

Tackling Unmet Needs for Major Obstetric Interventions

Case studies

Benin

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ABBREVIATIONS

ABPF: Association Béninoise pour la Promotion de la Famille (Benin's association for family promotion)
ACP: Africa - Caribbean – Pacific
AMI: Absolute Maternal Indication
CADZS: Cellule d'Appui au Développement des Zones Sanitaires (support unit for health zones)
CAM: Co-ordination and Management team (ITM Antwerp, B)
CERRHUD: Centre de Recherche en Reproduction Humaine et Démographie (Centre of Research in Human Reproduction and Demography)
CHD: Centre Hospitalier Départemental (Departmental Hospital Centre)
CNHU: Centre National Hospitalier et Universitaire (National and University Hospital Centre)
CREDESSA: Centre Régional pour le Développement et la Santé (Regional Centre for Development and Health)
DHS: Demographic and Health Survey
DPP: Direction de la Planification et de la Prospective (Planification and Perspective Directorate)
DSF: Division de la Santé Familiale (Family Health Division)
EB: Expected Births
EC: European Commission
EDF: European Development Fund
FP: Family Planning
GBR: Gross Birth Rate
GDP: Gross Domestic Product
GFR: General Fertility Rate
GTZ: Gesellschaft für Technische Zusammenarbeit (German Co-operation)
IMF: International Monetary Fund
ITM-A: Institute of Tropical Medicine in Antwerp
IUED: Institut Universitaire d'Etudes au Développement (University Institute of Development Studies)
MOI: Major Obstetric Intervention
MSP: Ministère de la Santé Publique (Ministry of Public Health)
PADS: Programme d'Appui au Développement de la Santé (Support Programme for Health Development)
PEV/SSP: Programme Elargi de Vaccination/Soins de Santé Primaires (Vaccination/Primary Health Care Programme)
PHC: Primary Health Care
Prosaf: Programme intégré de Santé Familiale (Integrated Programme of Family Health)
RAC: Réseau aérien de communication (radio-communication system)
RH: Reproductive Health
SOU: Soins Obstétricaux d'Urgence (Emergency Obstetric Care)
SSDRO: Service des Statistiques de la Documentation et de la Recherche (Statistics, Documentation and Research Service)
UNDP: United Nations Development Programme
UNFPA: United Nations Population Fund
UNICEF: United Nations Children Fund
UON: Unmet Obstetric Need
UR: Uterine Rupture
USAID: United States Agency for International Development
UVS: Unité Villageoise de Santé (villager health unit)
WB: World Bank
WHO: World Health Organisation

1. INTRODUCTION

The study of unmet obstetric needs in Benin has provided an opportunity to test a rather different approach from that adopted in other countries in the UON network. The usual strategy is to contact simultaneously the heads of maternal health programmes at the central level of the Ministry of Health and research institutes in the country, which can offer technical help in setting up the study. It is then usual, when the ministry has given its agreement, to involve those in charge of peripheral health services and academic authorities (professors of obstetrics and gynaecology). In Benin, however, the coordination and management team had no contact with the Ministry of Health, and the strategy was to begin with the involvement of partner organisations (in this case the Swiss Co-operation) and seek progressively to build up a consistent case which might persuade the Ministry of Health of the strategic value of a study of this kind. It is thus from this point of view that it may be worth while to consider the development of this approach in Benin.

2. CONTEXT

General

Situated in West Africa, in the Gulf of Guinea, this little country (area 112,000 sq. km) has a population of 6 million, 60% of them living in rural areas. It is a relatively young population, half of them being under 20. After the country became independent in August 1963, it had a fairly unsettled political life until Mathieu Kérékou came to power in 1972. President Kérékou established the National Committee of the Revolution and ran the country on Marxist-Leninist principles. After a series of domestic crises, the government called a general election in 1979 – the first since 1972 – and the National Committee of the Revolution was replaced by a new national assembly. In 1980, President Kérékou was re-elected and pursued his Marxist-Leninist policies until 1989, when this political option was abandoned and the single party was separated from the State. In 1991, the Supreme Council of the Republic took over the role of a legislative assembly and a new constitution was drafted. A fresh election in 1991 brought to power Nicéphore Soglo, who gave place in 1996 to Mathieu Kérékou. The country now has a good democratic image and accordingly has received numerous gifts and loans from the United States, Germany, France, the International Monetary Fund (IMF), the West African Development Bank and the African Development Bank. The country has also benefited from the attention generated by the summit held at Cotonou in 2000, marking the signature of the new partnership between the European Union and the ACP (African, Caribbean and Pacific) countries.

Since the 1970s, the country has received much external aid, particularly in the form of Beninese-Swiss and Beninese-German projects, mainly in peripheral areas. In the mid eighties one in five districts was receiving external aid, directed particularly towards improving the management of services and introducing systems for the recovery of costs by the sale of essential medicines in generic form. In spite of this aid a survey in 1986 revealed an overall malfunction of health services, with 80% of the health budget going on the payment of salaries, leaving little money available for investment; urban areas get the lion's share, and hospitals gain at the expense of basic health services. Moreover, there is a constant shortage of medicines in most of the peripheral structures, where the health services are seen as badly organised and unwelcoming¹. Supervision is irregular and frequently inadequate¹. Because of all these factors, primary-level health structures have low utilisation rates. In order to improve this situation Benin subscribed wholeheartedly to the Bamako Initiative in 1988. With the help of numerous partner organisations (UNICEF, which supports the Vaccination/Primary Health Care Programme (PEV/SSP), WHO, the World Bank, Swiss Co-operation, French Co-operation, the African Development Bank, EDF, etc.) which provide integrated support for primary care at the peripheral

¹ Knippenberg R., Levy-Bruhl D., Osseni R., Drame K., Soucat A., Debeugny C. 1990. Initiative de Bamako: soins de santé primaires, *Enfant en Milieu Tropical*, 184-185, 5-94.

level and for various programmes for the control of specific diseases (malaria, tuberculosis, etc.), Benin will be able within a few years to provide primary health care for 75% of its population.

- At the end of the 1990s, when Benin was involved in a policy of decentralisation of its health system, a round table found that in spite of the effort invested the system still has grave inadequacies:
- the arrangements for dealing with the population's health problems are not adequate in the peripheral health services, at the base of the health pyramid;
- the management of the system suffers from excessive centralism;
- the mobilisation and use of resources are not optimal;
- the potentialities of the private sector are not used in the most effective way.

The government then decided to expand the concept of health to include the sanitary conditions of families. This involves rejecting a system of welfare benefits and promoting the participation of communities in their own development. These two objectives constitute the political basis of Benin's Ministry of Health, and the family now becomes the priority target for development. The directing principles of the 1997–2001 plan were the following:

- to guarantee the whole population access to quality services, to take account of their real needs and to make available to them quality medicines at lower cost;
- to rationalise the health system by developing health zones, decentralisation and collaboration with the private sector;
- progressively to integrate the various health services and programmes at the level of health zones on the basis of the primary health care approach.

In order to achieve these objectives the plan is centred on the concept of the health zone, the base of the pyramid, at which both curative and preventive services, whether public, private, provided by religious bodies or by any other organisation, are to be developed in an integrated way. The health zones must also leave room for individuals and communities to play a part in controlling their own health. The zones will therefore be managed by a health committee, given statutory basis by a presidential decree in July 1998 which provides that a health zone shall "have independent legal status and autonomy of management subject to the oversight of the departmental health directorate". Support for this policy at central level is provided by the Ministry of Health, acting through CADZS (a unit responsible for supporting the development of health zones) and the Directorate of Planning. This project has been established in the first place in the departments of Zou and Borgou, supported by a Beninese-Swiss project, the University Institute of Development Studies' programme of support for health development (PADS-IUED).

Since their establishment, however, the health zones seem to have suffered from an excess of centralism on the part of the Ministry of Health. The departmental health directorates have perhaps not enough freedom of action to play their role adequately².

In 1998, Benin had 6 departments³, 67 sub-prefectures, 10 urban districts and 568 communes. The main health indicators, according to the UNDP 2000 report, are: rate of population increase for the period 1995–2000 2.7%, gross birth rate 43.6 per 1000, infantile mortality 88 per 1000, maternal mortality 498 per 100,000 live births according to the demographic and health survey (EDS) for 1996. The maternal mortality rate was revised upwards in 2001 in updated figures for 1995 published by WHO and UNICEF, which showed a rate of 884 (559-1.226)⁴.

² Ministère de la Santé, de la Protection Sociale et de la Condition Féminine, Politiques et stratégies nationales de développement du secteur santé 1997-2001, République du Bénin. March 1997, 67 p.

³ Since then, the departments have been divided up, and there are now 12.

⁴ Hill K., AbouZahr C., Wardlaw T. 2001. Estimates of maternal mortality for 1995. *Bull WHO* 79: 182-193.

The health system has a pyramidal structure, with three levels: the national level, which includes the Cotonou National Hospital and University Centre; the intermediate level, with five departmental hospital centres; and the peripheral level, with 354 communal health complexes, 48 dispensaries, 19 maternity hospitals and 11 zone hospitals. There are also nine hospitals run by religious organisations, two of which act as zone hospitals. At the lowest level in the pyramid are 310 village health units, which provide primary health care and can also handle deliveries.

From the financial point of view, external aid provided almost 78% of the resources necessary for the public investment programme in 1997.

Maternal health policy

Since the mid eighties maternal health policy has been based on the standard arrangements for mother and child care (ante-natal clinics, vaccination, etc.), in accordance with the PEV/SSP programme. Over the same period maternal mortality seems to have fallen, from 1600⁵ in 1980 to 990⁶ per 100,000 live births in 1994 and 884 in 1995⁴). In the mid nineties increased resources were devoted to maternal and infantile health, family planning and nutrition programmes and to a warning system for risk-free childbirth. A major factor was the establishment in 1994 of a Family Health Division in the Ministry of Health with responsibility for developing, following up and coordinating the programme for reduced-risk childbirth, the programme concerned with the reproductive health of adolescents and the programme for training trainers in reproductive health. In 1997, this policy showed only limited results: the prevalence of contraception was 2%, 54% of deliveries were assisted and utilisation of post-natal services was only 27%. The action plan for 1997–2001 seeks to improve this situation, particularly by the injection of additional material and human resources but also by the organisation of a system of referral and counter-referral designed to permit earlier identification and improved care for at-risk pregnancies. This strategy aims to reduce maternal mortality (from 498 per 100,000 live births in the 1996 EDS survey to 200 per 100,000 live births in 2016), to reduce the infantile and juvenile mortality rate from 166.5 per 1000 (EDS 1996) to 90 per 1000 in 2016, and to persuade 50% of adolescents and young adults to adopt a more responsible attitude to sexual behaviour in order to reduce the number of under-age pregnancies and involve men in reproductive health. The policy is still strongly based on prevention and education, and the improvement of emergency obstetric care is not directly discussed in the documents concerning maternal health policy. Nevertheless this aspect is not forgotten by health workers in the field. It was against this background that action plans for emergency obstetric and neo-natal care were developed at a workshop on maternal mortality in November 1999.

In parallel with the putting into effect of the Bamako Initiative a certain improvement in health conditions can be observed; but Benin's health policy, excessively centred on primary health care, seems for many years to have "forgotten" the other levels of the health pyramid, for example the hospitals of referral, and to have given insufficient attention to the need for articulation between the different levels.

The Ministry of Health has, on paper, developed maternal health policies which are accepted as relevant by health workers in the field. Some officers of international organisations involved and national officials complain, however, of the lack of coordination of these activities. Examples of this are the Ministry of Health's large-scale programme for the construction of health structures, while at the same time the recruitment of staff was frozen (by the Ministry of Finance), and the launching of a family planning programme at a time when an 80-year-old law still prohibited any contraceptive propaganda or practices.

