MATERNAL MORTALITY IN SINGAPORE
RECENT SURVEY 1960-1962

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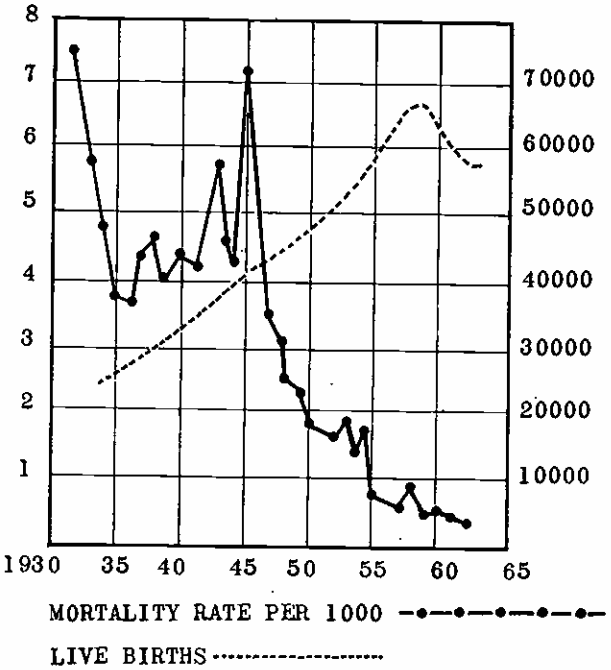
Interests on Maternal Deaths continue to attract the attention of the Authorities concerned with the health problems of the State, but the interest of an Obstetrician is centred not only on the figures that are reported from year to year but also on the enquiries into the ways and wherefores of such maternal mortalities; and more important, on what must be recommended in the way of prevention of such maternal deaths. The very art and science of Obstetrics have in these present years moved forward into the frontiers of Preventive Obstetrics and the progressive obstetrician aims now on the age-old motto of "Prevention is better than Cure".

A clinical report on an enquiry of maternal deaths in Singapore and at the Kandang Kerbau Hospital for the years 1955 to 1959 has been published in the Journal of the Singapore Medical Association; and it has been increasingly felt that there should be such a continued report on maternal mortality in the State of Singapore every three years. The present report is an outcome of this desire. There had been some comments arising out of the previous report especially on the authenticity of the figures and it is necessary at this time to state that the figures quoted for the Kandang Kerbau Hospital are as authenticated as can possibly be. Figures from the State's Registry of Births and Deaths may vary and discussions with officials in that department showed that the variations are not the fault of the department with its lay staff but the medical personnel attesting to the cause of death on the Death Certificate. In a number of cases, no allusion had been made to the pregnant state of the deceased persons and simple listing of the cause of death in accordance with the International Classification List had caused the department of Statistics to omit such a case as a Maternal Death. As far as the Kandang Kerbau Hospital is concerned, this deficiency has been adequately bridged as all Maternal Deaths are required to be brought for scrutiny by the respective Consultants who in turn confirm that they are Maternal Deaths and certify them so on the Death Certificates. Also, it would be necessary to stress that considerations of maternal mortality at the Kandang Kerbau Hospital do not take into account the deaths that are attributed to Abortions since the problem of abortions at this institution is so complicated with the suspected many cases of interfered pregnancies that come for treatment.

TABLE I
TREND OF MATERNAL MORTALITY IN SINGAPORE



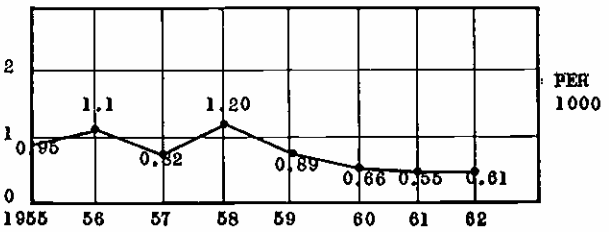
Year	No. Births	Exclude Abortions Maternal Deaths	Incidence Per 1000
1930	—	—	7.6
1955	58716	46	0.77
1956	61801	42	0.69
1957	63655	49	0.78
1958	64550	46	0.72
1959	64948	34	0.52
1960	61775	28	0.45
1961	59930	24	0.40
1962	58977	23	0.39

