

Rewarding Safe Motherhood

How can Performance-Based Funding Reduce
Maternal and Newborn Mortality in Tanzania?

Ottar Mæstad

R 2007: 17

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Executive summary

Maternal and newborn mortality remain high in Tanzania. Several initiatives have been taken recently in order to address these major health problems, one of them being the Norwegian Tanzanian Partnership Initiative (NTPI). One of the core ideas of this initiative is to implement some kind of performance-based funding system for the district health service. This report discusses whether and how a performance-based funding system can be designed so as to contribute to reducing maternal and neonatal mortality.

It is not possible in practice to link performance incentives directly to reduced maternal and newborn mortality. Incentive mechanisms are bound to be linked to some intermediary or process indicators. A thorough understanding of the reasons for high mortality ratios, and of the effectiveness and costs of alternative interventions, is therefore needed in order to design an effective incentive scheme.

Maternal and newborn mortality in Tanzania

The maternal mortality ratio in Tanzania is currently estimated at 578 per 100,000 live births. There has been no improvement in mortality rate over the last decade. Cause-specific mortality estimates from representative samples in Tanzania are not available. Estimates for Africa suggest that haemorrhage (bleeding) is the dominant cause of maternal deaths (34%), followed by sepsis/infections (10%) and hypertensive disorders (9%). Most women die during labour or on the first day after delivery from causes that cannot be predicted and are difficult to prevent. Universal availability of timely diagnosis and treatment around the time of delivery is therefore essential. Routine delivery in health centres under the supervision of skilled health workers has been recommended as the main strategy for reducing maternal mortality. Postnatal care is also important in order to reduce deaths caused by infections. Antenatal care is less effective in reducing maternal mortality.

The newborn mortality rate in Tanzania is 32 per 1,000 live births. The three major causes of newborn deaths in Tanzania are sepsis/pneumonia (28%), prematurity (27%) and birth asphyxia (26%). Most fatal conditions for newborn babies present themselves immediately after birth or the first days thereafter. Facility-based interventions, such as skilled maternal and neonatal care, emergency neonatal care and emergency obstetric care, would contribute significantly to mitigating several of the dominant causes of newborn deaths. Family- and community-based interventions are also highly cost-effective, while antenatal services are less cost-effective compared to intrapartum and postnatal care.

Implementation of core interventions in the Tanzanian context

Only 47% of deliveries in Tanzania currently take place at a health facility, and health professionals assist in only 46% of all births. Reasons for the low utilisation of skilled delivery services can be found on both the demand and the supply sides.

On the demand side, 62% of women state that they face large barriers in seeking health care in general, in particular due to lack of money, long distances, and lack of transport. Financial costs seem to be a major barrier against facility-based deliveries in Tanzania, despite the fact that these services are supposed to be provided for free.

On the supply side, the poor quality of the service is a major cause of low utilisation. Many of the lower-level facilities appear to not offer much to the pregnant mother beyond a delivery

bed. 52% of the health centres and 70% of the dispensaries have been found to lack essential equipment and supplies for emergency obstetric care, and many lack personnel with authority to perform relatively simple life-saving procedures. At the hospital level, more than one third of government hospitals do not provide comprehensive emergency obstetric care. Poor quality management at the hospital level has also been shown to account for a large share of maternal deaths. Furthermore, lack of friendliness towards pregnant mothers has been noted as a major barrier to increased utilisation at all levels.

Low perceived quality is also related to the lack of an effective referral system in many parts of the country. This is due both to health system factors, such as lack of ambulances and communication equipment, but also to external factors such as long distances and inadequate road networks.

There is considerable scope for improving the quantity and the quality of skilled attendance on mothers and newborns in health facilities in Tanzania. This requires action on both the supply and demand sides. On the demand side, the issues of distance and transport are crucial, alongside the need to ensure that payment exemption policies are lived up to. On the supply side, there is an especially large need to improve the supply of equipment and drugs for basic emergency obstetric care, first at the health centre level and then at the dispensary level. The next step will be to follow up with high quality referral services. Action is also needed in order to make women more comfortable with delivering at a health facility. Finally, more skilled personnel need to be trained and recruited in order to manage the increased workload.

The unmet need for family planning in Tanzania is estimated at 22%. Effective family planning can significantly reduce the number of maternal deaths (although the impact on the maternal mortality *ratio* will be negligible). Realistic estimates of what can be achieved through family planning are, however, quite low. A large share of deaths caused by unsafe abortions can be prevented through post-abortion care, but only 5% of health facilities in Tanzania provide comprehensive post-abortion care at present.

Almost all pregnant women (94%) receive antenatal care and as many as 62% make four or more ANC visits. The quality of the service is, however, not always adequate. Any further contributions to reducing maternal and neonatal mortality from antenatal care in Tanzania must come through improvements in the *quality* of the service. Still, only modest reductions in mortality can be expected from improving the quality of these services, except perhaps in specific locations where malaria is an important indirect cause of maternal mortality.

The amount of postnatal care for women who deliver in health facilities in Tanzania is unknown. In the case of home deliveries, only 13% of mothers receive a postnatal check-up within two days of delivery.

A broad range of community-level initiatives have been implemented in order to reduce delays and increase the share of women who deliver at health facilities. There is little knowledge about the effectiveness of the various initiatives. No examples have been identified in Tanzania of the use of cash transfers in order to stimulate demand for skilled birth attendance, but incentives exist in some districts for registering pregnancies.

Performance-based funding

Performance-based funding schemes can, if properly designed, strengthen incentives for implementing effective interventions against maternal and neonatal mortality. At the same time, performance-based funding increases the scope for decentralised decision making and provides opportunities for finding effective local solutions to local challenges.

Performance-based funding systems can be distinguished along a number of dimensions. One dimension is to what extent rewards for high performance are granted to *institutions* (e.g., health facilities and district administrations) rather than to *individuals* within them (e.g., in the form of increased salaries or bonuses for health workers or administrators).

Another dimension is the *administrative level* at which performance is rewarded. Rewards for high performance can be granted all the way from the central administrative level, via regional and district level, to the health facility level, or the community level.

The choice between an institution-based and an individual-based reward system is a difficult and important one. There is considerable experience with performance rewards at the institutional level in health systems in developed countries, but very little experience so far with performance rewards at the individual level in the health sector. Institution-based rewards are simpler to administer, but institution-based rewards will be ineffective if the workers do not take an interest in promoting the goals of their respective organisations.

The Minister of Health in Tanzania has indicated that there is a need to motivate individual health workers to take increasing responsibility for improving the health services. This can be achieved by strengthening either extrinsic or intrinsic motivations. Extrinsic motivations (e.g., monetary rewards) are easy to manipulate, but they also have their drawbacks, especially in complex organisations such as are found in the health sector. An alternative is to implement measures to strengthen the “organisational identity” or other sources of intrinsic motivation amongst health workers. Performance-based pay at the individual level should be implemented only if this is the most cost-effective way of strengthening health worker motivation.

Irrespective of whether performance-based incentives are provided to institutions or individuals, they are likely to remain ineffective unless incentives are provided both at the health facility level and at the district level. Actions need to be taken at both levels in order to successfully implement core interventions that can reduce maternal and newborn mortality.

Performance indicators which are both feasible and well targeted for reducing maternal and newborn mortality include:

Goals	Performance indicators
Skilled birth attendance	<ul style="list-style-type: none"> Number of institutional deliveries
Quality of intrapartum care	<ul style="list-style-type: none"> Number of basic and comprehensive EmOC units per capita Quality score based on implemented quality management procedures (e.g., use of partograms)
Postnatal care	<ul style="list-style-type: none"> Number of institutional deliveries where mother stays at facility for 2/3 days Number of postnatal checkups within two days
Quality antenatal care	<ul style="list-style-type: none"> Number of malaria prevention measures (IPT and ITN), iron/folic acid supplements, TT immunisations
Reduced delays	<ul style="list-style-type: none"> Number of working ambulances per capita Number of kilometres driven related to maternal and neonatal health
Improved skill level	<ul style="list-style-type: none"> Number of staff (per capita) trained for EmOC Share of health facilities with at least one staff trained for EmOC

Performance-based funding at the district level is not in itself sufficient to achieve the desired effect on maternal and neonatal health. The scheme needs to be complemented by broader national efforts to strengthen the health system. Performance-based funding at the district level will, for instance, not fully address the challenges related to poor transport infrastructure, delayed supplies of drugs and equipment from the central level, the shortage of health workers in general, and the shortage of people trained for emergency obstetric care in particular. Nor is there any reason to believe that performance-based funding will improve those aspects of the quality of the service that are difficult to observe for both clients and supervisors.

In addition, there are challenges related to the practical implementation of performance-based funding that may undermine the effectiveness of the scheme, in particular the challenges related to production of reliable reports of achieved results and to timely and accurate payment of performance rewards.

The need for research

Evidence on the impact of performance-based funding in the health sector of low and middle income countries is very limited. In particular, evidence is scarce on the impact of performance-based funding which rewards health workers based on output indicators. Large financial resources are currently being donated to the achievement of the health-related Millennium Development Goals. It is an ethical obligation towards those who suffer from death and disease to put these resources to their most effective use. One should therefore not miss the opportunity to ensure that the impact of the interventions is properly documented and researched. The possibilities for doing so strongly depend on how the interventions are being rolled out.

Introduction¹

The 2004 Tanzanian Demographic and Health Survey (TDHS) has shown a marked reduction in the under-five mortality ratio over the last 10-15 years. However, there has been no reduction in neonatal mortality (i.e., mortality within the first four weeks of life). Nor has there been any reduction in the maternal mortality ratio. Maternal and neonatal mortality and morbidity account for a high share of the burden of disease in the country.² These facts have inspired a renewed focus on the need to reduce maternal and neonatal mortality in Tanzania.

One of the recent efforts to address this challenge is the Norwegian Tanzanian Partnership Initiative (NTPI). The main goal of this initiative is to strengthen the efforts to attain Millennium Development Goals 4 and 5 on reducing child and maternal mortality. The modalities of the practical implementation of the NTPI have not been decided upon yet. However, one of the core ideas of the initiative is to implement some kind of performance-based funding system for the district health services. A feasibility study of such a funding system has been conducted, providing a number of useful recommendations on how to implement a results-based financing system in practice (Smithson et al. 2007).

This report discusses whether and how a performance-based funding system can be designed in order to contribute to reducing maternal and neonatal mortality. In contrast to the Feasibility Study, which mainly addresses the practical modalities of a results-based financing system, this study takes a step back by sharpening the focus on the underlying reasons for implementing performance-based funding. We acknowledge that reduced maternal and neonatal mortality will probably not be the only goal of a performance-based funding system; the scheme will also aim at a broader strengthening of the health system. Nevertheless, a sharp focus on maternal and neonatal mortality seems appropriate in the design phase, both because these are major health challenges in Tanzania and because improved maternal and child health is an important motivation behind the initiative.

A large share of maternal and neonatal deaths can be averted through low-cost interventions. The major challenge, however, is to implement the interventions in practice, i.e., to achieve high coverage ratios with high quality services. A performance-based funding scheme is an attempt to address this challenge through strengthening the incentives for *implementation* of interventions with documented effects. The basic idea is to increase the reward (or reduce the cost) for the implementation of core interventions, with the expectation that health workers, health administrators and/or service users will respond to these incentives in a way that increases the quantity and quality of health services.

