Decline in Adult Female and Maternal Mortality over Three Successive Surveys in Indonesia

(Preliminary analysis: NOT FOR QUTATIONS)

Mohamed M. Ali, Department of Reproductive Health & Research, World Health Organization, WHO, Geneva (alim@who.int) and
Zoë Matthews, University of Southampton, UK Z.Matthews@soton.ac.uk

Abstract

This paper exploits the wealth of data now available on adult female mortality in Indonesia from three successive DHS surveys – administered in 1994, 1997 and 2002/3. Using sibling histories from a combined sample of 150,769 sisters aged 15 to 49 during the ten years period before the survey, mortality rates are calculated. Over the last decade female mortality has declined by 15%, maternal mortality has dropped by 22% and the percentage of adult female deaths due to maternal causes has fallen from 19% to 14%. Despite these improvements, there are concerns that health gains for women are occurring only among the rich. Adult female mortality rates were calculated by wealth quintile, using an elaboration of the familial technique by fitting a Poisson regression.

The wealth divide in mortality for Indonesia, already reported to be significant (Graham et al, 2004), is now confirmed to be widening over the three survey years, even controlling for other variables such as education, place of residence and province. From non-significant differences between the wealth quintiles in 1994, the most recent survey shows that the adjusted ratio of maternal mortality rates of poor to richer subgroups has widened to more than sevenfold and the differences are now significant. Moreover, although there are also significant differences in all cause female mortality rates over the same time period – these are less marked than those found for maternal mortality. Thus non-maternal deaths are less closely linked to poverty status than maternal mortality which underlines the potential of using maternal mortality as a means of tracking progress in poverty reduction strategies. The Indonesian 'bidan di desa' policy in force over the last 15 years to combat maternal mortality, has clearly enabled a widening of access for professionally assisted births, but may have introduced a 'two tier system' which excludes those who cannot pay for midwifery services at childbirth.

Introduction

The disparities in the levels of maternal mortality between poor and rich countries are often cited as an example of global injustice. Less attention, however, is paid to the differences between poor and rich populations within countries. Although the promise of the Millennium Development Goals is to lead us away from global poverty, there is a need to go beyond a beguilingly simple interpretation of a declining rate of maternal death to identify subgroups of the population whose rate may actually be climbing. In other words the setting and monitoring of development targets as national averages may disguise huge internal differences – and these differences may be due to poverty.

Indonesia holds a particular interest with regard to maternal mortality, because of the implementation of its 'bidan di desa' policy established in 1989 whereby a certified midwife was to be placed in every village to boost skilled attendance at birth (Koblinsky, 2003). However, given that the new cadres of village midwives are now reliant on user fees there is concern that the new provisions, although designed to widen access, may be exacerbating inequalities. Three successive DHS surveys – administered in 1994, 1997 and 2002/3 have shown that mortality (rates per 1000) for women aged between 15 and 49 has declined by 15% (from 2.19 to 1.89) over the last decade, and maternal mortality ratio has dropped by 2% (from 390 to 307). Meanwhile the percentage of adult female deaths due to maternal causes has fallen from 19% to 14%. However, a recent analysis of ten developing countries showed that a strong correlation exists between poverty and risk of maternal death in all countries studied, including Indonesia as well as Chad, Kenya and Peru (Graham et al, 2004).

This paper follows on from previous work by looking at mortality differentials by wealth in Indonesia, which now has three successive survey data sets on adult female and maternal mortality. Interest focuses on the differences in mortality between rich and poor, and whether these differences are changing over time. This country, the fourth most populous in the world, which is spread over many hundreds of islands, and which includes many isolated communities, has engaged with the problems of safe motherhood by establishing birth posts and training midwives. It is difficult to draw firm conclusions on the effects of the policy in terms of maternal mortality reduction due to wide confidence intervals – but given the availability of data on household assets it is possible to track inequalities over time.

The paper is presented in four parts – firstly providing background material, then describing the data and methods and thirdly presenting the results of the analysis. The analysis includes the calculation of maternal mortality rates as well as all cause adult female mortality rates by wealth quintiles based on the wealth status of the household were the female respondent is residing. This is the 'familial technique' applied to 'sisterhood estimates' as suggested by Graham et al (2004). An elaboration of this method is also applied which uses a Poisson regression model to provide adjusted estimates of the rich-poor disparity in mortality over time by controlling for a range of socio-economic factors such as respondent's level of education, place and region of residence, and sister's age (current or at death) as reported by the respondent. A fourth and final section of the paper concludes and discusses the results of the analysis.

