IMPROVING EFFICIENCY

ASSESSING EFFICIENCY IN SERVICE DELIVERY

by Isaac Adams, Daniel Darko and Dr.Sandro Accorsi

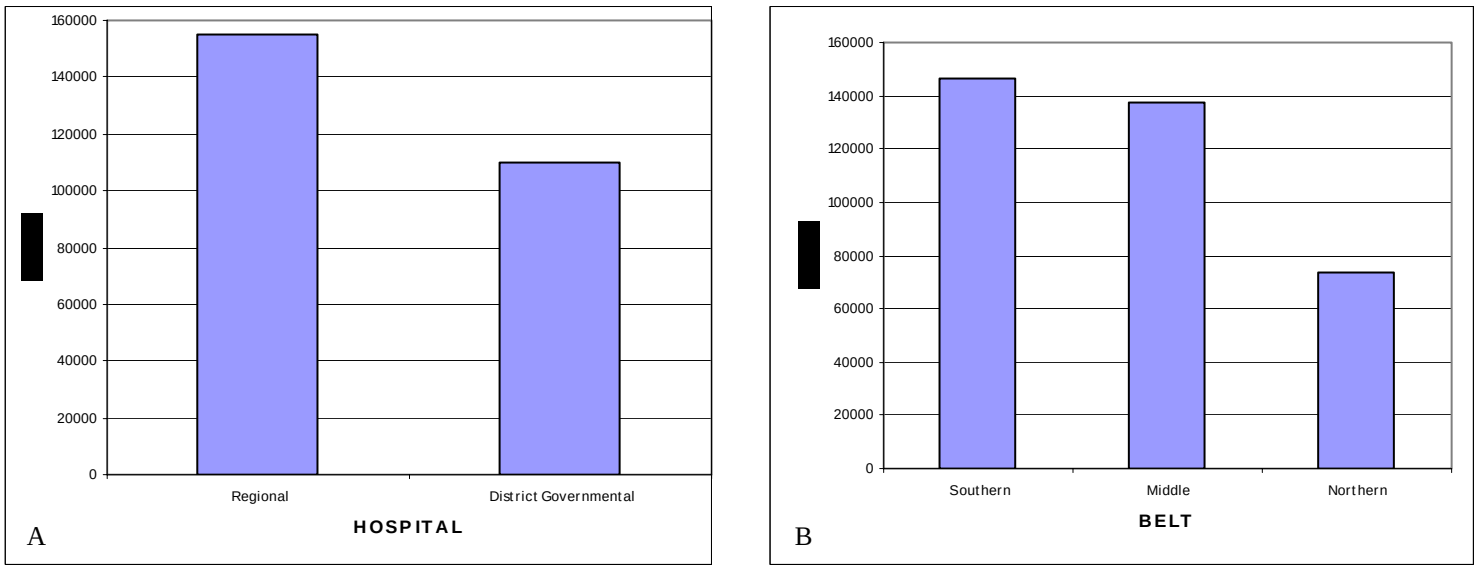
One of the pillars of the health sector reforms has been the improvement of efficiency in service delivery. Under this strategic objective the key programme areas have related, among others, to the development of management systems to support service delivery, the implementation of a human resource strategy, which will improve the distribution of health staff across the country, and the adoption of resource distribution criteria that will ensure equity in the allocation of resources. In recent years, some efforts have been made at developing systems for assessing performance and generating information to assist in the distribution of resources in the health sector. However, most of these measurements have focused on the implementation of services and the intermediate steps that determine how inputs are transformed into outputs. Innovative ways of measuring efficiency, particularly involving the use of simple relational measures, need to be employed gradually to understand some of the disparities in performance as well as providing some guide in the reallocation of resources in the bid to close the inequity gap.

This section uses available information to estimate the cost of providing service and workload analysis in order to provide a picture of efficiency in the delivery of services.

Cost of service

Comparative analysis of average costs of performing the same activity across facilities is central to performance monitoring. One of the key indicators used for this purpose is the Average Cost per Patient-Day Equivalent (PDE). It is defined as the average cost of producing a day-equivalent of institutional care. In other word it provides information on how much it costs a facility to take care of one patient for one day of hospital admission or three outpatient visits. This assumes that the cost of one inpatient day is the same as that of three outpatient visits.