This recent survey shows a happy position for the State of Singapore—See Table I—to an extent that in 1962, the risk of an expectant Singapore mother dying in pregnancy and childbirth stands at 1 in 2569 deliveries (0.39 per 1000). Notice that this low rate had been steadily maintained from 1960 to 1962. Across the Causeway in the states of Malaysia, the maternal death rate in 1960 was reported as 2.4 per 1,000 and this is a 6 times higher risk. Indeed it is widely accepted that the risk is truly higher in the other Malaysian States as there had been many maternal deaths which had not been certified by medical personnel and therefore had not been statistically considered as maternal deaths. It is left to the readers' reasoning to form the conclusions as to figures cited but one point of view must still remain uppermost in our minds and that is—although the Singapore figures are happily low, complacency should be furthermost from the mind and interests should be maintained as to how we may reduce these figures even lower.

As in the previous series, overall details of the deaths as recorded by the Registrar of Deaths and the Department of Statistics are not completely available for study, and the causes ascribed as causes of death for statistical purposes do not provide information enough for analytical purposes. The same recourse had to be resorted to, and that is to fall back on all the available evidences at the Kandang Kerbau Hospital from which records, the main substance of this survey had been compiled. Figures at the Kandang Kerbau Hospital are appended as in Table II. It will be necessary to stress again that the Hospital receives and admits all sorts and all manner of cases that arrive at its door-step, and therefore, the maternal mortality figures for the Hospital are certainly higher when compared to figures for the whole State. On the basis of such figures, the maternal mortality rate for the Kandang Kerbau Hospital stands at 0.6 per 1000 or 1 in 1500 deliveries for the years 1960-1962 as compared to 0.9 per 1000 or 1 1001.5 deliveries in the previously reported series for the years 1955 to 1959—an appreciably reduced figure.

TABLE II

INCIDENCE OF MATERNAL DEATHS AT K.K. HOSPITAL, 1955-1962.



Year	No. Births	Maternal Deaths	Incidence Per 1000
1955	22920	22	0.95
1956	25878	29	1.10
1957	31724	26	0.82
1958	29280	34	1.20
1959	35406	32	0.89
1960	36267	22	0.66
1961	36590	20	0.55
1962	37861	23	0.61

FACTORS IN THE MATERNAL MORTALITY:

(a) Racial Factors;

The racial break-down of maternal deaths that had occurred at the Kandang Kerbau Hospital for 1960-1962 are as appended in Table III.

TABLE III

Race	1960-1962		1955-1959	
(1) Chinese ...	35 cases ...	53.8%	99 cases ...	69.2%
(2) Malays & Indonesians ...	24 cases ...	38.4%	26 cases ...	18.2%
(3) Indians				
Tamils ...	5 cases ...		15 cases ...	
Sikhs ...	1 case ...	9.2%	1 case ...	11.2%
(4) Eurasians ...	Nil ...	—	2cases ...	1.4%

TABLE IV

RACIAL RISKS OF MATERNAL DEATHS IN SINGAPORE BASED ON STATE FIGURES 1960-1962

	1957	1960	1961	1962
CHINESE				
No. Births ...	46263	44964	43062	34366
Maternal Deaths	22	17	13	9
Rate per 1000	0.49	0.37	0.30	0.26
MALAYS/INDONS				
No. Births ...	9317	10577	10990	9617
Maternal Deaths	28	11	8	12
Rate per 1000	4.10	1.0	0.72	1.20
INDIANS				
No. Births ...	5020	5084	4759	3899
Maternal Deaths	3	1	3	1
Rate per 1000	0.59	0.19	0.63	0.26

In order to have a clearer picture of the relative racial risks, attention is to be directed to Table IV:

The following features of interest are cited:—

(a) The fall in the number of Chinese births in 1962 *viz.* 11897 births as compared to 1957 and the almost steady number of births amongst the Malay and Indonesian communities.