Background

In a move which responded directly to the Safe Motherhood Initiative (ref from the Sri Lanka meeting of 1987) – the Indonesian government took the message forward, and in 1989 launched a programme to place a certified midwife in each of its villages. The aim was to tackle the high maternal mortality ratio (MMR) which at the time was well over 300 per 100,000 live births (Koblinsky 2003). Neighboring countries such as Malaysia and Thailand, along with Sri Lanka, had shown the way in the Asian region by building up their health systems and their human resources for safe motherhood – their subsequent declines in maternal mortality have been dramatic (WHO, 2005).

The Indonesian policy, named 'Bidan di Desa (BDD)' after the village midwife cadre it produced, abandoned the training of traditional birth attendants (TBAs) in favor of a three year nursing training for an educated intake plus one subsequent year of midwifery. The new midwives (bidans) were to partner with TBAs to attend births at 'polindes' or well-equipped community birthing huts. It was estimated that a total of 54,000 bidans would need to be trained, with the first batch available for service by 1993. Bidans received two successive three year contracts of employment from the government, after which they were expected to be self sufficient based on user fees. The last BDD cohort was trained in 1999, meaning that 2006 is the first year where no government support exists for BDD (Koblinsky, 2003).

In mid-September 1998, almost ten years after BDD, a new health paradigm was introduced in Indonesia that focused on health promotion and prevention under the motto "Healthy Indonesia 2010". To achieve Healthy Indonesia, the Ministry of Health set a new range of targets aiming to maintain and enhance quality accessible and affordable health services (BPS and ORC Macro 2003). The new scheme set a target of 90 percent of births to be assisted by medical staff by 2010 (Ministry of Health of Indonesia, 2001).

Based on the most recent DHS survey, 66% of women's most recent births that occurred within three years of the survey were attended by skilled professionals, which included a mix of bidan (who covered 20% of all births), nurse-midwives, doctors and obstetricians. For the first time in 2002-2003 the survey included bidan as a separate category of birth assistant on the survey questionnaire. The evolution in the most skilled person present at deliveries seen in Figure 1 shows that TBAs are gradually giving way to midwives as the most common assistant – albeit leaving over 30% still attended by TBAs only. The proportion of births in a health facility, also shown in Figure 1, was substantially higher in 2002-2003 than in the two previous surveys, reaching nearly 40% in the more recent survey. The growth in institutional deliveries is due almost entirely to the private sector, with the provision of delivery services at practitioners' homes as well as their own practice sites (including polindes) categorized as private care.

The effect on maternal mortality of these programmatic efforts is hard to establish. The MMR is estimated at 307 maternal deaths per 100,000 live births for the period 1998-2002 from the most recent survey. From the 1997 data, the MMR estimate representing the period 1993-1997 was 334. Analysis of results from the 1994 IDHS showed that the MMR for the five year period 1990-1994 was 390. However, because maternal mortality rates and ratios are associated with high sampling errors, the 95% confidence intervals around all three figures overlap, making it impossible to conclude that there has been a decline. Although the declining trend seen over the three estimates seems to add to the evidence for a decline, even at a relaxed level of confidence (67%) the confidence intervals still overlap, making it difficult to conclude with confidence that there has been any decline in the level of maternal mortality over the past 10-15 years in Indonesia (BPS and ORC Macro 2003).

We cannot rule out a dramatic decline – given the size of confidence intervals, a drop from 450 to 225 (a halving) could be possible. An increase is even possible from about 300

upwards to above 350. However, a steep decline may not be likely given that more than 50% of births still happen at home in nearly all provinces of Indonesia – this proportion ranges from as low as 10 percent in Jakarta, and up to an astounding 94 percent in central Kalimantan. Proportions of home births in the 80s and 90s are not uncommon among the districts, and births with TBAs and lay people are still common in many parts of Indonesia.

