

## REVIEW

# The effectiveness of community-based loan funds for transport during obstetric emergencies in developing countries: a systematic review

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<b>Objective</b>	Scarcity and costs of transport have been implicated as key barriers to accessing care when obstetric emergencies occur in community settings. Community-based loans have been used to increase utilization of health facilities and potentially reduce maternal mortality by providing funding at community level to provide emergency transport. This review aimed to provide evidence of the effect of community-based loan funds on utilization of health facilities and reduction of maternal mortality in developing countries.
<b>Methods</b>	Electronic databases of published literature and websites were searched for relevant literature using a pre-defined set of search terms, inclusion and exclusion criteria. Screening of titles, abstracts and full-text articles were done by at least two reviewers independently. Quality assessment was carried out on the selected papers. Data related to deliveries and obstetric complications attended at facilities, maternal deaths and live births were extracted to measure and compare the effects of community-based loan funds using odds ratios (ORs) and reductions in maternal mortality ratio. Forest plots are presented where possible.
<b>Results</b>	The results of the review show that groups where community-based loan funds were implemented (alongside other interventions) generally recorded increases in utilization of health facilities for deliveries, with ORs of 3.5 (0.97–15.48) and 3.55 (1.56–8.05); and an increase in utilization of emergency obstetric care with ORs of 2.22 (0.51–10.38) and 3.37 (1.78–6.37). Intervention groups also experienced a positive effect on met need for complications and a reduction in maternal mortality.
<b>Conclusion</b>	There is some evidence to suggest that community-based loan funds as part of a multifaceted intervention have positive effects. Conclusions are limited by challenges of study design and bias. Further studies which strengthen the evidence of the effects of loan funds, and mechanism for their functionality, are recommended.
<b>Keywords</b>	Maternal mortality, developing countries, community, loan funds, interventions, review, emergency obstetric care, transport

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## KEY MESSAGES

- Scarcity and costs of transport is a crucial contributor to the problem of maternal death in poor communities because of its contribution to delay in seeking care, especially during emergencies requiring emergency obstetric care (EmOC). Thus, loan funds provide funding at community level to make available emergency transport and offset transport fees.
- Community-based loan funds may increase utilization of health facilities, met need for complications and even reduce maternal mortality.
- Reductions in maternal mortality are achieved when loan funds are available, utilized by pregnant women in need of EmOC to reach a health facility and adequate care is provided at the facility.
- Partnerships between communities and external stakeholders, as well as community involvement in interventions are crucial for loan funds intervention success and sustainability.

## Introduction

Recent estimates from the World Health Organization (WHO) report a global decline in maternal mortality by 47% between 1990 and 2010. Yet an estimated 287,000 women still die from pregnancy-related complications; with 99% of these deaths in developing countries. Sub-Saharan Africa accounts for 56% and South Asia 29% of all deaths (WHO 2012).

The pathways leading to maternal death are complex. The presence of physical barriers to access such as distance and transport are crucial contributors to the problem (Lee *et al.* 2009) because they contribute to delay in the initial decision to seek care (first delay) and delay in reaching a health facility (second delay) (Thaddeus and Maine 1994), especially when obstetric emergencies occur. Gabrysch and Campbell (2009) highlighted physical accessibility and economic accessibility as factors affecting the use of maternal health services in developing countries. They categorized transport and distance as components of physical accessibility and the cost of transport, as a component of economic accessibility. Both physical and economic accessibility have an indirect effect on the first delay and a direct effect on the second delay. These delay factors have an immense contribution to maternal death (Thaddeus and Maine 1994; Holmes and Kennedy 2010), thus eliciting interest in community loan funds for transport.

Loan funds aim to tackle the problem of insufficient funds for healthcare by the poor. The Bamako initiative in 1987 pioneered the involvement of communities in healthcare financing. Since then, various forms of community-based healthcare financing have been used. These financing schemes include those aimed at the prevention of catastrophic debts associated with transport and emergency obstetric care (EmOC) (Morrison *et al.* 2010). The schemes make cash available in communities so that impoverished pregnant women can overcome barriers of transport and other costs associated with childbirth. The schemes include community health insurance and pre-payment arrangements, conditional cash transfers and vouchers, as well as loan schemes and revolving funds, all of which promote access to skilled attendance and health facilities. Emergency loan funds, in particular, are local systems established by communities for pooling and borrowing money to cover the cost of transportation to the nearest medical facility in the event of an unpredictable, life-threatening obstetric complication (Olaniran *et al.* 1997; Opoku *et al.* 1997).

