

# Mortality and morbidity patterns in measles cases admitted to the hospitals in Yogyakarta

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## ABSTRACT

Djauhar Ismail - *Mortality and morbidity patterns in measles cases admitted to the hospitals in Yogyakarta*

The case fatality rate of measles cases admitted to the hospitals in Indonesia in the period of 1973 -1989 varied from as high as 26.1% in Medan to 2.4% in Bali, with an average of 10.9% in all hospitals. In Indonesia, according to the National Household Health Survey 1985, the province of Yogyakarta had the lowest of infant mortality and was ranked high for the coverage of measles immunization and also the medical facilities in this area is relatively easy to access. The purpose of this study was to obtain the case fatality rates and the clinical characteristics of measles cases admitted to the hospitals in the province of Yogyakarta in the period of 1984 to 1990, leading to a comparison with data from other hospitals in Indonesia. This study comprised, a retrospective study during the period of 1984 - 1987 involving 5 hospitals in Yogyakarta municipality, and a prospective study during the period of 1988 - 1990 carried out in 9 hospitals in the province of Yogyakarta. The results showed that the percentage of under-five children suffering from measles admitted to the hospitals in the period 1984 - 1987 was higher compared to under-five children hospitalized in the period of 1988 - 1990 (60% versus 36%). Therefore, it can be concluded that there was a shift in the distribution of measles cases to older children. This was probably due to the coverage of measles immunization in Yogyakarta which was higher as compared with other places. Since younger children were already protected by immunization, a relatively more older cases were found in Yogyakarta. The case fatality rate of 0.4% (2 out of 472 cases) during the period of 1984 -1987 and 0.8% (3 out of 386 cases) during the period of 1988-1990 in Yogyakarta were much lower as compared with the data reported from other hospitals in Indonesia. Several factors such as the general health condition of the province of Yogyakarta, as well as the frequency and types of complications of the diseases and the nutritional status of the measles patients may explain the different mortality of measles patients in Yogyakarta compared that in other places in Indonesia.

**Key words :** measles - morbidity - mortality - case fatality rate - immunization

## ABSTRAK

Djauhar Ismail - *Mortalitas dan pola morbiditas penderita campak yang dirawat di rumah sakit-rumah sakit di Yogyakarta*

Angka kematian penderita campak yang dirawat di beberapa rumah sakit di Indonesia (selain di Yogyakarta) dalam kurun waktu tahun 1973 -1989 menunjukkan variasi yang besar mulai setinggi 26,6% di Medan sampai 2,4% di Bali, dengan rata-rata sebesar 10,9% di semua rumah sakit yang melaporkan. Di Indonesia, menurut Survei Kesehatan Rumah Tangga tahun 1985, propinsi Yogyakarta mempunyai angka kematian bayi yang terendah dan cakupan imunisasi campak yang tinggi dan di samping itu di daerah ini untuk mendapatkan pelayanan kesehatan relatif mudah. Penelitian ini bertujuan untuk mengetahui angka kematian dan gambaran klinis penderita campak yang dirawat di rumah sakit-rumah sakit di propinsi Daerah Istimewa Yogyakarta mulai tahun 1984 sampai dengan tahun 1990, sehingga dapat dibandingkan dengan keadaan penderita campak yang dirawat di rumah sakit lain di Indonesia. Penelitian ini dilakukan di rumah sakit-rumah sakit di seluruh wilayah propinsi Daerah Istimewa Yogyakarta secara retrospektif untuk penderita yang dirawat pada periode tahun 1984-1987 dan secara prospektif untuk penderita yang dirawat pada periode tahun 1988-1990. Hasil penelitian ini menunjukkan bahwa dibandingkan dengan penderita yang dirawat pada periode tahun 1988-1990, persentase anak Balita penderita yang dirawat pada tahun sebelumnya (1984-1987) adalah lebih tinggi sehingga dapat disimpulkan bahwa ada pergeseran distribusi umur penderita campak ke arah yang lebih tua. Hal ini kemungkinan disebabkan karena cakupan imunisasi campak di Yogyakarta lebih tinggi dibandingkan dengan cakupan di daerah lain sehingga anak yang lebih muda sudah terlindung dari penyakit campak akibat imunisasi. Angka kematian penderita campak yang dirawat di rumah sakit untuk periode tahun 1984-1987

adalah 0,4% (2 dari 472 kasus) dan tahun 1988-1990 adalah 0,8% (3 dari 386 kasus), yang jauh lebih rendah bila dibandingkan dengan angka kematian di rumah sakit lain di Indonesia. Beberapa faktor yang mungkin mempengaruhi rendahnya angka kematian penderita campak ini di antaranya adalah status kesehatan masyarakat di Yogyakarta, jenis dan frekuensi timbulnya komplikasi penyakit campak, status gizi dan relatif lebih mudahnya keterjangkauan pelayanan kesehatan di wilayah propinsi Yogyakarta.