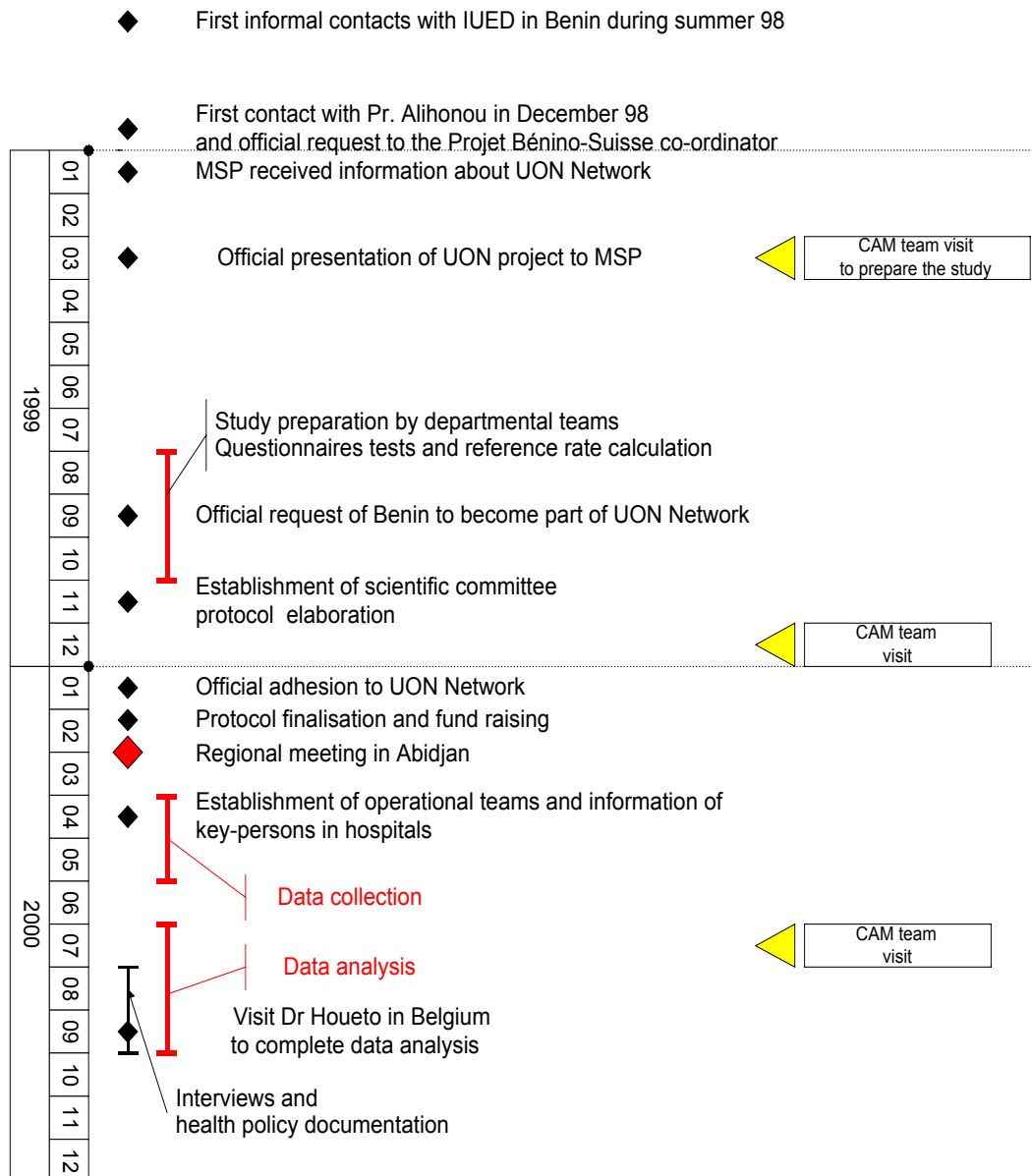
⁵ Maternal mortality was 1600 per 100,000 live births for the period 1980–1992 according to the UNDP Human Development Report for 1996.

⁶ WHO (1996). Revised 1990 estimates of maternal mortality: a new approach by WHO and UNICEF, WHO.

Frequently policies are adopted on a short-term basis, without taking account of social and cultural factors, the development of the road network, education, etc. – factors which are not as a rule the responsibility of the Ministry of Health. The lack of coordination between ministries is, in the view of some field workers, one of the stumbling-blocks which have retarded the application of health policies. Similarly, there is a basic lack of coordination between the various partner organisations involved in maternal health.

3. THE UON EXERCISE

Figure 1. CHRONOGRAM OF THE UON EXERCISE IN BENIN



Approach to the collection of data in hospitals

Before the beginning of data collection the study team⁷ brought together a number of key figures⁸ in the various health formations concerned to inform them about the study and train them in the collection of data. At this meeting the objectives and aims of the study were spelt out and the tools for collecting data and the guide on completing the questionnaires explained.

The study team then visited each health formation and, assisted by the key personnel who had previously been trained, carried out the collection of data. On average, the team spent two days with each formation in order to complete the “women” and “health formation” questionnaires. There was no preliminary analysis on the spot, either with the hospital team or the departmental team. It was only after all the information had been collected that the data was coded and the results could be analysed.

Equipment and method*Introduction*

The UON study has two complementary parts: one based on a questionnaire for women, analysing Major Obstetric Interventions, their indications and their results for women and infants, and the deficits observed, and another based on a questionnaire for health formations, making it possible to draw up an inventory of the human and material resources of the various health structures concerned.

Population studied

The study covered only two departments, Borgou and Zou⁹, which account for more than 60% of the country’s territory and a third of its population. The criteria for selecting these departments were based on their relatively high maternal mortality, the problems of geographical accessibility and the presence of partner organisations interested in the project and working in these areas (PADS, GTZ and USAID).

Table 1. POPULATION OF REFERENCE BY DEPARTMENT, BENIN, 1999

Department	Population	Expected Births
Borgou	1,055,463	47,939
Zou	1,028,230	43,494
Total	2,083,693	91,433

The population for 1999 was a projection by the Beninese National Statistical Institute from the 1992 census. The numbers of expected births were calculated by using gross birth rates specific to each department (Borgou 45.4 per 1000, Zou 42.3 per 1000).

Referral rate

A number of different methods of calculating the referral rate were tried. In the first place a survey was carried out in the sub-prefecture of Cové (department of Zou), which had an estimated population in 1998 of 38,191. This sub-prefecture has only one hospital able to deal with obstetric emergencies, and the study committee considered that the accessibility of this hospital, though not optimal, could be regarded as very satisfactory. Nevertheless, the proximity of the Zou departmental hospital centre led the investigators to include this hospital in their survey and to record all patients coming from Cové admitted to the hospital. They based this decision on two assumptions:

⁷ The study team consists of two statisticians, a gynaecologist and obstetrician, a midwife and a medical student.

⁸ Key figures in health formations: a gynaecologist, surgeon, or doctor with surgical competence, a midwife and an assistant anaesthetist.

⁹ These two departments have now been divided up to form four – Borgou and Alibori, Zou and Collines.

- the great majority of women in the sub-prefecture presenting an AMI go to the Cové hospital;
- and when the operating theatre is not available, the women are invariably referred to the Zou hospital centre.

Originally, the survey team had obtained a referral rate of 3% (53 MOI/AMI for 1772 expected births), but this figure was revised downwards when the list of indications and interventions to be taken into account was corrected (particularly by the exclusion of extra-uterine pregnancies and the treatment of peritonitis), producing a rate of 2.2%. When a member of the coordination and management team visited Benin this astonishingly high figure gave rise to much discussion. Given the imprecision of the data used in both the numerator¹⁰ and the denominator¹¹ and the small number of expected births, the rate so calculated had too large a confidence interval. It was therefore proposed in December 1999 to wait until the end of the study and use data from other large towns with a hospital meeting the accessibility criteria in order to check, and if necessary alter, this referral rate by basing it on a larger population and thus reducing chance errors.

This course was followed, and after completion of the study, it appeared that the rate was indeed unduly high compared with the results obtained in other towns with a functional hospital. It was therefore finally decided to calculate the referral rate *a posteriori* on the basis of the data gathered during the survey and for urban populations (within a 5 km radius of a functional hospital) round health structures whose functionality was unanimously recognised. Three hospitals presumed to be functional were excluded from the calculation of the referral rate because the rates calculated were either much below 1% or much above 2%, raising questions about the validity of the population figures and/or the correctness of the addresses given by women who had had an intervention (overstatement of the number of such women, some of whom may have given a temporary address “in town” instead of their real address).

On the basis of these considerations, the referral rate was set at 1.5% in October 2000, when Dr Houéto visited Antwerp (**Table 2**).

Table 2. DATA BASE FOR CALCULATION OF REFERRAL RATE, BENIN, 1999

Sub-prefecture	Number of inhabitants	Expected Births	MOI/AMI performed	Referral rate
Dassa-Zoumé	19,788	837	11	1.31
Savalou	28,123	1,190	22	1.85
Abomey	61,091	2,584	36	1.39
Cové	35,261	1,492	18	1.21
Parakou	124,054	5,635	89	1.58
Tchaourou	11,769	535	9	1.68
Bembéréké	9,972	453	7	1.55
Total	290,058	12,724	192	1.51

The calculation of the referral rate is an important stage in the study. On the one hand it enables the health workers concerned to become familiar with it; on the other it frequently leads, as it did in Benin, to a discussion of the interventions and indications to be taken into account.

¹⁰ The investigators originally counted as AMIs indications not listed in the protocol; they then excluded these “wrong” indications, but without re-checking the hospital records. It thus became impossible to determine with certainty the exact number of MOI/AMI.

¹¹ The population used is a projection from the 1992 census, using an annual rate of increase of 2.3%.

*Criteria for inclusion***Population**

The study covered all women of Beninese nationality coming from the departments concerned who had had a Major Obstetric Intervention during the year 1999, whether in a hospital in one of the departments covered by the study or in a department outside the study area. The team therefore visited Atacora (a neighbouring department) to check whether the hospital in Bassilia had admitted any women with MOI for AMI coming from one of the departments in the study area. They also checked that no women from either of these departments had gone to a neighbouring country (Togo, Nigeria, Niger or Burkina Faso) for an MOI/AMI.

Account was also taken of all cases of maternal death before or after an intervention. No account was taken of women operated on in a hospital in one of the two departments concerned but coming from a town or village in another department.

Absolute Maternal Indications and Major Obstetric Interventions

The various discussion groups which considered the list of interventions and indications to be taken into account in the study were concerned to amend the list to take account of the realities of the situation in Benin. Thus in one of the early meetings extra-uterine pregnancies, post-partum and post-abortum peritonitis and incomplete haemorrhagic abortions were added to the Absolute Maternal Indications and their surgical treatment to the Major Obstetric Interventions. In the course of the discussions, and with the support of members of the UON network, these indications and interventions were taken off the list, with the exception of laparotomies for extra-uterine pregnancies.

Health formations

The study covered all health formations – private, public and others – in the two departments with an operating suite and the human and material resources required for dealing with obstetric emergencies. Two hospitals in the department of Zou did not meet these criteria: the one in Ouessé, whose operating suite was not functional in 1999 for lack of a doctor with surgical competence, and the one in Savé, which began to do surgical work only in November 1999 (though the three Major Obstetric Interventions performed after that date are included in the “women” file) and was not included in the survey of health formations.

*The variables studied***Questionnaire for women**

This questionnaire (presented in Annex 1) made it possible to construct a “women” file which provided the basis of an analysis designed to reveal deficits in each sub-prefecture. The questionnaires were completed by the national survey team in collaboration with the departmental team and the staff of maternity hospitals. Of the variables covered in the questionnaire the most important for the purposes of the analysis are the following:

Name of health formation

Sub-prefecture in which the formation is situated according to the administrative structure of Benin

Sub-prefecture of origin of mother: This information is given by the mother on admission to hospital. It should be treated with caution, since the mother may declare as her area of residence not her real home but a temporary area of residence, usually situated near the health formation, where she has been staying for the last stages of her pregnancy.

