Maternal Mortality in Pakistan - Compilation of available Data

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Abstract

Objective: To compile available information - both hospital and community based - on the maternal mortality ratios (MMRs) and the causes of maternal deaths in Pakistan
Methods: Data was collected from articles published in Medical Journals, in Proceedings of Conferences and of Workshops as well as from News letters of the national Committee for Maternal Health (NCMH). The data was then tabulated in order of the year of publication.
Results: The MMRs reported from hospitals vary between 17 in a private tertiary hospital to 2736 in a government tertiary hospital. In the community the range is from 160 in Sindh to 673 in Khuzdar. Data for different periods of time from three tertiary public hospitals, two in the south and one in the north of Pakistan, show no decrease in MMRs. The trend remains the same.
In the hospitals over 80% of the deaths are due to direct causes. The most common cause of death is hemorrhage, followed by eclampsia and sepsis. The causes of death in the community are also the same though the proportions vary. Direct causes account for 78.1% of deaths, hemorrhage being the most common followed by sepsis, eclampsia, rupture of the uterus, and abortions.
Conclusions: Available data shows that the Maternal Mortality Ratios in Pakistan continue to remain high despite attention paid to maternal health. To address the unacceptable state of maternal health, a policy change with a morc comprehensive and integrated approach to maternal health services is needed. Strategies need to be developed which are short term, medium term and long term. This includes competency based training, deployment and supervision of a cadrc of skilled attendants for delivery at the community level. In addition upgrading of health care systems especially availability of emergency obstetric care is urgently required (JPMA 52:539; 2002).

Introduction

The Maternal Mortality Ratio (MMR) of a country is indicative of its health and development status. Information on maternal mortality is required to determine this status and to set priorities for policy making and programmatic and operation research strategies.
Data from around the world shows that there is great disparity between the maternal mortality of the developing and developed world[1]. Even among the developing countries the MMRs vary widely. A large number of maternal deaths are reported from most of the developing countries but the exact numbers are not known. Registration of vital events like deaths and births is incomplete and at times inaccurate. Surveys and studies to determine the magnitude and causes of maternal deaths on a national basis are both complex and costly[2]. Hence population based data, especially nationwide, is scarce. Hospital-based data is more easily available, and although it is well known that hospital data is not representative of the general population and is biased, it does serve as a basis for policy making, for advocacy and for determining trends over a period of time.

Materials and Methods

In this paper available information on maternal mortality in Pakistan from both hospitals and community has been collated. Most of this data has been published in journals which are not listed in

the Index Medicus and are thus not easily retrievable. In addition to published articles, information printed in the newsletters of the National Committee for Maternal Health (NCMII) and in Conference proceedings have also been included. The information presented in the papers is not uniform e.g. the booking status of the women was not given in most of the reports. Hence this information has not been shown in the table. Some of the MMRs reported are based on total births and not live births[3-5] and this has been indicated in the table.
The multi-hospital figures include government hospitals, other public sector hospitals and a few private hospitals. All information has been tabulated according to the year of publication. The years covered by the report are shown in brackets against the name of the institution/s.

Results

Hospital based data

The MMR reported in different hospital based studies is shown in Table 1.

Table 1. Maternal mortality ratios hospital based data.