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## INTRODUCTION

In Indonesia, as in most developing countries, measles is still one of the infectious diseases that cause a high morbidity and mortality<sup>1</sup>. Due to the lack of a reliable recording and reporting system, the real magnitude of this public health problem cannot be easily determined.

Hospital data has limitations in giving the picture about measles in the community due to excluded cases which are not admitted to the hospital or which do not seek medical attention. In many instances only severe cases come to the hospital, leading to a relatively high percentage of complications and high mortality rate. However, important information about the impact of measles in the community can be derived from hospital data which include much information concerning, among others, diagnosis, clinical signs and symptoms, complications, treatment and final outcome.

The review of hospitalized measles cases in several hospitals in Indonesia (excluding Yogyakarta) in the period of 1973-1989 indicates the case fatality rate varied from as high as 26.1% in Medan<sup>2</sup> to 2.4% in Bali,<sup>3</sup> with an average of 10.9% in all hospitals<sup>3</sup>.

In order to obtain the case fatality rate and the clinical data of hospitalized measles cases in the province of Yogyakarta a retrospective and prospective studies were conducted to leading to a comparison with the data from other hospitals.

## METHODS

This study was carried out retrospectively (for the period of 1984-1987) and prospectively (between 1 February 1988 and 31 Januari 1990).

The retrospective data were collected from the medical records of 5 hospitals in Yogyakarta municipality: Dr. Sardjito General Hospital, Bethesda Hospital, Panti Rapih Hospital, PKU Muhammadiyah Hospital, and the Klinik 45, a private

childrens' clinic. These hospitals serve the population of Yogyakarta municipality that is about 425.000 in 1987. Most patients of these hospitals come from Yogyakarta municipality (urban area), whereas about 5 to 10% come from the semi-urban or rural areas surrounding Yogyakarta. The patients originated from families of all socio-economic levels.

Apart from the above mentioned hospitals, 4 district hospitals, i.e. Gunung Kidul, Sleman, Kulon Progo, and Bantul hospital were also involved in the prospective study. Altogether these 9 hospitals serve most of all hospital admission services in the province of Yogyakarta with a total population of 3.1 million in 1987. The paediatric ward of these hospitals is supervised by paediatrician who had been individually contacted by the author before the study was commenced.

Patients with measles were involved in the study if they met the following diagnostic criteria: (1) fever; (2) catharral signs and symptoms (cough, coryza, conjunctivitis) and (3) a maculopapular and confluent rash.

The diagnosis of bronchopneumonia was based on the occurrence of: (1) dyspnoe and (2) auscultatory symptoms (mostly crepitations) and in most cases with (3) evidence of lung infiltration by radiologic examination. Diarrhoea was diagnosed when a child had three or more loose stools per day. The criteria for measles encephalitis were based on clinical signs and symptoms.

On admission (if needed after rehydration) and before discharge from the hospital, the nutritional status of the cases was assessed by the weight for age, using the modified Harvad standard. A body weight of 80% or more, between 60-80%, and < 60% was considered as well nourished, moderate undernutrition and severe malnutrition respectively.

In the prospective study more specific data were collected. A structured form was developed for data collection.

### Result of the retrospective study

In the period of 1984-1987, 472 measles cases (243 males and 229 females) were admitted to the 5 hospitals in Yogyakarta municipality. The proportion of cases of the under 1 year of age group, between 1-4 year of age, and five and over were 9.9% (5.6-15.0%); 51.3% (45-54.1%), and 38.8% (31.2-46.1%) respectively (TABLE 1).

### Complications

Measles complications were found in 176 (37.3%) cases. The most common complication is bronchopneumonia (19.7%), followed by diarrhoea (11.7%), febrile convulsion (2.3%), tuberculosis reactivation (2.3%), otitis media (1.9%), and encephalitis (0.6%) as shown in TABLE 2.

### Fatalities

Two out of 472 measles patients died (case fatality rate 0.4%). One of them was an 11-month baby who died of bronchopneumonia and diarrhoea, while another one, a 14-month baby, also had bronchopneumonia. Both of them had not been vaccinated against measles.

### Results of the prospective study

In the two-year period of the prospective study (between 1 February 1988-31 Januari 1990) 386 children with measles were admitted to the 9 hospitals in the province of Yogyakarta. Two hundred and seventy cases (70%) were referred to the hospital by their parents, while the remainder (30%) was referral cases, i.e. 84 cases (21.7%); 25 cases (6.5%), and 7 cases (1.8%) were referred

TABLE 1. - Age distribution of measles cases admitted to the 5 municipal hospitals in Yogyakarta, 1984-1987.

