

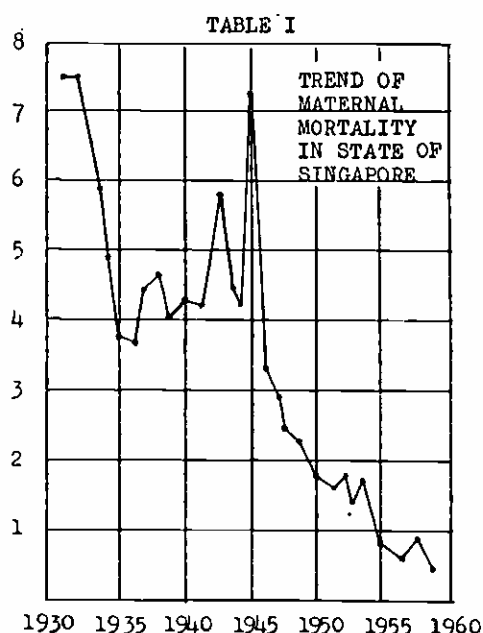
MATERNAL MORTALITY IN SINGAPORE — 1955 TO 1959

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In the more socially advanced countries of the world, claims have now been made of the great safety which their Maternity Services are able to provide for the community. Thus for example in England and Wales, the chances of an expectant mother dying as a result of her pregnancy or from causes directly associated therewith have fallen from 1 in 226 in 1928 to 1 in 1,500 in 1955, the mortality rate for the year being 0.66 per 1,000. In Scotland, this figure reached 0.7 per 1,000.

In the State of Singapore, mortality figures for the years from 1955 to 1959 reach comparable and favourable proportions — See Table I.



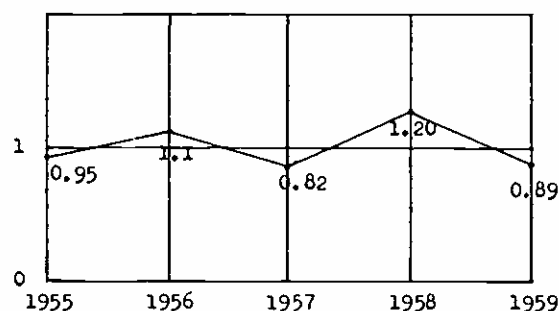
YEAR	NO. BIRTHS	EXCLUDE ABORTIONS NO. MATER- NAL DEATHS	INCIDENCE
1930	—	—	7.6 per 1000
1955	58,716	46	0.77 " "
1956	61,801	42	0.69 " "
1957	63,655	49	0.78 " "
1958	64,550	46	0.72 " "
1959	64,948	34	0.52 " "
CRUDE DEATH RATE IN SINGAPORE (1957) — 7.3 per 1000			

There has been a tremendous fall as compared to 1930 when the maternal mortality was 7.6 per 1000 and at the present moment as it stands in 1959, the risk of an expectant mother dying in pregnancy and childbirth is 1 in approximately 1938 deliveries. It can also be true to say that these figures have occurred despite the acknowledged deficiencies in the Maternity Services in the State.

Overall details of the deaths recorded by the Registrar of Deaths and the Department of Statistics are not completely available for study. The causes that have been ascribed as causes of death for statistical purposes do not provide enough information for analytical purposes. And the recourse is to make investigations into the maternal deaths that have occurred at the Kandang Kerbau Hospital for the afore-mentioned years 1955 to 1959.

The incidence of maternal deaths would appear to be much higher than the State figures show. This is because the hospital accepts all emergencies and all cases are admitted irrespective of any prevalent circumstances. The Kandang Kerbau Hospital figures are shown on Table II.

TABLE II
INCIDENCE OF MATERNAL DEATHS
AT KANDANG KERBAU HOSPITAL 1955 TO 1959



YEAR	NO. BIRTHS	NO. MA- TERNAL DEATHS	INCIDENCE
1955	22,920	22	0.95 per 1000
1956	25,878	29	1.1 per 1000
1957	31,724	26	0.82 per 1000
1958	29,280	34	1.20 per 1000
1959	35,406	32	0.89 per 1000

It is common knowledge to assume that the State figures have been diluted by the far greater number of normal deliveries that have occurred both in domiciliary confinements as well as in private maternity homes. On the basis of the Kandang Kerbau Hospital figures, a total of 145,208 babies were delivered during the 5 year period and 143 mothers had died in relation to these deliveries, giving an incidence of 0.99 per 1000—an equivalent of 1 mother dying in every 1001.5 deliveries.