We do not know whether performance-based funding will be an effective implementation strategy in the Tanzanian health system. The international evidence base on the impact of performance-based funding is limited, and the effect of initiatives of this kind is anyway likely to depend heavily on local context. To our knowledge, the effect of performance-based funding has not been rigorously investigated anywhere in the Tanzanian health system, although it has lately been

¹ For their valuable inputs and comments on an earlier draft, I am grateful to participants at the Results-Based Financing Seminar in Dar es Salaam, 26-27 November 2007, and to Bjørg Evjen Olsen, Berit Austveg, Ingvar Theo Olsen, Siri Lange, Karen Marie Moland and Gunnar Kvåle.

² Lopez et al. (2006) estimate that 8.6% of the total burden of disease in Sub-Saharan Africa is due to maternal and perinatal conditions (as compared to 1.2% in high income countries). The share is probably higher in Tanzania due to the relatively low HIV prevalence, and correspondingly lower BoD from HIV/AIDS, compared to other countries in the region.

implemented in some voluntary agencies. The limited evidence base suggests that the funding system should be piloted and rigorously evaluated before large-scale implementation.

The purpose of this report is to *contribute to an informed discussion about the design of a performance-based funding scheme* that can be a candidate for piloting and evaluation – provided policy makers have sufficient faith in the idea of strengthening implementation through performance-based funding.

We take as our starting point that one of the goals of a performance-based funding system in Tanzania will be to reduce maternal and neonatal mortality. A basic insight from the theory of incentives is that the least costly way of achieving any objective is by tying the incentives as closely as possible to the goal one is trying to achieve. A direct application of this principle to our case would be to create a performance-based funding system where rewards are inversely linked to mortality ratios. However, due to limitations of data availability and data quality, this approach is not feasible. For instance, records of maternal deaths are typically seriously incomplete, and precise survey estimates of maternal mortality ratios are difficult and costly to obtain due to methodological challenges and sample size requirements.

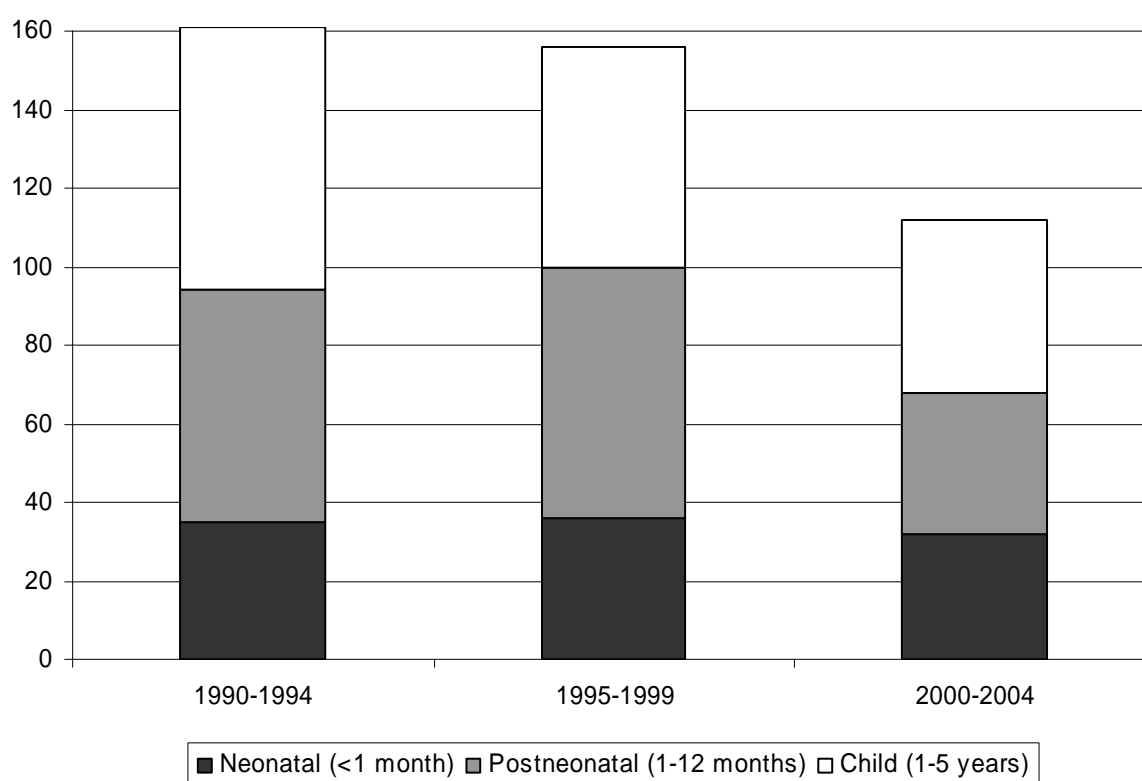
As a consequence, incentive mechanisms are in practice bound to be linked to some intermediary or process indicators which are thought to have an impact on mortality ratios. In order to design a cost-effective incentive scheme, a profound understanding is needed both of the causes of high mortality ratios and of the effectiveness and costs of alternative interventions. We therefore start by summarising the existing evidence on these issues in the context of maternal and neonatal mortality (Section 2). We then go on to discuss issues related to the implementation of these cost-effective interventions in the Tanzanian context (Section 3). Finally, we draw implications for the design of a performance-based funding system that addresses maternal and neonatal mortality (Section 4).

2. Maternal and neonatal mortality: Magnitude, causes and interventions

2.1 Maternal and child mortality in Tanzania

Figure 1 illustrates the sharp reduction that has taken place in under-five mortality in Tanzania over the last decade, down from 161 to 112 deaths per 1,000 births. The diagram also shows that the fall in mortality has taken place almost exclusively after the neonatal stage (i.e., after 1 month). The absence of a decline in neonatal mortality is disturbing given the fact that neonatal deaths account for 29% of all under-five deaths, amounting to 44,900 deaths each year (Lawn and Kerber, 2006).

Figure 1: Early childhood mortality in Tanzania (deaths per 1,000 births)



Source: TDHS 2004.

Each year approximately 8,100 Tanzanian women die of pregnancy-related causes (Lawn and Kerber, 2006). There has been no reduction in maternal mortality in Tanzania over the past decade. Maternal mortality is currently estimated at 578 deaths per 100,000 live births (TDHS 2004), which is somewhat higher than, but not statistically significantly different from, the 1996 estimate of 529 deaths per 100,000 births.³

³ There is a large number of estimates of maternal mortality ratios covering more limited geographical areas. See Olsen (2002a) for a comprehensive overview. Among studies conducted after 1990, community-based studies have showed maternal mortality ratios ranging between 348 in Hai district to 1099 in Morogoro rural district (see Msiwa et al., 2003),

Data from several developing countries show that the risk of death for the mother is heavily concentrated in the first day after delivery, although the risk remains high throughout the first week after delivery (Ronsmans and Graham, 2006).

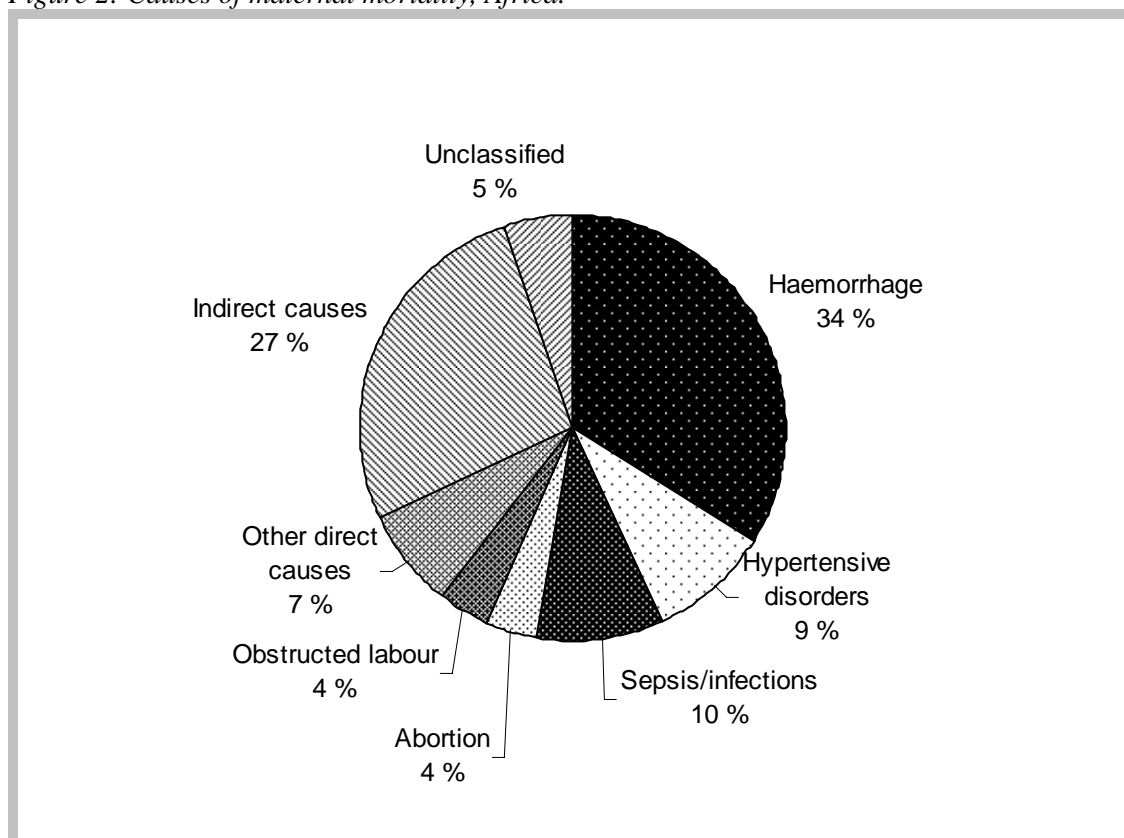
A similar risk pattern is observed for the newborns. Among the four million neonatal deaths annually in the world, at least one million deaths occur during the first day and three million deaths occur during the first week (Lawn et al., 2005a).

The overlap in the timing of peak risk of maternal and neonatal death, combined with the fact that there is some overlap in effective interventions, make a joint discussion of maternal and neonatal health highly appropriate.

2.2 Maternal mortality: causes and interventions

A recent comprehensive and representative data set on cause-specific maternal mortality in Tanzania is not available. We will therefore use the most recent WHO estimates for the Africa region as our benchmark and use complementary sources to comment on particularities relevant for Tanzania.

Figure 2: Causes of maternal mortality, Africa.



Source: Kahn et al. (2006)

while hospital-based studies have shown estimates of 845 (Welraven et al., 1994) and 933 (pre-intervention) and 186 (post-intervention) (Mbaruku and Bergstöm, 1995). Indirect sisterhood methods have produced estimates between 288 in Kwimba district (Kazaura, 1991) and 946 in Iringa district (Francesconi and Pesani, 2001).

Figure 2 illustrates the relative importance of the main medical causes of maternal mortality in Africa. A distinction is made between direct causes and indirect causes. Haemorrhage (bleeding) is the dominant cause of maternal death (34%), followed by sepsis/infections (10%) and hypertensive disorders (9%), mainly as pre-eclampsia or eclampsia. Note that some authors have challenged the estimated share of sepsis/infections as being a substantial underestimate (Costello et al., 2006).

Within the large group of indirect causes, important contributors are HIV/AIDS (6%), anaemia (4%) and malaria (n.a.).