Area of origin of the mother: urban or rural. All women living within 5 km of a health formation effectively offering Major Obstetric Interventions are regarded as living in an urban area. Those living outside a 5 km radius are regarded as living in a rural area. The terms urban and rural are thus out of line with the normal administrative criteria.

Type of intervention: The list of interventions considered is as suggested in the basic UON protocol¹².

Indication for intervention: The indications considered are also as suggested in the UON protocol. The scientific committee wanted to add extra-uterine pregnancies; but this indication is not included in the list of AMIs in order to produce results comparable with those of other participating countries.

Results for mother: nothing to report, died, complication, referred.

Results for child: born living and living when discharged from hospital, stillborn, died within 24 hours of birth.

Time and cause of mother's death: before, during or after intervention – infection, haemorrhage, hypertensive disease.

Questionnaire for health formations

This questionnaire was used to construct a “health formation” file, required for the analysis of the human and material resources of each health formation and for the linking of information with the “women” file. Of the variables covered by this questionnaire the most important for the analysis are:

Name of health formation

Sub-prefecture in which the formation is situated according to the administrative structure of Benin

Type of formation: private, public or run by a religious organisation

Category of formation: departmental or zonal hospital

Number of functional operating theatres

Number of gynaecologists and doctors with surgical competence: This includes not only gynaecologists but also all doctors in the health formation capable of carrying out Major Obstetric Interventions.

Number of midwives and nurses with gynaecological competence: This includes all paramedical personnel capable of carrying out deliveries.

Total number of births

Number of dystocic births

Number of caesareans

Number of uterine ruptures

Material used in collection of data

For **information on individual cases** of Major Obstetric Interventions for Absolute Maternal Indications the source of data was the questionnaire for women (see Annex 1). A questionnaire was completed for each case meeting the criteria.

The sources of information for the questionnaire were:

- the register of births
- the records of hospital treatment
- the register of the operating suite
- maternal files and record cards
- monthly reports on the work of the maternity hospital

¹² Caesarean, laparotomy, hysterectomy, version and extraction, craniotomy.

The basic document for identifying cases is the register of the operating suite, from which the survey team were able to list all cases of MOI in the year 1999. Information not included in the register (death after intervention, result of operation, state of mother and child on discharge, date of discharge) was obtained from the register of births or the records of hospital treatment. Questionnaires in which the data seemed inconsistent were discussed with the caring team. After all the questionnaires were completed, the number of MOIs was re-counted and compared with the register of the operating suite.

For **information on health formations**, (maternity hospitals, i.e. all hospitals in which Major Obstetric Interventions were performed in 1999) the source was the questionnaire for health formations (see Annex 2). A questionnaire was completed for each health formation selected.

The completion of the forms on health formations was done at the same time as the questionnaires on women and by the same people. The work was carried out in collaboration with members of the hospital administration, using data from the statistics kept by the maternity department in each health formation. As will be seen below, there does not seem to have been any cross-check between this questionnaire and the record of the number of MOIs performed in the operating suite; for with the exception of two hospitals the questionnaire for women appears to show systematic under-recording of the number of caesareans performed in the year 1999.

Data base

Description of data used

The “women” file

Originally this file contained 1986 records, with no duplicates. There were 983 MOIs for AMI, 970 MOIs for non-AMI, 9 AMIs without MOI and 24 non-AMIs and non-MOIs. Some minor amendments were made to the file (**Table 3**):

- 6 cases for which the intervention was not stated. After analysis of the result for the mother and the time of death it appeared that these women had died before any intervention, and those for whom the indication was an AMI were added in to the AMIs (2 cases);
- 10 cases of mothers who died before any intervention, with no mention of the indication. The cause of death made it possible to distinguish between AMIs and non-AMIs; and mothers who died of a post-partum haemorrhage were added in to the AMIs (3 cases);
- 1 case recorded as MOI for AMI, with no mention of the intervention. Since the indication was uterine rupture and the mother had died from a cardiac problem after the intervention, the case was treated as a laparotomy.

Table 3 takes account of these changes in the distribution of MOIs and AMIs.

Table 3. DISTRIBUTION OF CASES ACCORDING TO CATEGORY OF INTERVENTION AND CATEGORY OF INDICATION, BENIN, 1999

		AMI		Total
		Yes	No	
MOI	Yes	984	970	1,954
	No	13	19	32
Total		997	989	1,986

Another modification to the file was designed to remedy a case of inconsistency between the indication and the intervention performed: a case of uterine rupture for which the operation recorded was a caesarean was reclassified among the laparotomies. It should also be noted that the extra-uterine pregnancies added by the Beninese scientific committee to the list of AMIs will not be considered as such here. The main reason for this change is to obtain data comparable with data for other countries; for extra-uterine pregnancies are not included in the list of AMIs

proposed by the UON network because of the difficulty of obtaining a valid referral rate for this pathology. The epidemiology of ectopic pregnancies varies considerably between different countries and even between regions within the same country.

Other changes of greater importance were made in the “mother’s area of residence” variable, since women were to be considered as coming from an urban area only if they lived within 5 km of a health structure with facilities for the surgical treatment of obstetric emergencies. As a result all women living in sub-prefectures more than 5 km from a health structure were considered as living in a rural area. This affects a total of 14 cases (2 in Glazoué, 1 in Ouessé, 1 in Savé, 2 in Banté, 1 in Agbangnizoun, 1 in Ouinhi, 5 in Zangnanado and 1 in Zakpota).

After these changes have been made, some data is still missing (where the information is not in the file) or not mentioned (where the information was not in the sources used in the collection of data). **Table 4** summarises these problems.

Table 4. DATA MISSING OR NOT MENTIONED IN THE “WOMEN” FILE, BENIN, 1999

Over all data collected

Variable	Data					
	Missing		Not noted		Total	
	Number	%	Number	%	Number	%
Whole file (1,986 cases)						
Type of area			7	0.4%	7	
Indication	4	0.2%	71	3.6%	75	3.8%
Type of intervention	15	0.8%			15	0.8%
Result for mother			17	0.9%	17	0.9%
Result for child	31	1.6%	11	0.5%	42	2.1%
Mother’s deaths (60 cases)						
When mother died			5	1.7%	5	1.7%
Cause of mother’s death			14	23.3%	14	23.3%

For MOI for AMI

Variable	Data					
	Missing		Not noted		Total	
	Number	%	Number	%	Number	%
Whole file (984 cases)						
Type of area			3	0.3%	3	0.3%
Indication						
Type of intervention						
Result for mother			5	0.5%	5	0.5%
Result for child	10	1%	6	0.6%	16	1.6%
Mother’s deaths (24 cases)						
When mother died			1	4.2%	1	4.2%
Cause of mother’s death			7	29%	7	29%

Although overall the file is fairly complete, there is a serious problem about the information on maternal deaths. Since there are only a few cases and the cause of death is not given in almost a third of the cases of MOI for AMI, no reliable analysis in statistical terms is possible.

The “health formations” file

The data relate to 14 health formations (5 in Zou and 9 in Borgou). Among these are the two departmental hospital centres at Abomey and Parakou. Two hospitals and one private clinic have been excluded – the hospital at Savé, where surgical work began only in November 1999, the hospital at Ouessé, where the operating suite is not functional, and the Chabi-Kenou private clinic, where no Major Obstetric Interventions were performed in 1999.

Reconciliation of data from the “women” and “health formation” files

Although the information for both questionnaires was collected at the same time and by the same people, the survey team do not seem to have cross-checked the different sources – administrative sources for the health formation questionnaire and hospital sources for the questionnaire for women. As a result, there are considerable inconsistencies between the two files. In Zou (with the exception of the data on the Savé hospital, for which the health formation questionnaire was not completed) the health formation questionnaire records 890 caesareans, compared with only 767 in the questionnaire for women: this means that 14% of the caesareans performed in these hospitals in 1999 are missing from the “women” file. In Borgou there are the same problems, but the difference between the two questionnaires is less, with only 77 caesareans, or 8% of the caesareans recorded in the health formation questionnaire (1015 cases) missing from the questionnaire for women. The largest divergences are in the Zou hospital centre, where a fifth of the caesareans performed are missing from the “women” file, and where the total number of MOIs in that file is lower than the number of caesareans recorded in the “health formation” file. The same situation is found in the Cové hospital, the Sounon-Sero hospital in Nikki and the Banikoara hospital, where respectively 25%, 21% and 20% of the caesareans to be expected from the figures in the “health formation” file are missing from the “women” file. In these three hospitals, too, the total number of MOIs performed in 1999 is less than the total number of caesareans declared in the report of the administration.

The lack of concordance between the administrative data on the activity of the hospitals and the data obtained from the records of the operating theatre constitutes a serious problem. It is difficult to determine in which of the two files the errors lie. However the administrative reports, based on the hospital records of admissions and discharges, do not give the mother’s department of origin, while in the UON study the questionnaire for women was completed only for mothers living in Zou and Borgou. It may well be that this is the explanation of the disagreement between the figures given in the questionnaires for health formations and for women. In the health formation questionnaire the administration records all interventions, whether performed on women from Zou, Borgou or any other department. The lack of notification of the women’s area of origin in the administrative report makes it impossible to undertake any analysis of the utilisation of the hospital by the population of the same district or any more refined analysis of the catchment area. The other information supplied by the health formation questionnaire (human and material resources), however, is perfectly utilisable for analysis, particularly of workload.

Discussion of biases

One of the main objectives of the UON approach is to make a reliable estimate of the minimum number of women who have not had access to a complete range of essential obstetric care. The biases which we now consider do not in any way affect the validity of the study, whose object is to offer as precise a view as possible of the scale of deficits as a planning tool and a stimulus to consideration of means of improving the handling of obstetric interventions. Various types of bias are possible: on the one hand those resulting from the inadequacy of demographic data in developing countries, which are difficult to check, and on the other those directly connected with the approach adopted here.

“Demographic” biases

The population figures used here were those of the 1992 census, supplied by the directorate of demographic studies in the Beninese National Statistical Institute and projected to 1999 on the basis of the annual rates of population growth in each of the departments.

The numbers of expected births were calculated on the basis of the gross birth rates for each department (EDS 1996). A more refined analysis could have been made on the basis of the general fertility rate for each type of area (urban and rural), since we have information (from the 1992 census) on the distribution of population between urban and rural areas and between male and female in each department, as well as the general fertility rate and the proportion of women

aged 15–49 (EDS 1996) for the country as a whole. Calculating on the basis of this data, and assuming that the urban/rural distribution and the sex ratio in each department have not changed since 1992 and that the proportion of women aged 15–49 and the general fertility rate are the same in both departments, we obtain figures which are very comparable with those obtained using the gross birth rate for each department. Since the small differences between the figures obtained by these two methods (a variation of around 2%) may be due as much to the imprecision involved in using the gross birth rate as to the assumptions made in using the gross fertility rate, it may be considered that the method used in Benin is perfectly valid for this study.

Biases due to inexact diagnosis

As **Table 4** shows, indications and interventions are generally well notified in the records used in the collection of data. In addition the presence during the completion of the questionnaire for women of the gynaecologists and/or surgeons who performed the interventions was a great help in achieving the best possible conformity of the data. There might perhaps be a problem about diagnosis in the department of Borgou, where only two hospitals have gynaecologists; but the absence of any inconsistencies between indications and interventions in the “women” file seems to show that these problems, if they exist at all, are few in number.