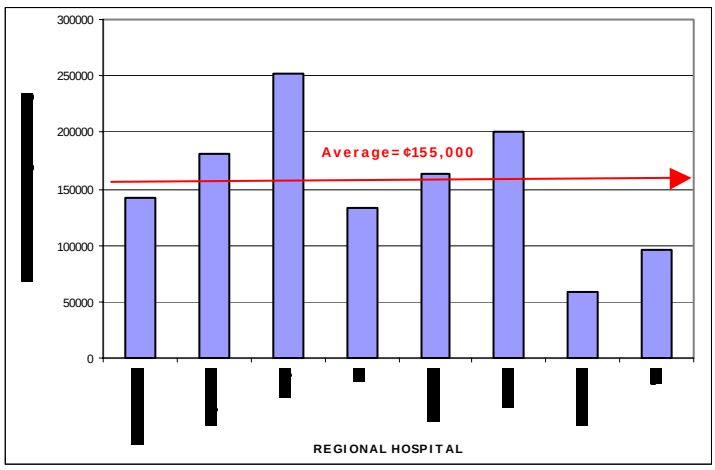
The average cost per patient-day equivalent in selected facilities was ¢130,557.00. This does not include the mission hospitals since the full expenditure data was not available. The cost analysis was therefore limited to government facilities (regional and district hospitals) for which the full data sources (including both expenditure and service data) were available. In general, the provision of care at high-level facilities implies higher costs due to more intensive input use (such as specialized staff and sophisticated equipment). As a result, the average cost per patient-day equivalent in regional hospitals (¢155,000.00) was higher than in district government hospitals (¢ 109,953.00) as indicated in the figure below. Even wider differences were observed across belts, with facilities located in the northern belt showing the lowest cost per patient-day equivalent (¢73,275.00) with respect to that observed in



Distribution of the cost per patient-day equivalent in selected hospitals by type of facilities (A) and by belt (B) (Ghana, 2003).

Since the average cost per patient-day equivalent is the ratio of costs to services, high cost may be related to high values in the numerator (corresponding to high expenditures) and/or low values in the denominator (due to low attendance). Average cost data also include expenditures generated by a heterogeneous mix of inpatient cases, with more complex case mix contributing to higher average costs. For example, communicable diseases and spontaneous deliveries are relatively inexpensive admissions, whereas admissions for accidents, surgical conditions and complicated and chronic diseases are more expensive.

Since high cost per patient-day equivalent may reflect poor efficiency, high quality, or more complex case mix, it is important to develop cost analysis in facilities of the same level, sharing similar patterns of hospital resource use and case-mix. Regional hospitals may be taken as an example. The average cost per patient-day equivalent for the regional hospitals was ¢155,000.00, with wide variations across individual facilities, ranging between ¢58,708.00 in Upper East Regional (Bolgatanga) Hospital and ¢252,719.00 in the Greater Accra Regional Hospital (Ridge Hospital). These differences may be related to both variations in expenditures and in volume of services provided. However, whereas the amount of services provided was similar in Ridge Hospital (52,002 PDE) and in Bolgatanga Hospital (55,048 PDE), wide differences in total expenditures were observed between the two hospitals accounting for the much higher cost per PDE observed in Ridge Hospital compared to Bolgatanga Hospital. This analysis is therefore useful for assessing hospital performance and identifying hospitals whose average costs are far from the norm.



Distribution of the cost per patient-day equivalent in regional hospitals (Ghana, 2003).

Some caution must be exercised in interpreting average cost differences. In particular, the comparison of the cost of producing a patient-day equivalent in different facilities may be difficult to interpret because the outputs may be qualitatively different and, in interpreting cost per PDE, we have to take into account not only the relative efficiency of input use, but also the inpatient case mix and the quality of care. If information on the case mix and quality of services is added to cost data, it becomes easier to understand the efficiency implications of the average costs.

Under utilisation of hospital services and overstaffing, with fixed costs such as salaries are common causes of high levels of average cost per patient-day equivalent because overhead costs and other fixed inputs spread over a smaller number of services. As a result, high expenditures, combined with relatively low service utilization, may account for the high cost per patient-day equivalent in some facilities. Since it is the ratio of costs to services, improved performance may be obtained through reduced costs and higher service utilisation. In this regard estimation of the cost per patient-day equivalent should be combined with workload analysis to give a clearer picture of efficiency.