Complementary sources of evidence with relevance for Tanzania are reported in Table 1. These scattered and somewhat old sources of evidence suggest that abortion may be more important as a cause of maternal death in Tanzania compared to regional averages. WHO (1997) estimated unsafe abortions to account for 16.5% of maternal deaths in Tanzania. Among the indirect causes of maternal mortality, we note that anaemia has been reported as a potentially more important source of maternal death in Tanzania than in the Africa region. Note, however, that the study reporting anaemia to account for 13.2% of maternal deaths is an old study (from 1993) and from one district only (MacLeod and Rhode, 1998). Finally, malaria has been estimated to account for 4-5 % of maternal deaths in high endemic areas of the country. In low endemic areas, one study showed that as many as 44% of maternal deaths were caused by cerebral malaria (Olsen et al., 2002b).⁴

About 15% of all pregnancies will experience life-threatening complications (Hibbard, 1978). Most maternal deaths occur during labour, delivery and the first day after giving birth (Ronsmans and Graham, 2006). Most complications cannot be predicted or prevented and some of them can become fatal within a few hours. Hence, a significant reduction in maternal mortality requires access to timely diagnosis and treatment around the time of delivery (the intrapartum stage). Timely diagnosis and treatment will often require considerable skill. The Lancet Maternal Survival Series steering group therefore recommended effective routine delivery in health centres under the supervision of skilled health workers as the main strategy for reducing maternal mortality. There is also potential for more effective intrapartum care in relation to home deliveries and for more extensive use of drugs (especially antibiotics and misoprostol) outside health facilities in order to reduce mortality caused by sepsis and haemorrhage (Costello et al., 2006). A reduction in maternal mortality can also be achieved through safe abortions, family planning and post-abortion care. Although high quality antenatal care may also contribute somewhat, especially in those areas where malaria accounts for a high share of the indirect causes of maternal deaths, antenatal interventions are generally regarded as less effective for reducing maternal mortality (McDonagh, 1996).

⁴ Note that the overall maternal mortality ratio was not higher than 382 in this study.

Table 1: Maternal mortality: causes and interventions

Causes of maternal mortality	Relative importance		Time of presentation ⁷	Average duration until death if condition fatal ⁸	Interventions ⁹
	Africa ¹	Tanzania			
Direct causes					
Haemorrhage (bleeding)	34 %		<i>Ante partum:</i> 28 weeks of gestation up to delivery <i>Post partum:</i> Up to 24 hours after delivery	<i>Ante partum:</i> 12 hours <i>Post partum:</i> 2 hours	Drugs (oxytocin, misoprostol ¹⁰) Blood transfusion High-level obstetric care
Sepsis/infection	10 %		Delivery to 6 weeks postpartum	6 days	Clean delivery conditions Antibiotics Tetanus toxoid immunisation (antenatal)
Hypertensive disorders	9 %		28 weeks of gestation to 2 days postpartum	2 days (eclampsia)	Antenatal monitoring (urine test and blood pressure) Anti-hypertensive drugs Caesarean section
Obstructed labour	4 %		During labour	3 days	Basic or comprehensive EmOC Antenatal care (information and identification of risk cases)
Abortion	4 %	16.5% ³		6 hours to 6 days	Family planning Safe abortion and post-abortion care
Other direct	5 %				
Indirect causes					
HIV/AIDS	6 %	2.2-14.3% ⁴			
Anaemia	4 %	2.2-13.2% 4,5,6,11			Iron and folic acid supplements Blood transfusion
Other indirect causes	19 %	Malaria, low endemic: 4.0-5.3% ^{5,6} Malaria, high endemic: 44% ¹¹			Intermittent presumptive treatment (IPT) of malaria during pregnancy Insecticide-treated bednets (ITN) Emergency care for cerebral malaria
Unclassified	5 %				

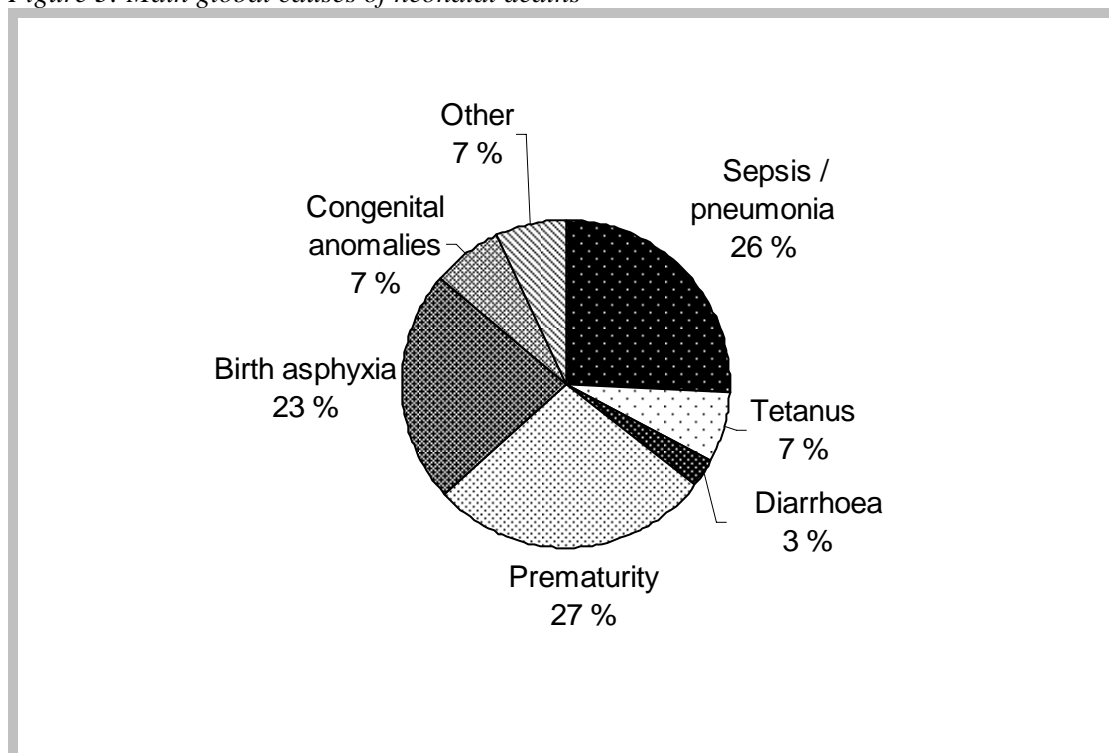
Sources: ¹Kahn et al. (2006), ²Everett (1975), ³WHO (1997), ⁴MOH (1997), ⁵MacLeod and Rhode (1998), ⁶Urassa et al. (1996), ⁷Graham et al. (2006), ⁸AbouZahr (1998) and Graham et al. (2006), ⁹Campbell and Graham (2006), ¹⁰Høj et al. (2005) and Costello et al. (2006), ¹¹Olsen et al. (2002).

2.3 Neonatal mortality: causes and interventions

Among the 4 million annual neonatal deaths, only 3% occur in countries with reliable vital registration systems. Best available estimates indicate that there are three major causes of neonatal mortality worldwide (Figure 3):

- infections (sepsis/pneumonia, tetanus, diarrhoea) (36%)
- prematurity (27%)
- birth asphyxia (23%).

Figure 3: Main global causes of neonatal deaths



Source: Lawn et al. (2005a)

As shown in Table 2, the estimates of causes of neonatal mortality in Tanzania follow the global averages quite closely, except that a significantly lower share of deaths is caused by tetanus.

Table 2. Neonatal mortality: causes and interventions

Causes of neonatal mortality	Relative importance		Interventions ²	Cause-specific mortality reduction ²
	World ¹	Tanzania ³		
Sepsis / pneumonia	26 %	28 %	Emergency neonatal care Case management of pneumonia Family care: clean home delivery, hygienic cord care, thermal care, breastfeeding promotion	30-70% 20-55% 20-50%
Tetanus	7 %	2 %	Antenatal care, including tetanus toxoid Family care (see above) Skilled maternal and neonatal care	80-95% 75-85% 50-70%
Diarrhoea	3 %	2 %	Family care (see above)	25-60%
Prematurity	28 %	27 %	Antenatal corticosteroids for preterm labour Extra care for low birth weight infants (warmth, hygiene, feeding) Emergency neonatal care	25-50% 20-50% 15-40%
Birth asphyxia	23 %	26 %	Emergency obstetric care Skilled maternal and neonatal care	20-60% 30-45%
Congenital anomalies	7 %	7 %	Folic acid supplementation	1-10%
Other	7 %	7 %		

Sources: ¹Lawn et al. (2005b), ²Darmstadt et al. (2005), ³Lawn and Kerber (2006).

Most fatal conditions for neonates present themselves immediately after birth or the first days thereafter. The timing from presentation to death in the case of birth asphyxia is very short (20 minutes). For infections and prematurity the time span is longer, often around five days (Graham et al. 2006). Thus, even though neonatal deaths, like maternal deaths, are heavily concentrated on the first day after delivery, the time from delivery to death is on average longer for the babies than for the mothers.⁵

While it is commonly asserted that around 90% of maternal deaths can be prevented through available, low-tech interventions, the share of preventable neonatal deaths is somewhat lower. Darmstadt et al. (2005) have estimated that the combined impact of 16 interventions with proven efficacy would be a 59% (41-72%) reduction in neonatal mortality at universal coverage. With 90% coverage, the estimated mortality reduction drops to 50% (31-61%).⁶ Hence, while many neonatal deaths are preventable, there is also a significant number of deaths that seem difficult to prevent with the available methods, at least in the short run.

The most effective interventions for each of the main causes of neonatal mortality are listed in Table 2. The most potent interventions are those that address a major cause with a high degree of cause-specific mortality reduction. It is noteworthy that facility-based interventions, such as skilled maternal and neonatal care, emergency neonatal care and emergency obstetric care, would contribute significantly against several of the dominant causes of neonatal death. Darmstadt et al.

⁵ According to Ronsmans et al. (2006), data from Mathlab, India, show that many more mothers die on the first day after delivery than on the following six days, while Lawn et al. (2005a) suggest that the concentration of neonatal deaths around the time of delivery is less extreme.

⁶ The country estimate for Tanzania provided by Lawn and Kerber (2006) falls in the same range.

(2005) estimate that a 90% coverage of facility-based clinical care alone could reduce neonatal mortality by 23-50%.⁷ This highlights the importance of a joint focus on maternal and neonatal health. It is also a reminder that some of the same factors that constitute barriers to improved maternal health are likely to prevent progress in the reduction of neonatal mortality.

Neonatal mortality could also be significantly reduced through family- and community-based interventions, including clean home delivery, hygienic cord care, thermal care and breastfeeding promotion, as well as community-based case management of pneumonia.

Antenatal interventions have generally less effect on neonatal mortality compared to intrapartum and postnatal care. The most important antenatal intervention is tetanus toxoid immunisation, but only 2% of newborn deaths in Tanzania are caused by tetanus (Lawn and Kerber, 2006).

2.4 Cost-effectiveness

Cost-effectiveness is the appropriate criterion for selecting among interventions if the goal is to maximise the reduction in maternal and neonatal deaths within given budget ceilings. In the design of performance-based funding systems, one should therefore attempt to stimulate the implementation of those interventions that generate high effect per unit of resources used.

Maternal and neonatal deaths are caused by a complex set of conditions. A meaningful approach to addressing these challenges will therefore focus on packages of interventions rather than on any single quick fix. Unfortunately, however, the evidence base on the cost-effectiveness of various packages is very limited. This is mostly due to lack of evidence on the effect of various intervention packages. We did not find any measures of cost-effectiveness that dealt specifically with the Tanzanian case.