Biases in collection of data

As regards discrimination between different types of area, particular effort was devoted in Benin to making sure that the areas of origin of the mothers were correct both in the numerator (notification of origins in the sources used in the collection of data) and the denominator (urban and rural population of reference). A list of all the areas concerned was drawn up and a woman’s inclusion in an urban or rural area was determined on the basis of the distance between her home and the nearest functional hospital. This list was used during the collection and coding of data in order to validate the entries concerning the mother’s place of residence. It is always possible, however, that some women on admission to hospital may have given a temporary address near the hospital. This bias, which cannot be checked for the present study, is even more likely to appear in cases of MOI for AMI, since women aware of a possible risk in childbirth may decide to stay nearer a health formation during the later stages of their pregnancy. In any future studies, it should be possible to minimise this bias by giving more attention to this information, which can also be checked from documents such as the *carte* recording the follow-up of the woman’s pregnancy.

Results

We begin with a descriptive analysis of the results of the study on interventions, indications and deficits for each sub-prefecture. We then undertake a more specific analysis, seeking to bring out differences between types of area and to determine the levels and causes of intra-hospital maternal and infantile mortality. Then the data in the “women” file will be cross-checked with the information on health formations, in order to compare the results for the different formations in function of their human and material resources.

The tables, figures and maps that follow have been constructed by reference to the categories of intervention and indication shown in **Table 3**. Particular attention will be paid to Major Obstetric Interventions (1954 cases), Absolute Maternal Indications (997 cases), non-Absolute Maternal Indications (989 cases) and MOIs for AMI (984 cases). The analyses by type of area do not take into account cases for which the mother’s area of origin is unknown, though these will be included in the totals in some table (they represent less than 0.5% of the data).

Major Obstetric Interventions

A total of 1954 MOIs were performed in 1999 in hospitals in the departments of Zou and Borgou. This represents an average rate for both departments of 2.14 MOIs per 100 expected births. There is a considerable disparity between urban and rural areas (3.2 MOIs per 100 expected births in urban areas against 1.83 in rural areas). The rural rate, however, is relatively

high, compared with rural rates in other countries in the UON network, which are always well below 1%.

Table 5. MAJOR OBSTETRIC INTERVENTION ACCORDING TO TYPE OF INTERVENTION AND AREA, BENIN, 1999

	Urban area		Rural area		Total*	
	Number	%	Number	%	Number	%
Caesarean	554	88.4%	1,150	87.1%	1,710	87.5%
Hysterectomy	5	0.8%	16	1.2%	21	1.1%
Laparotomy	64	10.2%	138	10.5%	203	10.4%
Version-extraction	3	0.5%	3	0.2%	6	0.3%
Craniotomy	1	0.2%	13	1%	14	0.7%
Total	627	100%	1,320	100%	1,954	100%

* The totals include the 7 cases in which the mother's area of origin is unknown.

Caesareans represent, according to type of area, between 87 and 88% of interventions performed. Laparotomies and hysterectomies – most frequently performed for uterine rupture – represent 11% in urban areas and 11.7% in rural areas. Recourse to hysterectomy, however, is slightly more frequent in rural areas, where one uterine rupture out of 6 necessitates a hysterectomy, compared with one in 10 in urban areas. These relatively slight differences suggest that ease of access to hospital structures is broadly the same for women living relatively far from a hospital and women living close to a functional hospital. Caesarean rates per 100 expected births are 2.84 in urban areas and 1.6 in rural areas.

Women who have not had an obstetric intervention

The file contains 32 cases of women who have not had any MOI. Of these 13 were AMIs. Five of these women died before any intervention; for the others, 5 of whom also died (during or after the intervention), the type of intervention performed is not mentioned in the database.

Absolute Maternal Indications

The "women" file contains a total of 997 Absolute Maternal Indications. Foeto-pelvic disproportions are the principal indications for an MOI (55%), both in urban and in rural areas. Obstructed labour problems (disproportions, abnormal presentations and uterine ruptures) represent 84% of the indications for intervention. This proportion varies little according to type of area (82% in urban areas, 85% in rural areas). Uterine ruptures, however, are more frequent in rural areas, pointing to delay in receiving hospital treatment for these cases of obstructed labour, no doubt due to the lateness of the women's decision to go to hospital in the case of a serious problem in childbirth.

Table 6. ABSOLUTE MATERNAL INDICATIONS ACCORDING TO TYPE OF AREA, BENIN, 1999

	Urban area		Rural area		Total*	
	Number	%	Number	%	Number	%
Uterine rupture	18	6.7%	71	9.8%	89	9%
Transverse, facial and front presentation	46	17%	156	21.5%	203	21%
Foeto-pelvic disproportion	156	58%	387	53.4%	544	54.6%
Ante-partum haemorrhages	44	16.4%	103	14.2%	148	14.8%
Post-partum haemorrhages	3	1.1%	5	0.7%	8	0.8%
Severe haemorrhages	2	0.7%	3	0.4%	5	0.5%
Total	269	100%	725	100%	997	100%

* The totals include 3 cases in which the mother's area of residence is unknown

Ante- and post-partum haemorrhages are found rather more frequently in urban areas, but the difference is small. Ante-partum haemorrhages, however, have an incidence (number of cases per 100 expected births) 1.6 times higher in urban areas (0.23 cases per 100 expected births, against 0.14 cases per 100 expected births in rural areas). This seems to confirm the

hypothesis of accessibility problems: since haemorrhages are rapidly fatal, women living in areas far away from hospitals are unable to get there in time to receive treatment.

Non-Absolute Maternal Indications

The most frequent non-Absolute Maternal Indications, whatever the type of area, are of foetal distress (**Table 7**). There is little difference in the frequency of the various causes according to type of area. There are, however, more cases of foetal distress in urban areas, while the antecedents of caesareans and dynamic dystocia are found more frequently in rural areas. But the differences are relatively small (6.3 points for foetal distress, 5.2 points for dynamic dystocia and 3.9 points for the antecedents of caesareans). The operations most frequently performed are caesareans (95% of operations in rural areas and 98% in urban areas, excluding from the calculation extra-uterine pregnancies for which a laparotomy performed).

Table 7. NON-ABSOLUTE MATERNAL INDICATIONS ACCORDING TO TYPE OF AREA, BENIN, 1999

	Urban		Rural		Total*	
	Number	%	Number	%	Number	%
Foetal distress	145	43.7%	217	37.4%	363	39.6%
Antecedent of C-section	53	16.0%	115	19.8%	169	18.4%
Ectopic pregnancy	47	14.2%	78	13.4%	126	13.8%
Dynamic dystocia	20	6.0%	65	11.2%	85	9.3%
Eclampsia	18	5.4%	23	4.0%	41	4.5%
Breach presentation	11	3.3%	23	4.0%	35	3.8%
Complications connected with cord	10	3.0%	10	1.7%	20	2.2%
Other cause	8	2.4%	9	1.6%	17	1.9%
Stationary labor	3	0.9%	3	0.5%	6	0.7%
Obstructed labor for non-AMI presentation	3	0.9%	12	2.1%	15	1.6%
Obstructed labor for other cause	3	0.9%	7	1.2%	10	1.1%
Toxaemia, pre-eclampsia	2	0.6%	1	0.2%	3	0.3%
Premature rupture of the membranes	2	0.6%			2	0.2%
Genital malformation	2	0.6%	3	0.5%	5	0.5%
Other obstetric antecedent	1	0.3%	3	0.5%	4	0.4%
Prophylactic C-section	1	0.3%			1	0.1%
Mother's medical problem	1	0.3%	2	0.3%	3	0.3%
Vaginal haemorrhage	1	0.3%	2	0.3%	3	0.3%
Ante-partum haemorrhage	1	0.3%	3	0.5%	4	0.4%
Puerperal infection			4	0.7%	4	0.4%
Sub- total	332	100%	580	100%	916	100%
Not mentioned	32	8.8%	41	6.6%	73	7.4%
Total	364		621		989	

* The totals include 4 cases in which the mother's area of residence is unknown.

When incidence rates are calculated for each of the indications by reference to the number of expected births for each type of area the ratio of urban to rural rates gives a very different picture of the differences between types of area (**Table 8**). Toxaemias of pregnancy and eclampsia, which seemed scarcely more frequent in urban areas, are in reality 7.4 times more numerous in these areas. Similarly, cases of foetal distress and problems connected with the cord (problems endangering the child's life) are respectively 3.7 times and 2.5 times more numerous in urban areas.

This table shows that caesareans are more frequently performed for non-Absolute Maternal Indications in urban areas. Although the available data is insufficient to allow us to determine the cause of this difference between types of area, we can speculate on possible explanations:

The diagnosis of these pathologies, whose prognosis for the mother's life is much better than that for Absolute Maternal Indications, is more difficult to establish. It calls for more

advanced obstetric knowledge and/or specific equipment. The necessary obstetric competence and equipment may be lacking in peripheral areas, particularly in basic health structures which are the first to see the women and are supposed to refer them upwards in the event of any problem.

Parturient living in rural areas are less likely to be confined in a health structure, delivery at home attended by an untrained person being more frequent in rural than in urban areas.

Table 8. NON-ABSOLUTE MATERNAL INDICATIONS: RATIO OF URBAN RATES TO RURAL RATES, BENIN, 1999

	Urban rate (‰ EB)	Rural rate (‰ EB)	ratio U/R
Toxaemia, pre-eclampsia	0.10	0.01	7.4
Complications connected with cord	0.51	0.14	3.7
Stationary labor	0.15	0.04	3.7
Other cause	0.41	0.13	3.3
Eclampsia	0.92	0.32	2.9
Foetal distress	7.43	3.02	2.5
Genital malformation	0.10	0.04	2.5
Ectopic pregnancy	2.41	1.08	2.2
Mother's medical problem	0.05	0.03	1.8
Vaginal haemorrhage	0.05	0.03	1.8
Breach presentation	0.56	0.32	1.8
Antecedent of C-section	2.72	1.60	1.7
Obstructed labor for other cause	0.15	0.10	1.6
Other obstetric antecedent	0.05	0.04	1.2
Ante-partum haemorrhage	0.05	0.04	1.2
Dynamic dystocia	1.02	0.90	1.1
Obstructed labor for non-AMI presentation	0.15	0.17	0.9
Puerperal infection	0.00	0.06	0.0
Premature rupture of the membranes	0.10		
Prophylactic C-section	0.05		

Geographical and financial accessibility undoubtedly also plays a part in determining recourse to hospital, whether or not on referral from a peripheral structure. Since certain pathologies, such as eclampsia, are very rapidly fatal, the mothers will not have time to reach hospital for treatment but die at home or during transport to hospital.

The technical competence and equipment available in urban hospital structures perhaps makes it more likely that Major Obstetric Interventions will be performed for indications which involve no risk (or less risk) for the mother. The risk involved in a caesarean is such that in rural areas doctors undertake them only in case of absolute necessity.

Major Obstetric Interventions for Absolute Maternal Indications

The rate of MOI/AMI is 1.37 per 100 expected births in urban areas and 1 per 100 expected births in rural areas. There is thus no marked difference between types of area. Caesareans are 1.4 times more frequent in urban areas, while for other interventions there is very little difference (**Table 9**).

Table 9. MAJOR OBSTETRIC INTERVENTIONS FOR ABSOLUTE MATERNAL INDICATIONS, BENIN, 1999*Urban areas*

	C-section	Hysterec tomy	Laparo tomy	Version extraction	Cranio tomy	Total	Mother died before intervention
Uterine rupture		2	16			18	
Transverse, facial and front presentation	43			3		46	
Foeto-pelvic disproportion an pre-rupture	155		1			156	
Ante-partum haemorrhages	44					44	
Post-partum haemorrhages		3				3	
Severe haemorrhages							1
Total	242	5	17	3		267	1

Rural areas

	C-section	Hysterec tomy	Laparo tomy	Version extraction	Cranio tomy	Total	Mother died before intervention
Uterine rupture		11	60			71	
Transverse, facial and front presentation	148			2	5	155	
Foeto-pelvic disproportion an pre-rupture	385					385	
Ante-partum haemorrhages	97	1			1	99	1
Post-partum haemorrhages	2	2				4	1
Severe haemorrhages							3
Total	632	14	60	2	6	714	5

To these two tables must be added 3 cases in which the mother's area of origin is unknown.