The aim of this article is to review the effects of community-based loan funds for transport during obstetric emergencies or for delivery, on the utilization of health facilities and on maternal mortality, in developing countries.

## Methods

### Search strategy

The search strategy used the following search terms: (community OR community-based) AND (deliver\* OR emergency obstetric care OR EmOC OR emergency care OR obstetric care OR pregnancy OR maternal health service\* OR health service accessibility OR healthcare facility OR emergency health service\*) AND (maternal mortality OR morbidity OR pregnancy outcome\* OR obstetric labour complication\* OR pregnancy complication\*) AND (emergency referral OR revolving fund\* OR transport OR loan system\* OR community fund\* OR obstetric referral OR resource mobilization OR transport fund\* OR healthcare scheme\* OR transport system\*). This strategy was run in Medline, Embase, Scopus, Cochrane database, Pubmed and Popline. The strategy used for the search was developed to meet the specific requirement of each electronic database and according to their subject headings or search structure. No date or language restrictions were applied to the search strategy. The search was completed in August 2013. In addition, the search strategy was modified and used to search websites of organizations known to be active in the field including WHO, JhPiego, BRAC, Eldis, Averting Maternal Death and Disability (AMDD) and the United Nations Children's Fund (UNICEF), so as to find technical reports, monographs on the internet and literature from international agencies. Hand searching of the reference lists of retrieved articles and their related articles was conducted to ensure relevant articles were not missed. All retrieved articles were managed by exporting them from their original sources to Refworks.

### Inclusion criteria

Studies were included based on the following criteria. The population of interest were pregnant women who used emergency transport for delivery care or for obstetric emergencies. The interventions were those that promoted the availability of emergency transport for pregnant women by establishing loan funds at community level, such as communal fund schemes,

credit finance and revolving funds for transport, petrol or mobilization of transport owners. The studies were randomized controlled trials (RCTs) and non-randomized studies, e.g. before and after cohort studies, and case-controlled studies that measured the following outcomes: maternal mortality, utilization of health facilities for delivery or obstetric care or uptake of fund.

### Exclusion criteria

Studies that were not eligible for inclusion into the review include studies that were not in the English language, qualitative studies and studies that were not in developing countries. The World Bank definition of developing countries was utilized in this review (World Bank 2011).

### Study selection

Titles and abstracts of identified articles were screened against the inclusion criteria by two reviewers. Full text of articles whose eligibility could not be identified from their titles and abstracts alone were read to determine their eligibility for inclusion. All potentially eligible articles were then appraised according to study criteria using a data extraction form. The screening of articles was carried out independently by the two reviewers and disagreements resolved by discussion and consensus.

### Quality assessment

The quality assessment of the included studies was carried out using the Effective Public Health Practice Project (EPHPP 1998) for quantitative studies. The tool consists of 21 items and includes the following components: selection bias, study design,

confounders, blinding, data collection methods, withdrawals and drop-outs. Studies were given an overall rating of strong, moderate or weak.

### Statistical analysis

STATA version 9.1 (TX) and MedCalc version 12.7.5 (Ostend, Belgium) softwares were used for analysis. Data related to deliveries and obstetric complications attended at facilities, maternal deaths and live births were extracted to measure and compare the effects of community-based loan funds using odds ratios (ORs) and reductions in maternal mortality ratio (MMR). Analysis of effect estimates across studies was conducted to calculate ORs and difference-in-difference estimates for changes in the percentage of women delivering in a health facility and MMR. Forest plots were presented where possible. The percentage changes with 95% confidence intervals were derived for studies which did not have a control group or could not provide adequate data to permit the calculation of ORs.

## Results

### Search results

A total of 1434 articles were screened resulting in retrieval of 34 articles. Of these, 12 articles did not study a community-based loan funds intervention, 6 articles were not about interventions in the community, 3 studies were reports which did not provide the specific outcome data and 1 study was a review. Eleven full-text articles were not in the English language, despite having English abstracts. Nonetheless, none of these were

