China: Lowering maternal mortality in Miyun County, Beijing

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Introduction
Miyun County is one of the outer suburbs of Beijing located some 75 kilometres from the city. About 82% of the county territory is mountainous and transport between various locations proves difficult. The county population stood at 410,000 during the mid-1980s and experienced a birth rate of approximately 19 per 1000 with annual deliveries ranging from 7,600 to 8,000.

The maternal mortality ratio in Miyun County in this remote part of China had been estimated to be thrice the national ratio of 94.7 per 100,000 live births. Given uncertainty about the correctness of the data, a study was designed to arrive at a more accurate ratio in order to derive intervention measures. Thus safe motherhood interventions were designed based on the review of a 3-year account of maternal mortality in the county. Changes were introduced into the organization of maternal care services focusing on improving access to care for obstetric emergencies, staff training, and health education of families and the community. The interventions were implemented in a pilot zone and checked for their efficacy by observing changes in a control area. In proceeding this way the impact of the measures taken could be compared and quantified.

Objectives
(i) To establish an accurate account of maternal deaths in the county.
(ii) To test the impact of improved access to maternal care services, mass health education, and strengthened obstetric emergency services on the maternal mortality ratio.

Materials and methods
Members of the WHO Collaborating Centre for Research and Training in Perinatal Care joined with the county project team of the Health Bureau of Miyun County and responsible staff of the "MCH Institution" of the county. The steps to be taken were identified and the advisory team furnished technical advice to the project throughout its duration.

In order to design highly effective and targeted intervention measures it was felt necessary to first determine a more accurate estimation of the magnitude of maternal mortality. A retrospective study of maternal deaths which had occurred in the designated pilot zone and the control area during the years 1985 to 1988 was therefore carried out. This would provide the basis for evaluating the anticipated impact of the interventions measures in the pilot zone. All maternal deaths were identified and their causes analysed. Based on the analysis the project team designed measures to improve the situation. In order to assess the impact of the future changes, a pilot area and a control area were designated. In the pilot area, the following steps were undertaken:

Establishment of obstetric emergency and rescue teams
At both the county hospital and the county maternity hospital rescue teams were set up. In order to give high visibility to the operation each hospital director was designated as the head of the team. The obstetrics department carried the chief technical responsibility with support from the other units of the hospital. Thus emergency obstetric cases were either resuscitated on-site or transferred to the hospital for immediate intervention to take place.

Strengthening of the maternal and child health network
The prime organizational unit for MCH activities at county level is the MCH institution. It works in close liaison with the obstetrics and gynaecology and the paediatrics departments of the county hospital and the maternity hospital. At the local level the township hospital is the unit responsible for increased attention to maternal care. Obstetricians, paediatricians, and public health physicians were all sensitized to the issues surrounding unnecessary maternal deaths and training programmes were set up to enhance their skills.

At the grass roots level the village doctors and birth attendants at the health stations worked closely with women's organizations to educate the community about maternal health issues.
**Procedural changes and improvements**

The regulations governing maternal case management were reinforced:

(i) The application of the rules of the Ministry of Public Health governing referral between the three levels (i.e., the village health station, the township hospital, and the county hospital) was strengthened.

(ii) Clinical procedures were established for the handling of 5 emergency conditions (postpartum haemorrhage, severe pregnancy induced hypertension, amniotic embolism, shock, and neonatal asphyxia).

The management of perinatal care was strengthened and, in addition, the following steps were taken:

(i) Maternal health records were standardized, and standards were imposed for the following:
   - antenatal examination,
   - management of high-risk pregnancies,
   - standardized health education during pregnancy,
   - regular meetings on maternal care,
   - reinforcement of the referral system,
   - a streamlined information system.

(ii) A monitoring technique for appropriate perinatal care was promoted widely.

(iii) For the identification and referral of high-risk pregnancies the following measures were taken:
   - 15 conditions needing referral and the reasons for not delivering at the village health station were identified;
   - the referral system was reviewed to identify the most appropriate level of care for each type of condition requiring attention and the most suitable level of facility for receiving treatment;
   - the risk-score system for identification of high-risk pregnancies was reviewed and modified;
   - for the 5 common high-risk factors (pregnancy-induced hypertension, twins/multigravida, antepartum hemorrhage, abnormal presentation, and pregnancy complicated by other diseases) a diagnostic reference scheme was developed;
   - standardized training materials were developed for the various levels of staff; and
   - health education sessions were conducted which sought to reach women of reproductive age, their parents, their husbands, and their in-laws.

For the implementation of the intervention measures 6 pilot areas were chosen to test the effectiveness of the steps taken. Health education messages were based on the analysis of causes of maternal deaths which had previously occurred in the community. After community health education sessions had taken place members of the community were interviewed in order to ascertain the level of retention of newly acquired knowledge on the prevention of maternal deaths. Data on the maternal health situation was established prior to the implementation of the measures so that the validity of the approach could be tested and the measures modified, if necessary.

**Results**

Adjustment of the maternal mortality ratio for the county

The analysis of available death certificates for the 3-year period in question revealed an additional 33 maternal deaths. It was found that 27.3% of maternal deaths had not been reported. This led to a revision of the 1985-1988 figure from 83/100,000 live births to 114/100,000, an increase of 37.35% over the original figure, far below the threefold increase in maternal deaths originally estimated.