Graham et al. (2006) provide cost-effectiveness estimates for broad intervention packages addressing maternal and perinatal mortality (and morbidity) in sub-Saharan Africa. One of their conclusions is that to increase the share of women who receive comprehensive EmOC services is less cost-effective than strategies that only – or in addition – increase the share of women who receive primary-level care (including basic EmOC services) and that improve the quality of primary-level services. Hence, a strengthening of the primary level of care would receive high priority from a cost-effectiveness perspective. Large reductions in maternal mortality can, however, not be achieved without also including comprehensive EmOC services.

Darmstadt et al. (2005) provide cost-effectiveness estimates of interventions to prevent neonatal deaths. The following interventions (or intervention packages) stand out as the most cost-effective:

- Family care/low birth weight care/community management of pneumonia
- Skilled maternal and immediate neonatal care
- Emergency obstetric care

The available estimates of cost-effectiveness are all based on a long list of assumptions that may or may not be valid in the Tanzanian context. They need to be handled with corresponding care. One problem with the estimates is the non-inclusion of the costs of training more health workers, which is probably an important part of a strategy to improve the share of skilled birth attendances. Note also that the cost-effectiveness estimates generally do not include the costs of inducing behavioural change – be it on the supply or the demand side. For example, the estimates of the costs of

⁷ See Hinderaker et al. (2003) for a discussion of the avoidability of perinatal and neonatal deaths in rural Tanzania.

increasing the share of pregnant women who deliver in health facilities do not include the costs of inducing more women choose to do so (e.g., costs related to improved or subsidised transport). On the supply side, the standard assumption is simply that all services that can potentially be delivered actually are delivered in practice. In other words, the issue of underperformance on the part of health workers is being ignored. This is probably a serious mistake in the Tanzanian context (e.g., Leonard et al., 2007).

3. Implementation: the Tanzanian context

The previous section presented a set of interventions that are effective in dealing with the main causes of maternal and neonatal mortality. In this section, we place these interventions into the Tanzanian context, attempting to identify current rates of uptake as well as barriers to effective implementation.

3.1 Intrapartum care in health facilities

There seems to be agreement that the best strategy for reducing maternal mortality in the long run is that women routinely deliver at health facilities under the supervision of skilled health workers. Skilled birth attendance (within or outside a health facility) is also an effective strategy for prevention of neonatal deaths.

Only 47% of deliveries in Tanzania currently take place at a health facility.⁸ The remaining births take place at home. The prevalence of home births is lower for first births (37%), for urban residents (18%) and for women with more education (14% if secondary school completed) (TDHS 2004).

Health professionals assist in 46% of the deliveries. Most of the births not assisted by health professionals are assisted by relatives or other untrained people (31% of all births), while trained birth attendants and traditional birth attendants assist in 8% and 11% of the births respectively.

Only 3% of babies born in Tanzania are delivered by caesarean section, which is a low share compared to the WHO recommendation of 5-15%. One of the reasons for the low share is that comprehensive EmOC is not universally available. Only 64.5% of government hospitals provide comprehensive EmOC services (Malecela et al., 2006).

Explanations for the low use of health facilities must be sought both on the demand side and on the supply side (health system factors). On the **demand side**, a large share of women (62%) state that they face large barriers in seeking health care in general. The most often cited barriers are lack of money, long distances to health facilities, having to take transport, and not wanting to go alone (Table 3).

Table 3. Tanzanian women's barriers to seeking health care when sick

Barriers	Percent who stated barrier as a big problem
Getting money for treatment	39.9
Distance to health facility	37.6
Having to take transport	37.2
Not wanting to go alone	24.4
Unfriendly provider	14.3
Concern there may not be a female provider	7.7
Knowing where to go for treatment	6.3
Getting permission to go for treatment	5.5
Any of the above	62.1

Source: TDHS, 2004

⁸ The share of deliveries taking place at a health facility varies from 31% in Mara to 90% in Dar es Salaam (TDHS, 2004).

While these reasons are meant to reflect barriers to seeking health care in general, it is not unreasonable to assume that the same factors play an important role in the low delivery ratios in health facilities. It is alarming that such a high share of the women perceive distance and transport to be major barriers, because these factors are crucial for the timely treatment of maternity complications. Although more than 70% of Tanzanians live within 5 kilometres of a health facility, most of the nearby facilities are small dispensaries which offer only a limited range of services. The travel distance to a health centre or hospital remains very long for most Tanzanians.

Economic costs are an important barrier to facility-based deliveries in Tanzania (Mrisho et al., 2007). Although delivery services are supposed to be free, delivery kits are not universally available, implying that the mother has to go and buy her own. In a study from Dar es Salaam and Kisarawe, it was reported that mothers are sometimes asked to pay for the delivery kit even when it is available at the health facility (Mæstad and Mwisongo, 2007). The Ministry of Health is currently working on a new mechanism for ensuring the supply of delivery kits at the health facilities.

The general level of trust in the health system is likely to be a key factor for the decision about where to deliver. We should bear in mind that despite an unacceptably high maternal mortality ratio, a pregnant mother on average faces a 99.5% probability of surviving. Most women will have the experience that home births regularly work out well. Maternal deaths will be such a rare event in most communities that people will find it difficult to observe differences in mortality ratios between home-based and facility-based deliveries, if any. A general lack of trust in the health system can therefore have a substantial negative impact on the demand for facility-based deliveries.

In addition, there are factors related to gender imbalance and cultural practices that negatively affect the demand for facility-based deliveries (Mrisho et al., 2007)

Reasons for not choosing to deliver at health facilities must also be sought on the **supply side**. In light of the large barriers that many women experience in seeking health care, the health system has to offer significant “value added” compared to home births in order for women to make the effort. In several developing countries, women have reported a low quality of delivery services, such as slow and delayed provision of care, lack of privacy, abusive language etc. (D’Oliveira et al., 2002; Kabakian-Khasholian et al., 2000).

In Tanzania, many of the lower level facilities appear not to offer much to the pregnant mother beyond a delivery bed. Without equipment and drugs to address maternal complications, the health facilities do not appear especially attractive to soon-to-be mothers. A study conducted by NIMR in 2005 indicated that only 5.5% of government health centres and none of the dispensaries provided basic EmOC services during the three months preceding the survey, despite the fact that delivery services were provided in 81% of the health centres and 87% of the surveyed dispensaries (Malecela et al., 2006).⁹ Lack of cases with an indication was a commonly cited reason for non-provision of service, but lack of equipment and supplies were also important factors: 52% of the health centres and 70% of the dispensaries were found to lack essential EmOC equipment and supplies. Drugs were also found to be lacking, especially oxytocin (for haemorrhage) and magnesium sulphate (anticonvulsant). The NIMR study also found that a major barrier to increased provision of EmOC services is policy regulations which prevent health workers from performing life-saving interventions, e.g. assisted vaginal delivery and removal of retained products.

⁹ The EmOC signal functions include the ability to administer parenteral antibiotics, administer parenteral oxytocics, administer parenteral anticonvulsants, perform manual removal of placenta, perform removal of retained products, perform assisted vaginal delivery, perform surgery and perform blood transfusion. Facilities performing the first six signal functions are regarded as providing basic EmOC services while those performing all eight functions are graded as comprehensive EmOC facilities.

Urassa et al. (2005) found that none of the primary and secondary level facilities in Dar es Salaam were providing basic/essential newborn care.

Low quality of service is an important issue also at the hospital level. The lack of comprehensive EmOC services at more than one third of government hospitals is only one of the problems (Malecela et al., 2006). In Kigoma, the maternal mortality ratio at the regional hospital was reduced from 849 to 275 per 100,000 live births over a seven-year period following the implementation of 22 interventions focusing on quality improvements within the hospital (Mbaruku, 2005). In the same period, the demand for facility-based deliveries increased by 40%, suggesting a positive relationship between quality and demand.

Unsatisfactory courtesy towards patients is another important barrier at all levels. According to Table 3, 14% of women state that unfriendly behaviour is a major barrier to seeking health care. There is some evidence to suggest that abusive behaviour may be an even larger problem in relation to deliveries (Moland, 2002; Gilson et al., 1994; Jewkes et al., 1998).

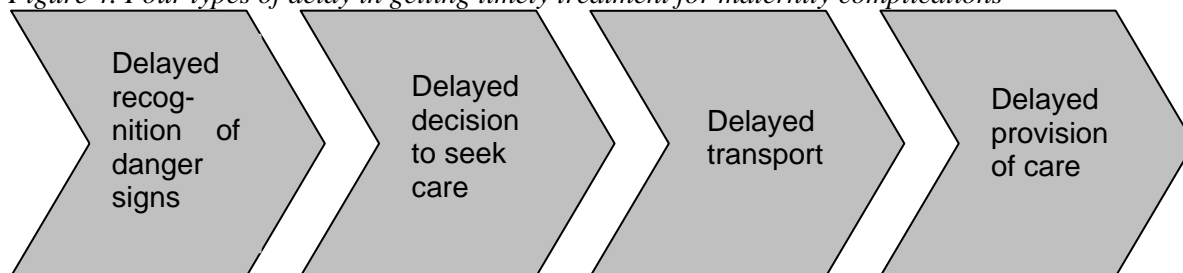
The provision of high quality maternal and neonatal services depends on the availability of qualified staff. According to the 2001/02 census of Human Resources for Health in Tanzania, there are about 9500 health workers at health centres and dispensaries with qualifications at the level of nurse/midwife or above. Most of them have qualified as nurse/midwives or clinical officers. About 7000 of them work at dispensaries while 2500 are to be found at health centres. With some 500 health centres and 4500+ dispensaries in total in the country, this implies an average of 1.5 qualified staff per dispensary and 5 qualified staff per health centre.¹⁰ Even though geographical variation is probably large, these figures suggest that a significant pool of human resources is potentially available for intra-partum care at the lower and intermediate levels of the health system. But due to the general shortage of human resources (the staffing levels are significantly below the staffing norms), a higher demand for facility-based deliveries will create a need for training and recruitment of more skilled health workers. Note that in Kigoma, where significant progress was made in reducing maternal mortality, the increase in demand for facility-based deliveries resulted in midwives applying for relocation to new posts due to the high workload (IHRDC 2005). Despite these observations, there also appear to be health facilities with slack capacity, especially at the lower levels.

Effective interpartum care also requires a functioning referral system. Due to the short time span between the onset of complications to death, the issue of reducing delays in diagnosis and treatment of maternal and neonatal complications remains a crucial one. According to Urassa et al. (1997), a large proportion of maternal deaths in Tanzania are due to delayed decision making at home, lack of transport, and inappropriate care if they make it alive to a health facility. Three or four types of delays are commonly identified (Thaddeus and Maine, 1994. See Figure 4). Facility-based deliveries with a skilled provider may reduce delays at all levels, but will probably have the strongest impact on the recognition of danger signs and the decision to seek care. For most Tanzanians, the alternative to home delivery will be delivery at a dispensary or health centre with limited access to emergency obstetric care. Therefore, in cases of serious complications transport is likely to become an issue anyway. But ambulance services are usually not available. Similarly, delayed provision of care once one reaches a referral hospital (e.g., because essential supplies have to be bought from outside, or because of a need to organise blood donations) is not likely to be much affected by whether or not the delivery started at a health facility. Therefore, even if one succeeds in getting women to deliver in facilities, this will not solve the issue of transport and the

¹⁰ A study from six districts in Northern Tanzania found that the average number of qualified staff was 1.9 at the dispensary level and 7 at the health centre level (Olsen et al., 2005), i.e. somewhat above the national averages.

issue of delayed provision of care within health facilities. The issue of transport will be further discussed in the paragraphs on community-based interventions.