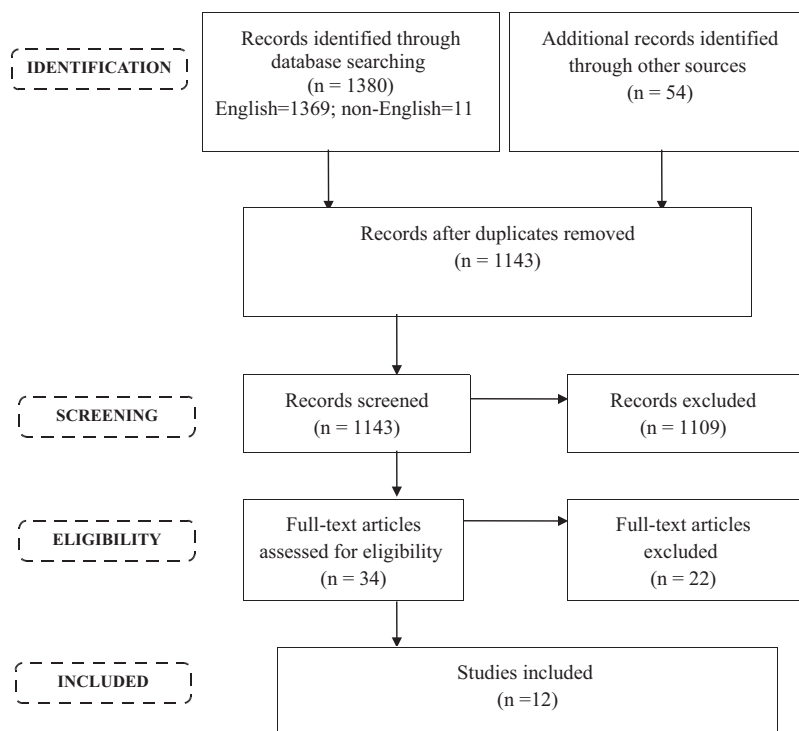


Figure 1 Study selection flow diagram.

eligible for inclusion after abstract screening. This resulted in the final inclusion of 12 studies (Figure 1).

### Study characteristics

The summary characteristics of included studies are given in Table 1. All the studies involved mobilizing communities to establish and maintain community-based loan funds. One provided financial incentives to expectant mothers, in addition to establishing loan funds (De Costa *et al.* 2009), another established a revolving petrol fund (Shehu *et al.* 1997), seven set up loan funds with emergency transport schemes (Essien *et al.* 1997; Olaniran *et al.* 1997; Opoku *et al.* 1997; Lungu *et al.* 2004; Manandhar *et al.* 2004; Rana *et al.* 2007; Ahluwalia *et al.* 2010), whereas the other three studies established loan funds only (Chiwuzie *et al.* 1997; Fofana *et al.* 1997; Hossain and Ross 2006). All the studies also included other interventions such as upgrading and establishment of EmOC facilities, health education and training of health workers and Traditional Birth Attendants/Village Health Workers.

The majority of the studies required community members to contribute their own cash either upfront or as a revolving approach where users of the loan had to reimburse the fund. Two of the studies (Shehu *et al.* 1997; De Costa *et al.* 2009) describe a grant being given to the community to start the fund. It was not always clearly stated who instigated the fund collection, how the funds were managed or which members of the community were expected to contribute.

Six studies had a control group (Fofana *et al.* 1997; Lungu *et al.* 2004; Manandhar *et al.* 2004; Hossain and Ross 2006; De Costa *et al.* 2009; Ahluwalia *et al.* 2010), whereas the other six studies did not (Chiwuzie *et al.* 1997; Essien *et al.* 1997; Olaniran *et al.* 1997; Opoku *et al.* 1997; Shehu *et al.* 1997; Rana *et al.* 2007).

Loan funds were administered in different ways. In Essien *et al.* (1997), loan funds were interest free, financed from community contributions and managed by them. In Olaniran *et al.* (1997), a 2% interest rate was charged. Funds were granted only to women with obstetric complications and usage was restricted to transport and hospital fees. However, three studies reported use of the funds for offsetting other medical fees (Essien *et al.* 1997; Fofana *et al.* 1997; Opoku *et al.* 1997).

### Reported outcomes

#### *Uptake of community-based loan funds*

Uptake was described in different ways across the studies. In Nigeria, only nine loan funds were used out of the 20 established (Olaniran *et al.* 1997). In Sierra Leone, there was an attempt to establish loan funds in six chiefdoms, but only two were successful (Fofana *et al.* 1997). In an intervention in India, despite funds being made freely available for transport to EmOC facilities and incentives given for registration of pregnancies, only 24% of women requiring referral used the transport fund (De Costa *et al.* 2009). The authors attribute this to a lack of trust in health facilities with respect to quality of care.