(b) There is a continued definite greater risk for a Malay/Indonesian mother dying from Pregnancy and Labour as compared to her other racial counterparts. In 1957, there had been a ten times higher risk and in 1962, this risk had stood at five times higher.

It would appear from the tables presented above that the Chinese Community at large has made determined and realistic efforts on the subject of family planning and one would hope that this same trend can be recorded amongst the other racial communities. Because the Malay and Indonesian communities run such a higher risk of dying, it is to be emphasised that the campaign to minimise the avoidable factors of these maternal deaths should be concentrated on a more emphasised scale amongst these two particular sections of our Society. Indeed over the past few years, many healthy signs have already appeared on the scene. There is definitely a greater number of mothers from these two communities being booked for Hospital confinement. There is a definite greater break-down of previous prejudices against institutional confinements and against what the modern Obstetrician can do for them. Thus in 1958, only 15.1 per cent of Malay and Indonesian babies were born in Hospital and in 1962, this figure was more than doubled to 38.1 per cent (Report of the Registrar of Births, Deaths, Marriages and Persons, Singapore 1962).

(b) Booking

This factor continues to be a major avoidable factor in the causation of maternal deaths in Singapore, despite the fact that there had been a considerable improvement in the booking rate. See Table V.

At the Kandang Kerbau Hospital, a case is considered to be UNBOOKED unless the mother has had at least three ante-natal visits and attending at the Hospital.

Booking for ante-natal care alone is just not sufficient for the ideal is still a co-ordinated, complete, adequate and non-haphazard ante-natal care. The liaison between the Hospital and the maternal and child health clinics as well as the General Practitioner clinics will need to be more perfected.

(c) Age

The age distribution of maternal deaths in the Kandang Kerbau Hospital is as shown in Table VI.

Attention is to be centred on the above 40 years age group. In 1957 the maternal death rate amongst this group was 6.1 per 1000 on basis of the State's figures. In the years 1960 to 1962, there has been a considerable fall in this rate but the risk still remains 2 to 6 times higher —Table VII. Public Health Workers and Family Planning Campaigners should do well to direct their major attention on this category of patients in order to minimise the risks in this group of patients.

TABLE V

INCIDENCE OF BOOKING IN MATERNAL DEATHS

Race	Booked		Unbooked	
	1955-59	1960-62	1955-59	1960-62
CHINESE	6	7	93	28
MALAYS/INDONS	0	3	26	21
INDIANS	0	3	16	3
Total:	4.3%	20%	95.7%	80%

TABLE VI

MATERNAL MORTALITY—AGE DISTRIBUTION (1960-62)

Age Group	Chinese	Malays/Indons	Indians	1960-62	1955-59
15-20 yrs.	—	2	1	4.6%	6.9%
21-25 yrs.	4	3	5	18.4%	15.4%
26-30 yrs.	7	1	7	23.0%	24.6%
31-40 yrs.	9	—	4	20.0%	42.4%
Over 40 yrs.	7	3	—	15.3%	19.4%

TABLE VII

MATERNAL MORTALITY IN OVER 40 YEARS AGE GROUP (BASED ON STATE'S FIGURES)

Year	Total Births	No. Births	Maternal Deaths	Rate
1957	62685	2945 (4.7%)	18 cases	6.1
1960	61775	2908 (4.7%)	5 cases	1.9
1961	59930	2991 (5.0%)	1 case	0.4
1962	58977	2690 (4.6%)	2 cases	0.7

(d) Parity

Table VIII shows the parity distribution of the maternal deaths that occurred in the years under review. Notice from the State's figures, the high percentage of maternal deaths amongst the group para 6 and over. The risk amongst this group still hovers at a 5 times greater risk as can be seen from the Kandang Kerbau Hospital figures. It is necessary to point out that at the Kandang Kerbau Hospital, 10 cases had died in the years 1960-1962 who were over 40 years of age; and 9 cases of the 10 were in the parity range 6 to 17—exemplifying the still greater risk of death in a mother when two bad combinations as age over 40 years and parity of the Grande Variety co-exist in one same patient. On this aspect again, family planning workers as well as public health workers and educationists should take careful note—for consider the fact that 43 deaths could have been avoided in the years 1960-1962 from out of a total of 65 maternal deaths that had occurred.