Ref. #	Author	Year of Reporting	Name of Hospital	No. of Deaths	MMR*
3.	Aziz S. A.	1968	Liaquat Medical College Hospital, Hyderabad (1961 – 65)	87	1878
4.	Jafarey SN	1972	Jinnah Postgraduate Medical Centre, Karachi (1960 – 69)	227	899 (total births)
5.	Janjua S.	1979	Eight City Hospitals (1975)	121	799
1.	Janjua, S.	1991	Thirteen City Hospitals (1977)	124	693
			Ten City Hospitals (1979)	181	1125
			Ten City Hospitals (1982)	193	957
			Federal Government Hospital, Islamabad (1975-84)	30	171
	Ahmad, Z. Majid S. S. Khattak, M. F.		Civil Hospital, Karachi (1979-83)	127	2736
			Lady Reading Hospital, Peshawar (1982-86)	107	1343
			Khyber Medical College, NWFP (1985)	501	**5010 (Per 100,000 maternity admissions)
6. and 8.	Jafarey SN	1992 & 1994	SOGP Study of 30*** Hospitals all over Pakistan (1989 – 90)	703	670 740 in Public hospitals 90 in private hospitals
		1992 & 1994	Jinnah Postgraduate Medical Centre, Karachi (1981 –90)	384	710
7.	Farook, S.M	1993	Liaquat Medical College Hospital, Hyderabad (1986-90)	168	2608
9.	Najmi R. S	1995	Sir Ganga Ram Hospital, Lahore (1983 – 92)	65	225
10.	Sachdev, PS and Memon GU	1996	Liaquat Medical College Hospital, Hyderababd (1990-95)	268	2321
11.	Qazi G. R.	1999	Lady Reading Hospital, Peshawar (1992)	40	1420 (total births)
12.	Mumtaz F.	1999	Liaquat Medical College Hospital, Hyderabad (1996 – 97)	32	NR
13.	Tayyub S.	1999	Civil Hospital, Karachi (1992 – 96)	78	1517 (total births)
14.	Baloch SN	1999	Sandeman Hospital, Quetta (1991 – 94)	128	630
	Nazakat B	1999	Women and Children Hospital, Abbottabad (1997)	4	343
	Hashmi H	1999	Civil Hospital, Unit III, Karachi (1998)	13	1370
15.	Korejo R and Noorani K.	2000	Jinnah Postgraduate Medical Center, Karachi (1991 – 99)	481	883
	Hashmi H	2000	Lyari General Hospital, Karachi (1998)	4	558
	Syed S. S.	2000	Sobhraj Maternity Hospital, Karachi (1995 – 99)	43	201
14. & 15.	Nazir K. and Setna F.	1999 and 2000	Lady Dufferin Hospital, Karachi (1997 – 99)	8	71
15.	Mahmud G.	2000	Pakistan Institute of Medical Sciences, Islamabad (1998 – 99)	18	309
	Malik T.	2000	Lady Willingdon Hospital, Lahore (1998 – 99)	83	490
	Majeed S.	2000	Khyber Teaching Hospital, Peshawar (1998 – 99)	64	889
	Malik T.	2000	Fatima Memorial Hospital, Lahore (1998 – 99)****	2	17
14. & 15.	Idrees R. and Afshan A	1999 and 2000	Ziauddin Medical University Hospital, Karachi (1997 – 99)****	7	97.7

* Per 100,000 live births unless indicated otherwise

** This figure needs rechecking. Unfortunately the author is no longer alive.

*** **20 Government and Public Sector Hospitals**

Abbasi Shaheed Hospital, Karachi; Aga Khan University Hospital, Karachi; Civil Hospital (all three units), Karachi; Jinnah Postgraduate Medical Center, Karachi; Site Hospital, Karachi; Lady Dufferin Hospital, Karachi; Lyari General Hospital (Unit IV Civil Hospital), Karachi; PNS Shifa, Karachi; Sindh Government Hospital, Liaquatabad, Karachi; Sobhraj Maternity Home, KMC, Karachi; Allied Hospital, Faisalabad; Bhitai Hospital, Hyderabad; Central Hospital, Saidu Sharif, Swat; Civil Hospital, Khairpur; Holy Family Hospital, Rawalpindi; Lady Aitchison Hospital, Lahore; Lady Dufferin Hospital, Quetta; Liaquat Medical College Hospital, Hyderabad (All three units); Lady Willingdon Hospital, Lahore; Victoria Hospital, Bahawalpur.

10 Private Hospitals

Asim Clinic; Al-Fatima Clinic; Baqai Hospital; Medicare Hospital; Mehran Clinic; Naseem Maternity Home; Nazimabad Hospital, Tipu Clinic, Ziauddin Hospital and Ziauddin Memorial Hospital.

**** Private tertiary hospitals

The earliest paper is from Liaquat Medical College, Hyderabad that gives data for the years 1961 to 1965[6]. In 1970's there were two reports[3,7]. The majority of the reports are from the 1990's[4,5,8-17].

The number of deaths on which the MMRs have been calculated range from 2 deaths in one year in a private tertiary hospital in Lahore[15] to 703 deaths in 2 years in 30 Pakistan[8,10].The figures are based on information covering 1 to 10 years.

The MMRs reported by various hospitals range between 17 at Fatima Memorial Hospital, Lahore and 2736 at Civil Hospital, Karachi[1]. The figure of 5,010 reported from Khyber Medical College, Peshawar and calculated from 100,000 maternity admissions (Khattak MF) is much above figures from another

campus of the same institution (Majid SS). Since the author is no longer alive it is not possible to verify or get further information about this.
Three public tertiary hospitals have reported figures over different periods of time. This shows very little change in the trend (Table 2).