Other studies (Chiwuzie *et al.* 1997; Essien *et al.* 1997; Shehu *et al.* 1997) reported a high uptake of community-based loan funds. Chiwuzie *et al.* (1997) found that out of a total of 456 pregnant women who applied for loans, 380 loans were granted

and 93% of these were repaid in full. Shehu *et al.* (1997) reported an increase of 23% in the number of women who utilized the emergency transport system after establishment of the loan fund. Decline in the use of the funds was described due to depletion of funds when loan repayment difficulties occurred (Chiwuzie *et al.* 1997; Essien *et al.* 1997; Shehu *et al.* 1997).

#### *Utilization of health facilities for delivery or EmOC*

Tables 2 and 3 summarizes the findings from studies which measured utilization of health facilities for delivery or EmOC. All studies were multifaceted so the reported changes in utilization cannot be solely attributed to community loan funds. Lungu *et al.* (2004) and Manandhar *et al.* (2004) reported ORs of 3.5 (0.97–15.48) and 3.55 (1.56–8.05), respectively, for utilization of delivery care services in intervention groups compared with control groups, while odds of EmOC utilization in Fofana *et al.* (1997) and Manandhar *et al.* (2004) were 2.22 (0.51–10.38) and 3.37 (1.78–6.37), respectively (Graph 1).

In studies without control groups, change in utilization was measured as difference in proportion of women using health facilities before and after intervention. They found that areas that had established community-based loan funds recorded an increase in utilization of health services for delivery and EmOC services by women with emergency complications. The study by Olaniran *et al.* (1997) recorded a slight increase of about 5% in institutional deliveries, whereas Hossain and Ross (2006) recorded an increase of about 23.8% in obstetric complications treated in the intervention group, compared with an increase of about 1% in the control group. Opoku *et al.* (1997) recorded an increase of 37% (28.18–46.78) in institutional deliveries, as well as an increase of 180% (145.79–242.45) in the number of women with obstetric complications treated. Rana *et al.* (2007) recorded an increase of 135% (131.67–137.69) in institutional deliveries, as well as an increase of 15% (9.31–23.28) in number of complications treated.

Of particular interest, however, was the study by Lungu *et al.* (2004). Among two intervention village groups, one where loan funds were used exclusively to provide transportation through bicycle ambulance reported less utilization of health facilities compared with the group where loan funds were used on transportation plans already selected by the communities. The authors attributed this to sociocultural and economic factors that impeded adoption of the intervention especially bicycle ambulances despite the benefits associated with their use.

#### *Maternal mortality*

Three studies measured maternal mortality as an outcome (Table 4). These studies had both intervention and control groups and were reportedly powered to measure maternal mortality, with the exception of one (Manandhar *et al.* 2004). All three studies, which comprised loan funds and various other interventions, reported lower odds of a maternal death occurring in intervention groups compared with control groups. De Costa *et al.* (2009) found a reduction in MMR from 531 to 230 per 100 000 live births in the communities with community-based loan funds. Manandhar *et al.* (2004) also recorded a lower MMR of 69 per 100 000 live births in the