Figure 4. Four types of delay in getting timely treatment for maternity complications



Given the current high ratio of home births in Tanzania, it must be expected that a significant share of births will continue to take place outside health facilities. Commonly proposed strategies for reducing maternal mortality ratios in these cases include:

- Training traditional birth attendants
- General information campaigns directed to all women
- Skilled providers at home

Neither of these alternatives appears particularly promising in a Tanzanian context. Only 11% of births in Tanzania are attended by traditional birth attendants (TDHS, 2004). The majority of home births are assisted by family and friends. Training of traditional birth attendants will therefore have limited impact even in the case of high efficacy. Moreover, evidence on the efficacy of this type of training has shown that without the support of skilled back-up service, there is no impact on maternal mortality ratios (Sibley et al. 2004). It has also been shown that information, education and communication interventions are not particularly effective in reducing delays (Stanton, 2004). Finally, the general lack of skilled health workers in Tanzania implies that sending them to attend home deliveries on a large scale would raise concerns about efficiency in the utilisation of these scarce resources.

In summary, there is considerable scope for improving the quantity and quality of skilled attendance on mothers and neonates in health facilities in Tanzania. This requires action on both the supply and demand sides. On the supply side, there is an especially large need to improve the supply of equipment and drugs for basic emergency obstetric care, first at the health centre level and then at the dispensary level. The next step would be to follow up with high quality referral services. Action is also needed in order to make women more comfortable with delivering at a health facility. Finally, more skilled personnel need to be trained and recruited in order to manage the increased workload.

On the demand side, the issues of distance and transport are crucial ones, aside from the need to ensure that payment exemption policies are lived up to. A strengthening of the supply side may have little impact on utilisation unless these demand side barriers are also addressed (Costello et al., 2006).

3.2 Family planning and safe abortion

Family planning has little potential impact on maternal mortality ratios, simply because it reduces both the nominator (number of deaths) and the denominator (number of births). The potential effect on the absolute number of maternal deaths is, however, sizeable. It is estimated that 30% of all pregnancies in Africa are unplanned and that 20% result in induced abortion (Allan Guttmacher Institute, 1999). These figures, combined with the estimates of the share of maternal deaths caused by abortion in Kahn et al. (2006), imply that elimination of unplanned pregnancies could potentially reduce maternal mortality by 14%. However, realistic estimates of how many of the unwanted pregnancies can be avoided through family planning are much lower.

According to Kahn et al. (2006), safe abortion can reduce maternal mortality by a maximum of 4% in Africa. This is a much lower figure than the WHO (1997) estimate for Tanzania of 16.5%. Legal abortion is severely restricted in Tanzania, and hence most abortions are illegal and many are unsafe. Health facilities are supposed to provide post-abortion services, though. A large share of deaths caused by unsafe abortions can be prevented through post-abortion care. Access to such services is, however, limited as only 5% of health facilities in Tanzania provide comprehensive post-abortion care (MoH, 2006).

3.3 Antenatal care

Antenatal care is not effective against any of the largest causes of maternal and neonatal deaths. In particular, antenatal risk screening has been shown to have little impact on mortality ratios (McDonagh, 1996). Focussed antenatal care of high quality does, however, impact on maternal deaths caused by anaemia (through iron and folic acid supplementation) and malaria (through intermittent presumptive treatment of malaria and insecticide-treated bednets), and on neonatal deaths caused by tetanus (through tetanus toxoid immunisation of the pregnant mother).¹¹ It is sometimes also claimed that antenatal care plays an indirect role by familiarising the pregnant mother with the formal health system and thus increasing the rate of skilled birth attendance.

In Tanzania, almost all pregnant women (94%) receive antenatal care, and as many as 62% make four or more ANC visits. The quality of the service is, however, not always adequate. Only 60% received iron supplements and 50% received an antimalarial drug. 80% reported having received at least one injection of tetanus toxoid during pregnancy and 56% received two or more doses. Less than 50% reported having received information about pregnancy complications or having given a urine sample. Two thirds reported that blood pressure was taken (TDHS, 2004).

These figures suggest that further contributions to reducing maternal and neonatal mortality from antenatal care in Tanzania must come through improvements in the *quality* of the service. Due to the high coverage, there is no reason to believe that increasing the number of antenatal visits would contribute significantly to more facility-based deliveries. There is a potential to increase the uptake of iron supplementation and antimalarial drugs. Also, in rural areas only 47% of babies are immunised against tetanus.

Even if coverage of high quality antenatal services were significantly improved, only modest mortality reductions should be expected. Anaemia accounts for only 4% for maternal deaths in Africa (Kahn et al., 2006), while tetanus accounts for as few as 2% of neonatal deaths in Tanzania (Lawn and Kerber, 2006). There is more uncertainty about the importance of malaria. While only 4-

¹¹ Antenatal care also plays a role in the screening and management of sexually transmitted diseases, such as HIV/AIDS (including the prevention of mother-to-child transmission of HIV) and syphilis (which may cause abortions and stillbirths).

5% of maternal deaths have been reported as malaria deaths in high endemic areas, one study reports that more than 40% of maternal deaths was due to malaria in a low endemic, low maternal mortality area. This may suggest that high emphasis should be put on malaria prevention in the highlands.

3.4 Postnatal care

Both the mother and the baby remain at high risk in the first days after delivery. Postnatal services can play a crucial role in reducing maternal and neonatal mortality, especially mortality caused by infections. The frequency of postnatal check-ups for women who deliver in health facilities in Tanzania is unknown. In the case of home deliveries, only 13% of mothers receive a postnatal check-up within two days of delivery, as recommended (TDHS, 2004). Hence, there seems to be potential for reducing mortality through scaling up postnatal services. Effective distribution of antibiotics is crucial for the effectiveness of these services.

3.5 Community-based interventions

A broad range of activities may be included under the umbrella of community-based interventions, for instance, empowerment of village health workers, community-based distribution of antibiotics, strengthen family care for newborns (clean home delivery, hygienic cord care, thermal care, breastfeeding promotion), motivation for delivering at health facilities (including cash transfer programmes), local initiatives for improving access to transport (including savings initiatives, buying of stretchers, ambulances, radio calls) etc.

Community interventions which increase the share of women delivering at health facilities and reduce delays are particularly promising for reducing maternal mortality ratios. Interventions which improve family care for newborns are promising for reducing neonatal mortality.

Although community-based interventions have been implemented in several places in Tanzania, it is difficult to get a comprehensive picture of their scope and scale due to local variation and the involvement of a large number of different donors.

A recent study of good practices in four districts with relatively low maternal mortality ratios (Moshi, Ileje, Serengeti and Misungwi) concluded that common practices in these districts included the following community-based interventions (PMO-RALG and RNE, 2007):

- Empowerment and training of village health workers, in some cases supported by networking between the village health workers and minor financial compensation such as bicycles or exemption from community project contributions.
- Systematic tracking of all village pregnancies by the village health workers or the village health committees, with visits to each pregnant woman several times during the pregnancy and planning of the delivery.
- Discussion and analysis regarding each maternal mortality at village and district level to discuss what could have been done to prevent the death.
- Campaign to motivate pregnant women to deliver at health facilities.
- Training of traditional birth attendants to motivate them to ensure delivery at a health facility and to recognise the danger signals that makes facility delivery crucial.
- Improved radio communication, transport of women to health facilities for delivery and ensuring the means and funds for transport.
- Life skills education and programmes for young girls, including young pregnant girls.

The study made no assessment of the effectiveness of the various practices, but nevertheless emphasised the important role of the village health workers. These were recruited through the UNICEF project Child Survival Protection and Development (CSPD) and their role is to track and register all pregnancies, the place of delivery, the general health status of the children, the number of fatal outcomes etc.

When it comes to the issue of reducing delays through improved transport, it will be important to stimulate solutions which fit the local realities. Ambulance cars have been shown to be effective in several settings (Krasovec, 2004), provided maintenance and access to fuel are reliable. In several areas, however, road quality is a constraining factor. Community involvement is then needed in order to address the bottlenecks effectively. In some places, stretchers may be suitable (PMO-RALG and RNE, 2007). In Kigoma, an arrangement with a mining company has made airplane transport possible for pregnant women. More generally, Liljestrand (2006) claims that a multi-sectoral approach, involving roads and communication, education, water and sanitation, has been an important characteristic of several of those countries that have managed to reduce maternal mortality in recent decades.

No examples have been identified in Tanzania of the use of cash transfers in order to stimulate demand for skilled birth attendance, although incentives exist in some places for registering pregnancies (e.g., exemption from voluntary/self-help work in Ileje). Conditional cash transfer programmes, especially for the utilisation of preventive health services, have been implemented in several countries, mostly in Latin America. A systematic review shows that cash transfer programmes are effective in increasing the utilisation of preventive health services in cases where health systems are functioning adequately (Lagarde et al., 2007). Evidence of the impact of cash transfer programmes in promoting facility-based deliveries is very limited. Preliminary reports from an Indian attempt providing a cash amount of 35 USD per facility-based delivery suggest that the positive impact can be quite strong.¹²

Cash transfers could also be considered as part of a performance-based funding scheme in Tanzania. The economic cost of seeking health care is a major barrier for 40% of the women in Tanzania (TDHS, 2004). As mentioned, the payment exemption system does not always work as intended. Moreover, gender inequalities imply that males often rule the allocation of household resources and thereby women's health decisions. Conditional cash transfers might be effective in this context.

Considerable care needs to be exercised in the implementation of any cash transfer programme in order to avoid corruption and other misusing of resources. In-kind transfers and voucher systems may be less vulnerable to such challenges. These issues need to be further discussed before piloting in light of the practical realities at the local level.

¹² Presentation by Dr. K. Maiti. Results-Based Financing Seminar, Dar es Salaam, November 2007.

4. Implications for performance-based funding

This section draws implications from the available evidence for the design of a performance-based funding system which addresses maternal and neonatal mortality. The Feasibility Study recommended a performance-based system with output-based salary bonuses paid to teams of health workers as a key component (Smithson et al., 2007). Although this chapter is written with such a system in mind, many of the considerations below are also valid in other types of performance-based funding system. We start the chapter by providing an overview of alternative ways of implementing performance-based funding. Before discussing the performance-based funding system in greater detail, we also stress the implications of the fact that monetary incentives are but one of the sources of human motivation. Some of the limitations of a performance-based funding system are highlighted towards the end of the chapter.

4.1 Performance-based funding – alternative designs

Performance-based funding systems can be distinguished along a number of dimensions. One dimension is to what extent rewards for high performance are granted to *institutions* (e.g., health facilities and district administrations) rather than to *individuals* within those systems (e.g., in the form of increased salaries or bonuses for health workers or administrators).

Another dimension is the *administrative level* at which performance is rewarded. Rewards for high performance can be granted all the way from the central administrative level, via regional and district level, to the health facility level, or the community level.

Table 4. Who are rewarded?

Level where rewards are given	Rewards given to	
	<i>Institutions</i>	<i>Individuals</i>
Central/regional level	<i>GAVI funding</i>	
District level	<i>Local government capital development grant</i>	<i>P4P Feasibility Study</i>
Facility level		<i>P4P Feasibility Study</i>
Community/patient level		<i>Conditional cash transfers</i>

The Feasibility Study had its focus on rewards provided to health workers at the facility level, though it was also proposed to reward health planners at the district level. Conditional cash transfers would be an example where rewards are provided to individuals at the community level (i.e., the service users). Other performance-based funding systems currently in place, like the GAVI funding system and the local government capital grant allocation in Tanzania, provide rewards at the institutional level (in the form of higher budgets) but do not provide monetary rewards to individuals within the respective institutions.