Year	Age	HOSPITAL					Total	
		Bethesda	PKU Muhammadiyah	Panti Rapih	Klinik 45	Dr. Sardjito	n	%
1984	< 1	5	3	9	1	6	24	15.0
	1 - 4	24	1	32	9	20	86	53.8
	5 -	16	-	8	18	8	50	31.2
Total		45	4	49	29	34	160	100
1985	< 1	3	-	2	-	1	6	15.0
	1 - 4	4	3	3	3	5	18	45.0
	5 -	9	1	2	4	-	16	40.0
Total		16	4	7	7	6	40	100
1986	< 1	2	-	1	1	4	8	5.6
	1 - 4	11	2	17	19	29	78	54.1
	5 -	11	2	4	15	26	58	40.3
Total		24	4	22	35	59	144	100
1987	< 1	2	-	3	1	3	9	7.0
	1 - 4	13	4	18	15	10	60	46.9
	5 -	13	-	9	17	20	59	46.1
Total		28	4	30	33	33	128	100

TABLE 2. - Major complications of measles cases admitted to the 5 municipal hospitals in Yogyakarta, 1984-1987

Complication	1984	1985	1986	1987	Total	
					n	% *
Bronchopneumonia	36	6	24	27	93	19.7
Diarrhoea	8	4	25	18	55	11.7
Febrile convulsion	3	-	6	2	11	2.3
Encephalitis	1	0	2	-	3	0.6
Tuberculosis reactivation	8	0	1	2	11	2.3
Otitis media	2	3	2	2	9	1.9
Other complications	2	4	3	1	10	2.1
No complication	99	28	76	93	296	62.7

\* percentage from the total cases (472 cases) \*

Note: some cases had more than one complication

to the hospitals by the medical practitioners, primary health centres, and nurses and traditional healers respectively.

More than half of the cases (56.2%) came to the hospitals on the third or fourth day of illness. The mean duration of the foregoing illness at home was 3.7 days, with a range between one and 11 days.

#### Source of infection

Most of the parents (71.7%) did not know the source of infection from which their children contracted the disease. Some parents (20.2%) mentioned that the infection came from children outside their houses, and 8.5% of the parents mentioned that their children contracted the disease from siblings at home.

#### Vaccination status

As could be confirmed by their immunization cards or their "Road to Health" cards, 41 cases (10.6%) had been vaccinated against measles; 305 cases (79.0%) had not been vaccinated and the vaccination status of the 40 cases (10.4%) was not known.

#### Age and sex

The age range of the cases was 7 months to 12 years; the sex ratio was 1:1. The age distribution of the cases is shown in TABLE 3.

TABLE 3. - Age distribution of measles cases admitted to the 9 hospitals in the province of Yogyakarta, February 1988 - January 1990

Age (years)	1988		1989/1990	
	n	%	n	%
0	12	7.2	18	8.2
1	13	7.8	16	7.3
2	12	7.2	13	5.9
3	7	4.2	13	5.9
4	16	9.6	22	10.0
5	27	16.3	33	15.0
6	27	16.3	29	13.2
7	19	11.4	35	15.0
8	17	10.2	1	8.6
9	7	4.2	10	4.5
10	5	3.0	6	2.7
11-12	4	2.4	6	2.7
Total	166		220	

#### Clinical findings

The examination on admission revealed that 207 children (53.6%) were mildly ill, 175 children (45.3%) were moderately ill and 4 children (1.0%) were severely ill.

#### Nutritional status and weight changes

The nutritional status of the cases on admission was as follows: 212 children (54.9%) were well-nourished, 163 children (42.3%) had a moderate undernutrition and 11 children (2.8%) had a severe undernutrition (marasmus) (TABLE 4).

TABLE 4. - Nutritional status of measles cases on admission

Nutritional status	Number of cases	%
Well-nourished	212	54.9
Moderate undernutrition	163	42.3
Severe undernutrition	11	2.8
Total	386	100.0

The weight changes of the cases were obtained by comparing the weight on admission with the weight on discharge from hospital. During the hospitalization 241 children (62.4%) were losing weight: 150 children (38.9%) losing up to 5% of their weight, 78 children (20.2%) losing 5 to 10%, 12 children (3.1%) losing 10 to 15% and one child (0.3%) losing more than 15% of his weight (TABLE 5).

TABLE 5. - Weight loss of measles cases

Weight loss (%)	Number of cases	%
up to 5	150	38.9
5 - 10	78	20.2
10 - 15	12	3.1
> 15	1	0.3
Total	241	62.5

\* percentage from the total cases (386 cases)

#### Complications

The complications of measles cases at the time of admission and during hospitalization are listed in TABLE 6. Of all measles cases, 192 children (49.7%) had no apparent complication.

In the present study, respiratory complications and diarrhoea were the most common.