Workload Analysis

The economic and human costs of poor human resources management and low productivity are particularly high in the labour-intensive health system. It is well known that staff shortages and unequal workload have negative effects on access to care, on the quality of care and on patient demand, contributing to the overall inefficiency in health care delivery.

The analysis of human resources management in the health sector is usually focused on the availability of health staff, as measured by indicators such as population to doctor ratio. Furthermore, differences in case mix, technical capacity and skills differentiate hospital levels and imply different sizes of facilities roughly measured by the number of beds and health staff. The numbers of each type of staff can be related to hospital beds and translated into staffing ratios per bed.

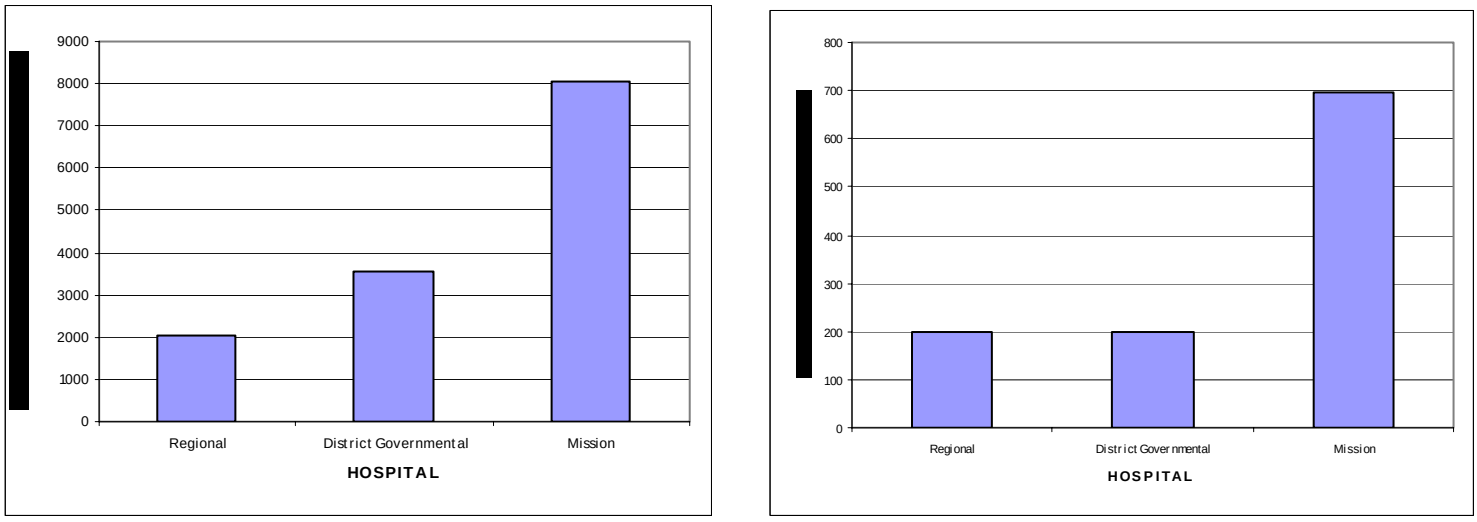
Examination of staffing ratios in selected hospitals reveals variation in the total staff per bed and

in the composition of staff, with an average ratio of 0.05 doctor per bed, 0.64 nurse per bed and almost one (0.96) of other staff per bed. The overall staffing ratio per bed (including all categories of health staff) was 1.65. Staffing ratios varied widely across facilities, with a ratio of doctor per bed ranging from 0.20 at the Ridge Regional Hospital to 0.01 in some district government hospitals and mission hospitals which are mainly located in deprived areas. The ratio of nurse per bed ranged between 1.36 nurses per bed in Ridge Regional Hospital and Tema General Hospital to 0.21 in Eikwe Mission Hospital.

In general, staffing ratios may reflect the quality in health care delivery, but they can not be interpreted as an infallible proxy for quality of services. Training and skill levels, supporting technology, productivity, teamwork, and the organization of services are all essential complementary co-determinants of quality. The overall staffing ratio per bed seems to be within the range observed in other developing countries, however the ratio of doctors per bed was excessively low, especially in some district governmental and mission hospitals, representing a potential impediment to provision of quality services, mainly in deprived areas. Case mix differences between hospitals may suggest that referral hospitals require greater staffing intensity than lower level hospitals, and, as expected, regional hospitals tended to employ higher concentrations of staff per bed. However, the variations in complexity of cases seen across the levels of facilities do not seem to justify such large differences in staffing patterns.