The choice between an institution-based and an individual-based reward system is a difficult and important one. There is considerable experience with performance rewards at the institutional level in health systems in developed countries, but very little experience so far with performance rewards at the individual level in the health sector. Institution-based rewards are much simpler to administer, as there will be no allocation of rewards to individual workers. On the other hand, institution-based

rewards will be ineffective if the workers do not take an interest in promoting the goals of their respective organisations.

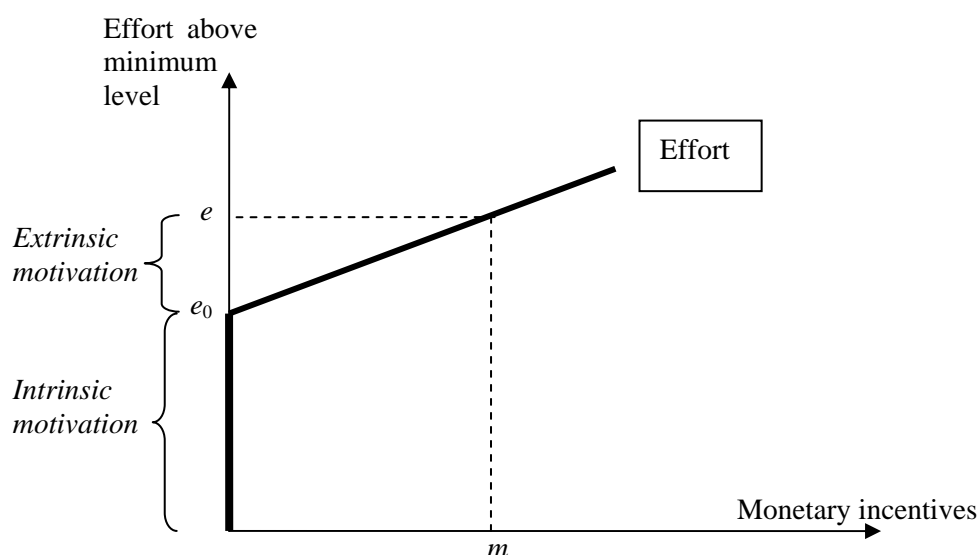
The Minister of Health in Tanzania, in his opening address at the Results-based Financing Seminar in November 2007, pointed out the lack of organisational culture as one of the main challenges in the health sector. He asked why workers are exploiting to such a limited degree the opportunities for improvement that are within their capacity to achieve. His analysis suggests a need to implement new mechanisms which improve the motivation of individual workers. The next section discusses alternative ways of doing this.

4.2 Extrinsic and intrinsic motivations

The idea behind a results-based funding system with salary bonuses is that economic rewards will motivate health workers to increase their effort on the job. However, people can – and often do – contribute high effort (i.e., effort beyond what is strictly required in order to keep their job) without any monetary incentives to do so. The reasons for doing so may be several: a sense of moral duty, satisfaction from doing one's best, a desire to promote the goals of the organisation one is working for, etc. These motivational sources are *intrinsic* sources of motivation, as opposed to *extrinsic* motivational forces, such as monetary incentives.

These concepts are illustrated in the figure below. With monetary incentives m , the effort beyond the minimum level is e in this case. But only part of this extra effort can be attributed to monetary incentives. Even without any monetary incentives the effort would be e_0 , due to intrinsic motivations.

Figure 5. Extrinsic and intrinsic motivations



The existence of both intrinsic and extrinsic sources of motivation has important implications for discussion of the design of incentives for improved performance:

- There are alternative ways of designing incentives for improved performance at the individual level, either by strengthening extrinsic motivations, by stimulating intrinsic sources of motivation, or both.

Extrinsic motivations are often thought to be easier to manipulate than intrinsic motivations, at least in the short run. Performance-based payments for simple mechanical operations (in non-health sectors) have documented positive effects (e.g., Shaerer, 2004; Laezar, 2000).

But extrinsic incentives also have their drawbacks. Four well-known problems with performance-based pay are:

- 1) In organisations with multiple objectives and tasks, a performance-based salary system may need a lot of fine-tuning in order to avoid sub-optimal allocation of the workers' time. In a health facility, there are a large number of tasks and if only one of them is rewarded (e.g., the number of deliveries), that may reduce the quality of service for other patient groups. This is known as the *multi-tasking* problem.
- 2) An incentive system based on extrinsic motivations involves high transaction costs in terms of reporting and validating data. In the Tanzanian context, the main extra cost will be related to validation of data, as long as performance-based funding is based on existing reporting systems.
- 3) A results-based incentive system implies that workers' incomes become more uncertain. Although it can be argued that a performance bonus to Tanzanian health workers will come in addition to existing salaries and thus improve worker welfare, one could alternatively increase the fixed monthly salary, which would imply less uncertainty for the workers.
- 4) Since extrinsic motivation systems need to be renegotiated/redesigned from time to time, there will be incentives to underperform in order to avoid too ambitious targets in the future (the *ratchet effect*).

Because of these problems, many organisations, in particular those complex organisations where workers are expected to produce several outputs that are difficult to measure, often rely on fixed salaries rather than performance-based pay. This does not imply that these organisations are not trying to encourage higher worker efforts. Some organisations try to build what is known as "organisational identity" by inducing workers to adopt the goals of the organisation they are working for as their own goals (Akerlof and Kranton, 2005). In a similar vein, some organisations provide generous benefits to their employees, unrelated to performance, in order to stimulate higher worker effort. Laboratory experiments have indicated that workers who receive higher fixed salaries may exert higher effort. This is usually explained by the concept of *reciprocity*: when the employer is generous towards its employees, the employees may respond by increasing their effort as an act of reciprocity (Fehr and Falk, 2002).

The Tanzanian health sector also faces this fundamental choice: should higher effort be stimulated through performance-based pay, or should worker effort rather be stimulated by playing with or strengthening intrinsic motivations, or both? There is no firm evidence to favour either of the alternatives.

- 5) It is not necessarily the case that the different sources of motivation operate and can be triggered independently. It has been raised as a concern that the introduction of extrinsic motivations may diminish the strength of intrinsic motivations (i.e., a crowding out effect). Titmus (1971) claimed that such an effect was taking place in the case of blood donations in England, where the introduction of a payment per donation caused a reduction in the quantity and quality of blood donations.¹³ Similar effects can be envisaged in professions where performance is determined to a large extent by ethical codes of conduct. A concern that has been raised in the Tanzanian context is that a piece-rate per unit of output may create an attitude amongst workers that they will do only those tasks that are directly rewarded. For this reason, the feasibility study recommended a performance-based funding system where rewards are released only when predetermined output targets are reached, rather than a system with rewards per unit of output.
- 6) Sometimes the symbolic value of an economic incentive can be more important than the economic value involved. Placing a small economic reward on a certain output/outcome can act as a signal to the workers that they should place particular emphasis on improving this outcome. Even if the economic values involved are small, this may be enough to induce higher effort.

Hence, in order for a performance-based bonus system to be appropriate in the health sector of Tanzania, the following conditions need to be fulfilled:

- Performance incentives to health workers are a more cost-effective way of improving performance than direct provision of inputs that will *enable* health workers to improve their performance (e.g., training, equipment, drugs, other infrastructure).
- A bonus system is a more cost-effective way of improving performance than interventions targeting intrinsic sources of motivation (e.g., interventions based on the idea of reciprocity). A minimum requirement would be that it is feasible to design a bonus system which increases effort in core dimensions without reducing it too much in other dimensions. In other words, the incentives must be powerful enough to cause health workers actually to increase their outputs, the problem with multi-tasking must not be overwhelming, and reliable reporting and data validation systems must be in place.
- The introduction of a bonus system will not weaken intrinsic motivations more than it strengthens the extrinsic ones.

Scattered evidence from Tanzania suggests that there are a number of health workers who are demotivated and frustrated (e.g., Manongi et al., 2006). Although reasons for low levels of motivation are probably complex, a common denominator appears to be a feeling of low levels of recognition and acknowledgement, be it from superiors at the respective working stations or in relation to higher authorities. If the available pieces of evidence are reliable and representative for Tanzania, a few implications follow:

- The current level of intrinsic motivation is not particularly high.
- There is a potential for improving intrinsic motivation (although the most effective interventions for this purpose, and their costs, are largely unknown).
- The risk is low of a large crowding out effect of intrinsic motivations in the wake of a performance-based bonus system.

¹³ Deci (1971) and Gneezy and Rustichini (2000a, 2000b) have also documented that monetary incentives can reduce intrinsic motivations.

Against this background, it appears as highly relevant in the Tanzanian context also to consider ways of strengthening intrinsic sources of motivation, as either a complement or an alternative to performance-based pay.

4.3 Performance-based funding for reduced maternal and neonatal mortality

This section summarises the implications of the evidence reproduced in this report for the design of a performance-based funding scheme.

4.3.1 Incentives needed at several levels of the district health system

Many of the interventions that we have identified as cost-effective require decisions and actions at several levels of the health system. At the facility level, it is possible to work on recruiting more women to deliver at a health facility. But since most facilities do not have their own budgets and do not have any financial autonomy, they need assistance at the district level and above in order to deal with these challenges.

Similarly, a number of actions are linked to reducing delays which cannot be dealt with at the health facility level. For instance, the building of roads, the purchase and running of ambulances and communications equipment and the building of maternity homes require action at the district/community level. The table below indicates that action will often be needed beyond the facility level in order to implement core interventions to reduce maternal and neonatal mortality.

Table 4. Effective implementation often requires action beyond the facility level – examples

Intervention	Level at which action needed		
	<i>Central</i>	<i>District</i>	<i>Facility</i>
Increase number of skilled birth attendants	x	x	
Reduce distance to health facility	x	x	
Increase number of facilities providing EmOC	x	x	
Provide ambulance service		x	
Provide radio communication		x	x
Avail equipment and drugs	x	x	x
Recruit more women to deliver at health facilities			x
Increase number of antenatal contacts			x
Improve quality of antenatal services	x	x	x

Political will and effective administration at the district level are needed for most of the interventions. A performance-based funding system needs to acknowledge this crucial role of the district administration in the implementation of reform. District administrations can be rewarded based on the same indicators as for frontline health workers, or based on separate performance indicators.

When it comes to the provision of equipment and supplies, less reliance on the district administration can be achieved by providing greater financial autonomy at the health facility level. Although capacity problems will be a major obstacle to a comprehensive financial decentralisation to the facility level, the provision of some petty cash could be an important contribution in assisting the health workers to recruit more women to deliver at the health facilities.

4.3.2 Incentives for increasing the share of skilled birth attendance

An obvious candidate indicator for performance-based funding would be the **number of deliveries attended by skilled health workers**. Given the current shortage of health workers, it is not recommendable to encourage skilled workers to attend home-based births on a large scale, however. Therefore, the **number of institutional deliveries** seems to be a more appropriate indicator in the Tanzanian context. Both of these indicators have several strengths. In particular, although the indicators focus on quantity (the number of deliveries), they also have the potential to increase certain aspects of quality, because low demand is an important reason for the low share of facility-based/skilled birth attendances in Tanzania. In order to recruit more women, health workers therefore need to improve the quality of the service.