The differences between urban and rural areas are relatively small. In the department of Zou, however, there are 1.47 more MOI/AMIs per 100 expected births in urban than in rural areas, while in Borgou there are only 1.27 times more. There is a greater difference in the rate of caesareans per 100 expected births: caesareans are 1.6 times more frequent in urban areas in Zou, as against 1.26 times in urban areas in Borgou.

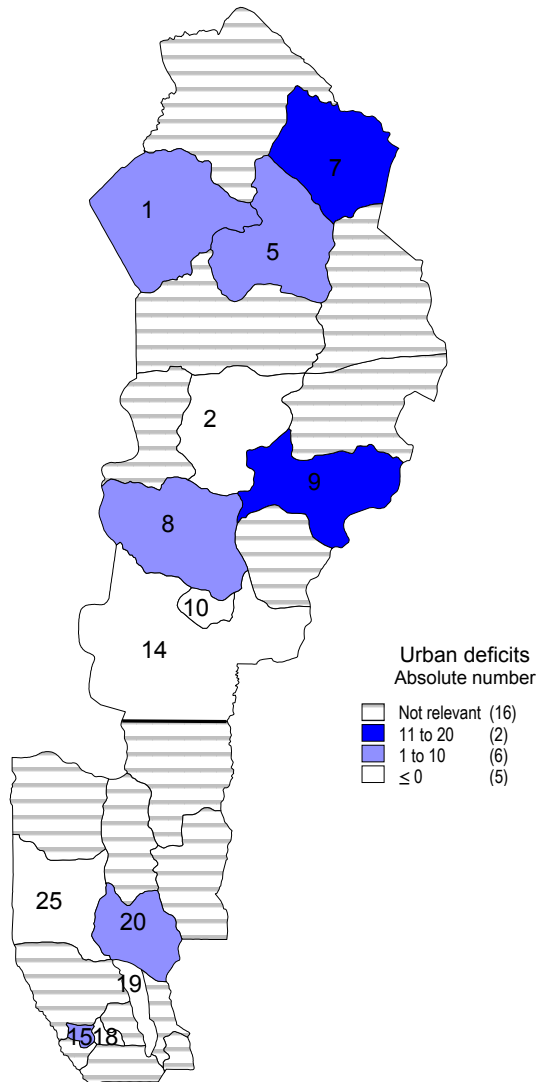
As will be seen below in the analysis of deficits, the performance of the Zou hospitals appear to be better than that of the hospitals in Borgou, where even the urban areas show considerable deficits. As regards the rural areas, it should be noted that Borgou has a much larger total area but only a slightly larger population than Zou, with about the same proportion of rural population (80% in Zou, 77% in Borgou). Accessibility problems will thus feature more prominently in Borgou, whose nine hospitals have to cover very large geographical areas.

The analysis of deficits by type of area will reveal disparities between the two departments. The results obtained, however, must be read with caution. The small number of MOI/AMIs expected in the various sub-prefectures, whether in urban or rural areas, implies that biases in the analysis, particularly urban/rural contaminations of the numerator, may have a considerable influence on the figures presented.

Deficits in urban areas

In absolute figures the deficits do not seem too large (**Figure 2**), but there is only a small urban population, and thus few expected births and MOI/AMIs. In relative terms, however, four towns out of 13, all situated in Borgou, have a deficit of more than 60% (**Table 10**). The hospitals in these sub-prefectures, therefore, do not appear to be achieving their objectives in terms of coverage of the population.

Figure 2. DEFICITS IN ABSOLUTE NUMBERS OF MAJOR OBSTETRIC INTERVENTIONS FOR ABSOLUTE MATERNAL INDICATIONS, URBAN AREA, BENIN, 1999



The numbering of the sub-prefectures is as in **Table 10**

Four sub-prefectures (two in Zou and two in Borgou) show negative deficits. Two of them are covered by departmental hospital centres in Zou (covering the town of Abomey and also Bohicon, the two towns having more or less merged) and Borgou (whose departmental hospital centre is situated in Parakou). In the other two, since the number of MOI/AMIs expected is low, it is difficult to be certain about the degree of coverage, for urban/rural contaminations are possible and may, in view of the small numbers involved, produce variations in the coverage observed.

Table 10. DEFICITS IN MAJOR OBSTETRIC INTERVENTIONS FOR ABSOLUTE MATERNAL INDICATIONS, URBAN AREA, BENIN, 1999

Department	Nr	Sub-prefecture	Expected Births	MOI for AMI		Deficits	
				Expected	Performed	Number	%
Borgou	1	Banikoara	919	14	4	10	71%
	2	Bembéréké	453	7	7	0	0%
	3	Gogounou	Not relevant				
	4	Kalalé	Not relevant				
	5	Kandi	575	9	7	2	22%
	6	Karimama	Not relevant				
	7	Malanville	1518	23	3	20	87%
	8	N'Dali	186	3	1	2	67%
	9	Nikki	1110	17	5	12	71%
	10	Parakou	5635	85	89	-4	-5%
	11	Pérééré	Not relevant				
	12	Sinendé	Not relevant				
	13	Ségbana	Not relevant				
	14	Tchaourou	535	8	9	-1	-13%
Zou	15	Abomey	2584	39	36	3	8%
	16	Agbangnizou	Not relevant				
	17	Banté	Not relevant				
	18	Bohicon	2488	38	54	-16	-42%
	19	Cové	1492	23	18	5	22%
	20	Dassa-Zoumé	837	13	11	2	15%
	21	Djidja	Not relevant				
	22	Glazoué	Not relevant				
	23	Ouessé	Not relevant				
	24	Ouinhi	Not relevant				
	25	Savalou	1190	18	22	-4	-22%
	26	Savé	Not relevant				
	27	Zakpota	Not relevant				
	28	Zangnanado	Not relevant				
	29	Zogbodomey	Not relevant				
		Total	19,522	297	266	31	10%

Deficits in rural areas

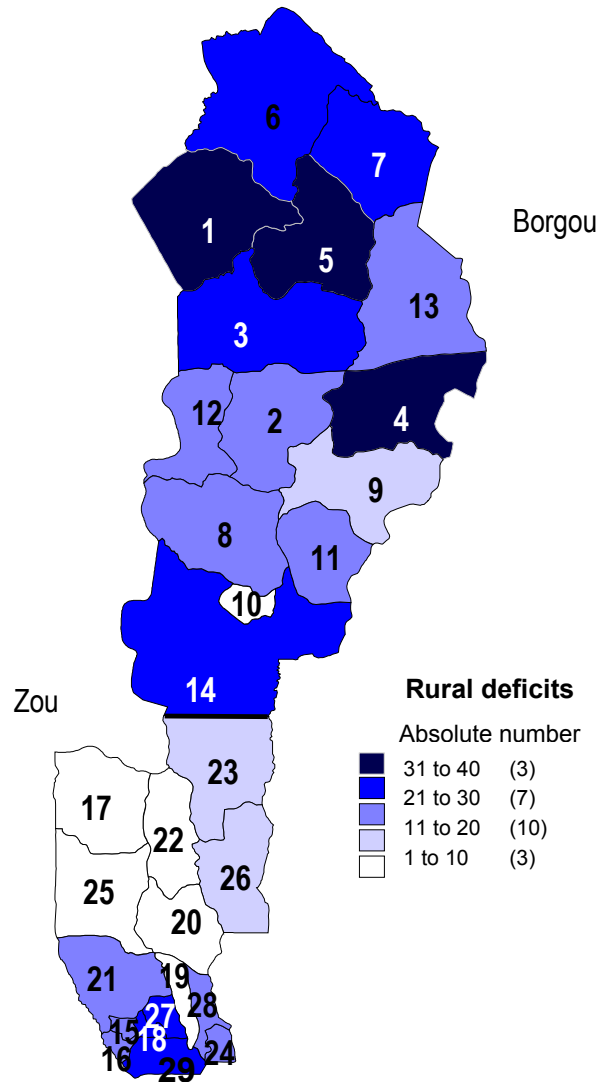
Half the sub-prefectures have a relative deficit of over 50% (**Table 11**), with absolute deficits ranging between 13 and 40 cases (**Figure 3**). Of these, six have a functional hospital (Banikoara, Kandi, Tchaourou and Malanville in Borgou, Bohicon and Abomey in Zou). Two of the hospitals concerned provide no coverage even in urban areas (see **Table 10**: Banikoara and Malanville). The Kandi hospital handles 88% of expected MOI/AMIs, while the hospitals in Zou and the Tchaourou hospital appear to be fully carrying out their responsibilities for dealing with obstetric emergencies in urban areas. More surprising are the considerable deficits in rural areas served by Bohicon and Abomey: since the Zou departmental hospital centre is in Abomey, and the two sub-prefectures are of no great extent, it might have been expected that they would provide good coverage of rural areas.

Seven sub-prefectures have deficits of between 20 and 50%; three of them have hospitals (Bembéréké, N'Dali and Nikki, all in Borgou). These sub-prefectures have very large areas. Eight sub-prefectures have deficits ranging between 11% and strongly negative deficits. Among them is Parakou, a very small sub-prefecture in which is the Borgou departmental hospital centre, with a very large deficit (-567%) which is undoubtedly due to errors in recording the mothers' real area of origin. This large hospital centre attracts large numbers of patients, and it is

highly probable that many of them give as their place of residence a temporary address in the sub-prefecture, although in fact they come from neighbouring sub-prefectures.

This may also have an influence on the deficits in the sub-prefectures of N'Dali, Tchaourou and Péréré, which have common borders with Parakou. This is also the case to a lesser extent in Savalou, though the deficits in the neighbouring sub-prefectures of Banté, Glazoué and Dassa-Zoumé are also negative.

Figure 3. DEFICITS IN ABSOLUTE NUMBERS OF MAJOR OBSTETRIC INTERVENTIONS FOR ABSOLUTE MATERNAL INDICATIONS, RURAL AREAS, BENIN, 1999



The numbering of sub-prefectures is as in **Table 11**

Over all, the hospitals in the department of Zou seem to be doing better in dealing with obstetric emergencies. Although this department is much smaller in area than Borgou, it must also be noted that coverage of urban areas, which is not influenced by the geographical extent of the sub-prefectures, is much better in Zou, with an overall negative deficit, than in Borgou, with an overall deficit of 24%. This is also the case in rural areas (49% of deficits in Borgou, 20% in Zou),

but account must also be taken of the extent of the department of Borgou and its population density¹³, little more than a third of that of Zou.