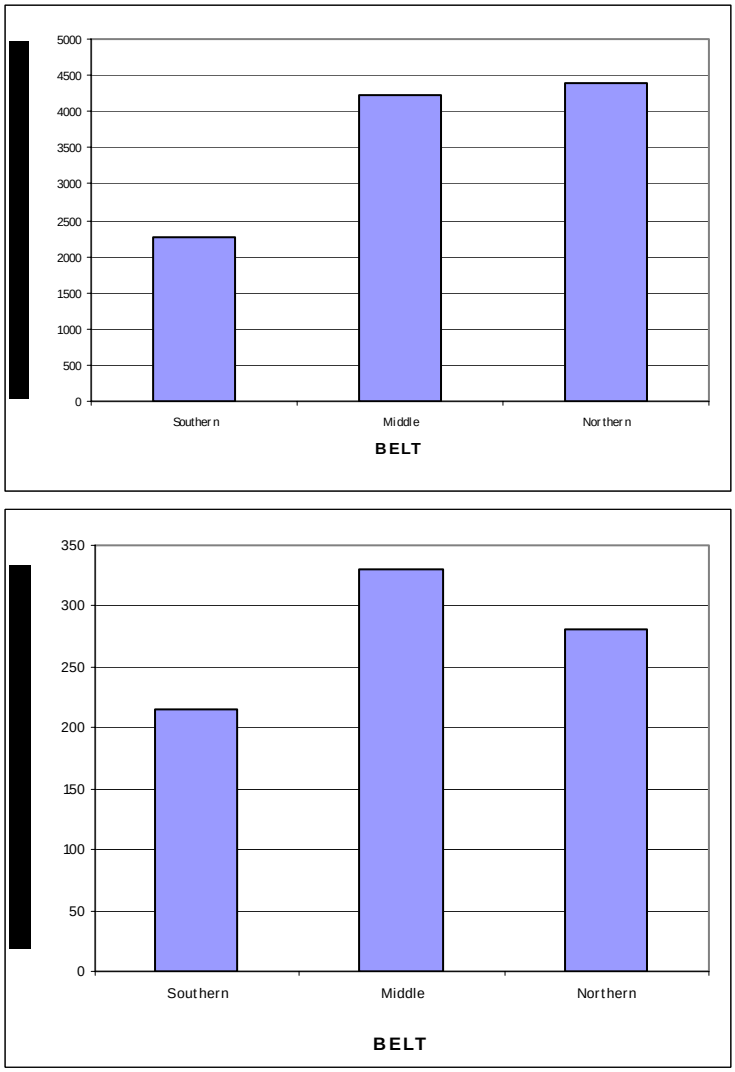
Workload analysis may provide better understanding of the efficiency in service delivery. The average "productivity", expressed as inpatient days per staff member, was 3,236 inpatient days per doctor and 401 inpatient days per nurse. These patterns seem consistent with the levels of staff workload observed in other developing countries; for example, in Sri Lanka, the productivity ranged between 1,510 and 2,529 inpatient days per doctor and between 465 and 694 inpatient days per nurse. However, the average productivity in Ghana was the result of wide differences across facilities, with the highest productivity being observed in mission hospitals (with 8,068 inpatient days per doctor and 695 inpatient days per nurse). This high productivity may be related to fewer staff and higher workload which may be supported by the fact that the mission hospitals used their bed capacity more efficiently with a bed occupancy rate of 63.6% compared to 49.5% in district government hospitals. On the other hand, official statistics in mission hospitals may underestimate staffing patterns since this did not include expatriate staff and volunteers and other staff working in the hospital, but not directly employed by the facility.

Lower productivity was observed in district governmental hospitals, with 3,532 inpatient days per doctor and 201 inpatient days per nurse, and especially in regional hospitals, with only 2,038 inpatient days per doctor and 200 inpatient days per nurse.



