Maternal mortality in Tanzania

by

Dr. med. Carsten Krüger, MD

Word count (text only): 3246

**Table of Contents**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title page</td>
<td>1</td>
</tr>
<tr>
<td>Table of contents</td>
<td>2</td>
</tr>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Proximate causes</td>
<td>3</td>
</tr>
<tr>
<td>Distant causes</td>
<td>5</td>
</tr>
<tr>
<td>Underlying risk factors, socioeconomic and macro-level influences</td>
<td>8</td>
</tr>
<tr>
<td>Conclusion</td>
<td>9</td>
</tr>
<tr>
<td>References</td>
<td>10</td>
</tr>
</tbody>
</table>
Introduction

According to the latest WHO/UNICEF/UNFPA estimates which examined maternal mortality in 2000, Tanzania belongs to the ten countries with the highest maternal mortality ratio (MMR: defined as maternal deaths per 100000 live births).\(^1\) Its MMR is estimated to be around 1500/100000 (910-2200/100000), thereby placing Tanzania only behind Sierra Leone, Afghanistan, Malawi, Angola and Niger.\(^1\) The wide range of the MMR indicates that there is a high degree of uncertainty, and this is underlined by the fact that the official country statistics display a much lower figure at around 578/100000 (95% confidence interval 466-690) for the ten years before the last survey in 2004-2005.\(^2\) But even with this figure Tanzania belongs to the 20 countries with the highest MMR worldwide.\(^3\) The lifetime risk of maternal death in Tanzania is 1:10, which is number 6 in comparison with all other nations.\(^1\) In absolute terms, Tanzania again ranks number 6 worldwide (21000 maternal deaths annually), now behind India, Nigeria, Pakistan, The Democratic Republic of Congo, and Ethiopia, all countries with very large populations and high fertility rates.\(^1\)

Whatever the exact figures are, the consistent ranking in the top ten (or twenty\(^2\)) of all countries indicates that maternal mortality is a very serious public and individual health problem in Tanzania. To put it in a global perspective: the average MMR worldwide is estimated to be around 400/100000, whereas some industrialized countries like Sweden may have an MMR as low as 2/100000.\(^1\) 99% of all maternal deaths occur in developing countries.\(^1\) These huge differences require a thorough analysis in order to implement solutions which will work in the local context. Hence, this essay is an attempt not only to collect information on country-wide estimates of maternal mortality in Tanzania, but also to examine the proximate (direct and indirect) and distant causes of maternal mortality, risk factors, underlying cultural, socioeconomic issues and health systems aspects.