MATERNAL MORTALITY FACTORS

RACIAL FACTORS

The population of the State of Singapore is generally recognised as being very cosmopolitan. But analysis of the Maternal Deaths show that four communities are involved in proportions as shown on Table III.

TABLE III

Racial Break-down of Maternal Deaths
in Kandang Kerbau Hospital 1955 to 1959.

CHINESE		
Hokkien	— 51 deaths	
Teochew	— 27 "	
Cantonese	— 14 "	
Hakka	— 5 "	
Foochow	— 1 death	
Hainanese	— 1 "	
	<u>99 deaths</u>	<u>= 69.2%</u>
MALAYSIANS		
Malays	— 19 deaths	
Indonesians	— 7 "	
	<u>26 deaths</u>	<u>= 18.2%</u>
INDIANS		
Tamils	— 15 deaths	
Sikhs	— 1 death	
	<u>16 deaths</u>	<u>= 11.2%</u>
EURASIANS		
	<u>2 deaths</u>	<u>= 1.4%</u>

On a cursory glance it might appear that the highest deaths have occurred amongst the Chinese population. When viewed with the population figures, this is naturally a fallacy for the Chinese population constitutes approximately 78% of the entire State population. The majority of the deaths in this community occurred amongst the indigenous section in contrast with the 16 Indian maternal deaths in which only 4 occurred amongst the local born Indians and the rest being amongst the immi-

grant population. For its total population at large, the highest risk is amongst the Malaysians as Table IV would show.

TABLE IV
RACIAL RISKS OF MATERNAL DEATHS
(Based on 1957 State Figures)

CHINESE	—	No. Births	46,265
		Maternal Deaths	22
		(Rate: 0.49 per 1000)	
MALAYSIANS	—	No. Births	9,317
		Maternal Deaths	28
		(Rate: 4.1 per 1000)	
INDIANS	—	No. Births	5,020
		Maternal Deaths	3
		(Rate: 0.59 per 1000)	

It will appear that the risk of a Malaysian mother dying from child-birth in this State is approximately 8 to 10 times greater than the other racial counterparts.

Some reasons must be found for this apparently high risk, but probably lack of good ante-natal care, a peculiar restraint from institutional confinements, ignorance, generally poor resistance and a tremendous tendency to rely on the local "bedan" and on home confinement—all accounting for the high mortality ratio. Within the recent year, however, there appears to be a definite and gradual progressive change of out-look amongst the Malaysian population and one begins to see more Malaysian mothers attending the ante-natal clinics and coming to institutions for their confinements. This change would appear to be most welcome and will no doubt result in a lowering of the maternal death rate.

BOOKING

An avoidable factor is generally recognised as an indication that the risk of death could have been materially lessened. The most impressionable factor in this maternal mortality survey is the fact that the majority of deaths have occurred amongst UNBOOKED patients. It is customary in the Kandang Kerbau Hospital not to consider a patient as being booked until she has fulfilled at least 3 ante-natal visits and attending at this hospital. Of the 143 maternal deaths reviewed, only 6 cases had been booked making an aggregate only of 4.3% of booked patients. The remaining 95.7% of patients that have died had not been seen at this hospital prior to delivery and had come to the hospital as emergencies either delivered or just about due to deliver. The distribution of the booking rate amongst the population groups is shown on Table V.

TABLE V
INCIDENCE OF BOOKING IN
MATERNAL DEATHS

	Booked	Non-Booked
CHINESE	- 6	93
MALAYSIANS	- 0	26
INDIANS	- 0	16
EURASIANS	- 0	2
	<u>6 or 4.3%</u>	<u>137 or 95.7%</u>

Booking factor provides the most scope amongst the avoidable factors. Though it is true to say that there are maternity and child-welfare clinics at the moment in the State to provide the required ante-natal services, it would also be right to say that ignorance, socio-economic factors and indifference to the hazards of pregnancy and child-birth do keep expectant mothers away from these clinics. Although in the majority of cases, the mothers are to be blamed for this state of affairs, yet this lack of co-operation from the patient does not entirely absolve the health and education services, on whom rests the responsibility to gain the confidence of the expectant mother and to guide and influence her in the care of her own health. A more intensive education campaign would no doubt produce results especially now on a population that appears to be very receptive to ideas about what the Government is planning to do for them. More on this factor will be discussed when consideration is given to some of the avoidable factors in the Toxaemia of Pregnancy.