**Table 1** Summary of characteristics of included studies

Author/country	Study design	No. of participants/births	Setting	Study intervention	Other interventions	Outcomes studied
Studies with control groups						
Fofana <i>et al.</i> (1997)/Sierra Leone	Before and after study	NR	Rural	Mobilization of communities to establish loan funds to promote utilization of obstetric services. Community members contributed to funds to pay for emergency transport and treatment	Upgraded health facilities, training health staff on drug administration and provision of EmOC, health education	Utilization of health facilities. Uptake and costs of establishing loan funds
Lungu <i>et al.</i> (2004)/Malawi	Case control study	I 136 women C 53 women	Rural	Community transport plans. Community members contributed to funds used to maintain the bicycles	Bicycle ambulance	Utilization of health facility, travel time and acceptability
Manandhar <i>et al.</i> (2004)/Nepal	Cluster randomized controlled trial	I 3036 pregnancies C 3344 pregnancies	Rural	Women's groups formed which established community contributions to fund schemes and emergency transport systems	Participatory women's groups	Stillbirths, neonatal and maternal mortality, various other indicators of antenatal, delivery and postnatal care
Hossain and Ross (2006)/Bangladesh	Before and after study	150 women	Rural	Sensitization of community on birth planning resulted in establishment of community emergency funds to facilitate transportation to a health facility	Upgraded health facilities, birth planning and blood donation by volunteers	Utilization of health facilities, knowledge of danger signs and birth planning
De Costa <i>et al.</i> (2009)/India	Before and after study	I 11,305 births C 7662 births	Rural	Female village residents were assigned as facilitators who kept a cash fund, obtained as a project grant, for emergency transport money	Financial incentives to expectant mothers	Maternal mortality and numbers of referrals
Ahluwalia <i>et al.</i> (2010)/Tanzania	Before and after study	NR	Rural	Communities were mobilized by a village worker to contribute money for transport and emergency plans	Improving quality of health services, training of VHWs	Types and numbers of community activities established, knowledge of danger signs, uptake of antenatal care, maternal mortality
Studies with no control groups						
Olaniran <i>et al.</i> (1997)/Nigeria	Before and after study	NR	Semi-urban	Direct encouragement to communities to establish loan funds and emergency transport system	Educational activities promoting EmOC	Utilization of health facilities and other obstetric services, recognition of complications, referrals, uptake of loan funds and costs
Opoku <i>et al.</i> (1997)/Ghana	Before and after study	NR	Rural	Community meetings to establish loan funds for transport	Upgraded facilities, community education on obstetric complication	Utilization of health facility and costs of community mobilization
Chiwuzie <i>et al.</i> (1997)/Nigeria	Before and after study	NR	Rural	Direct encouragement to communities to establish loan funds and emergency transport system	Upgraded emergency obstetric services	Numbers of applications for loans, costs and repayments
Shehu <i>et al.</i> (1997)/Nigeria	Before and after study	NR	Rural	Seed grant was given to the community by the project to establish a revolving petrol fund which users of the transport had to pay	Upgraded emergency obstetric services	Transport costs and time and women transported
Essien <i>et al.</i> (1997)/Nigeria	Before and after study	NR	Rural	Establishment of a revolving community emergency loan fund financed by community members repaid by users and mobilization of transport community service	Upgraded emergency obstetric services	Community contributions, women transported and uptake of fund
Rana <i>et al.</i> (2007)/Nepal	Before and after study	NR	Rural	Establishment of revolving funds for travel to EmOC facilities and EmOC treatment	Establishment of EmOC services, health education on EmOC	Utilization of health facilities

Notes: NR, not reported; VHW, village health worker.

**Table 2** Utilization of health facility for delivery

Study		Utilization		Change Pre vs Post	% Change (95% CI)		OR (95% CI)
		Pre- intervention	Post- intervention		Pre vs Post comparison	Difference in difference intervention vs control comparison	
Studies with control groups							
Lungu <i>et al.</i> (2004)	Intervention group	NA	88.89% <sup>b</sup>	NA	NA	NA	3.50 (0.97–15.48)
	Control group	NA	69.81% <sup>b</sup>				
Manandhar <i>et al.</i> (2004)	Intervention group	NA	201 <sup>b</sup>	NA	NA	NA	3.55 <sup>a</sup> (1.56–8.05)
	Control group	NA	66 <sup>b</sup>				
Hossain <i>et al.</i> (2006)	Intervention group	2.40% <sup>b</sup>	20.50% <sup>b</sup>	NA	18.10 (11.70–26.66)	17.6 (15.24–20.12)	NA
	Control group	4.50% <sup>b</sup>	5.00% <sup>b</sup>		0.5 (0.44–1.38)		
Studies with no control groups							
Opoku <i>et al.</i> (1997)		142 <sup>b</sup>	195 <sup>b</sup>	53	37 (28.18–46.78)	NA	NA
Olaniran <i>et al.</i> (1997)		44 <sup>b</sup>	46 <sup>b</sup>	2	4.54 (1.26–15.13)	NA	NA
Rana <i>et al.</i> (2007)		1971 <sup>b</sup>	4623 <sup>b</sup>	2652	134.55 (131.67–137.69)	NA	2.29 (2.17–2.42)

Notes: CI, confidence interval; NA, not applicable.

<sup>a</sup>OR reported in the article.

<sup>b</sup>Raw values (which could not be calculated by authors due to limited data) are presented in both %s and nos.

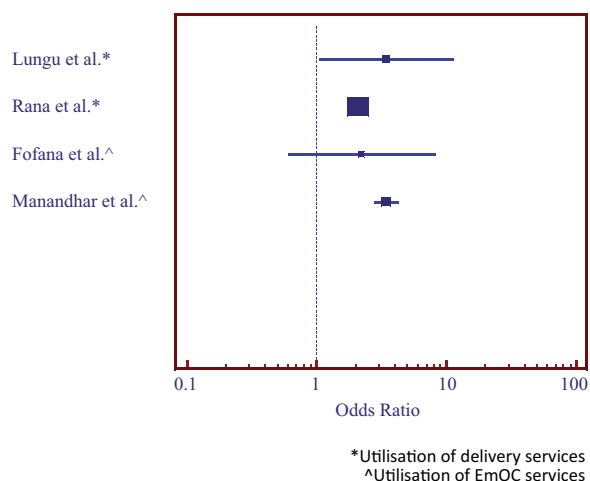
**Table 3** Utilization of EmOC services for obstetric complications