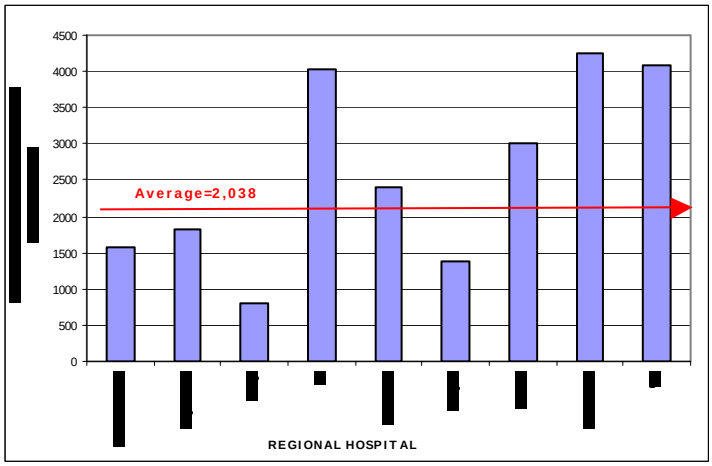
Number of bed days per doctor (A) and per nurse (B) by type of hospitals (Ghana, 2003).

The highest staff "productivity" was observed in the facilities located in the middle and northern belts, with those located in the southern belt showing consistently the lowest workload for both doctors and nurses.

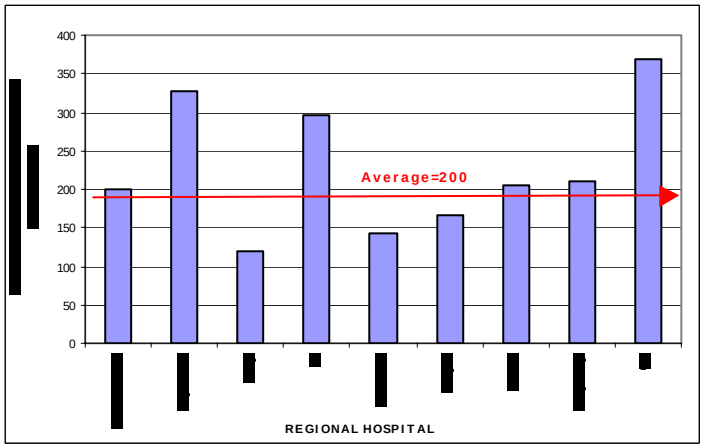


Number of bed days per doctor (A) and per nurse (B) by belt (Ghana, 2003).

Hospitals of the same level showed wide differences in productivity, and, as was done with the cost analysis, regional hospitals may be taken as an example. The Greater Accra Regional Hospital (Ridge Hospital) showed the lowest workload, with 800 inpatient days per doctor and 120 inpatient days per nurse whereas the highest workload was observed in hospitals located in the northern belt, with Upper East Regional Hospital (Bolgatanga Hospital) accounting for the highest number of inpatient days per doctor (4,247) and Upper West Regional Hospital (Wa Hospital) accounting for the highest number of inpatient days per nurse (368).



Distribution of the number of bed days per doctor in regional hospitals (Ghana, 2003).



Distribution of the number of bed days per nurse in regional hospitals (Ghana, 2003).

Conclusions

The comparison of the average costs of producing hospital services has wide policy implications. Firstly the differentials in cost per PDE across facilities give an approximation of the potential savings (or increased availability of services) to be derived from improving performance. Indeed the combination of high expenditures and/or low service utilization is a common cause of inefficiency in hospital resource use because overhead costs and other fixed inputs spread over a smaller number of services. This is particularly important where fixed costs account for high proportion of the health budget, such as in Ghana, where salaries account for about 70 percent of the government's recurrent budget.

In matching supply and demand, the supply of health staff must be translated into the supply of hospital services through productivity assessments that define the volume of services each health worker is able to provide. These considera-

tions lead to two categories of labor force analysis to be considered. The first is the analysis at a macrolevel of the long-term impact of various strategies of production, retention and use of human resources. The second is the microanalysis of worker activity profile and productivity. The macroanalysis deals quantitatively with the numbers of personnel to plan for, while the microanalysis relates quantitatively to ways in which those personnel can and should be employed. Workload analysis shows that staff "productivity", expressed as inpatient days per staff member, is higher in mission hospitals since they have fewer staff and higher workload.

The variability across individual facilities was higher than expected, and this may have resulted not only from differences in staffing pattern and case mix but also from the relative efficiency of input use and it highlights the fact that a number of factors subject to management intervention may contribute to low efficiency. The key strength of the observed results however indicates that there is wide room for improving the efficiency in hospital service delivery by increasing service utilisation and by improving staff distribution and productivity.