AGE

The age distribution of the maternal deaths under review is as shown on Table VI.

Some useful information is gleaned from this survey on the factor of age. Although it would appear that the majority of maternal deaths have occurred amongst patients aged 21 years to 35 years, this is only sequential for about 80% of deliveries in the State have occurred amongst mothers in this age group. In most recognised series, the hazards of pregnancy and child-birth do increase progressively with age—thus for example in 1957 (State) in the over 40 years age group—there were 2,945 deliveries out of a total of 62,685 deliveries (4.75%), but 18 maternal deaths had occurred giving an incidence of 6.1 per 1000 deliveries. This figure is approximately six times higher than the prevailing risk in all deliveries.

There is no doubt that the elderly mother is more likely to encounter complications and this occurs irrespective of the parity. The natural process of growing older, higher parity, the diminished endurance and the diminished resistance to disease makes the elderly mother more likely to require help much more and much earlier.

PARITY

The parity distribution of the maternal mortality under review is grouped as shown on Table VII.

TABLE VI
AGE DISTRIBUTION

AGE GROUP	CHINESE	INDIANS	MALAYSIANS	EURASIANS	TOTAL	PER CENT
15-20 yrs.	5	2	3	—	10	6.9
21-25 yrs.	15	4	2	1	22	15.4
26-30 yrs.	20	5	10	—	35	24.6
31-35 yrs.	21	4	8	—	33	23.0
36-40 yrs.	23	1	1	—	25	19.4
Over 40 yrs.	15	—	2	1	18	12.7
	99	16	26	2	143	100

Over 40 years group 1957: 2,945 out of 62,685 deliveries 4.7% and 18 deaths. Rate: 6.1 per 1000

TABLE VII
PARITY DISTRIBUTION

PARITY	CHINESE	INDIANS	MALAYSIANS	EURASIANS	TOTAL	PER CENT
0 - 1	15	4	4	1	24	16.9
2 - 3	11	2	—	—	13	9.0
4 - 5	19	7	6	—	32	22.4
6 & over	54	1	18	1	74	51.7
	99	14	28	2	143	100

A "Grande Multipara" is nowadays defined as any mother who has had five or more viable pregnancies, and this constitutes a group liable to dramatic complications so as to merit the term "the Dangerous Multipara".

In this series under review, more than one half of the maternal deaths—51.7%—had occurred amongst women having more than five viable pregnancies. Statistics from other countries give equivalent results and the risk of this group of mothers dying as a result of child-birth is about five times higher than in the group having less than 5 children.

There are many factors which operate to increase the hazards of high parity. In one respect high parity is more associated with advancing age and with a cardio-vascular system less resilient and with hypertensive disease more manifest. The tendency of obesity is another factor for adiposity prejudices an accurate examination, and many conditions are diagnosed with difficulty or sometimes not appreciated at all. In the society such as we have in this State, sociological factors do play a very important part. The majority of this "Grande Multipara" group are poor, overworked and tired. There is the physical dissipation of repeated pregnancies and anaemia and undernourishment make their mark from one pregnancy to the next with little or no respite in some cases. Such mothers are generally too busy to attend to their own health and initial minor ailments are often left to degrees until they reach major and critical proportions. The wear and tear of daily life sometimes does increase lumbar lordosis and must provide food for thought before we can regard the pelvis of a highly parous patient as beyond question. Increasing lumbar lordosis sometimes increases the inclination of the pelvic

brim and the occasional sub-luxation forwards of the sacrum on the sacro-iliac joint advances the sacral promontory to reduce the true conjugate diameter.

CLINICAL FACTORS ON CAUSES OF DEATH

When the 143 deaths as due to child-birth are arranged in this survey in clinical groups rather than in the sequence of the International Classification, the five largest groups are as shown on Table VIII.