Study		Utilization		Change Pre vs Post	% Change (95% CI)		OR (95% CI)
		Pre- intervention	Post- intervention		Pre vs Post comparison	Difference in difference intervention vs control comparison	
Studies with control groups							
Fofana <i>et al.</i> (1997)	Intervention group	5 <sup>b</sup>	12 <sup>b</sup>	7	140 (108.95–278.60)	132.1 <sup>a</sup> (147.53–121.55)	2.22 (0.51–10.38)
	Control group	12 <sup>b</sup>	13 <sup>b</sup>	1	8.33 (1.48–35.38)		
Manandhar <i>et al.</i> (2004)	Intervention group	NA	333 <sup>b</sup>	NA	NA	28 (14.78–39.89)	3.37 (1.78–6.37)
	Control group		207 <sup>b</sup>				
Hossain <i>et al.</i> (2006)	Intervention group	16.00% <sup>b</sup>	39.80% <sup>b</sup>	NA	23.8 (15.84–32.15)	22.8 (20.30–25.50)	NA
	Control group	11.10% <sup>b</sup>	12.10% <sup>b</sup>		1 (0.18–05.45)		
Studies with no control groups							
Opoku <i>et al.</i> (1997)		26 <sup>b</sup>	73 <sup>b</sup>	47	180.79 (145.79–242.45)	NA	
Shehu <i>et al.</i> (1997)		13 <sup>b</sup>	16 <sup>b</sup>	3	23.07 (8.17–50.25)	NA	
Rana <i>et al.</i> (2007)		1.90% <sup>b</sup>	16.90% <sup>b</sup>	NA	15 (9.31–23.28)	NA	

Notes: CI, confidence interval; NA, not applicable.

<sup>a</sup>Relative percentage change calculated due to lack of denominators

<sup>b</sup>Raw values (which could not be calculated by authors due to limited data) are presented in both %s and nos.



**Graph 1** Forest plot of utilization of delivery and EmOC services-weighted OR.

intervention group compared with 341 in the control group after intervention. The study by Ahluwalia *et al.* (2010) which consisted of two intervention groups representing two different geographical areas and one control group recorded a post-intervention reduction in MMR of 56% and 37% in intervention groups, compared with a reduction of 26% in the control group. Overall, differences in the reductions of MMR in the two intervention groups compared with that of the control group were 71 ( $P < 0.001$ ) and  $-6$  ( $P < 0.612$ ).

**Quality assessment**

The quality of four studies was rated as strong (Lungu *et al.* 2004; Manandhar *et al.* 2004; De Costa *et al.* 2009; Ahluwalia *et al.* 2010), six as moderate (Fofana *et al.* 1997; Olaniran *et al.* 1997; Opoku *et al.* 1997; Shehu *et al.* 1997; Hossain and Ross 2006; Rana *et al.* 2007) and two as weak (Chiwuzie *et al.* 1997; Essien *et al.* 1997). The studies categorized as strong had no weak ratings, moderate studies had one weak rating and weak studies had two or more weak ratings across parameters assessed (Table 5). The weak ratings resulted from failure to mention type of study design and report on withdrawals and drop-out rates, as well as the percentage of participants completing the study.

**Discussion**

Community-based loan funds have been implemented in many developing countries. Loan funds are supposed to allow people to pool and borrow money so that in the event of an emergency, money will be available to pay for the costs of reaching medical care. Given the unpredictability of obstetric complications and need for life-saving care in a health facility, loan funds have been used to remove the barriers of cost when pregnant women access healthcare during an emergency. This article synthesizes the available evidence on the effects of community-based loan funds for transport during obstetric emergencies in developing countries. Our review has indicated that evidence on the effectiveness of community loan funds in relation to uptake, health facility utilization and maternal mortality is inconclusive.