Some quality improvements for the recruitment of more women are achievable at the facility level without external support, for instance, being friendly to the pregnant women, doing small repairs, cleaning the environment, making sure that stock shortages are reported in good time, etc. But due to the lack of financial autonomy, a range of quality improvements are beyond reach for the health facilities. Apart from providing larger financial autonomy at the facilities, a possible remedy would be also to provide incentives for district health officials based on the number of institutional deliveries. This would be an incentive to provide the health facilities with quality improvements needed in order to attract more women (e.g. equipments and reliable drug supplies).

Strong incentives may be required for health workers to want to increase the number of deliveries. The issue was discussed at two multi-stakeholder workshops in Dar es Salaam in 2005, where it was noted that the challenge of compensating for health workers' personal effort in attending a delivery is considerable, in particular if the pregnant woman is poor (IHRDC, 2005).¹⁴ Thus, small monetary incentives may have little or no impact. Careful consideration is therefore needed in order to ensure that any incentives are powerful enough. Two strategies for strengthening the incentives within a limited budget would be, first, to avoid spreading incentives thinly across a range of performance indicators, and second, to attach incentives only to the increase in number of deliveries beyond a benchmark, not to the total number of deliveries attended.

One potential problem with rewarding the number of institutional deliveries is that it may lead to too few referrals of complicated deliveries. In Rwanda, this problem was addressed by letting health workers retain their rewards even if the case was referred (Meessen et al., 2005). A similar mechanism would need to be implemented in a Tanzanian context as well.

A second, and more subtle, issue is that rewards related to the number of institutional deliveries might reduce incentives to promote family planning. It remains to be seen whether this concern is legitimate or not.¹⁵

¹⁴ The source does not explain why the delivery of a poor woman is more "costly" for a health worker. One possible interpretation would be that there is an additional personal/emotional "cost" related to providing these services to women with lower socio-economic status.

¹⁵ The obvious solution would be to link the incentive to the **share of institutional deliveries** rather than to the absolute number of deliveries. One challenge with this indicator is that there is no good system for registering pregnancies at present. But since 94% of pregnant women attend antenatal care, this registry could be used to measure the number of pregnancies. Village health workers are also a potential source of information about the number of pregnancies. A second problem is that women will often deliver at other facilities than where they receive antenatal care. A system which rewards the number of deliveries divided by the number of antenatal cases will therefore easily be regarded as unfair. This problem can maybe be addressed by linking incentives to the **increase in the share of institutional deliveries** rather than to the absolute share. It could be argued against using the number of antenatal cases in the denominator that incentives for providing antenatal care would be reduced. This argument has little merit, though, since antenatal contact is probably an important and necessary part of recruiting women for facility-based delivery.

An interesting option would be to use demand side interventions in order to increase the share of institutional deliveries, for instance in the form of **conditional cash transfers** to the mothers, or some kind of voucher scheme, conditioned upon facility-based delivery. Demand side interventions can be seen as an alternative to supply side incentives, or they can be used in combination. One advantage of demand side interventions compared to supply side interventions (and salary bonuses in particular) is that demand side interventions are easier to remove if they do not work as intended. If health facilities or health workers are given a performance reward, it may easily come to be regarded as a contractual right. To remove such privileges can easily lead to even lower performance levels than at the outset.

Positive experiences with conditional cash transfer programmes have occurred where the quality of health systems is adequate. In the Tanzanian context, conditional cash transfers without measures to improve the quality of maternal and neonatal services make little sense. Alternative ways of stimulating higher quality are further discussed below.

Demand side interventions can be administered separately from performance-based funding on the supply side, but the two schemes can also be integrated. If each facility were equipped with the necessary financial resources combined with strong rewards for increasing the share of institutional deliveries, the facilities would have flexibility and incentives to set up those arrangements which most effectively would increase the demand for their services. The facility would then presumably put up a cash transfer programme if this were thought to be the most cost-effective way of recruiting more women. Attempts with performance-based funding in voluntary agencies in Tanzania have showed that some facilities started rewarding traditional birth attendants for referring women to the facilities.¹⁶ This illustrates how financial autonomy and incentives in combination can release creativity and utilise local knowledge in order to deal with health challenges.

4.3.3 Incentives for providing high quality intrapartum and postpartum care

An important concern related to using the number (or share) of institutional deliveries as the main performance indicator is that the indicator is not sensitive enough to the quality of the service. As already discussed, some of this worry is unfounded, as demand for institutional deliveries will depend upon the quality of service, in particular those quality aspects that relate to friendliness, attentiveness, cleanliness and maybe to some aspects related to availability of equipment and drugs. However, when it comes to drugs dispensing and other clinical aspects of the service, the patient will rarely be able to observe the true level of quality, and other mechanisms are thus needed in order to induce high quality.

Since quality is impossible to measure directly on a routine basis, we have to rely on proxy indicators. Indicators may be related either to the availability or use of inputs, to the implementation of quality assurance mechanisms, or to some outcome variable. In our context, the **availability of personnel, equipment and drugs to perform basic emergency obstetric care** would be one example of a useful input indicator. Such performance indicators will normally not be applicable at the facility level, only at the district level, as much of the control of the availability of inputs is beyond the control of the health facility. An alternative way of specifying the indicator would be as the **number of basic EmOC units per capita**. This would correspond directly to targets in the Roadmap for Reduction in Maternal and Newborn Deaths (MoH, 2006).

Experiences from Rwanda suggest that performance-based funding can be used as a mechanism to improve quality management at the facility level.¹⁷ Facilities are rewarded based on their score on a

¹⁶ Presentation by Frank van de Loij. Results-Based Financing Seminar, Dar es Salaam, November 2007.

¹⁷ Presentation by Dr Werner Vandenbulcke. Results-Based Financing Seminar, Dar es Salaam, November 2007.

quality index, where the score is determined through monthly supervision. A key aspect of this system is that performance-based funding creates an incentive to implement supervision on a regular basis. It is of course naïve to believe that the true level of quality can be correctly observed through monthly supervision. This example nevertheless shows that performance-based funding can also play a positive role in stimulating supervision and focussing on quality aspects of the service.

A measurable and sensible outcome indicator in relation to maternal and neonatal health is extremely difficult to come up with. One candidate could be the **number of deliveries attended where the mother and the child are alive 6 weeks after delivery**, but there are so many problems with this indicator that it will not be discussed further here.¹⁸

Quality indicators in health facilities are often related to the number of adverse outcomes, e.g. the number of maternal deaths. Performance-based funding could in principle be inversely related to such “negative” outcome indicators. However, it would cause very strong incentives for sending away difficult cases and misreporting bad outcomes. Such indicators are therefore not recommendable as a basis for performance-based funding.

A much cited quality indicator for maternal health services is the **caesarean section ratio**, which should be around 5-15% in a well-functioning health system. Although this indicator is very useful in a system without performance incentives, it can be hazardous to tie economic incentives to this outcome measure. The danger is that caesarean sections will be performed also on mothers who are able to deliver normally. The usefulness of the indicator relies on the premise that only those who need a caesarean section actually get it. The introduction of economic incentives can undermine the validity of this premise.

The large reduction in maternal mortality in Kigoma (Mbaruku, 2005) was achieved through active *quality management* within the hospital. It is difficult to see how performance-based funding can be used to stimulate the implementation of such internal processes directly. This will usually remain a matter of good leadership. Hence, we should not expect performance-based funding to be able to deal appropriately with all the quality challenges faced in the provision of maternal and neonatal health services. Of course, there will also be opportunities for using monetary incentives within hospitals in order to stimulate the implementation of quality improvement reforms. For instance, incentives to doctors for staying at, or nearby, the hospital rather than far away can be important in reducing delays within hospitals.

4.3.4 Incentives for promoting postnatal care

The high risk of death for both mother and child during the first week after delivery and the low ratios of postnatal care in Tanzania at present imply that there is a strong rationale for strengthening these services. For facility-based deliveries, one possible indicator would be the **average length of stay after delivery**. However, this indicator could give incentives to keep women in the facilities longer than necessary and is therefore not recommendable. An alternative indicator would be the **number of institutional deliveries where the mother stays at least 2 (or 3) days at the facility**.

A large number of mothers will continue to deliver outside health facilities in the foreseeable future. An incentive related to the **number of postnatal check-ups** (within a specified time period) might

¹⁸ One argument against this indicator is that since the number of deaths is small compared to the number of deliveries, the indicator is unlikely to be able to offer any strong monetary incentive when applied in a performance-based funding system. Another problem is the difficulty of collecting this type of data in a systematic and reliable way. Mothers usually come back to the health facilities for immunisation of their children, but not necessarily to the facility where they delivered. Some kind of incentive would probably be needed for the mothers to come back, or one would have to invent alternative data collection methods.

be useful for stimulating increased coverage of this service. The specification of the time period will here become an issue on its own. A check-up within a short time period is appropriate if the primary purpose is to ensure proper care for the baby, while a longer time period would be preferable in order to detect infections of the mother.

4.3.5 Incentives for improving the quality of antenatal services

Given the high present uptake of antenatal services, it would not be sensible to use the number of antenatal contacts as an indicator for performance-based funding. Incentives related to antenatal care must be related to the quality of the service. Possible indicators would be the number immunised with **tetanus toxoid**, the number receiving **malaria drugs** and **insecticide-treated bed nets** and the number receiving **iron and folic acid supplementation**. Given the relatively high uptake of these services at present, the limited potential of antenatal care for reducing maternal and neonatal mortality, and the need to limit the range of performance indicators in order not to dilute incentives, one should consider leaving antenatal services outside the performance-based funding system.

An additional argument in this direction is that if there are strong incentives to increase the ratio of institutional deliveries, this may in itself induce health workers to recruit women actively through extensive and high quality antenatal care.

4.3.6 Incentives for reducing delays

While increasing the rate of institutional deliveries will contribute to reducing delays, this important challenge needs to be addressed from other angles as well. In particular, the issue of access to transport is a crucial one in Tanzania. Without improved and more accessible transport alternatives, the referral system for maternal complications will remain ineffective.

The issue of transport is not easy to incorporate effectively into a performance-based funding system. At the heart of the problem is of course the fact that transport systems need to be addressed outside the health sector. The health sector is confined to working towards more effective utilisation of existing infrastructure. In many areas of Tanzania, accessible ambulance cars would be very useful in reducing delays. It would be possible to include the **number of working ambulances per capita** as an indicator for performance-based rewards at the district level. This indicator, however, does not stimulate making the ambulances accessible to pregnant women. The focus on ambulances and radio calls has also been questioned due to their unreliability (IHRDC, 2005). The suggested indicator partly addresses these challenges by focusing on the number of *working* cars, but is unable to deal with problems related to lack of fuel. Financial barriers on the part of the pregnant mother may also prevent its use. An alternative indicator which would address these problems would be the **number of kilometres driven related to pregnancy, deliveries or neonates**.

Local initiatives and locally adapted solutions should be encouraged to improve transport. Experiences from districts with low maternal mortality ratios suggest that buying stretchers is useful in some places. In other places, they have arranged transport saving clubs or built maternity waiting homes (PMO-RALG and RNE, 2007).

4.3.7 Incentives for further training

Malecela et al. (2006) found that a large number of staff who would potentially be able to provide (selected) basic emergency obstetric services are not routinely practising these skills. This suggests that there is a need for further training. Practical on-the-job training is especially important in relation to maternal and neonatal services.