TABLE VIII
CLINICAL FACTORS—CAUSES OF DEATH

Toxaemia and its complications	— 55 deaths = 38.5%
Haemorrhage and shock	— 40 „ = 27.9%
Medical Conditions	— 31 „ = 21.0%
Operative & Anaesthetic Hazards	— 10 „ = 6.9%
Sepsis	— 7 „ = 4.9%

These deaths do not take into consideration cases that have died as a sequel of abortions and are related only directly with obstetric deaths. To some extent there is some overlap as to classification of the clinical causes of death but the plan adopted here is only to indicate the primary condition and not what follows as a complication. Thus for example all deaths due to Toxic Accidental Haemorrhage are included in the Toxaemia group rather than in the Haemorrhage group, and similarly in cases which have had operations like Caesarean sections where haemorrhage might have been a factor, the case is included under the Operative and Anaesthetic hazard group rather than in the Haemorrhage group.

In their succeeding order of frequency, each clinical group will be discussed in turn and the culminating and avoidable factors indicated.

TOXAEMIA AND ITS COMPLICATIONS

There have been 55 deaths in this survey where Toxaemia had been cited as mainly responsible for the maternal deaths. This number constitutes 38.4% of all the deaths. As is common with most countries, the problem of Toxaemia presents the greatest tribulations simply because we have not been able as yet to definitely ascertain the cause of this condition. All we know is there are many factors. This deficiency notwithstanding, there are many countries where the system of ante-natal care has been brought to such an efficiency that it presents a minor problem in ante-natal obstetrics. Both Australia and New Zealand are two countries which have brought the state of the ante-natal services to such a pitch. In the State of Singapore, we cannot claim such an efficiency in our ante-natal care for pregnant mothers, and Toxaemia will present an important problem for such time until we are able to educate the people and to provide the adequate and special care that is needed to cope with it. The culminating factors in this group of Toxaemia deaths are shown on Table IX.

TABLE IX
FATAL COMPLICATIONS OF TOXAEMIA

Hypertensive Heart Failure	13 cases	=	23.5%
Renal Failure—Uraemia	4 .. {	=	10.9%
Anuria	2 .. }		
Cerebro-Vascular Accidents (Cerebral Haemorrhage)	10 ..	=	18.3%
Toxic "Accidental" Ante- Partum Haemorrhage	15 ..	=	27.3%
Eclampsia	11 ..	=	20.0%

Of those that died with Hypertensive Heart Failure, 1 case died in hospital after what appeared to be a "normal" vaginal delivery at home. 2 cases in the Renal Failure group had anuria associated with eclampsia, and there was 1 case of Pontine haemorrhage associated with attacks of eclampsia. Of the 15 deaths associated with abruptio placentae, 2 cases died undelivered, 2 died followed Caesarean sections and 3 cases died after Caesarean Hysterectomies had been carried out for "apoplectic" uteri. There was 1 case of eclampsia that died after a Caesarean section and 1 case died undelivered.

It is difficult to state exactly and with deliberation the avoidable factors in this group but some may be considered. Of the 55 maternal

deaths in this clinical group, only 3 cases had been booked in the hospital—about 5.5%. From personal experiences, it is felt that there are many cases who through ignorance or indifference have failed to make any arrangements for their ante-natal care. There will be many patients too who will refuse to follow the advice given to them by the doctor or midwife but instead will receive misguided advice from their "experienced" relatives. The outcome will be that many patients either are taken critically ill at home or are admitted to hospital desperately ill. In all the cases, it must appear that ante-natal care had been incomplete, inadequate or haphazard. Certainly many cases had been wrongfully booked for home confinement. In this hospital although we are desperately short of ante-natal beds, we do try in all instances when cases are seen and require admission, to make available the bed accommodation. Nevertheless in future planning, it would seem judicious to have a larger number of ante-natal beds so that such cases however mild may be admitted without any difficulty.

HAEMORRHAGE AND SHOCK

A total of 40 deaths or 27.9% of all the maternal deaths under review had been associated with haemorrhage and shock. A breakdown of the conditions which accounted for this group is given on Table X.