Table 2. Trends in maternal mortality ratios in three tertiary hospitals.

Hospital		MMR
Jinnah PostgraduateMedical Centre, Karachi	1960-1969	889
	1981-1990	710
	1991-1999	883
Liaquat Medical College Hospital, Hyderabad	1961-1965	1878
	1986-1990	2608
	1990-1995	2321
Lady Reading Hospital, Peshawar	1982-1986	1343
	1992	1420

Community based data on MMRs
The MMRs of community based studies is shown in Table 3.

Table 3. Community based maternal mortality ratios.

Ref. #	Author	Year of Reporting	Area	No. of Deaths	MMR
1.	Graham. W (Sisterhood method)	1988	---	1700	270
17.	Bashir et al	1995	Faisalabad City, 1989-1993*	215**	77
18.	Fikree et al	1997	**Pakistan** (difference sites 1989-1992)	196	433
			Sindh		
			Karachi	34	281
			****Baluchistan**		
			Pishin	19	289
			Loralai	42	593
			Khuzdar	40	673
			Lasbela	23	463
			NWFP		
			Abbottabad	15	360
			Mansehra	23	523
19.	Karim et al	1998	Sindh		160***

* Includes hospital & community data
** 40.9% deaths in a teaching tertiary hospital, 26.5% in private hospitals, 32.6% at home.
*** Authors have considered it to be an underestimate.
**** Baluchistan 4 years recall. Others 5 years recall.

The study by Fikree and co-workers includes samples from Sindh, Baluchistan and NWFP[18]. The table shows the MMR in different places ranging between 281 and 673. The figure of 160 from the province of Sindh has been stated by the authors to be an under-estimation[19].

Causes of Death

The major causes of death in hospitals are given in Table 4.

Table 4. Causes of death in hospital based studies.

Ref. #	AUTHORS		DIRECT (%)							INDIRECT (%)		
			Hemorrhage	Hypertensive Disorders of Pregnancy (mostly Eclampsia)	Sepsis	Obstructed Labor / Rupture of Uterus	Abortion	Anaesthetic Complications	Pulmonary Embolism	Severe Anaemia	Hepatitis	Heart Disease
3.	Aziz S. A.	LMC	9.2	17.2	--	10	5.7	--	--	39*	--	9
4.	Jafarey SN	JPMC	15.8	13.7	8.8	1.32	5.7	6.1	6.1	18.1	9.7	5.3
6. and 8.	Jafarey SN	JPMC	21.2	18.6	13.3	8.7	11	6.9	4.8	3.1	5.7	3.1
	Jafarey SN	Thirty Hospital	21.1	19.8	15.3	5.5	10	9.5	3.4	3.4	7.9	5
1.	Janjua. S	Thirteen Hospitals	28	14	31	8	---	---	2	--	8	6
		Ten Hospitals	23	13	28	8	--	4	8	4	2	1
1.	Ahmad, Z.	CHK	21	13	21	6	11	3	5	7	9	2
1.	Majid S. S.	LRH	34	15	17	6	--	7	8	--	2	--
7.	Farook S. M.	LMC	14.9	20.2	27.3	5.9	4.7	2.4	7.7		7.1	
10.	Sachdev, PS and Memon GU	LMC	14.1	19.8	20.5	14.2	5.6	4.5	1.8	2.3	6.3	2.2
11.	Qazi G. R.	KMC	32.5	20	17.5	---	2.5	5	7.5	---	2.5	---
9.	Najmi RS	FJMC	23	26.1	7.7	4.6	9.23	6.1	1.5	3.2	6.1	3.2
13.	Tayyub S	DMC	33.3	17.9	14.1	12.8	12.8	2.6	1.3	1.3	2.6	1.3
15.	Korejo R and Noorani K	JPMC	25.1	23.1	10.8	5.4	8.5	5.4	4.4	4.8	3.9	2.1
15.	Mahmud G	PIMS	26	21	5.2	--	15.7	10.5	--	--	--	--
15.	Malik T.	LWH	37.3	19.2	37.3				2.4		2.4	

* The most common cause has been highlighted.