Table 11. DEFICITS IN MAJOR OBSTETRIC INTERVENTIONS FOR ABSOLUTE MATERNAL INDICATIONS, RURAL AREAS, BENIN, 1999

Department	Nr	Sub-prefecture	Expected Births	MOI for AMI		Deficits	
				Expected	Performed	Number	%
Borgou	1	Banikoara	5,153	78	38	40	51%
	2	Bembéréké	3,038	46	26	20	43%
	3	Gogounou	2,924	44	15	29	66%
	4	Kalalé	3,669	55	23	32	58%
	5	Kandi	3,296	50	16	34	68%
	6	Karimama	1,698	26	1	25	96%
	7	Malanville	2,416	36	12	24	67%
	8	N'Dali	2,460	37	21	16	43%
	9	Nikki	2,752	42	32	10	24%
	10	Parakou	411	6	40	-34	(-567%)
	11	Péréré	1,585	24	9	15	63%
	12	Sinendé	2,382	36	16	20	56%
	13	Ségbana	1,885	28	15	13	46%
	14	Tchaourou	3,340	50	23	27	54%
Zou	15	Abomey	952	14	1	13	93%
	16	Agbangnizou	2,557	39	19	20	51%
	17	Banté	2,479	37	52	-15	-41%
	18	Bohicon	1,860	28	6	22	79%
	19	Cové	177	3	3	0	0%
	20	Dassa-Zoumé	2,564	39	41	-2	-5%
	21	Djidja	3,057	46	33	13	28%
	22	Glazoué	3,154	48	57	-9	-19%
	23	Ouessé	2,765	42	39	3	7%
	24	Ouinhi	1,595	24	10	14	58%
	25	Savalou	2,667	40	66	-26	-65%
	26	Savé	2,411	36	32	4	11%
	27	Zakpota	3,729	56	33	23	41%
	28	Zangnanado	1,824	28	16	12	43%
	29	Zogbodomey	3,113	47	17	30	64%
		Total	71,913	1,086	712	374	34%

Some hospitals (Banikoara, Bembéréké, Parakou and Malanville in Borgou and Savalou in Zou) have established a system of referral and counter-referral. But this system seems imperfect, particularly in Banikoara and Bembéréké, which have no ambulance. The sub-prefectures of Sinendé and Gogonou have an ambulance for referral to Bembéréké, as has the sub-prefecture of Segbana for referral to Kandi. The system, except in Savalou, which has radio communication, depends on the telephone system; and though telephones are available and functional in the towns, this is certainly not the case in the surrounding villages. **Table 11**, showing rural deficits, is eloquent on the performance of these systems of referral and counter-referral.

Excluding the deficit in Parakou, which seems aberrant and must certainly have been biased by urban/rural contamination, only women living in the sub-prefecture of Savalou seem to gain any substantial benefit from this evacuation system. Sub-prefectures without a hospital but with an ambulance seem also to benefit, though to a lesser extent than Savalou, from having a vehicle able to transport referrals.

¹³ Borgou has an area of 50,098 sq. km and a population density of 20 to the sq. km. Zou has an area of 19,174 sq. km and a population density of 54 to the sq. km.

The analysis of maternal deaths and their causes and of early perinatal mortality will also make it possible to understand more clearly the disparities between departments. These differences, as discussed above, are quantitative, but they also relate to the qualitative aspect of the arrangements for dealing with obstetric emergencies.

Uterine ruptures

The file includes a total of 89 uterine ruptures, 71 of them in women from rural areas. A hysterectomy was found necessary in 15% of these cases, most frequently for women in rural areas. Most of these interventions were successful: there were only 6 deaths, all of women from rural areas, who had no doubt been late in reaching hospital. Few of these interventions, however, managed to save the child, only six of whom survived the intervention (none at all in hysterectomies). In more than 80% of the cases, and as much as 87% in rural areas, the infant was stillborn, and no doubt could not have been saved by the intervention.

Table 12. UTERINE RUPTURES: TYPE OF INTERVENTIONS AND NUMBER OF MATERNAL DEATHS ACCORDING TO TYPE OF AREA, BENIN, 1999

	Urban area		Rural area		Total	
	Number	Deaths	Number	Deaths	Number	Deaths
Hysterectomy	2	0	11	1	13	1
Laparotomy	16	0	60	5	76	5
Total	18	0	71	6	89	6

Uterine ruptures complicate 8% of cases of obstructed labour in urban areas and 12% in rural areas. There is a distinct difference between the two departments, particularly in rural areas. In Borgou, uterine ruptures represent almost 16% of obstructed labour problems, in Zou only 9%. Once again, distance has not been compensated for by an efficient evacuation system, and accessibility is a more serious problem in Borgou.

Intra-hospital maternal deaths

There are a total of 60 cases of maternal death in the “women” file (**Table 13**), 32 of them for Absolute Maternal Indications (24 after a Major Obstetric Intervention, 3 for whom the intervention is not known and 5 who died before operation). The fatality rate for AMIs is slightly higher (3.2% of deaths) than for non-AMIs (2.8% of deaths), and in both cases the death rate is higher in rural areas, though the difference between urban and rural areas is not significant¹⁴. There is no statistically significant difference ($p>0.5$) between departments and types of area either for AMI or non-AMI. Similarly, mortality after MOIs does not differ according to the type of area and/or department ($p>0.3$). On the other hand, intra-hospital maternal mortality¹⁵ is higher in Zou than in Borgou. The data in the health formation file show that in Zou this mortality is 931 per 100,000 live births, while in Borgou it is 784 per 100,000 live births. It should be remembered that the data include all women, whatever their department of residence, admitted to one of the hospitals concerned in the study.

¹⁴ Chi square: AMI = 2.3 $p<0.123$, non-AMI = 1.08 $p<0.298$.

¹⁵ Method of calculation used here to evaluate intra-hospital maternal mortality: number of maternal deaths in the hospital / number of deliveries in the hospital x 100,000.

Table 13. INTRA-HOSPITAL MATERNAL DEATHS ACCORDING TO INDICATION (MOI AND NON-MOI), BENIN, 1999

	Urban area (633 cases)		Rural area (1.346 cases)	
	Number	%	Number	%
Uterine rupture			6	13%
Transverse, facial and front presentation	1	8%		
Foeto-pelvic disproportion an pre-rupture			10	21%
Ante-partum haemorrhages	2	15%	4	8.5%
Post-partum haemorrhages			4	8.5%
Severe haemorrhages	2	15%	3	6%
Cause non-AMI	8	62%	20	43%
Total	13	100%	47	100%

Analysis of these figures is difficult in view of the small number of deaths observed. Nevertheless, it may be observed that haemorrhages (ante- and post-partum) are responsible for almost half the number of deaths due to an Absolute Maternal Indication.

Since caesareans are the operations most frequently performed (88% of interventions), it follows that this type of intervention produces most deaths. Out of 27 deaths after a caesarean, there are 16 Absolute Maternal Indications and 11 non-Absolute Maternal Indications. The analysis of differential mortality according to type of area shows that the risk of dying after a caesarean is higher, without being statistically significant ($p=0.4$), in rural areas when the indication is an AMI, but that there is practically no difference when it is non-absolute.

Table 14. INTRA-HOSPITAL MATERNAL DEATHS BEFORE INTERVENTION AND AFTER CAESAREAN, ACCORDING TO TYPE OF INDICATION AND AREA, BENIN, 1999

AMI (C-sections and mother died before intervention)						
	Urban area (243 cases)		Rural area (636 cases)		Total (879 cases)	
	Number	%	Number	%	Number	%
Maternal deaths						
After C-section	3	1.23%	13	2.04%	16	1.8%
Before intervention	1	0.41%	4	0.63%	5	0.6%
Non-AMI (C-sections and mother died before intervention)						
	Urban area (315 cases)		Rural area (526 cases)		Total (841 cases)	
	Number	%	Number	%	Number	%
Maternal deaths						
After C-section	4	1.27%	7	1.4%	11	1.3%
Before intervention	3	0.95%	8	1.5%	11	1.3%

While most of the hospitals in Zou and Borgou appear, on the evidence of deficits observed in urban areas, to be providing fairly good coverage in terms of dealing with obstetric emergencies, the quality of the service provided is still not entirely satisfactory. Intra-hospital maternal mortality is, over all, still very high.

Ante- and post-partum haemorrhages account respectively for 18 and 38% of deaths of mothers with an AMI, and the infections found in 1.5% of the patients are the main complications of the interventions performed in these hospitals.

Child deaths

Early perinatal mortality (stillbirths and deaths within 24 hours) is very high in all types of area, and is even slightly higher (taking in all indications and interventions, with the exception of laparotomies for extra-uterine pregnancies) in urban areas, where the "women" file shows 1.3 times more deaths (per 100 births) within 24 hours of the birth than in rural areas, and where, on

the other hand, the stillbirth rate is only half that in rural areas. These differences are no doubt due to the fact that in rural areas it takes longer to reach a health structure in the event of problems.

Table 15. NUMBER OF CHILDREN STILLBORN AND DYING WITHIN 24 HOURS OF AN MOI ACCORDING TO TYPE OF INDICATION AND AREA, BENIN, 1999

	AMI			Non-AMI			Total		
	Number of MOI	Number of deaths	% of deaths	Number of MOI	Number of deaths	% of deaths	Number of MOI	Number of deaths	% of deaths
Urban	267	173	64.8%	360	170	47.2%	627	343	54.7%
Rural	714	479	67.1%	606	223	36.8%	1,320	702	53.2%
Total	981	652	66.5%	966	293	30.3%	1,947	1,045	53.7%

Not including 7 cases in which the mother's area of origin is not known

While, as we have seen above, delay in reaching hospital has serious consequences for the survival of the mother, the prospects are still worse for the survival of the child. And while in rural areas it is often already too late to hope to save the child, the interventions performed in urban areas may make it possible to bring a living infant into the world but its prospect of survival over the first 24 hours is often much reduced.

If we consider only MOI/AMIs, early perinatal mortality is higher in rural areas, and the differences in terms of stillbirths are still greater. They account for 19% (33 stillbirths) of child deaths in urban areas, against 34% (164 stillbirths) in rural areas. The causes of these deaths are mostly problems of obstructed labour, with (as noted above) a larger number of uterine ruptures in rural areas. Haemorrhages, mostly ante-partum, are more frequently the cause of death of the child in urban areas (17.3% of cases in urban areas, 12.3% in rural areas). The higher frequency of uterine ruptures and the lower frequency of haemorrhages in rural areas suggests that the accessibility of health structures is a problem in peripheral areas, with women presenting a problem of obstructed labour often arriving very late at the hospital and women suffering from haemorrhages not reaching hospital in time to have treatment.

Caesareans can save the child's life, but, as **Figure 4** below shows, while up to a caesarean rate of 2 per 100 expected births there is a sharp fall in early perinatal mortality in the department of Borgou (falling from 50 to 22 per 100 MOIs) this is not at all the case in Zou. In that department there seems to be no association between the caesarean rate and early perinatal mortality, which remains very high, always above 75% (except in Ouessé, at 14%, and Savé, at 65%).

In Borgou, three sub-prefectures (Kandi, Bembéréké and Sinendé) have a low early perinatal mortality rate of under 12%. The women in these three towns were almost all operated on in the Kandi or the Bembéréké hospital. These hospitals, and particularly the one in Bembéréké, seem to do well in dealing rapidly and effectively with obstetric problems, both for women living in the prefecture and for those from neighbouring prefectures, particularly for women from Sinendé, which has an ambulance for transporting patients to Bembéréké hospital. There is also an ambulance for the transport of emergencies in two of the sub-prefectures adjoining Kandi, so that parturient can be rapidly referred to hospital. The availability of vehicles for the transport of patients thus plays an essential part in getting parturient quickly to hospital and consequently has a favourable impact on the survival prospects of the child.