TABLE X
FATAL CASES—HAEMORRHAGE
AND SHOCK

Placenta Praevia	— 5 cases —	12.5%
PPH—with Retained Placenta	— 13 cases —	32.5%
no Retained Placenta	— 14 cases —	35.0%
Ruptured Uterus/ Shock	— 7 cases —	17.5%
Uterine Inversion	— 1 case —	2.5%

Of the 5 cases with Placenta Praevia, 2 died undelivered and 2 cases died following delivery by Caesarean sections. 13 cases had post-partum haemorrhage associated with retained placenta and 7 of these were delivered as home confinements. The 14 cases that had post-partum haemorrhage without retained placenta had 2 cases that were delivered at home and 2 cases died after a Hysterectomy had been done for atonic uteri. There were 7 cases of maternal deaths that were associated with ruptured uteri and of these, 1 died undelivered and 3 died after Hysterectomies had been carried out.

There had been only one case that died with an acute inversion of the uterus with no post-partum haemorrhage.

Of some of the factors that may have been responsible for this group of maternal deaths, ante-natal care again looms large. Failure to appreciate the significance of even a small episode of ante-partum haemorrhage, the apparent air of over-confidence in "Grande Multiparous" patients and failure to appreciate the danger of collapse in a patient with a comparatively minor degree of post-partum haemorrhage are some incriminating factors. It must be conceded that there would have been many more maternal deaths in this group but for the fact that there exists in the services of this hospital the facilities of blood transfusions which are obtainable in ample amounts and at all times of the day and night. One factor, however, must be regretted and that is the total absence of a Resuscitation or "Flying Squad" Service. It is true that a fairly efficient ambulance service is at the present moment available but there have been at least 10 deaths in this series under review where death might have been prevented, had there been a "Resuscitation Squad" in operation. The concept of bringing blood transfusions and the services of an Obstetrician for the treatment of haemorrhage, either ante-partum or post-partum to the patient's own home or to a private maternity home lacking adequate facilities has been well recognised. The danger of transferring patients with retained placentae and even unassociated with post-partum haemorrhage has been time and time again stressed. For such patients, it is imperative that we bring the services to the patients and not patients to the hospital services.

MEDICAL CONDITIONS COMPLICATING PREGNANCY

Medical Diseases in Pregnancy claimed a total of 31 deaths—about 21.8% of all the maternal deaths under review. The majority of these cases have medical conditions which must have existed prior to the respective fatal pregnancy, and only 6% of these cases had been booked to allow of an earlier diagnosis and the benefits of a Medical Consultation by a Physician. 20 of the 31 deaths were admitted into hospital in critical conditions and without any prior medical treatment or if treatment had been given at all, such treatment was poorly followed up.

The disease conditions which have been incriminated in association with the maternal deaths are shown on Table XI.

TABLE XI
FATAL CASES — MEDICAL CONDITIONS

HEART DISEASES			
Mitral Stenosis	—	8 cases	
Beri-Beri Heart	—	4 cases	
Coronary Thrombosis	—	1 case	
Asthmatic Heart Failure	—	2 cases	
		<u>15 cases</u>	<u>= 48.5%</u>
BLOOD DISEASES			
Anaemia	—	8 cases	
Leukaemia	—	1 case	
		<u>9 cases</u>	<u>= 29.0%</u>
LIVER DISEASES			
Jaundice/Hepatitis	—	2 cases	
Carcinoma of Liver	—	1 case	
		<u>3 cases</u>	<u>= 9.6%</u>
THYROID DISEASE			
Thyrotoxicosis	—	2 cases	<u>= 6.5%</u>
LUNG DISEASES			
Pulmonary TB	—	1 case	<u>= 3.2%</u>
TERMINAL CARCINOMA OF BREAST			
	—	1 case	<u>= 3.2%</u>

In effect, the single case that died from Terminal Carcinoma of the Breast should be allotted to a defined surgical condition, but being the only one case it was allotted to this group.

The array of medical conditions does not preclude the fact that Heart Disease in Pregnancy still forms the major and serious complication of medical conditions in pregnancy. Aside from Coronary Thrombosis, most of the other conditions listed are amenable to treatment and to prevention from complications. The problem of Blood Diseases is taken entirely with the problem of Anaemia in Pregnancy, and it is a reasonable statement to make that at least 30% of expectant mothers in this state are anaemic in pregnancy, i.e. if we were to make 60% HHb as a reasonable limit of anaemia. It has been the experience in this hospital that when a case of Anaemia is admitted in the hospital and in labour and if it was complicated by Toxaemia, the problem of treatment is difficult and the onset of heart failure under such conditions makes the case almost certainly fatal. Hepatitis, Thyrotoxicosis and Pulmonary