TABLE 6. - Type of complications of measles cases admitted to 9 hospitals in the province of Yogyakarta, February 1988 - Januari 1990

Complications	Number	Percentage of admission
Bronchopneumonia	51	13.2
Bronchitis	39	10.1
Diarrhoea	39	9.6
Bronchopneumonia + diarrhoea	9	2.3
Bronchitis + diarrhoea	4	1.0
Otitis media	18	4.7
Febrile convulsion	10	2.6
Encephalitis	3	0.8
Tuberculosis reactivation	3	0.8
Stomatitis	85	22.0
No complication	192	49.7

There were 12 cases (3.1%) who were, by the request of the family, untimely discharged from the hospital, i.e. before completion of treatment. The reasons given by the parents of these children were: their child looked healthy, the mothers should take care another child at home or (in a small proportion of the cases) there was an economic reason. In the follow up examination at the hospital, all of these cases were completely recovered.

#### Fatalities

Among the 386 measles cases admitted to the hospitals, 383 cases (99.2%) recovered and 3 cases died (case fatality rate 0.8%). The three children who died at the district hospitals, were at the age of 15, 18 and 20 months; all had measles complicated by bronchopneumonia and one of them (18 month old) had diarrhoea with severe dehydration.

#### Duration of hospitalization

The mean duration of hospitalization of measles cases was 5.1 days with a range from 1 to 24 days.

## DISCUSSION

#### Age distribution

The results of the retrospective study (1984-1987) and the prospective study (1988-1990) on measles cases admitted to the hospitals in the province of Yogyakarta showed a difference in the age distribution of the cases. In the period of

1984-1987, more cases (between 53.9 and 68.8%) consisted of children under 5 years old (TABLE 1), whereas in 1988 and in 1990, respectively, 36.0 and 37.3% of the cases were in the group of under 5 years old (TABLE 2). In the other hospitals in Indonesia, the percentages of cases aged 1 to 4 years were found to be higher than in the other age groups. It is clear that there is a shift in the age distribution of the hospitalized measles cases to older children in Yogyakarta. This probably occurred because the coverage of measles immunization in Yogyakarta was higher compared to that in other places. Since younger children were already protected by immunization, in Yogyakarta relatively more older cases were found.

#### Nutritional status

The nutritional status of the measles cases was as follows: more than half (54.9%) was well-nourished, 42.3% had a moderate malnutrition and 2.8% was marasmic. In other hospitals in Indonesia measles cases with severe malnutrition were more often found.<sup>2,6,7,8</sup>

#### Complications

The measles cases in the nine hospitals had less complication than those in other hospitals in Indonesia, where in some hospitals about three fourth or more of the measles cases usually had one or more severe complications; the complications most frequently reported were bronchopneumonia and diarrhoea; as frequent as about 75% of measles deaths were associated with these two complications<sup>2,6,7,8</sup>. In Yogyakarta, measles cases with bronchopneumonia and diarrhoea constituted about 30% of all admitted measles patients.

#### Case fatality rate

In this study it was found that the case fatality rates (CFR) of measles in the hospitals in Yogyakarta in the period of 1984-1987 and 1988-1990 were 0.4% and 0.8%, respectively. Compared to other hospitals in Indonesia, such as in Medan in the period of 1973-1977, where CFR was 26.1%<sup>2</sup> or in Surabaya within the period 1984-1988<sup>7</sup> where the CFR was 9.0%, the mortality in the Yogyakarta hospitals was very much lower.

The availability and accessibility of medical care in Yogyakarta is relatively easy because Yogyakarta is a small province. This factor might more or less influence the outcome of hospitalization because patients tend to come earlier in seeking treatment.

Some other conditions of the province of Yogyakarta are worthwhile to be described. According to the National Health Household Survey in 1986<sup>1</sup>, Yogyakarta had the lowest level of infant mortality rate (an IMR level 27.1 per 1,000 live births versus the national IMR of 71.8 per 1,000 live births). Also, Yogyakarta had the lowest mortality of 1 to 4 year old children. In Yogyakarta this mortality rate was 2.0 per 1,000 while the national level was 10.6 per 1,000. Using these two health indicators, the general health condition of the province of Yogyakarta seems to be better than that of the other provinces in Indonesia.

## CONCLUSION

Retrospective and prospective studies on clinical characteristics of hospitalized measles cases in the period 1984-1987 and the period 1988-1990 were carried out in 9 hospitals in the province of Yogyakarta.

From these studies it can be concluded that : In Yogyakarta a shift in the age distribution of measles cases to older children had been observed. Case fatality rates of 0.4 and 0.8% in Yogyakarta were found. As compared with the data reported from other hospitals in Indonesia, the case fatality rates in Yogyakarta were much lower.

Some factors such as the general health condition of the province of Yogyakarta, as well as the frequencies and types of complications of the disease and the nutritional status of the measles patients may explain the different mortality of measles patients in Yogyakarta compared to other places in Indonesia.

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