**Table 4** Maternal mortality

Study	Maternal Mortality Measurement					
	Maternal deaths		OR <sup>a</sup> (95% CI)		Maternal mortality/100,000 live births	
	Pre-intervention	Post-intervention	Intervention vs control (post/pre intervention)	Intervention vs control (dead/alive, post-intervention)	Pre-intervention	Post-intervention
Manandhar <i>et al.</i> (2004)	NA	2	NA	0.22 <sup>b</sup> (0.05–0.90)	NA	69
	Intervention group	Control group			Pre-intervention	Post-intervention
De Costa <i>et al.</i> (2009)	27	11	NA	0.38 (0.18–0.73)	531	341
	Intervention group	Control group			Pre-intervention	Post-intervention
Ahluwalia <i>et al.</i> (2010)	17	46	0.53 (0.22–1.26)	0.53 (0.22–1.26)	261	600
	Intervention group 1	Intervention group 2			Pre-intervention	Post-intervention
	10	9	0.74 (0.26–2.10)	0.74 (0.26–2.10)	185	116
	Control group	Control group			Pre-intervention	Post-intervention
	113	138	NA	NA	285	210
					Change in Maternal mortality/100,000 live births (95% CI) Pre vs post-intervention	Difference in difference maternal mortality/100,000 live births (95% CI) Intervention vs control
					NA	NA
					301 (268.90–336.91)	NA
					NA	NA
					146 (124.17–171.66)	71 (41.88–100.12)
					69 (54.53–87.31)	$-6$ ( $-29.51$ to $17.51$ )
					75 (59.84–93.99)	—

Notes: CI, confidence interval; NA, not applicable.  
<sup>a</sup>OR was estimated after considering difference between total live-births and maternal deaths to estimate number of mothers alive.  
<sup>b</sup>OR reported in the article.

**Table 5** Quality assessment of articles included in the review

Author	Minimization of selection bias <sup>b</sup>	Study design <sup>b</sup>	Control for confounding <sup>b</sup>	Blinding	Data collection methods <sup>b</sup>	Withdrawals and dropouts <sup>b</sup>	Methodological quality <sup>a</sup>
Fofana <i>et al.</i> (1997)	Strong	Moderate	Moderate	NA	Strong	Weak	Moderate
Olaniran <i>et al.</i> (1997)	Strong	Moderate	Moderate	NA	Strong	Weak	Moderate
Shehu <i>et al.</i> (1997)	Moderate	Moderate	Moderate	NA	Strong	Weak	Moderate
Opoku <i>et al.</i> (1997)	Moderate	Moderate	Moderate	NA	Strong	Weak	Moderate
Chiwuzie <i>et al.</i> (1997)	Strong	Weak	Weak	NA	Moderate	Weak	Weak
Essien <i>et al.</i> (1997)	Strong	Weak	Weak	NA	Moderate	Weak	Weak
Lungu <i>et al.</i> (2004)	Strong	Moderate	Strong	NA	Strong	Strong	Strong
Manandhar <i>et al.</i> (2004)	Strong	Strong	Strong	NA	Strong	Strong	Strong
Hossain and Ross (2006)	Strong	Moderate	Moderate	NA	Strong	Weak	Moderate
Rana <i>et al.</i> (2007)	Strong	Moderate	Strong	NA	Strong	Weak	Moderate
De Costa <i>et al.</i> (2009)	Strong	Moderate	Strong	NA	Strong	Moderate	Strong
Ahluwalia <i>et al.</i> (2010)	Strong	Moderate	Moderate	NA	Strong	Moderate	Strong

Notes: NA, not applicable.

<sup>a</sup>Methodological quality: strong, no weak rating; moderate, 1 weak rating; weak,  $\geq 2$  weak ratings.

<sup>b</sup>Parameters assessed: minimization of selection bias: strong, the participants were likely; moderate, somewhat likely; weak, not likely, to represent the target population. Study design: strong, randomization occurred, e.g. RCTs; moderate, study described as case control, before and after, etc., weak, study design not specified. Confounders: strong, controlled for all relevant confounders; moderate, controlled for some confounders; weak, control for confounders not specified. Data collection method: valid and reliable data collection tools; moderate, tools valid but not reliable; weak, validity and reliability not described. Withdrawals and drop-outs: strong, reported withdrawals and drop-outs (80–100% of participants completed the study); moderate, reported withdrawals and drop-outs (60% of participants completed the study); weak, withdrawal and drop-out rates not specified.

In terms of uptake, there was little consistency in use of indicators, with some studies describing uptake across the number of schemes set up and others using proportions of successful applications. Varying levels of uptake were reported in six papers. Of these, only one study had a strong quality assessments score (De Costa *et al.* 2009) and reported poor levels of uptake.