TB are the other conditions under review which with proper and prompt treatment might not have resulted in deaths. Ante-natal care still ranks as a major avoidable factor. In the Kandang Kerbau Hospital, there still lacks the fine co-ordination between an Obstetrician and a Physician in the running of a Medical Diseases Complicating Pregnancy Clinic. A case with medical disease is seen by the Obstetrician in the ante-natal clinic, weeded out and either admitted into hospital or referred to a medical clinic on alternative days and so far removed from the ante-natal clinic proper. This set of circumstances certainly does discourage an already sick patient and would appear to be very unsatisfactory. A physician is called for consultation for an inpatient in the hospital only as the circumstances demand it, and the system is very much different from other centres where a Physician does a routine round for medical cases in an obstetric ward. There appears to be some scope for improvement in this set-up, and a closer liaison between the Obstetrician and the Physician is not only judicious but highly desirable.

SEPSIS

In keeping with the most rapid advances of anti-biotic and chemo-therapy and consistent with figures all over the world, sepsis claimed only 7 maternal deaths in this series under review—an aggregate of 4.8%. Certainly this problem has been much minimised in recent times, and no doubt there will continue to be a further reduction in maternal mortality ratio from this cause. Of the 7 deaths analysed, 4 deaths were incidental to the pregnancy being conditions as on Table XII.

TABLE XII
FATAL CASES OF SEPSIS

Meningitis/Encephalitis	— 2 cases	= 28.6%
Pericarditis	— 1 case	= 14.3%
Pneumococcal Sepsis	— 1 case	= 14.3%
Puerperal Sepsis	— 3 cases	= 42.8%
Total	7 cases	

There were in fact only 3 cases of sepsis that complicated the pregnancy and labour. 2 cases died from uncontrollable puerperal sepsis and 1 case from uterine sepsis following a surgical induction of labour.

ANAESTHETIC AND OPERATIVE HAZARDS

A total of 10 patients had died in this period under survey when classified under the group

of Anaesthetic and Operative Hazards. The distribution is shown on Table XIII.

TABLE XIII
ANAESTHETIC/OPERATIVE HAZARDS

Association with Forceps Deliveries	— 3 cases	= 30%
Association with Caesarean Sections	— 7 cases	= 70%
Total	10 cases	

These figures had probably been under-estimated for they do not include the cases which had died in the Haemorrhage and Shock group and where anaesthetics had been administered either for manual removal of the retained placenta or Hysterectomies either for atonic uteri or for ruptured uteri. Nevertheless a total of 6.9% of all maternal deaths under review and under this classification is certainly a high figure.

Most of the deaths had occurred in association with a General Anaesthesia and there had been one death following a Spinal Anaesthesia. In recent years and certainly during the period under review, open ether anaesthesia had been discarded for forceps deliveries or for manual removal of the placenta. As far as possible, spinal anaesthetic was avoided in favour of a general anaesthesia, and the most frequent method of administering this form of anaesthesia was induction by gas, oxygen or cyclopropane followed by maintenance with gas and oxygen and with the patient intubated. Scoline had been generally preferred as a relaxant and there had been occasional cases which had received intra-venous Pentathol for induction. There had been no deaths recorded which had been due to a symptom-complex of inhalation-asphyxia as described by Mendelsohn. An unprepared patient with a full or partially full stomach runs the risk of vomiting in association with a general anaesthetic, and inhalation of the vomitus can cause asphyxia. For this reason, we have been very careful in such cases to have the patient emptied of her gastric contents either through a tube or very rarely by the use of Apo-morphine as recommended by some authorities. Greater scope is now being employed in the matter of forceps deliveries and more and more of such deliveries are being achieved by means of Pudendal blocks. An added prophylactic measure which is adopted at the Kandang Kerbau Hospital is to withhold feedings from mothers in labour. In shocked cases where manual removal had to be carried out and in patients who are not at

all prepared for a general anaesthesia, this procedure was sometimes carried out with the use of intra-venous Morphine or Pethidine.

The incidences of both Forceps Deliveries and Caesarean Sections in this hospital are averages of about 1.3%, and it is thus true to say that the mortality rate for Caesarean Sections is approximately 1 in 100 and this figure is about twice that of Forceps Deliveries.