The costs differences between higher and lower level hospitals, the inverse relationship between hospital levels and productivity, and the scope to further increase the efficiency at the facility level indicate that there are economic gains to be obtained from improving hospital resource use and ensuring the match between patient care needs and the type of facility at which patients seek treatment. If basic cases are shifted and appropriate treatment can be provided at lower level facility with lower overhead costs, it is likely that a less costly combination of inputs will be used for treatment. This increases the cost-effectiveness of services by reducing the average cost per admission of specific treatments.

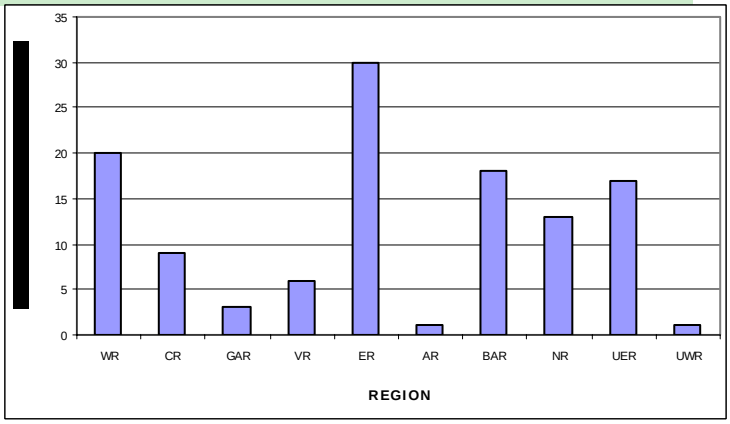
REDUCING AVOIDABLE DEATHS: INSTITUTIONAL MATERNAL MORTALITY

The current Five Year Programme of Work places emphasis on preventive and promotive aspects of safe motherhood (including health education, promotion of a full range of family planning services, and prenatal care including assessment of maternal risk), and on improving access to emergency and essential obstetric care. One of the key measures for assessing the effectiveness of safe motherhood services is the extent to which maternal deaths are avoided.

Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of pregnancy, from any cause related to or aggravated by the pregnancy or its management. These deaths could be as a result of direct or indirect causes. Direct obstetric deaths are those resulting from obstetric complications of pregnancy, labour, and the puerperium. They are mostly due to five major causes: haemorrhage, sepsis, eclampsia, obstructed labour, and complications of unsafe abortion. Globally, according to WHO estimates, around 80% of all maternal deaths are the direct result of obstetrical causes. Indirect obstetric deaths are those resulting from previously existing diseases or from diseases arising during pregnancy (but not related to direct obstetric causes), which were aggravated by the physiological effects of pregnancy; examples of such diseases include malaria, anaemia, hepatitis, HIV/AIDS and cardiovascular diseases. Globally, about 20% of maternal deaths are related to these indirect causes.

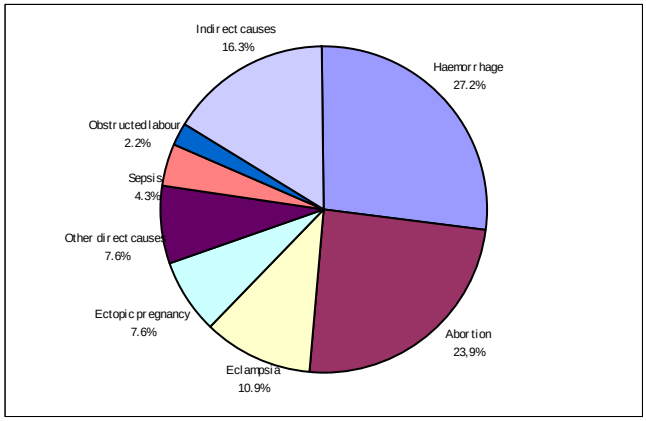
A total of 118 maternal deaths were recorded in selected facilities in 2003, most of them being reported in regional hospitals (74), while 23 maternal deaths were reported in district government hospitals and 21 in mission hospitals. Their distribution by region shows that the highest number of these deaths (30) occurred in Eastern Region, accounting for one fourth (25.4%) of the total maternal deaths.