LMC Liaquat Medical College, Hyderabad
JPMC Jinnah Postgraduate Medical Center, Karachi
CHK Civil Hospital Karachi
LRH Lady Reading Hospital, Peshawar
KMC Khyber Medical College and Lady Reading Hospital, Peshawar
FJMC Fatima Jinnah Medical College and Ganga Ram Hospital, Lahore
DMC Dow Medical College and Civil Hospital, Karachi
PIMS Pakistan Institute of Medical Services, Islamabad
LWH Lady Willingdon Hospital, Lahore

Information, which was not clearly stated, has been excluded. The cause of death has been based on clinical features alone as post mortems were not carried out in any case. The most common cause in each study has been highlighted in the table.

Over 80% of the deaths are due to direct causes. In the majority of the studies haemorrhage is the leading cause. In six studies[1,9,12,15] it is sepsis and[11] eclampsia. The contribution of abortion data of which is given in 12 studies, ranges between 2.5% and 15.7% with a mean of 8.5%. Anaesthetic complications are a significant cause of death ranging from 2.6 to 10.5% (mean 5.6%). Among the Indirect causes two early reports[3,6], show severe anaemia as the most common cause of death (39% and 18.1%). Hepatitis too contributes significantly (2to 9.7%).

Major Causes of Death in the Community

In the community 78.1% of the deaths were due to direct causes and 21 .9% to indirect causes. Hemorrhage was responsible for over half the deaths i.e. 52.9%. The second most common cause was Sepsis (16.3%) followed by Eclampsia (14.4%) and Obstructed labor (6.5%.) Abortion caused 5.2% of the deaths. Among the Indirect causes Hepatitis was the most common (14%) followed by Heart disease 9.3%.

A Study of Mothers Brought Dead to JPMC

A study was carried out at JPMC to establish the factors that caused delay in women reaching hospital in time. This showed that during a twelve year period 1981 -1992 a total of 601 maternal deaths were seen in the Department of Obstetrics and Gynaecology. Of these 150 (25%) women were brought

dead[16]. The reasons for delay were economic, like non-availability of transport and lack of finances (3 6%), soclo-cultural factors including absence of husband from home (34%), inadequate and inefficient maternal health services (2 1%). In 9% the reason for delay could not be determined.
The most common cause of death amongst these 150 women was haemorrhage (63% of which 42% were postpartum haemorrhage) followed by eclampsia (19.3%) ruptured uterus (9.3%) and acute inversion of uterus (6%.).

Discussion

The objective of this paper was to compile all available data on the ratios and causes of maternal mortality in Pakistan for ready reference. Nevertheless the information collated highlights the continuing high ratios of maternal mortality. This is of deep concern and requires discussion on future directions, policy and programmatic, to be taken by all concerned.
Most of the currently available data on maternal truly reflective of the situation in the community, it does give information about the causes as well as trends over the years. However hospital studies need to conform to a standard uniform pattern of reporting. Studies in the community are few and on small scales. More data, which is nationally representative, is necessary. It is of vital importance that all births and deaths throughout the country are registered.
The MMRs in the tertiary hospitals of Pakistan range between 17 to 2736*. A ratio of less than 100 has been reported by three hospitals. Two of these are private tertiary hospitals and one a public sector hospital which deals mostly with women who are registered in the hospital for antenatal care and delivery and hence receive standard care.
What is a matter of concern is that in three major public teaching hospitals from which data is available over different time periods during the last twenty to thirty years, the MMRs show no decline. The trend remains the same. Maternal mortality ratios in Jinnah Postgraduate Medical Centre, a government tertiary hospital, over two 10 year periods i.e. between 1960-1969 and 1981- 1990 and one 9 year period i.e.1960 - 1969, are 899, 710 and 883 respectively. Similarly data from Liaquat Medical College, Hyderabad, Sindh reveals an increase in the MMR from 1878 in 1961-1965 to2608 in 1986-1990 and 2321 in 1990-1995. Again, Lady Reading Hospital, Peshawar had an MMR of 1343 between 1982-86 and 1420 in 1992. (Table 4).
In the hospitals over 80% of the maternal deaths are due to direct causes, an indication of the poor maternal health status and inadequate health care, Hemorrhage is the overall leading cause followed by eclampsia and sepsis, though a few hospitals report sepsis and one reports eclampsia as the most common cause. In the 6 to 13% of deaths due to abortion the causes (given in two papers) are haemorrhage, sepsis and visceral injury. This last complication is almost definitely a result of unsafe abortion even though the women do not admit having resorted to it.
Among the indirect causes of death, severe anaemia per se was high during the 1960s, being 39% in Hyderabad[6] and 18.1% at JPMC, Karachi[3]. Subsequent figures from the JPMC show it to be much lower at 3.1% and 4.8%[8,10]. Recently data from Civil Hospital, Karachi shows anaemia to be responsible for a greater number of deaths (11.8%)14 again. Is this a result of increasing malnutrition, or is it just a sporadic finding? There are anecdotal accounts that anaemia is on the increase.
Of other medical disorders, hepatitis is also a significant cause accounting for between 2.5 to 9.7% of the deaths Data on the type of hepatitis is not available, though it is known that Hepatitis E during pregnancy is associated with a high maternal mortality.
Community data reveals that more than half of the deaths were due to haemorrhage (52.9%). The high proporton of deaths due to haemorrhage among women who die in the community and also among those who died before reaching hospitals (63%)16 indicates the urgent need for help in cases that are bleeding. Immediate help if not forthcoming kills the women.