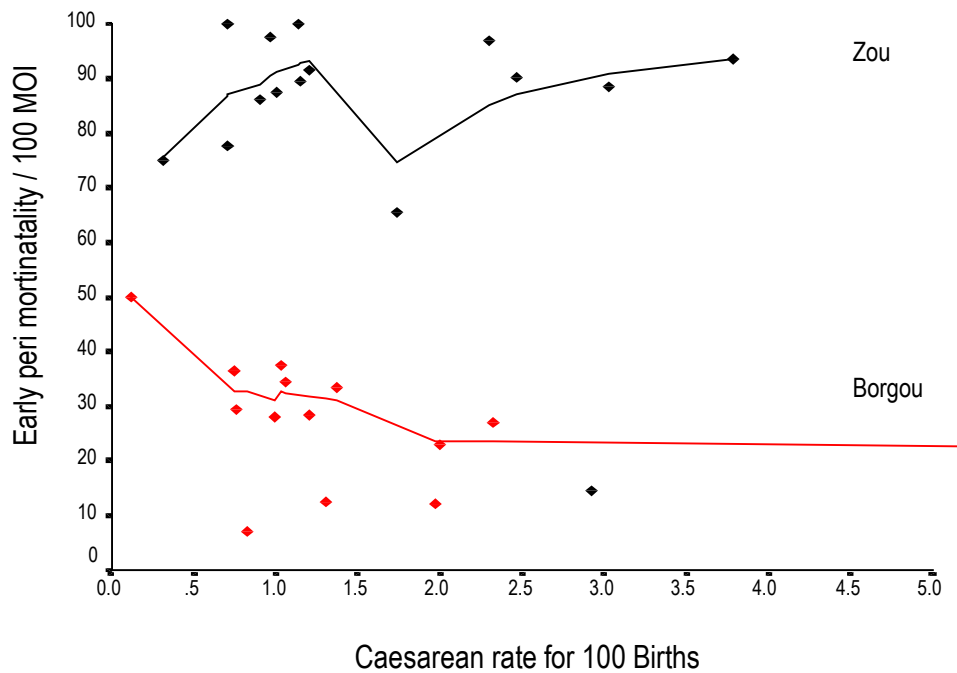
In Zou the perinatal mortality rate is high everywhere except in Ouessé, which has no functional hospital but lies close to Tchaourou, which has a hospital near the border between the two sub-prefectures used by almost all women in Ouessé who need hospital treatment for a problem.

The sub-prefecture of Savalou, which has an ambulance, seems rather poor at handling obstetric emergencies, at any rate as regards the prognosis for the child. The perinatal mortality

rate in this sub-prefecture is very high (94%). Ambulances seem, therefore, to be effective only if they are available not at the referral hospital but at the primary-level health structure, which is the women's first point of contact and refers them if necessary to the hospital centre – provided of course that the quality of treatment in the hospital is optimal.

The stillbirth rate calculated on the basis of data from the health formation questionnaire, and thus including women whatever their department of origin, is also high, with 8.5% of stillbirths among births and interventions at these hospitals.

Figure 4. STILLBIRTHS AND NEONATAL MORTALITY WITHIN 24 HOURS (PER 100 MOIs) AMONG WOMEN WHO HAVE HAD AN MOI, ACCORDING TO CAESAREAN RATE AND BY SUB-PREFECTURES IN RURAL AREAS, BENIN, 1999



Data for Parakou is not included in this figure. The caesarean rate of 19% in rural areas seems to be erroneous, no doubt because of serious contamination of the numerator by women from other areas.

The distribution of early perinatal mortality in terms of “time of the child’s death” is not the same in Zou as in Borgou. In Borgou stillbirths account for 84% of child deaths in rural areas, compared with 17% in Zou. (In urban areas the differences between departments are equally marked: stillbirths account for 35% of child deaths in Borgou, compared with 7% in Zou – though in both departments the stillbirth rate is lower in urban than in rural areas).

The large number of stillbirths in the Borgou hospitals can be explained by the delay in dealing with obstetric emergencies resulting from the distance between rural areas and the hospital. This explanation is also supported by the fact that the stillbirth rate is much lower in urban areas, which by definition are more accessible. Since the department of Zou is much smaller in area, the problem of geographical accessibility does not arise to the same extent and women can reach a health structure more quickly, so that their child is still alive on their admission to hospital. The difference marked here by the proportion of child deaths after the birth and within 24 hours suggests that there may be a problem about the quality of treatment; for even though in Zou these deaths occur more frequently on an AMI (66% in Zou, 48% in Borgou) they concern 83% of children treated in hospital, the mother almost always having had a caesarean.

In Borgou, on the other hand, once the hospital has taken on the obstetric emergency, there are only 16% of deaths within 24 hours. Although the Zou hospitals do better in quantitative terms in dealing with obstetric emergencies, they have a serious problem in terms of quality of care. Even if, as we shall see below, the workload of both medical and paramedical staff is on average higher in Zou, it is still quite reasonable (7 MOIs per doctor per month and 26 deliveries per midwife per month). Moreover, all the Zou hospitals have at least one gynaecologist on the permanent staff and at least one state-certified midwife, which is not the case in Borgou; theoretically, therefore, they ought to provide better treatment for patients.

Can we, as is often the case, explain the poor results in certain health structures by a shortage of human and/or material resources?

Work load and resources

In the two departments involved in the study, there are 14 hospitals capable of dealing with obstetric emergencies, nine for the 14 sub-prefectures in Borgou and 5 for the 15 sub-prefectures in Zou. In Zou, however, health coverage is in theory better because of its smaller size, its area being only 0.37 times as large as Borgou.

The data we have on hospital confinements seems to be badly contaminated because the collection of data, using the health formation questionnaire, did not take into account the mother's area of origin (by department). Since the bias thus introduced into the estimate of the proportion of hospital confinements per 100 expected births cannot be evaluated, it is not possible to use this information to assess the performance of the various hospitals in terms of coverage.

Table 16. HOSPITAL ACTIVITIES BY SUB-PREFECTURE, BENIN, 1999

	Intra-hospital deliveries	IOM		IOM/IMA	
		Number	% of intra-hospital deliveries	Number	% of total MOI
Banikoara	751	76	10%	41	54%
Bembéréké	557	210	38%	78	37%
Kandi	1,464	55	4%	39	71%
Malanville	710	21	48%	9	43%
N'Dali	264	127	48%	60	47%
Nikki	288	151	52%	64	42%
Parakou CHD	1,072	268	25%	101	38%
Parakou Zinflou	118	14	12%	6	43%
Tchaourou	378	155	41%	67	43%
Abomey	1,892	380	20%	217	57%
Cové	1,376	66	5%	43	65%
Dassa-Zoumé	585	146	25%	105	72%
Savalou	1,266	282	22%	153	54%
Total / Mean	10,721	1,951	18%	983	50%

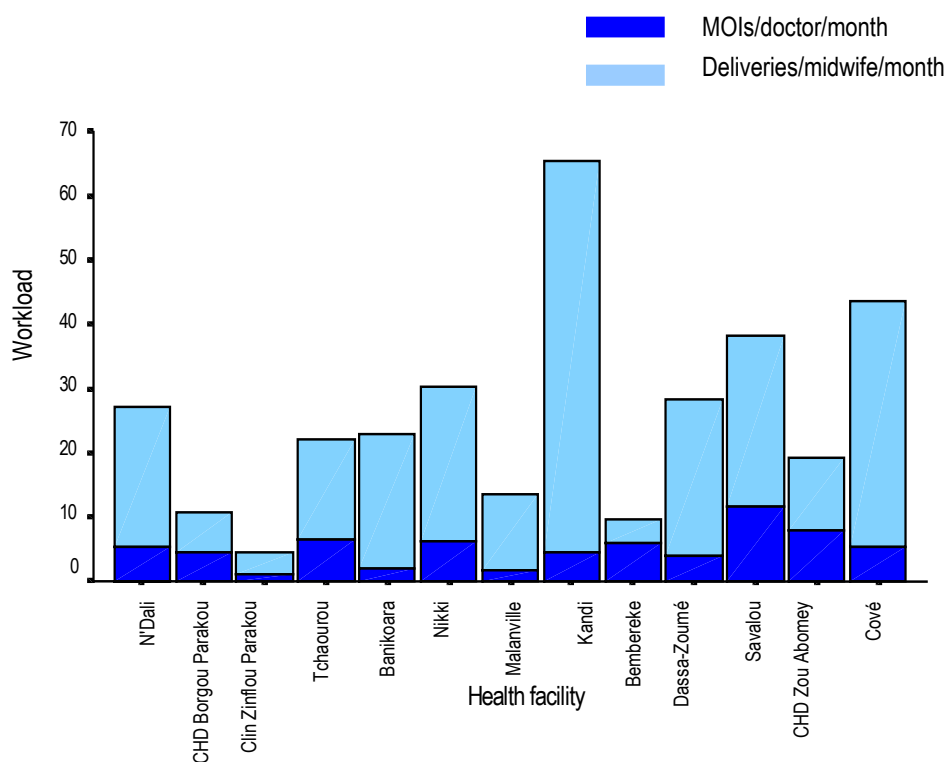
The proportion of Major Obstetric Interventions performed for Absolute Maternal Indications ranges between 37% in Bembéréké and 72% in Dassa-Zoumé. There is no correlation between the presence of a gynaecologist on the hospital staff and the proportion of MOIs for AMI ($p < 0.19$), nor between the presence of a gynaecologist and the MOI rate per 100 hospital confinements ($p < 0.34$).

Except in Malanville and the Zinflou private clinic all the gynaecologists and/or surgeons perform at least one Major Obstetric Intervention per month. In Savalou and N'Dali they perform more than 10 interventions per month. Though all these structures have a gynaecologist or a surgeon on the staff, in five of them one officer has by himself to provide service throughout the year. While in the Zinflou clinic, situated in Parakou (that is, in the same town as the departmental

hospital centre), this situation is manageable, this cannot be said for hospitals which are at a distance from any other health structure, for example in Malanville and Kandi.

As regards the midwives, it must be noted in the first place that no health structure – not even the departmental hospital centres in Parakou and Abomey – has a specialist midwife. Deliveries are carried out by maternity nurses and state-certified midwives. As **Figure 5** shows, the average number of deliveries carried out by midwives in the various hospitals is around 18 per month. In the Kandi hospital, which has only two midwives, the figure is very much higher, with each of the two midwives carrying out 61 deliveries per month. The health formation questionnaire for the Nikki hospital makes no mention of any midwife or maternity nurse, which is difficult to understand, since the hospital is responsible for almost 300 deliveries a year.

Figure 5. MONTHLY WORKLOAD OF MEDICAL AND PARAMEDICAL STAFF, BENIN, 1999



Over all, there appear to be no major staffing problems in the hospitals covered by the study. All of them have medical and paramedical staff able to deal with obstetric emergencies. Nevertheless, there may be a case for better management of the distribution of some categories of staff. A redeployment of paramedical personnel to bring about more even workloads should be considered, reducing the relative overabundance of staff in the two departmental hospital centres and Bembéréké hospital. This would make it possible, on the one hand, to reduce the excessive work loads in Kandi hospital and on the other would enable hospitals with only one or two midwives to provide a continuous service with reasonable hours of work. The problem for gynaecologists and other doctors is no doubt less acute, and no hospital seems to have any superfluous staff. A redeployment of medical staff is thus hardly possible: perhaps, therefore, the solution lies either in training additional gynaecologists or in intensifying the training of surgeons and/or generalists in obstetric operating techniques.

The geographical accessibility of health structures is frequently a factor in the poor performance observed. We have already noted, while analysing deficits in rural areas, that the existence of an organised system of referral and counter-referral, with an ambulance but without

a system of radio communication, was of little value in reducing deficits. The system established in Savalou, with radio communication facilities, is much more effective in this respect. The analysis of maternal and perinatal mortality, however, shows the considerable benefit of the evacuation systems that have been established. Imperfect as they may be, they make it possible to deal more rapidly with urgent cases and thus significantly improve the chances of survival for both mother and child.

4. UTILISATION OF RESULTS

Since there have not yet been any retro-information process on the results of the UON study in Benin and no final report has yet been issued, it is not really possible at this moment to measure the impact of the study. The only information on this subject available at present comes from the interviews carried out after the collection of data.

Retro-information

One of the objectives of the study was to confront those working in health systems – decision-makers at both central and peripheral levels and the staff of health structures – with the scale of the problem of maternal mortality. With this in mind retro-information meetings will be organised for considering the results of the study on the basis of a concrete view of the situation. These discussions should lead to changes and to programmes aimed at reducing maternal mortality.

In Benin this stage has not yet been reached, since the promoters of the study are few in number and involved in numerous programmes within the Ministry of Health, and the administrative constraints on the organisation of such meetings are difficult to manage.