Proximate causes

Women die from a certain medical condition during pregnancy, labor or the first 6 weeks after delivery, which comprises the time frame for the definition of maternal deaths. These disease entities are the immediate or proximate causes of maternal mortality which are further divided up into direct and indirect causes. WHO estimates that 80% of maternal deaths are due to direct causes, and the remaining 20% due to indirect causes.\(^1,4\) Hemorrhage, hypertensive disorders, sepsis/infections, (unsafe) abortions, obstructed labor, ectopic pregnancy, and (inconsistently) embolism are classified as direct causes. Indirect causes are conditions which have no causal relationship with the state of pregnancy or childbirth, but which might aggravate
maternal health or might be affected by pregnancy in an adverse direction leading to
death. A long list could be mentioned like anemia, malnutrition, HIV/AIDS, malaria,
tuberculosis, rheumatic heart disease, preexisting hypertension, diabetes, injuries and
others, of which the first five are probably the most relevant conditions.
The latest figures for direct and indirect causes of maternal mortality worldwide were
published in 2005, representing data of 2000, and produced the following estimates
(rounded): direct - hemorrhage 25%, hypertensive disorders 12%, sepsis/infections
15%, (unsafe) abortions 13%, obstructed labor 8%, other direct causes (e.g. ectopic
pregnancy, embolism) 8%; indirect causes (like HIV/AIDS, anemia) - 20%.\textsuperscript{4} In more
recent articles from 2006, a regional assessment is attempted, and for sub-Saharan
Africa the estimates are (rounded): hemorrhage 34%, hypertensive disorders 9%,
sepsis/infections 10%, (unsafe) abortions 4%, obstructed labor 4%, ectopic pregnancy
0.5%, embolism 2%, other direct causes of death 5%, HIV/AIDS 6%, anemia 4%, other
indirect causes of death 17%, unclassified deaths 5%.\textsuperscript{5,6} It is obvious that there are
large differences for certain conditions between worldwide and regional estimates, and
it is reasonable to assume that this is true for the countries themselves and different
areas (like rural vs. urban) within individual countries.\textsuperscript{4-6}
12-39% of maternal deaths occur during pregnancy, 11-17% during childbirth, and
50-71% in the postpartum period.\textsuperscript{4} The high risk in the postpartum period is not well
acknowledged, but about 45% of all postpartum deaths occur on the first day, and
more than two thirds in the first week after delivery.\textsuperscript{4,6} Especially postpartum
hemorrhage is the major threat during this period.\textsuperscript{6}
In an attempt to locate relevant information on MMR figures and direct and indirect
causes of maternal mortality in Tanzania, several studies could be traced. For hospital-
based studies, MMR ranged from 119 up to 933/100000.\textsuperscript{7-18} It appears that the studies,
which were published more recently, almost always showed higher MMR. Whether this
is due to problems in delayed care-seeking with resulting higher maternal mortality,
deteriorating medical care or better surveillance/reporting is not completely clear. But at
least in two longitudinal studies a marked reduction of the MMR in hospital was
achieved after intervention.\textsuperscript{15-17} - For community-based studies and those based on the
indirect or direct sisterhood method, MMR ranged from 241 up to 1099/100000.\textsuperscript{14,19-31} In
these studies, there is no consistent trend between more rural and more urban districts
or over time. When comparing hospital- and community-based studies, some authors
argue that hospital-based studies give higher estimates because of risk-pooling at the
facilities.\textsuperscript{14} But this was not the case in other studies where the hospital-based MMR
was lower than the community-based MMR.\textsuperscript{17,26,31}
Among the cited literature, the work of Mswia and colleagues\textsuperscript{30} seems most relevant,
first because of the recent study period, second because of the large sample size, and
third because of the diverse settings in different regions, ranging from urban
(Daressalaam, the former capital of Tanzania; MMR 591/100000) to semi-rural (Hai district; MMR 348/100000) to rural (Morogoro district; MMR 1099/100000). Direct causes constitute the majority, from 67% in urban Daressalaam to 88% in rural Morogoro. Whereas hemorrhage (30% and 17%) and abortion (21% and 29%) are the leading causes in Morogoro and Hai, resp., hemorrhage (17%), hypertensive disorders (14%) and sepsis (14%) lead the list in Daressalaam. Obstructed labor is most frequent in rural Morogoro (14%). Anemia is the leading indirect cause in all three areas (6-10%), but HIV/AIDS plays a major role in Daressalaam (6.5%). Most deaths in Daressalaam and Morogoro occurred in the postpartum period (49 and 40%, resp.), only in Hai district the majority of women (48%) died during pregnancy (due to a high number of abortions). In Daressalaam and Hai, most women died in hospital (71 and 78%, resp.), but in rural Morogoro the majority died at home (56%).

Other studies also give details about the causes, time and place of maternal deaths. Among direct causes, frequently hemorrhage, sepsis, eclampsia and obstructed labor are mentioned, although the actual figures vary considerably. Hemorrhage as a cause can be easily missed in hospital-based studies as it can kill women quickly so that they do not reach the hospital. For indirect causes, anemia is cited as a major problem, but malaria, relapsing fever and especially HIV can be locally important causes. Few authors mention the use of traditional medicine as a potential cause, which in my own experience can indeed be a serious problem. The ratio of direct to indirect causes is usually in favor of direct causes (57-86%), but in one study indirect causes constituted 71% of all maternal deaths. This finding is in agreement with a study from The Gambia where 50% of all maternal deaths were due to indirect causes. The time of death shows quite a consistent pattern: during pregnancy 15-33%, during delivery 13-15%, and in the postpartum period 54-70% of the women died. In different areas, the percentage of death outside any health facility varied considerably, ranging from 10% in urban Daressalaam, to 11% in a rural area in northern Tanzania, to 23% in rural central Tanzania, up to 77% in rural coastal Tanzania. Here factors like accessibility and quality of care play a major role, but also traditional beliefs and customs.

**Distant causes**

When it comes to the distant causes for the high MMR in Tanzania, then a complex picture develops. To analyze these in more detail, the “three delays” model will be followed as proposed by Thaddeus and Maine: the first delay occurs in deciding to seek care, the second in reaching a treatment facility, and the third in receiving adequate care at the facility. In the following analysis, I tried to collect the data which are available for the different levels of possible delay factors in Tanzanian studies. This
cannot be a complete, exhaustive analysis due to time and space constraints, but a satisfactory coverage of the major topics is attempted.