What do the continuing high MMR figures from the hospitals indicate? Is it that the proportion of women who are dying has now increased? Is it that the proportion of deaths has decreased in the community and increased in the hospitals? Is it that as a result of greater awareness of pregnancy related complications by both the community and the health care providers, and more facilities for transport, a greater number of women are now reaching hospitals but not in time to be saved? Is it that sub-standard care is given to women who come with complications to the hospitals? Is it that more accurate data is now being collected by the hospitals? Unfortunately, most of these questions cannot be answered as the trend in the number of deaths in the community is not known. Nevertheless the time trend data available from three major public hospitals in Karachi, Hyderabad and Peshawar does show that the picture continues to remain grim and that a rethinking of the strategies employed up till now needs to be done.

In Pakistan over 80% of the deliveries are still taking place at home, majority of them being conducted by the Traditional Birth Attendants (TBAs). A large number of these TBAs, about 40,000 to 50,000, have undergone training under one of the many initiatives for safe motherhood taken by the Government. The TBAs are however not supervised in their work and there is no back up support in time of need. A review of TBA training and utilization of programmes in 70 countries over the past three decades shows that there are limited examples of their successful utilization. In countries where the TBA's have been adequately supervised the strategy has shown some positive results[21]. In other words for effective functioning, TBAs require constant supervision, more than other health care providers do.

A different policy approach is now required which is comprehensive and comprises of short and long term goals. The time has come for a critical evaluation of all Safe Motherhood programmes , both in the public and private sector, be conducted to form the foundation of a national Safe Motherhood strategy . In the meantime, the potential strategy of preparing a cadre of appropriately trained midwives for maternal care during pregnancy, labour and the postpartum period should be pursued. In Europe particularly Sweden, even before the advent of modern technology, professionally trained midwives helped reduce maternal morbidity and mortality.

In Pakistan midwifery is a neglected profession. Though there are more than 10,000 nurses who have been trained in midwifery, very few are practising as midwives. Moreover their training, especially in skills, is deficient. The Lady Health Visitors (LHVs), a cadre of health care providers who are trained to deliver women in the community, do practice midwifery both in health facilities and in the community but their exact numbers are not known. Their training too, especially skills' training leaves much to be desired. Moreover back up support to them is lacking.

Midwifery training needs to be geared towards competency based skills. Midwives need to be motivated to work in the rural areas and their roles and career pathways well defined. They should, as a short-term measure, supervise existing trained TBNs in their work. As a long-term strategy TBA's should be phased out and replaced by midwives.

Nevertheless no matter how skilled the attendant at delivery, very little can be done when life-threatening complications arise and there is no access to emergency care. Recent studies done to evaluate the status of Emergency Obstetric Care (EmOC) in selected districts of Sindh have shown that there is an extreme shortage of health care facilities providing EmOC. In those that are present, majority have multiple deficiencies[21]. The deficiencies identified include lack of drugs, essential supplies, equipment and services as well as inadequate knowledge and skills of health care providers. Support services like blood bank and laboratories were not in place. There was no proper referral system. Though similar studies have not been conducted in other provinces of Pakistan, there is reason to believe that this situation is present all over the country.