It must also be recognised that the coverage of needs is such that access to hospital care might not be considered such an important problem as to justify a national meeting – even though in Borgou the number of health structures capable of dealing with obstetric emergencies still seems insufficient to cover such a large area.

On the other hand, the study has revealed worrying problems of quality of care and perinatal mortality. These would merit greater attention by decision-makers at national level and the providers of services. While one of the principal objectives of the study has been to reveal problems in the coverage of obstetric needs, the importance of considering quality of care is by no means secondary. It may well be questioned whether those concerned locally in the study and the decision-makers who will make use of it are sufficiently aware of the contribution which the study can make in this field.

Perception

Methodological note

This “research” part of the study was carried out by a sociologist from CERRHUD, a research unit directed by one of the leaders of the UON study and much involved in research on maternal health. This person was also concerned in the audits of “near miss” cases and of the SOU programme in Benin. Ten key workers involved at different levels in the effort for the reduction of maternal mortality were selected: 3 representatives of the Ministry of Health, 3 representatives of international and bilateral cooperation agencies (UNFPA, UNICEF, GTZ), 2 gynaecologists from the Cotonou hospitals, 1 member of a research institute (CREDESSA) and 1 member of a Beninese association for the promotion of the family.

An analytical grid (see Annex 3), standardised for all the countries involved, set out the essential questions on the global problems of maternal health and on the perception of the UON study itself.

Results

While five of the people questioned had not been informed of the carrying out of the study, nevertheless they all showed themselves interested by the project. All of them were very conscious of the problem of maternal mortality in Benin and were sometimes critical of the decision-makers, not for the Ministry's policy, which was considered entirely appropriate, but rather for the application of the policy. The action proposed "on paper" was, in their view, frequently not put into operation.

Those who were told about the study and kept informed about its development (representatives of the Ministry of Health and the partner organisations financing the study) are satisfied with Benin's participation in the UON network. The most positive points, frequently mentioned, are the involvement of health workers in the field, the stimulation of decision-makers at national level and the setting out of a panoramic view of the multiple deficiencies of the system of care for pregnant women. Everybody, however, was sceptical about the operational effects of the study, fearing that it would do no more than give an unduly medical description of the problem without systemic vision, including the various factors accounting for the inadequacy of the arrangements for dealing with obstetric emergencies. Some think that it would be desirable to involve in the retro-information process not only health workers but also representatives of the population. It would be advisable also not to limit the diffusion of the results of the study to those directly involved in reproductive health but to use the study to re-establish collaboration and partnership between all those who can play a part in promoting the interests of women in the wider sense (education, social position, employment, etc.).

5. CONCLUSION

The UON study in Benin faced numerous problems, one of the most important being the limited number of people able and willing to dynamise the approach proposed. Although the promoters of the study included people influential in the field of maternal health, the formal support of the Ministry of Health was long in coming. This slowness of the administration, which was perhaps also responsible for the delay in organising retro-information arrangements, did not, however, prevent the initiators of the study from carrying out the collection of data with a speed and efficiency which was frequently lacking in other countries in the UON network.

The present study, which is now being extended into other departments, has revealed a number of essential factors contributing to Benin's high maternal mortality. There is a problem of geographical accessibility: health coverage, particularly in Borgou, is inadequate, and there is a need for the construction or rehabilitation of health structures in the sub-prefectures where these are lacking. But this is not the only problem. It must also be admitted that even in sub-prefectures adequately provided with hospitals and with staff, the quality of care offered is not good enough to ensure that obstetric emergencies are efficiently handled. Intra-hospital maternal mortality and perinatal mortality are still dramatically high.

The realisation, some years ago, of the low rate of utilisation of health services, which were felt to be unwelcoming and poorly organised, led the Ministry of Health to develop the CADZS project for supporting the development of health zones. It is perhaps by accelerating this policy for the decentralisation and rationalisation of the health system that Benin will be able more rapidly to improve results both in the field of maternal health and in terms of the health problems of the population as a whole.

The programmes established by the Ministry of Health do indeed show its desire to attack more effectively the problem of maternal mortality; but concrete action has not yet been taken to realise these ambitions, and it is to be hoped that the UON study, by drawing attention to the problems in more concrete fashion, will have an accelerating effect on putting the programmes into operation. This is why retro-information on the results of the study, at both national and departmental level, is of such importance and must be one of the key points in the study if it is to be fully effective.

ANNEX 1: QUESTIONNAIRE FOR WOMEN

Nr Quest	Questions and answers	Code
	Identification of health facility	
Q1	Code of health facility Department: _____ Health zone: _____ Sub-prefecture: _____ Name of health facility: _____	□□□□
	Identification of parturient:	
Q2	Admission number: _____	
Q3	Admission date: ____/____/____	
Q4	Year if birth: _____ Age: _____ Address of parturient:	
Q5	Sub-prefecture (1): _____ Commune (2): _____ Village of origin (3) _____ Area / Street (4): _____ Name of homeowner (5): _____	□□□□
Q6	CS area: Zone of: _____ -	□□□□
Q7	Distance home-hospital: _____ km Area: Urban <input type="checkbox"/> Rural <input type="checkbox"/> Unknown <input type="checkbox"/>	
Q8	Place of delivery: 1. At home 2. In the way of hospital 3. This formation 4. An other public formation 5. An other private formation 6. Other (specify): _____ -	
Q9	Transfer: Yes <input type="checkbox"/> No <input type="checkbox"/> (go to Q12)	
Q10	If Yes Taxi <input type="checkbox"/> Ambulance <input type="checkbox"/> other <input type="checkbox"/> Specify _____ -	
Q11	Medical transfer Midwife <input type="checkbox"/> Other <input type="checkbox"/>	
Q12	Major Obstetric Intervention Date of intervention: ____/____/____ Time of intervention _____ hour _____ min	Yes <input type="checkbox"/> No <input type="checkbox"/>
Q13	Type of intervention: 1. Caesarean 2. Hysterectomy 3. Laparotomy for uterine rupture 4. Laparotomy for ectopic pregnancy 5. Internal version with breach extraction 6. Craniotomy / cranioclasie / embryotomy 7. Symphysiotomy 8. Other (specify): _____	Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
Q14	IMA	Yes <input type="checkbox"/> No <input type="checkbox"/>
Q15	Indication: 1. Uterine rupture 2. Obstruction labor for transverse presentation 3. Obstruction labor for front presentation 4. Obstruction labor for foeto-pelvic disproportion presentation 5. Obstruction labor for other presentation 6. Dynamic dystocia 7. Obstruction labor for other cause 8. Ante-partum haemorrhage for placenta praevia 9. Ante-partum haemorrhage for haematoma retro-placental 10. Ante-partum haemorrhage for other cause	Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>

	11. Post-partum haemorrhage	Yes <input type="checkbox"/> No <input type="checkbox"/>
	12. Breach presentation	Yes <input type="checkbox"/> No <input type="checkbox"/>
	13. Antecedent of caesarean	Yes <input type="checkbox"/> No <input type="checkbox"/>
	All maternal death	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Result for child	
Q16	1. Born alive (not reanimated) (Apgar >=7)	Yes <input type="checkbox"/> No <input type="checkbox"/>
	2. Born alive reanimated (Apgar <=7)	Yes <input type="checkbox"/> No <input type="checkbox"/>
	3. Stillborn	Yes <input type="checkbox"/> No <input type="checkbox"/>
	4. Born alive and died within 24h	Yes <input type="checkbox"/> No <input type="checkbox"/>
	5. Not reported	Yes <input type="checkbox"/> No <input type="checkbox"/>
Q17	Result for mother	
	Nothing to report	
	Complication: see Q19	
	Died: see Q15 and Q16	
	Transferred to another health facility: _____	
	If transferred	
	Name of health facility:	
	Result: ok = 1 death = 2 out of sight = 3	
Q18	Type of complication: _____	
Q19	Moment of mother's death:	
	Before intervention	
	During intervention	
	After intervention	
	Not reported	
Q20	Cause of mother's death:	
	Hypertensive disorder	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Haemorrhage	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Infection	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Unknown	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Other (specify): _____	Yes <input type="checkbox"/> No <input type="checkbox"/>
Q21	Date of discharge: ___/___/___	
Q22	Name of interviewer: _____	<input type="checkbox"/>
Q23	Date of survey: ___/___/___	
Q24	Control:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

ANNEX 2: QUESTIONNAIRE FORMATION

N° Quest	Questions and answers	Code
Q1	Identification of health facility Department: Health zone: Sub-prefecture: Health facility (name): Address of health facility:	
Q2	Type of hospital • Public (1) • Private (2)	
Q3	Category of health facility • Departmental hospital • Zone hospital • Sub-prefecture hospital	
Q4	Population of zone _____	
	Equipment	
Q5	Number of beds in maternity ward.....	
Q6	Total number of beds in health facility	
Q7	Number of operating theatres	
Q8	Number of obstetrical operating theatres	
Q9	Number of mechanical extractors in use	
Q10	Number of electric extractors in use	
Q11	Number of forceps in use	
Q12	Number of caesarean kits	
Q13	Number of ambulances in use	
	Personnel	
	Medical	
Q14	Number of gynaecologists	
Q15	Number of anaesthetists (physicians)	
Q16	Number of surgeons	
Q17	Number of physicians with surgical skill	
Q18	Number of students gynaecologists	
Q19	Number of specialised midwives	
Q20	Number of midwives with state degree	
Q21	Other (specify)	
	Paramedical	
Q22	Number of maternity nurses	
Q23	Number of aesthesia assistants	
Q24	Number of laboratory technicians (transfusion)	
Q25	Other category	
	Activities	
Q26	Number of admissions to maternity ward	
Q27	Number of admissions in gynaecology ward	
Q28	Total number of deliveries	
Q29	Of which total number of dystocic deliveries	
Q30	Of which total number of eutocyc deliveries	
Q31	Total number of laparotomies	
Q32	Total number of laparotomies for ectopic pregnancy	
Q33	Total number of hysterectomies	
Q34	Total number of craniotomies/ embryotomies	
Q35	Total number of stillbirths	
Q36	Total number of maternal deaths	
Q37	Total number of caesareans	
Q38	Total number of uterine ruptures	

Q39 Name of interviewer: _____
Q40 Date of survey: _____ \ _____ \ _____
Q41 Result of survey
- questionnaire completed
- questionnaire not completed
- Name of supervisor: _____
- Date of supervision

ANNEX 3. LIST OF MAIN DOCUMENTS PUBLISHED BY THE UON STUDY IN BENIN

Ministry of Health, Benin

Octobre 2000 Ministère de la Santé, Les Besoins Obstétricaux Non Couverts, Rapport final, Draft. 15 p.

Janvier 2000, Ministère de la Santé, Protocole d'étude sur les Besoins Obstétricaux Non Couverts, 29 p.

Octobre 1999 PADS, Point sur l'état actuel de la recherche sur les Besoins Obstétricaux Non Couverts dans les départements du Borgou et du Zou, 4 p.

1998 Houeto D.J., Sognigbe H., Gbehou J., Kotchofa I.S., Étude du taux des Interventions Obstétricales Majeures au CSSP de Cové en 1998, 6 p.

Coordination and management team

Juillet 2000 Dubourg D., Les Besoins Obstétricaux Non Couverts, Rapport de la mission au Bénin du 17 au 29 juillet 2000, 9 p.

Décembre 1999 Litt V., Samake S., Rapport de la mission au Bénin de l'équipe de coordination du réseau de recherche sur l'approche des Besoins Obstétricaux Non Couverts pour les Interventions Obstétricales Majeures (12 au 20 décembre 1999), 4 p.

Mars 1999 Litt V., Rapport de mission au Bénin du 8 au 13 mars 1999, 10 p.

Other documents

Juillet 2000 Tambekonou J., Les Besoins Obstétricaux Non Couverts au Bénin, Thèse pour l'obtention du grade de docteur en médecine, 154 p.