**First phase of delay**

Cultural and socioeconomic factors are major determinants, as in this phase the women and their families/communities themselves decide on the next steps in case of an obstetric complication. Typically, no professional advice is sought at this stage although perceived accessibility and previous experience with the health system (perceived quality of care) influence the decision. Hence it is crucial to understand the local beliefs on childbearing and birth, although these cannot be necessarily generalized for the whole country as anthropological research has shown even in neighboring tribes. In many tribes, motherhood is essential for women’s societal position which makes multiparity highly valued. An inherent problem is that women and men usually perceive pregnancy and childbirth as a normal process and do not anticipate that complications can arise at any time. Knowledge about and recognition of complications is generally poor, hence care-seeking can be delayed. People’s views of the causation of complications is another issue. If witchcraft or fate is thought to be the cause then people might seek traditional care or none at all which can occur in up to 50% of cases. Some tribes do not allow pregnant women to leave their premises during pregnancy due to fear of evil spirits. Seeking care at night may be another obstacle. In the postpartum period, when the woman delivered at home, local practices like seclusion periods play a major role in the decision to seek care. This not only exemplifies the weaker position of women in the society, but also explains that in the absence of the decision-makers severe delay can result. Distance, condition of roads, means of transportation and season (planting, harvest) are other important factors (perceived accessibility). Cost for transportation, expected fees at the hospital or for living expenses of accompanying persons are similarly important and can discourage people to seek care. Perceived quality of care is definitely another major determinant. Examples of deficiencies in quality are poorly staffed and equipped health facilities, fear of procedures or derogative behavior of staff. The value of perceived quality of care could be shown in a recent study on emergency obstetric care (EmOC) where the comprehensive emergency obstetric care (CEmOC) facilities were utilized much more frequently than the basic emergency obstetric care (BEmOC) ones. The role and value of traditional birth attendants (TBAs) in the whole process of care-seeking is not clear either. In one study, the majority was not trained. TBAs were not able to report any danger signs in pregnancy, and over 21% did not know any danger signs of delivery. Referral was recommended only in 52-54% of complications. Trained TBAs performed slightly better.
Second phase of delay

Reaching medical facilities which are qualified to provide EmOC is another obstacle. One problem is the distribution and location. About 76% of the Tanzanian population live in rural areas,\textsuperscript{49} therefore it is reassuring that about 75% of the population still live within 5 km of a dispensary or health center, and 47% within 10 km of a hospital.\textsuperscript{50} Other sources give the following figures: 93% living within 10 km, and 72% within 5 km of a health facility.\textsuperscript{46} In the study from northern Tanzania, it could be shown that not enough BEmOC facilities are available neither in rural nor in urban areas, but rather too many CEmOC centers are provided and utilized.\textsuperscript{48} This relatively high coverage with CEmOC facilities indicates a mismatch in distribution of resources which has to be addressed further. In another connected study, the met need for EmOC services was found to be only 60% with large variations in different settings.\textsuperscript{51} Another good indicator is the number of deliveries with skilled attendance. Although antenatal care (ANC) attendance is around 94%, only 46-47% of the actual deliveries take place in an environment of skilled attendance.\textsuperscript{2,3} Even in the former capital Daressalaam with a reasonable quality and quantity of medical care, about 20% of women who died from obstetric complications, did not reach a health facility.\textsuperscript{34} Geographical distance in rural areas is still a major problem because of lack of transport. In several of the studies, the authors give figures of 7-18% that distance due to lack of transport was a major obstacle.\textsuperscript{13,21,24,32,34,45} But even in cases where referral from a lower-level health facility to a referral center is necessary, delay occurs either due to patients’ preferences, cost or lack of transportation.\textsuperscript{24,34,45} Interestingly, there are only a few studies on the issue of providing reliable, affordable transportation in rural areas of Tanzania.\textsuperscript{52-54} Two examined this problem specifically with regard to maternal health, reporting encouraging results.\textsuperscript{53,54} The prevailing poverty of the population (see below) causes significant difficulties in accessibility.\textsuperscript{45} The role of TBAs in the referral process has been mentioned before.

Third phase of delay

To receive adequate, appropriate and timely treatment is a major issue. As mentioned above, numbers and distribution of EmOC health facilities needs further attention, especially in rural areas.\textsuperscript{48,51} Numbers, competence and actual availability of staff is another problem. The scarcity of human resources for health is pronounced. Together with Malawi, Tanzania ranks last in the number of physicians (2 per 100000).\textsuperscript{55} In contrast, Cuba provides 591 physicians per 100000 people. Although sheer numbers do not guarantee quality, an almost total lack of physicians means that there is no good service possible. In maternal health services, midwives constitute an even more important health worker category. No separate figure is available for Tanzania.\textsuperscript{55} If we assume that most nurses in Tanzania are trained as midwives (which is reality), then still Tanzania belongs to the 20 countries with the lowest number of nurse-midwives.
(37/100000; rank 17). In the study from Daressalaam, a physician was only available in 59% of the cases in district hospitals, but in 95% in the referral hospital. Nurse-midwife availability was almost 100% in both settings. At the district hospitals, 61% of care was considered to be of substandard quality, at the referral hospital this figure was 12%. Major factors were staff shortage, lack of equipment/drugs and wrong medical decisions/treatment. Theatre was not available in the district hospitals at any time, at the referral hospital only in 60%. In the same study, health staff considered 74% of all maternal deaths as preventable which indicates a high degree of sub-optimal care even at the hospital level. Another rural study classified 31% of all maternal deaths as preventable, and 85% of the women died in hospital. In western Tanzania, low quality of care was noted as the major problem, and in coastal Tanzania more than 60% of the deceased women had had contact with medical staff before deaths.

