies Research unit, University of Pretoria, South Africa. [6]Grey's Hospital, KwaZulu-Natal, South Africa. [7]University of the Witwatersrand and East London Hospital Complex, South Africa. [8]Jinnah Postgraduate Medical Center and the Aga Khan University, Karachi, Pakistan. [9]Saving Newborn Lives/Save the Children.

Authors' contributions

ACL, JL, GLD, RH undertook the searches and abstraction. ACL, SC, JL, GLD, and HB undertook the meta analyses. ACL, JL, HB, NM, SB and GLD organised the Delphi process. ACL and JL provided the initial draft of the paper and all authors contributed. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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A

Additional file 1: is an excel sheet that contains fives sheets each of which has a table presenting extraction criteria and outputs for studies used in the meta-analysis.

Additional File 2: is word document that contains the Delphi form used in the Delphi process and as well as background information and appendices that were provided to the Delphi participants.

List of abbreviations used

BEmOC=Basic Emergency Obstetric Care; CEmOC=Comprehensive Emergency Obstetric Care; SBA= Skilled Birth Attendant; TBA= Traditional Birth Attendant; WHO= World Health Organization; CHERG =Child Health Epidemiology Reference Group; GBD= Global Burden of Disease; PMR=perinatal mortality rate; NMR=neonatal mortality rate; ENMR =early neonatal mortality rate

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