This state of affairs needs to be corrected urgently. The health system should be upgraded and strengthened and the deficiencies identified corrected. A strong functional referral system should be put

in place for appropriate and timely transfer of women in need of a higher level care.
A National Strategy for Safe Motherhood is urgently needed. The National Committee on Maternal Health (NCMH), a technical body of the government that works in collaboration and partnership with other health and professional bodies, has been given the responsibility of developing it. It is hoped that a comprehensive strategy which includes actions to be taken by health and other relevant sectors, will soon be formulated, and more importantly implemented, in order to reduce maternal mortality and morbidity in Pakistan.

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Addendum

After the submission of the above paper two further reports on maternal morbidity have been published. These are: 1. Akbar N, Shami N and Asif S. Maternal mortality in a tertiary care teaching hospital. JCPSP., 2002; 12: 429-431 and 2. Sami S and Balooch SN. Maternal Mortality in **Balochistan:** a challenge for the Obstetrician. JCPSP., 2002; 12:468-71.

References

1.Zahr CA, Royston E. Compilers Maternal mortality - a global factbook. Geneva: WHO,, 1991.
2.World Health Organisation/United Nations Children Fund. The sisterhood method for estimating maternal mortality: guidance notes for potential users. Geneva:WHO., 1997. pp. 525-32.
3.Jafarcy SN. Review of Maternal Mortality Over 10 years period at Jinnah Postgraduate Medical Center, Karachi, J.Pak.Med.Assoc., 1972; 22: 71-76.4. Qazt GR. Maternal Mortality. An audit. JCPSP., 1999; 9: 251.56.
5.Mumtaz F. Maternal Mortality in Induced Abortion. JCPSP., 1999; 9: 215.16,
6.Aziz SA. Maternal Mortality in non-booked patient in a teaching institution in southern region of Pakista. , Pakistan Medical Review, 1 968;54-62.
7.Janjua S. Maternal Mortality in Major City Hospitals of Pakistan, J.Pak.Mcd.Assoc., 1979, 29: 3 1-35.
8.Jafarcy SN, Maternal Mortality in Pakistan -An Overview in Maternal and Perinatal Health in Pakistan. Proceedings of Asian and Oceanic Federation of Obstetrics and Gynaccology Workshop. Karachi November 1991, TWEL Publishers, Karachi 1992,
9.Farook SM. Maternal Mortality at Liaquat Medical College Hospital, Hyderabad. JCPSP, 1993; 3:8-11.
10.Jafarey SN. Maternal Mortality in Pakistan Report of International Workshop on 'Maternal and Infant Mortality' at Aga Khan University, Karachi. February, 1994, pp. 47-51.
11.Najmi RS. Maternal Mortality: A hospital based study. JCPSP.. 1995; 5: 66-67.
12.Sachdev PS, Memon GU. An analysis of maternal deaths in a hospital in Hyderabad. JCPSP,, 1996; 6: 3 13-15.
13.Tayyub S. Maternal Mortality: A Neglected Tragedy. Journal of Surgery Pakistan (lnternational),1999; 4: 13-17.
14.National Committee on Maternal Health Newsletter 1999, Karachi, p. 4.
15.National Committee on Maternal Health Newsletter 2000, Karachi, p. 2.
16.Jafarey SN, Korejo R. Social and cultural factors leading to mothers being brought dead to hospital.

tnt. J. Gynecol. and Obstet.,1995; 50:S 97-S 99.
17.Bashir A. A five year study of' maternal mortality in Faisalabad city. Pak. lnt. J. Gynecol. and Obstet., 1995; 50: S93-S96.
18.Fikree F, Midhet F, Saleem S, et al. Maternal Mortality in different Pakistani sites: Ratios, Clinical cause and Determinants. Ada. Obstet, and Gyneco!., Scandinavia, 1997: 76: 637-45.
19.Karim MS, Azam SI, Lakhani AD. MIMS - Sindh. Report of Household Socio-economic, Demographic and Maternal H lealth Survey conducted in Sindh Province. Aga Khan University, Karachi, 1998.
20.Kamal IT, The Traditional Birth Attendant: A Reality and a Challenge. Int. J. Gynecol. and Obstet., 1998;63:S43-S52.
21.Siddiqui R I, Rizvi T, Jafarey S. Situation Analysis of Emergency Obstetric Care (EOC) in Four District of Sindh. JCPSP.. 1999; 9: 187.89.