*Underlying risk factors, socioeconomic and macro-level influences*

Poor obstetric history (abortion, stillbirths, unwanted pregnancy) shows an odds ratio (OR) of 4-20:1 for maternal deaths. Age above 35 years and 5 or more pregnancies (multiparity) are other risk factors. In a country with a fertility rate of 5.7, it is not surprising to find these figures which might even be interconnected. The high neonatal and infant mortality rates might contribute to the problem as well, as it could be shown that significantly more women have short birth intervals less than the recommended 24 months in case of an infant’s death (33 vs. 14%). 16% of following births occur before 24 months, more so in rural than in urban areas. Looking at the nutritional status, 10% of women of child-bearing age have malnutrition (BMI < 18.5 kg/m²), more in rural areas, in the less educated and poorer women. Anemia prevalence is 48% in women aged 15-49 years, and higher in pregnant women (58%). The nutritional status of pregnant and lactating women does not only seem important for the outcome of the fetus and newborn infant, but also for the women themselves. Although there are no specific studies addressing nutrition and maternal mortality in Tanzania, in recent reviews examples are cited from other developing countries where nutritional interventions lowered MMR. For maternal morbidity, micronutrient supplementation has provided some positive results in Tanzania. The paradox of almost universal ANC attendance (94%), combined with rates of 46-47% of skilled attendance at birth, points to a failure in the quality of care in the health system (among other problems mentioned earlier) which definitely contributes to the high MMR. Tanzanian women carry a high workload to generate family income. Even during pregnancy, they spend up to 14 hours per day working for their families.
Consequently, in one study, peasants/unskilled workers had an OR for maternal death of up to 20:1 compared to professionals.\textsuperscript{21} The female adult literacy rate is 62\%, 15 points lower than the male adult literacy rate.\textsuperscript{49} Data from Tanzania\textsuperscript{21,30,61} could show that with lower educational levels there is an increased risk of maternal mortality (OR 3:1)\textsuperscript{21}. This is a finding which has strong policy implications: a major goal must be to increase the educational level of women of child-bearing age. In one study, the husband’s low educational level was a risk factor for maternal death indicating that in societies, where decisions are made not by the women themselves, educational levels of their close relatives must be considered as well.\textsuperscript{44} Single or divorced mothers had an OR of 5-28:1 for maternal death.\textsuperscript{21,22} Concerning poverty as an individual risk factor, recent data show that women in the lowest wealth quintile have a two-fold risk of maternal death compared to the highest quintile.\textsuperscript{6} Besides widespread individual poverty, Tanzania belongs to the world’s poorest nations. In the latest Human Development Report of 2006, it is ranked only number 162 out of 177 countries in the human development index, and number 64 out of 102 developing countries in the human poverty index-1.\textsuperscript{49} 58\% of the population live on < 1 USD/day, 90\% on < 2 USD/day. 29 USD per capita are spent for health annually, of which about 45\% are private contributions. Therefore the majority of households would spend more than 50\% of their annual consumption on maternal health care if they had to pay full service charges.\textsuperscript{62} With these figures in mind it is difficult to imagine how the state and its people can afford a sustainable maternal health care system of high quality, including sufficiently staffed and well-equipped health facilities, which are accessible and affordable (abolition of user-fees) at the same time. Some argue that structural adjustment programs, enforced by the World Bank and International Monetary Fund, had devastating effects on maternal and child health.\textsuperscript{46,63} There is some hope that with the recent debt relief programs positive changes will be achievable.

**Conclusion**

A highly complex picture of the causes of maternal mortality in Tanzania has emerged. Although nationwide investments in education, social status and economy are crucial to any success, it appears that at the present time improvement of skilled obstetric care in qualitative and quantitative terms may have a major impact, as more than half of all maternal deaths occur within the formal health system. But in order to achieve this goal, a much higher level of skilled attendance at delivery must be achieved together with a functioning referral system and qualified care in the health facility.
References


41. Bura MWT. Pregnancy and child rearing practices among the Wairaqw of Tanzania. Diploma in Tropical child health course. Liverpool: Liverpool School of Tropical Medicine, University of Liverpool, 1984.