Maternal mortality ratio reflects the risk of dying from maternal causes and is the most important indicator used for evaluating the effectiveness of the safe motherhood services. The numerator is the number of maternal deaths. The denominator, women exposed to the risk of dying from puerperal causes, is the number of women who have been pregnant during the period. However, since this number is unknown, the number of live births is used as conventional denominator for calculating this indicator. Therefore, maternal mortality ratio is calculated as the number of maternal deaths during a given year per 100,000 live births during the same period. The institutional maternal mortality ratio in selected hospitals was 294 per 100,000 live births in 2003, which was higher than the national average of 205 per 100,000 live births reported in 2003. This high rate is mainly related to the frequency of maternal deaths that occurred in the regional hospitals after referral of complicated cases from first-level facilities.



Distribution of institutional maternal deaths in selected hospitals by region (Ghana, 2003).

Out of the total 118 maternal deaths recorded, only 92 had the cause of death specified in the nominal roll. Among these 92 cases, haemorrhage and abortion were the most frequent causes, accounting together for half of the total maternal deaths (27.2% and 23.9%, respectively), as shown in the figure below.



Percent distribution of causes of maternal death in selected hospitals (Ghana, 2003).

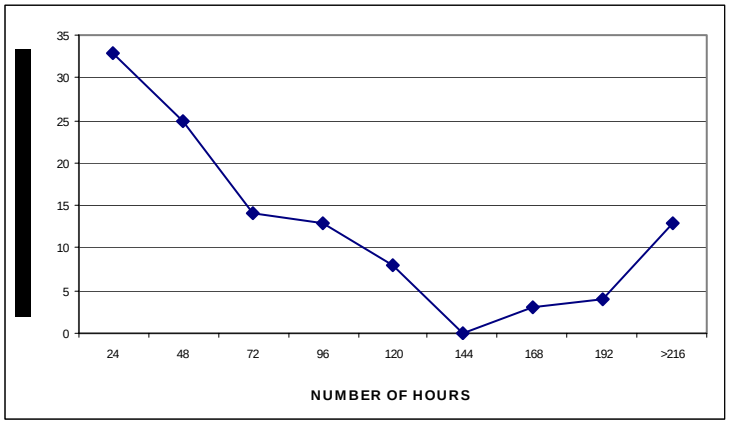
Complications of abortion were reported in 22 cases, representing a major cause of avoidable maternal deaths, while haemorrhage, especially postpartum haemorrhage, which is unpredictable, sudden in onset, and more dangerous when a woman is anaemic, was reported in 25 cases. Eclampsia (10.9%), ectopic pregnancy (7.6%) and sepsis (4.3%) were other important direct causes of maternal deaths. A much lower percentage (2.2%) was related to obstructed labour, while other direct causes, including retained placenta (3) and choriocarcinoma (2), accounted for 7.6% of the total maternal deaths. The most frequent indirect cause of maternal deaths was malaria in pregnancy (7), followed by hepatitis (2) and other conditions complicated by the pregnancy status (such as anaemia and HIV/AIDS).

This pattern of maternal deaths may be compared with the global WHO estimates, which, obviously, may vary in different settings, showing that haemorrhage is the leading cause of maternal deaths, accounting for 25% of the total maternal deaths, followed by sepsis (15%), unsafe abortion (13%), eclampsia (12%) and obstructed labour (8%). Other direct causes account for 7% of the total maternal deaths, while one out of five maternal deaths is attributable to indirect causes.

Lack of access to and use of essential obstetric services is a crucial factor that contributes to high maternal mortality. As 15% of all births are complicated by a potentially fatal condition, providing skilled attendants able to prevent, detect, and manage the major obstetric complications, together with the equipment, drugs, and other supplies essential for their management, is the single most important factor in preventing maternal deaths. However, according to the Demographic and Health Survey carried in 2003, only 47.1% of deliveries are supervised by skilled health personnel (a midwife or doctor).