CLINICAL FACTORS ON THE CAUSES OF MATERNAL DEATHS:

The classification on the causes of maternal deaths in this series under review follows the same classification as in the previous series (1955 to 1959). They are arranged in clinical groups as shown in Table IX.

TABLE VIII

MATERNAL DEATHS AND PARITY DISTRIBUTION

(a) STATE'S FIGURES (1960-62)

Parity	Chinese	Malay/Indons	Indians	1960-62	Compare 1955-59
0-1	4	—	1	7.7%	16.9%
2-3	—	4	3	10.7%	9.0%
4-5	7	2	1	15.3%	22.4%
6 and Over	24	18	1	66.1%	51.7%
TOTAL:	35	24	6	100.0%	100.0%

(b) KK HOSPITAL (1960-62)

UNDER PARA 5: Apprx: 70% of deliveries (77500)
Maternal Deaths: 22 cases
Rate: 0.29 per 1000

PARA 5 and OVER: Apprx: 30% of deliveries (33000)
Maternal Deaths: 43 cases
Rate: 1.3 per 1000

TABLE IX

CAUSES OF MATERNAL DEATHS—CLINICAL FACTORS

	1960-1962		1955-1959
TOXAEMIA and its Complications ...	20 cases ...	30.7%	38.5%
HAEMORRHAGE & SHOCK ...	25 cases ...	38.4%	27.9%
MEDICAL COMPLICATIONS ...	12 cases ...	18.4%	21.0%
OPERATIVE/ANAESTHETIC HAZARDS ...	3 cases ...	4.6%	6.9%
SEPSIS. ...	5 cases ...	7.7%	4.9%

Again here, the deaths do not take into consideration the deaths that had occurred in relation to abortions and they are only related directly to Obstetric Deaths. The same plan that of using the primary condition and not what follows in complications, is employed to indicate the clinical causes of deaths in this present series.

Notice the climb to first place of the Haemorrhage and Shock Group—now at 38.4 per cent as compared to 27.9 per cent in the 1955 to 1959 series. It is pleasing to note that Toxaemias of Pregnancy are showing a downward trend as a causative factor of maternal deaths and there is no reason to indicate why this trend should not be maintained if more patients are booked for ante-natal care and more ante-natal beds are made available for the management of these cases no matter how mild. Compared with the Haemorrhage and Shock Group, the avoidable factors in the Toxaemia Group are more amenable to correction. Haemorrhage and Shock in pregnant patients often appear like bolts out of the blue and the avoidable factors amenable for correction would appear to be less. Consideration of each clinical group is as follows:—

(a) Toxaemia

The fatal complications in this group are as listed in Table X below:

There appears to be relatively little change in the mode of death of patients with Toxaemia of Pregnancy in this series as compared with the 1955-1959 series. Toxaemia continues to remain a considerable problem in the Kandang Kerbau Hospital and will remain so especially with the fluid state of its aetiology. Despite this, definite improvement in mortality figures and in incidence can be attained, and the pass-words of early vigilance and emphasised hospitalisation in a case however mild are still recommended.

(b) Haemorrhage and Shock

The fatal cases are as listed in Table XI.

TABLE X

FATAL COMPLICATIONS OF TOXAEMIA

Mode of Death	1960-1962	1955-1959
Hypertensive Heart Failure	5 cases ... 25%	23.5%
Renal Failure—Uraemia	2 cases ... 10%	10.9%
Cerebro-Vascular Accidents	4 cases ... 20%	18.3%
Toxic Abruptio Placentae	5 cases ... 25%	27.3%
Eclampsia	4 cases ... 20%	20.0%