The evidence on improved utilization of health facilities is marginally stronger. All studies reported increased rates of utilization, with some studies showing significant changes ( $P < 0.01$ ). Yet these findings are compromised by uncertainty in study design, drop-out rates and confounding. Utilization of health facilities remained relatively low (below 50%) in all studies (Table 2) even after the intervention. The other indicator of utilization, the proportion of women with obstetric complications who actually received EmOC (Table 3), also remained suboptimal—ideally, all women with complications should receive emergency care. It is possible that community loan funds can improve women's access and uptake of health services to some extent, but other barriers exist which prevent optimal rates of utilization. These other barriers may include, for example, the loan funds being insufficient to pay for costs incurred, perceptions of poor quality of services or cultural prohibitions to using the loans or obstetric services and will require other interventions to further increase utilization.

Reductions in maternal mortality are of course one of the key desired outcomes of improving access. It may be hypothesized that these reductions could occur if firstly, the loans are available; secondly, they are used by pregnant women to reach care; thirdly, that at least some of the pregnant women who use the services because the loan is available are in need of emergency care and finally, that those who reach care receive

adequate life-saving treatment. Three high or moderately high scoring studies in our quality assessment recorded declines in maternal mortality in areas where community-based loan funds were established. Interpretations of these findings have to be cautious as the interventions in all the studies were multifaceted and not restricted to loan funds, so it is not possible to disentangle the effects of the other interventions. Other limitations also have to be considered, including statistical under-powering of studies, and the small number of maternal deaths recorded in one study (Manandhar *et al.* 2004).

Other insights into the use of community loan funds can be gleaned from this review, yet a consideration of these factors generates other questions which need exploration in future studies. There is a possibility that loan funds can be misused. The included studies reported that established loan funds were generally used as intended, by pregnant women for transport during delivery and EmOC although reports of other use (to offset other medical fees) existed. However, there is a possibility of reporting bias and no certainty of whether the studies adequately captured misuse, which community members may be reluctant to report (e.g. use of funds by influential people in the village for non-emergency purposes). Issues of set-up and sustainability of funds also arose. Various operational problems were described in establishing the schemes and in ensuring the continuing availability of funds. The articles included in this review did not aim to investigate the reasons why these problems arose in detail, although issues such as weak leadership, the fluctuating economic situation of loan scheme members, high transport and obstetric service cost and overall poverty were factors mentioned (Fofana *et al.* 1997; Olaniran *et al.* 1997). The formation of close partnerships between health teams, communities and the Ministry of Health and community

involvement in planning and implementation are described as key ways to overcome some of the barriers to establishing and sustaining loan schemes by the authors of the included studies (Opoku *et al.* 1997; Hossain and Ross 2006; Rana *et al.* 2007) and by others (Kidney *et al.* 2009; Morrison *et al.* 2010; Mushi *et al.* 2010). The various ways in which the funds were administered (e.g. who contributed funds and interest generated) may also affect both effectiveness of the scheme and its sustainability. Finally, one study (Lungu *et al.* 2004) reported a potential negative effect of decreased utilization in the intervention villages. Women were concerned that the use of the bicycle ambulance ‘publicized’ their condition inappropriately and left them open to the influence of evil spirits. It may be that the problem was related to the transport modality rather than the fund established to support it, but the examples serve to illustrate the need to monitor for unexpected adverse effects. For example, it is not known whether individuals may be ostracized in the community if they could not afford contributions or if community unrest was created due to individuals refusing to contribute.

To the best of our knowledge, this is the first systematic review of the effect of community based loan funds in maternal healthcare in developing countries. A number of constraints should be noted. There are few robust controlled studies of community loan funds. The implementation of multi-component interventions restricts interpretation of effects in most studies. Although some studies may have been missed out because only studies published in English language were included, however, the abstracts were reviewed in English and were assessed as unlikely to provide useful data. Information bias may have occurred but could not be assessed due to the component-specific nature of the standardized tool utilized, which made no allowance for its inclusion as a quality assessment parameter. Without contacting the authors of the studies to gain access to their databases, we were only able to use the data reported in the articles and could not conduct additional analyses.

## Conclusion

This systematic review was carried out to determine the effect of community-based loan funds. Findings of the review were inconclusive and limited by challenges of study design, multi-faceted interventions, bias and confounding. Nevertheless, there is some evidence to suggest that community-based loan funds, in association with other interventions, may increase utilization of health facilities. The question of uptake of the funds and their sustainability remains. From a research perspective, improving the quality of evidence on their effect is a priority. Future studies should have robust designs with controls and clear specification of outcomes. In-depth qualitative studies are needed to give further insights into issues of intervention design and sustainability. Theories of change should be made explicit so that the mechanisms through which loan funds might work can be better understood. The resulting improved quality of evidence will redress the current situation where much effort is being put into establishing community loan funds with uncertain impact.

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