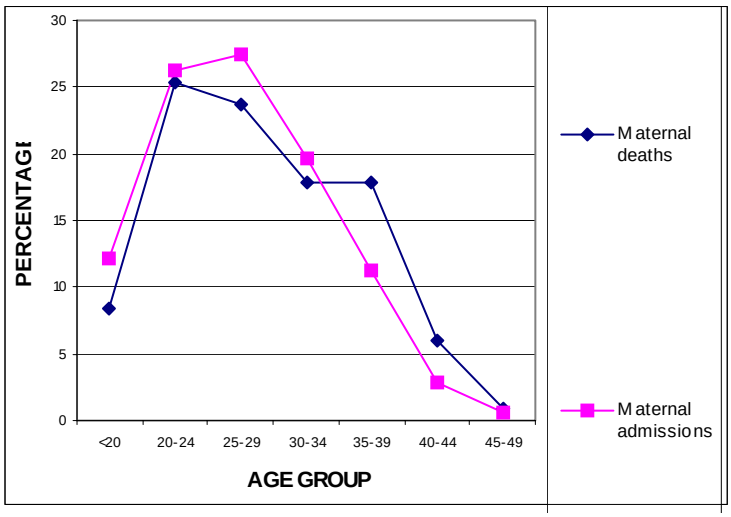
Financial accessibility is another key issue. The high costs of Caesarean section delivery, with an average of ¢743,249.00, still represent a major impediment to the access to emergency obstetrical services. These high costs may also delay the delivery of essential emergency care, with possible implications for the outcomes.

The date of death was reported in 113 out of the 118 cases of maternal deaths; among these cases with date of death recorded, over half (51.3%) of the total deaths occurred within 48 hours of admission, 33 (29.2%) of them within 24 hours and 25 (22.1%) between 24 and 48 hours, as shown in the figure below. This pattern of early maternal deaths after hospital admission highlights the importance of the availability of emergency obstetrical care in the hospitals.



Distribution of maternal deaths by the number of hours elapsed between hospital admission and maternal death in selected hospitals (Ghana, 2003).

Furthermore, the outcomes of pregnancy depend on the health and age of the mother, her nutritional status, her prior pregnancy history and the spacing between her previous births, as well as her education and her access to health services. In particular, important risk factors for maternal mortality are low education level, high parity and age below 20 or above 35. While the age-related patterns of maternal admissions and deaths were quite similar up to the 30-34 age group, the percentages of maternal deaths were higher in the 35-39 and 40-44 age groups. The distribution of maternal admissions and deaths by age group is shown in the figure below.



Distribution of the percentage of maternal admissions and deaths by age group in selected hospitals (Ghana, 2003).

The complications that cause the deaths and disabilities of mothers also damage the infants they are carrying. A total of 827 infant deaths were recorded as outcome of the 39,922 deliveries registered in the nominal roll of the maternity ward in selected hospitals. Maternal and infant health are interrelated, and significant reductions in infant mortality can be achieved with interventions designed to improve the health of the mother and her access to care during labour, birth, and the critical hours immediately afterwards. It is globally estimated that around two-thirds of the infant deaths occur during the neonatal period (before the age of 1 month), with over half of these neonatal deaths occurring within the first week of life: these deaths are largely preventable, being a consequence of inadequate or inappropriate care during pregnancy, delivery and postpartum.

Improving health, promoting equity: the way forward

Levels and patterns of maternal mortality ratio reflect gender-related inequalities in health, and its extent is a sign of women's place in society and their access to social, health and nutrition services and to economic opportunities. Maternal mortality risks are largely preventable and avoidable. For example, hypertensive disorders of pregnancy, particularly eclampsia (convulsions), can be prevented by careful monitoring during pregnancy and by treatment with anticonvulsivant drugs in cases of eclampsia, while sepsis, which is often a consequence of poor hygiene during delivery or of untreated sexually transmitted diseases (STDs), can be effectively prevented by careful attention to clean delivery and by detection and management of STDs during pregnancy.

The interventions needed to reduce the avoidable risks of childbirths are cost-effective. It is estimated that the "mother-baby package", including antenatal care, availability of a skilled attendant (midwife or doctor) at birth, emergency treatment of complications during pregnancy, delivery and after birth, and basic neonatal care, would cost about three dollars per person per year.

In this perspective, antenatal and postpartum care should focus more on detection and treatment of complications rather than on routine assessments which fail to identify many women who have complications. Furthermore, adequate antenatal care in the absence of safe childbirth is not sufficient because most obstetric complications occur abruptly and unexpectedly. Obstetric complications need to be treated in a facility where blood transfusion, caesarean section, placenta removal, and induced labour facilities are available. The combination of appropriate prenatal care, focusing on assessment of maternal risk and prevention and treatment of complications, and improved access to emergency and essential obstetrical care is the strategy to reduce maternal mortality.

Despite the fact that these interventions are cost-effective, the social and economic costs of maternal mortality are still enormous not only for the women themselves but also for their children's survival and well being, their households, and society as a whole. Reducing the maternal mortality rate is not only a major challenge, but also a realistic objective for the current Programme of Work.