TABLE XI

HAEMORRHAGE AND SHOCK—FATAL CASES

Condition		1960-1962	1955-1959
Placenta Praevia	...	4 cases ... 16%	12.5%
P.P.H.—with Ret. Placenta	...	9 cases ... 36%	32.5%
No ,, ,,	...	6 cases ... 24%	35.0%
Ruptured Uterus Shock	...	5 cases ... 20%	17.5%
Uterine Inversion	...	1 case ... 4%	2.5%

POST-PARTUM HAEMORRHAGE

Total No. of Cases	15 cases	27 cases
Nos. Born Before Arrival	10 cases	9 cases
Malays ... 7 cases Chinese ... 3 cases		
Nos. Born Before Arrival with Retained Placentae ...	5 cases	7 cases
Nos. Born Before Arrival & Died Before Arrival ...	5 cases	2 cases

The break-downs in percentages on the manner of the Haemorrhage and or Shock in the present series remain much the same when compared with the 1955-59 series. But alas! this group has now come to occupy first place amongst the clinical causes of maternal deaths at the Kandang Kerbau Hospital. There was a total of 15 cases of Post-Partum Haemorrhage in the present series and 10 cases were delivered before their arrival in the Hospital. Of these 10 cases, 5 cases were dead on arrival in the Hospital, and 5 other cases had the placenta retained. The 5 cases dead on arrival attests to the often quoted danger of transporting cases of Haemorrhage and Shock with or without retained placenta and especially without prior resuscitation. There appears now to be a cogent necessity for the review of the policy of initiating a Flying Squad Resuscitation Service—a Service inhumanly lacking in such an affluent society such as is claimed to be present in Singapore today. Haemorrhage and Shock had accounted for a total of 25 maternal deaths in the series under review—See Table IX and this reached top place amongst the clinical causes of maternal deaths — representing 38.4% of the total as compared with the 1955-59 series when this group was only 27.9 per cent.

(c) Medical Complications in Pregnancy

As shown in Table XII— the main problem of the fatal cases in this group still rests with Heart Diseases in Pregnancy. Out of the 12 cases who died in this series under review, only 4 cases or 33 per cent had been booked for Hospital Confinement. Most of the Medical complications are amenable to treatment if diagnosed early and fatalities can be avoided.

As noted in the previous series it needs to be stressed again that despite the presence of two organised medical units and a third medical Unit that will be in existence in the State's Medical Service, there remains lacking in this improving institution, the liaison and coordination between the Physicians and the Obstetricians, and a Medical Diseases complicating Pregnancy Clinic has yet to be established in this Hospital. It is still maintained that the services of a Physician must be brought to a Pregnant patient and the arrangement for referral of a Pregnant patient to a Physician's Clinic so far removed from this Hospital is certainly not to be condoned and encouraged.

(d) Anaesthetic and Operative Hazards

There had been 3 cases (4.6 per cent of all causes) of maternal deaths directly attributable to hazards of a General Anaesthesia and the specific cause of death is as described in Mendelsohn's syndrome viz: inhalation — asphyxia complex. There had been other cases which died following operative procedures and general anaesthesia for varying conditions but these deaths had been included into the list of the

TABLE XII

MEDICAL COMPLICATIONS—FATAL CASES

Condition		1960-1962		1955-59
Heart Disease				
Mitral Stenosis	...	4 cases	33.3%	48.5%
Blood Diseases				
Anaemia	...	2 cases	16.6%	29.0%
Liver Diseases				
Jaundice/Hepatitis	...	2 cases	16.6%	9.6%
Lung Diseases				
Pulmonary T.B.	...	1 case		
Lobar Pneumonia	...	1 case		
Pulmonary Embolism	...	1 case	25.0%	3.2%
Brain Disease				
Brain Tumour	...	1 case	8.3%	—

TABLE XIII

ANAESTHETIC/OPERATIVE HAZARDS—FATAL CASES

	1960-1962		1955-1959
Associated with Caesarean Sections ...	3 cases ...	100%	70%
Associated with Forceps Delivery ...	—	—	30%

TABLE XIV

SEPSIS—FATAL CASES

	1960-1962		1955-1959
Pericarditis	1 case ...	20%	14.3 per cent.
Puerperal Sepsis	4 cases ...	80%	42.8 per cent.