Further analysis of the records revealed that 60% of these deaths were directly linked to obstetrical causes. Haemorrhage was the leading cause of death followed by postpartum infections and pregnancy-induced hypertension. There appears to be a relationship between the number of antenatal visits and maternal deaths since 63% of the deceased had had no more than 3 antenatal checks during their pregnancy. This low number of clinical visits is considered insufficient for proper pregnancy care, the detection of risks, and the prevention of complications during pregnancy and delivery.

The research team considered that almost 40% of all these deaths were unnecessary. They estimated further that 2 out of 3 of these tragic deaths could have been avoided, if appropriate knowledge and skills had been available in the surrounding family environment and the health sector at the time when it was needed.

Impact of the strengthened maternal health measures

At the level of organization of maternal health services the increased availability of both staff and equipment led to visible improvements as depicted in Table 1. All the birth attendants in the pilot towns were equipped with delivery packages using the standard treatment regime. The hospitals in the pilot towns were reorganized and equipped to provide access to the ambulance service, X-ray facilities, laboratory test equipment, and other essential services.

Obstetric complications

During the project implementation period the incidence of postpartum haemorrhage, eclampsia,
Table 1
Maternity care network, pilot area in Miyun County, China, 1992

<table>
<thead>
<tr>
<th>Characteristics - Caractéristiques</th>
<th>Before intervention - Avant l'intervention</th>
<th>After intervention - Après l'intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of MCH workers – Nombre d'agents SMI</td>
<td>69</td>
<td>105</td>
</tr>
<tr>
<td>Number of townships without MCH workers – Nombre de municipalités n'ayant pas d'agents SMI</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Coverage of maternal care – Couverture des soins de santé maternelle</td>
<td>70.1%</td>
<td>91.2%</td>
</tr>
<tr>
<td>Screened for high risk – Taux de dépistage des sujets à haut risque</td>
<td>3.9%</td>
<td>11.4%</td>
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</tbody>
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Table 2
Obstetric complications before and after interventions,3 January 1989 to June 1992, Miyun County, China

<table>
<thead>
<tr>
<th>Complication</th>
<th>Incidence (%)</th>
<th>Case fatality (%) – Taux de létalité (%)</th>
<th>Cause–specific maternal mortality (per 100,000 live births) – Mortalité maternelle par cause (pour 100 000 naissances vivantes)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Control area – Zone témoin</td>
<td>Pilot area – Zone pilote</td>
<td>Control area – Zone témoin</td>
</tr>
<tr>
<td></td>
<td>Before - Avant</td>
<td>After - Après</td>
<td>Before - Avant</td>
</tr>
<tr>
<td>Postpartum haemorrhage – Hémorragie du post-partum</td>
<td>1.12</td>
<td>1.34</td>
<td>1.20</td>
</tr>
<tr>
<td>Eclampsia – Eclampsie</td>
<td>0.21</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td>Prolonged labour – Travail prolongé</td>
<td>0.43</td>
<td>0.40</td>
<td>0.07</td>
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</table>


Table 3
Change in maternal mortality ratio, control and pilot area, Miyun County, China (per 100,000 live births).

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<tr>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td>98.8</td>
<td>93.4</td>
<td>5.47</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>Pilot</td>
<td>150.7</td>
<td>36.6</td>
<td>75.7</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

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vices and access for obstetric emergencies. A control and pilot area were chosen in order to test the validity of the interventions. The reduction in maternal mortality from the main complications (postpartum haemorrhage and eclampsia) was impressive and no more maternal deaths were registered in the pilot area with reference to these causes. The overall maternal mortality ratio per 100,000 live births dropped by more than 75% in the pilot area throughout the three-year implementation period.

It was therefore shown that the synergistic effect of additional training of medical workers and traditional birth attendants, improved health education, the provision of easier access to emergency care services, the establishment of obstetric rescue teams at the county level, generally improved MCH services, and strengthened management capacity for high risk pregnancies were the most appropriate interventions to lower maternal mortality.

Résumé

Chine: Réduction de la mortalité maternelle dans le District de Miyun, Beijing

Dans le District de Miyun en Chine, les autorités médicales ont enregistré des taux élevés de mortalité maternelle qui devaient être vérifiés pour pouvoir prendre des mesures correctives. En 1988, il a été décidé d'entreprendre un projet d'interventions pilotes au niveau de l'organisation des services de santé maternelle et de la prise en charge des urgences obstétricales. Une zone témoin et une zone pilote ont été sélectionnées pour tester la validité des interventions. La réduction de la mortalité maternelle due aux principales complications de la grossesse et de l'accouchement (hémorragie du post-partum et éclampsie) a été spectaculaire et aucun nouveau décès maternel dû à l'une de ces causes n'a été enregistré dans la zone pilote. Le taux global de mortalité maternelle pour 100,000 naissances vivantes a baissé de plus de 75% dans la zone pilote au cours des 3 années d'exécution du projet.

Il a ainsi été prouvé que le renforcement de la formation des agents de santé et des accoucheuses traditionnelles, l'amélioration de l'éducation sanitaire et de l'accès aux services d'urgence, la formation d'équipes pour la prise en charge des urgences obstétricales au niveau du district, l'amélioration générale des services de santé maternelle et infantile et le renforcement de la capacité de prise en charge des grossesses à haut risque constituaient, en synergie, les interventions les plus appropriées pour faire baisser la mortalité maternelle.