While we have to accept these hazards, the risks can be minimised by good ante-natal care and adequate supervision and preparations of patients who are likely to undergo such operations, and certainly all these are to be done in hospitals. The anaesthetic risks can also be reduced by measures as has been discussed above, and it would certainly be towards ideal obstetrics if provision could be made for Anaesthetists experienced in obstetric work to be attached full-time to the hospital.

SUMMARY AND CONCLUSIONS

It becomes evident from this survey that child-birth in the State of Singapore has become very much safer than, say, about 30 years ago. The maternal mortality in 1930 was registered at 7.6 per 1000 deliveries and in 1959, State figures show an incidence of 0.52 per 1000, and Kandang Kerbau Hospital figures show an incidence of 0.89 per 1000.

No doubt the risks so involved are small; a study of the factors related to maternal deaths makes one feel that the risks could be reduced further, and the ideal certainly is not only to make obstetrics safe for the mother but to ensure that the mother is made safe for obstetrics. Of some of the more important factors that have been gleaned from this Maternal Mortality Survey for the years 1955 to 1959, the outstanding points are as follows:—

(a) Booking

If the standard of at least 3 ante-natal visits be taken before a case can be considered booked, the survey shows that 95.7% of the maternal deaths occurred amongst unbooked patients. A greater majority had received no special ante-natal care at all.

(b) Age

Although the greater number of deaths occurred amongst the 25-35 years age group, the greatest hazards are nevertheless manifest for mothers who are over 40 years of age. A figure of 18 maternal

deaths occurring for approximately 2,945 deliveries gives an incidence of 6.1 deaths per 1000 deliveries for mothers in this group—6 times higher risk.

(c) Parity

A total of 51.7% of all the maternal deaths under review fell amongst a group of mothers who have had 5 pregnancies and over, and it is generally accepted that the risks of a mother in this parity group is about 5 times higher than in the group with less than 5 pregnancies. This merits the terminology of the "Dangerous Grande Multipara" for patients in this category.

(d) Race

Child-birth is definitely more hazardous amongst the Malaysians for reasons such as a tremendous lack of good ante-natal care, indifference to the benefits of such care, a disinclination for confinement in hospitals and a tremendous reliance on the local "bedan". Thus for example in 1957, the comparative death rates of the three main race groups are as follows:—

Malaysians	-	4.1	per 1000
Chinese	-	0.49	per 1000
Indians	-	0.59	per 1000.

(e) Clinical Factors on Causes of Deaths

It becomes apparent that Toxaemia of Pregnancy and their complications rank as the highest killer of mothers in child-birth claiming a total of 55 lives or 38.5% of the total of 143 maternal deaths that occurred in the period under review. Haemorrhage and Shock claimed 40 lives or 27.9% and is listed 2nd on the list.

Medical Conditions in Pregnancy took a toll of 31 lives or 21.8% and the 3rd most frequent cause of maternal deaths. Operative and Anaesthetic Hazards accounted for 10 deaths—a total of 6.9%. Finally Sepsis claimed the least number of deaths—7—a total of 4.9%.

Of the possible avoidable factors which might have parts to play, three main aspects have to be cited:—

- (a) Ante-Natal Care will have to be improved and bettered especially in the detection and treatment of the Toxaemia of Pregnancy. An effective education

campaign to secure all mothers to have good ante-natal care must be launched, and co-ordination must be achieved between institutional, rural and general practitioner ante-natal clinics, so that incomplete, inadequate and haphazard ante-natal care is rendered non-existent. More ante-natal beds need to be provided in hospitals.

- (b) A Resuscitation Flying Squad Service must be put into operation so that there can be more effective treatment for collapsed cases and cases with haemorrhage. The need for this service becomes even greater when it is recognised that it is far more dangerous for cases with haemorrhage to be transported to institutions for active treatment. The Resuscitation Service must ideally be organised so as to bring the services to the patient. The increasing number of domiciliary confinements and the projected plans of establishment of satellite "normal"

maternity homes makes the need for this service more cogent.

- (c) The selection of cases for domiciliary confinement and for special obstetrical care in hospital must be exercised with better judgement and more especially in women in the older age groups and higher parities group.
- (d) Closer liaison between Physicians and Obstetricians over problems of Medical Diseases in Pregnancy is highly desirable and judicious.
- (e) An Obstetric Anaesthetic Service integrated by itself must be developed immediately.

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