primary clinical causes. Thus for example, there had been one case with severe toxaemia of pregnancy necessitating termination of pregnancy by Caesarean Section. Caudal anaesthesia was employed and the patient died from acute hypotension and shock following this anaesthetic. Heart Failure had been ascribed as a precipitating cause of death. The avoidable factor on this aspect hangs on the question of a prompt anaesthetic service, and a great cry of need for a Resident Obstetric Anaesthetist still goes forth—especially when a review of these cases showed that relatively junior anaesthetists with limited anaesthetic experience in Obstetrics were responsible for the anaesthesia in these cases. The comparative figures with the 1955-59 series are as shown in Table XIII.

(e) Sepsis

There had been one case of coincident sepsis (20 per cent) amongst the cases that were fatal in the years 1960-1962. The condition listed was Pericarditis.

There were 4 cases of fulminant puerperal sepsis involving patients who had been delivered in this hospital. These were discharged on the second or third day after delivery. This notwithstanding, sepsis as a causative factor of maternal death appears low and the problem would appear not to be so acute. It is anticipated that the death rate under this heading can be maintained at this very low level and indeed, improvement should be anticipated. The comparative figures with the 1955-1959 series are as shown in Table XIV.

SALIENT FEATURES OF THE PRESENT SURVEY:

1. The Maternal Death Rate for Singapore matches with the best international standards. Indeed it would appear to be better than many countries in Asia. In 1962—the death rate of 0.39 per 1000 live births is a record new low in the history of the State. This figure has been achieved despite the acknowledged deficiencies in the Maternity Services of the State. At the Kandang Kerbau Hospital, the death rate has kept pari passu with the State's figures but it is at a plane higher because all cases without any exception are admitted to the institution. The death rate kept at 0.66 per 1000 births in 1960 and was 0.55 per 1000 in 1961 and 0.61 per 1000 in 1962. The number of deliveries in 1962 at the Kandang Kerbau Hospital was 37861—the highest number ever recorded in the institution up to 1962.
2. The avoidable factors of the maternal deaths analysed have been emphasised and

these included Booking as well as particular care and attention for the Malay and Indonesian Sections of the community and also for the elderly parous patient as well as the Grande Multipara. Being over 40 years of age and being a Grande Multipara at the same time is to be included in the highest risk group.

3. The clinical factors that had caused maternal deaths at the Kandang Kerbau Hospital showed that Haemorrhage and Shock have come to occupy top place amongst these factors. This accounted for 38.4 per cent of all the deaths that had occurred in the years under review. Close scrutiny of the avoidable factors showed the cogent necessity of initiating a Flying Squad Resuscitation Service for the Hospital. There has been a decline in the percentage of maternal deaths caused by Toxaemia of Pregnancy and its complications—from 38.5 per cent in the 1955-59 series to 30.7 per cent in the present series. This can be attributed to the fact that the Hospital has taken every case of Toxaemia of Pregnancy—however mild—very seriously and the cases are admitted for treatment. The number of ante-natal beds in the Institution has been increased in the recent few years and it is anticipated that there should be a continued decline in the mortality rate for this clinical condition.

   Heart Disease in Pregnancy continues to be a major problem causing maternal deaths and a Physician cum Obstetrician Ante-Natal Clinic is strongly recommended for the Kandang Kerbau Hospital.

   Anaesthetic hazards continue to be a thorny factor also and it is felt that time is now ripe to review the question of Resident Obstetric Anaesthetists for the Kandang Kerbau Hospital.

4. The very encouraging mortality figures as presented in the present survey must not lull the people concerned into any complacency, for as already pointed out, the maternal mortality rates can certainly be more improved if the avoidable factors cited are overcome.

   Complacency in lieu of constant vigilance and continuous improvement is dangerous and there is no doubt that if vigilance is relaxed, the mortality rates can rocket to unfavourable levels.

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REFERENCES

Lean T.H.,: Maternal Mortality in Singapore 1955 to 1959: Singapore Med. Jour. Vol. 1 No. 3, September 1960.