Incentives could be implemented at the district level related to the **number of staff (per capita) who have received training in basic emergency obstetric care**. One should make sure that the indicator is designed in order to stimulate a certain geographical dispersion of the competence. An alternative indicator could be the **share of health facilities with at least one staff member trained in basic emergency obstetric care**. Similar indicators can be implemented related to competence in comprehensive emergency obstetric care.

District level officials probably have quite strong incentives already for sending staff for further training. Training courses are highly appreciated among health workers, especially since training normally involves generous allowances. Sending staff for training is therefore a good way of making people happy and thereby reducing complaints. What kind of training will be performed will largely depend on the availability of training courses, which is mostly decided at higher levels. This point serves to demonstrate that the issue of training, like several other important aspects of improved maternal and neonatal care, needs to be addressed by decision-makers outside the district health system and therefore cannot be dealt with through a performance-based funding system implemented through the district health basket fund.

Table 5 summarises some key point on the various performance indicators discussed above. The level of monitoring indicates at which levels the respective indicators *can* be meaningfully monitored, and should not be read as a recommendation about where they *should* be monitored and rewarded.

Goals / performance indicators	Level of monitoring		Comments
	<i>District</i>	<i>Facility</i>	
Skilled birth attendance: <ul style="list-style-type: none"> Number of institutional deliveries Number of deliveries attended by a skilled health worker Share of institutional deliveries 	X	X	- A simple indicator
	X	X	- Inefficient to encourage home deliveries with a shortage of human resources. Not recommendable.
	X		- The preferred indicator, but difficult to collect data on the total number of deliveries.
Quality intrapartum care: <ul style="list-style-type: none"> Number of basic and comprehensive EmOC units per capita Availability of personnel and equipment to perform EmOC Quality score based on implemented quality management procedures (e.g., use of partograms) Caesarean section rate / death rates 	X		- A simple indicator. Not applicable at facility level.
	X	(X)	- Allows for more fine-tuning than the previous indicator, but is also more complicated. Hardly applicable at the facility level.
	X	X	- Requires reporting through supervision, and may thus stimulate to a more detailed monitoring of quality aspects.
	X	X	- Not recommendable. May give perverse incentives.
Postnatal care: <ul style="list-style-type: none"> Number of institutional deliveries where mother stays at facility for 2/3 days Average length of stay Number of postnatal checkups (within a specified time period) 	X	X	- A simple indicator, but not recorded at present.
	X	X	- Not recommendable. Can give incentives for women to stay longer than necessary.
	X	X	- Important for stimulating postnatal care in the case of home deliveries.
Quality antenatal care: <ul style="list-style-type: none"> Number of malaria preventions (IPT and ITN), iron/folic acid supplements, TT immunisations 	X	X	- Less important indicators, due to low effectiveness and relatively high coverage of ANC.
Delays: <ul style="list-style-type: none"> Number of working ambulances per capita Number of kilometres driven related to maternal and neonatal health 	X		- Does not provide incentives to put the vehicles to "productive" use.
	X		- A more ideal indicator, but also more difficult to monitor.
Skill level: <ul style="list-style-type: none"> Number of staff (per capita) trained for EmOC Share of health facilities with at least one staff member trained for EmOC 	X		- Simple indicator, but does not provide incentives for a geographical dispersion of skills.
	X		- A simple indicator.

4.4 Limitations of performance-based funding

Performance-based funding schemes can, if properly designed, strengthen incentives to implement effective interventions against maternal and neonatal mortality. At the same time, performance-based funding increases the scope for decentralised decision making and provides opportunities for finding effective local solutions to local challenges.

But performance-based funding also has its limitations. The most obvious problem in relation to maternal and neonatal health is that it is impossible to link performance-based funding to the ultimate outcome, increased survival. Moreover, there are certain aspects of the quality of maternal and neonatal services which are difficult or impossible to observe for both clients and supervisors, for instance day-to-day clinical performance. There is no reason to believe that performance-based funding will improve these quality variables. In fact, the impact could be negative as health workers direct more of their energies towards increasing the number of institutional deliveries and towards improving observable quality variables.

Furthermore, there are a number of health system issues which are important for the implementation of interventions against maternal and neonatal mortality, but are beyond the control of district health authorities. Performance-based funding at the district level will not address any of these issues. Most notably, the central authorities need to find measures to address the current shortage of skilled health workers. The closer the system is to its capacity limit, the smaller will be the effect of performance-based funding on outputs. To increase the share of institutional deliveries from 47% to 80% entails almost 500,000 additional institutional deliveries per year. This will require a significant increase in the workforce. District authorities also need to be equipped with the necessary powers to attract skilled health workers to remote areas.

Similarly, further training of existing staff will largely remain a responsibility of the central and zonal levels, as they will have to offer possibilities for upgrading knowledge and skills in maternal and neonatal health in the existing workforce.

The central level will also have to deal with the review of existing curricula and policy guidelines on which types of health worker are allowed to perform which kinds of maternal and neonatal procedure. Lack of permission to perform basic emergency obstetric care was a frequently cited reason for not providing such services, according to Malecela et al. (2006). Furthermore, given the present shortage of doctors in Tanzania, one should consider the possibility of training more cadres in performing surgical emergency obstetric care. It is already common for assistant medical officers in Tanzania to perform caesarean sections. A study from Mozambique showed that assistant medical officers perform these procedures with the same level of quality as specialists (Pereira et al., 1996). In Malawi, clinical officers have been trained for surgery, and their postoperative outcomes in emergency obstetric operations are comparable to those of medical officers (Chilopora et al. 2007). Could clinical officers be trained for surgical emergency obstetric care in Tanzania as well?

The district health authorities are heavily dependent on the central level for provision of the equipment and drugs needed to upgrade more health facilities to providing emergency obstetric care. Health facilities and district authorities can make efforts to request new supplies in good time before stock shortages occur, but they ultimately depend on the Medical Stores Department for the supply.

Last but not least, other sectors need to be involved in the improvement of roads and transport services in order to establish an effective referral system in this large country with long distances between hospitals.

In addition to these broader health system issues, there are challenges related to practical implementation. First, a performance-based funding system requires a health information system at a much higher level of accuracy than the current HMIS system in Tanzania. While performance-based funding at the facility level would in itself be a major motivation for eliminating the current problem of incomplete reports, such a system would easily stimulate exaggeration of achieved results. Therefore, reports must be validated and measures to prevent corruption related to data reporting and validation must be in place.

Second, an effective performance-based funding system requires timely payment of rewards. Delayed payment is a quite effective way of demotivating the health workforce. Government health workers in Tanzania normally receive their salaries, which are disbursed at the central level, on time. There are larger problems related to payments of duty allowances, travel allowances and other payments administered at the district level. Health workers report that these delays are a big source of frustration (Lindkvist et al., *forthcoming*). Performance-based payments administered at the district level are susceptible to the same types of problem and measures need to be taken in order to minimise such delays.

In summary, performance-based funding at the district level is not in itself sufficient to achieve the desired effect on maternal and neonatal health. The scheme needs to be complemented by broader national efforts to strengthen the health system.

On a final note, it needs to be underscored that the alternatives to performance-based funding also have their limitations. The present system, where districts have responsibility for the development of health plans, but where their autonomy in the budget allocation process is restricted by a wide set of regulations and where there is little or no accountability for results, is also far from ideal. In particular, the present system seems unable to unleash the energy and creativity needed to address local challenges. Any reforms of the planning and funding mechanisms of the Tanzanian health sector – performance-based or not – should attempt to address this failure.

5. The need for research

The evidence on the impact of performance-based funding in the health sector of low and middle income countries is very limited. In particular, evidence is scarce on the impact of performance-based funding which rewards health workers based on output indicators. What will be the impact on maternal and child survival? And what are the impacts on the provision of other health services, on the quality of the services, on health worker motivation and morale, on information systems, on the reliability of supplies of drugs and equipment, on the effectiveness of the referral systems, on women's health care choices, on the level of trust in service providers, etc.? What are the mechanisms that bring about these impacts? And is performance-based funding the most cost-effective strategy for strengthening core aspects of health systems, or could the resources be put to more effective use through alternative approaches? Large financial resources are currently being donated to the achievement of the health-related Millennium Development Goals. It is an ethical obligation towards those who suffer from death and disease that these resources be put to their most effective use. We should therefore not miss the opportunity to ensure that the impact of the interventions is properly documented and researched.

The possibilities for generating reliable and convincing knowledge about impacts depend heavily on the design and implementation of the intervention. A major weakness with most, if not all, attempts to measure the impact of performance-based funding in the health sector is that it has not been possible to distinguish between the impact of 1) increased availability of resources, and 2) the switch to performance-based funding. The reason is obvious: performance-based funding has usually been introduced by adding new resources to the health system, and not by transforming an existing resource basket from traditional funding to performance-based funding. Hence, an observed positive impact of performance-based funding could in principle be due to the extra resources made available and not to the new funding system.

In Tanzania, there seems to be a unique opportunity to avoid this fallacy by first making additional resources available through the health sector basket funds and thereafter gradually switching to a performance-based funding system. A somewhat delayed introduction of performance-based funding would also leave some more time to address some of the most pressing problems of the health information system.

The most important precondition for enabling learning through research is that meaningful baselines are established. Due to the incompleteness of the HMIS system, this is not a trivial task. On the other hand, the prospect of performance-based pay at the facility level is likely to ensure a rapid improvement of this aspect. Most likely, data from the first year after the introduction of performance-based pay will have to be used as the baseline. This will probably not pose major measurement problems since the impact of performance-based pay on the supply side will anyway materialise over a period of several years. But in order to ensure that baselines are as reliable as possible, no frontloading of resources in the system should be allowed; any additional resources coming from performance-based funding should be released only after performance levels have been measured and reported.

Furthermore, learning and knowledge generation will be strongly enhanced through the establishment of control groups. Since performance-based funding will be introduced at the district level, controls can be established through a sequential phasing in of the new funding scheme across districts. By comparing the impacts in districts with and without performance-based funding, it will be possible to see whether positive or negative developments are due to the new programme or due to general time trends. The preferred sequencing order from a researcher's perspective would be a

random drawing. This would also be a fair procedure as all districts would have equal chances of being selected.

An immediate nation-wide roll out of performance-based funding would be the design with the lowest potential for generating learning and new knowledge, because research would be confined to a before-after evaluation. With such a design, a comprehensive and thorough understanding of the processes and mechanisms that have brought about change will become – if possible – even more important. Formative research can play an important role in this regard.

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SUMMARY

Performance-based funding has been proposed as one mechanism to speed up the implementation of interventions for reduced maternal and newborn mortality.

This report investigates the potential role of such funding mechanisms in increasing maternal and newborn survival in Tanzania. Less than 50% of deliveries in Tanzania take place at a health facility. Some of the reasons are difficult transport, high costs (e.g., having to pay for delivery kits), and low quality of the services offered at health facilities. Performance-based funding can potentially address some of these challenges, but not all. Demand side issues, such as high costs, can be dealt with by conditional cash transfers to women who deliver at health facilities. Some of the quality issues at the health facilities may be addressed by rewarding health workers according to the number of deliveries, thus making it in their interest to improve the quality of the service.

Performance-based funding cannot, however, fully address the challenges related to poor transport infrastructure, delayed supplies of drugs and equipment from the central level, and the shortage of skilled health workers. In addition, there are challenges related to reliable reporting of performance and timely payment of performance rewards that may undermine the effectiveness of a performance-based funding system.

Our knowledge of the effect of performance-based funding in the health sector is very limited. Thorough impact research therefore needs to be part of new initiatives of this kind.

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