Data and methods

In the 1994 and 1997 IDHS surveys, data were collected on adult and maternal mortality. Similar data were collected in the 2002-2003 IDHS that allow estimation of adult and maternal mortality using a direct estimation procedure. The information concerns the survivorship of all live births to the respondent's natural mother (i.e. the respondent's brothers and sisters). The direct approach to estimating adult and maternal mortality maximizes use of the available data, including information on the age of surviving siblings, the age at death of siblings who died, and the number of years ago that the sibling died. This allows the data to be aggregated for determining the number of person-years of exposure to mortality and the number of sibling deaths occurring in defined calendar periods (BPS and ORC Macro 2003). Rates of maternal and adult mortality are obtained by dividing maternal or all female deaths by person years of exposure (Rutenberg and Sullivan, 1991).

For reason of comparability, the data from Di Aceh, East Timor, Maluku, and Irian Jaya regions were excluded for the earlier two surveys (1994 and 1997) because the most recent survey (2002/3) was not administer questionnaires there (Table A1). Using sibling histories from all three surveys – creating a combined sample of 150,769 sisters aged between 15 and 49 during the ten years before the survey (Table A2). Mortality rates were calculated both for all causes and for pregnancy related causes. Maternal deaths are defined as any death that occurred during pregnancy, during childbirth, or within two months after the birth or termination of pregnancy. This definition includes all such deaths, even if they were due to non-maternal causes. However, using this definition is unlikely to result in over-reporting of maternal deaths because most deaths of women in the specified period are due to maternal causes and maternal deaths are very likely to be under-reported. Proportion maternal death (PMD) was also calculated.

The respondents were categorized according to wealth quintile as calculated by applying a principal components analysis to the presence of a range of assets at the household level. The score created by selecting the first principal component only was used to arrange households in ascending order of 'wealth' and from there divide the households into five wealth quintiles – this categorization being assumed to be similar to the wealth status of both surviving and dead sisters (Filmer and Pritchett 1997). This assumption – the basis of the 'familial method' - is not necessarily true, but as quintiles are a broad categorization, it is likely that sisters will belong at least to the same wealth grouping (Graham 2004).

Thus the analysis presented in this paper began by calculating overall mortality rates, and proceeded by calculating the rates within each wealth quintile, along with rates by other characteristics of the respondent such as region of residence, place of residence, and educational level. Mortality rates were also calculated by the sister's age (current age or age at death). The final stage in the analysis was to fit Poisson regression models to the mortality rates in order to calculate adjusted mortality rate ratios (comparing rich to poor respondents) which control for significant influences on mortality, and logistic regression to estimate the adjusted Odd Ratios (ORs) of maternal death out of all adult female deaths.

Because the survey design is a multistage sampling design, 'robust' standard errors for the estimated mortality rates and proportion maternal death were calculated. Similarly, robust standard errors for the incidence rate ratios (IRR) and ORs are reported. All analyzes were carried out in Stata 9 and the reported results are weighted by the inverse of the probability of the sample selection. Note that the weights of the two earlier surveys were standardized at both the household and the respondent files, after the exclusion of the four regions mentioned above.

Results

The number of adult female deaths resulting from the procedure of creating the sibling file is reasonably small, and the number of maternal deaths is even smaller, so disaggregated rates are subject to quite large sampling errors and should be interpreted with caution. The rates for all three surveys along with their, often overlapping, confidence intervals are presented in Annex: Table A3 presents rates and confidence intervals for all cause adult mortality and Table A4 presents the equivalent for maternal mortality rates.

The overall calculated rates (not disaggregated by wealth quintile) show a declining pattern of mortality for maternal death, but not for all cause mortality. The maternal mortality rate decline however, is not statistically significant due to overlapping confidence intervals. For all causes the annual mortality rate drops from 1.969 to 1.405 deaths per 1000 women of reproductive age from the 1994 survey to the 1997 survey, but then subsequently increases to 1.621 in the most recent survey. The initial decline does not suffer from overlapping confidence intervals, and can be considered a true drop, but the third survey's estimated rate cannot be said to be different from that of either of the earlier surveys.

The rates disaggregated by wealth quintile are presented in Figure 2 below without confidence intervals. Both all cause and maternal mortality rates show an approximately static situation for rich and poor alike over the last 15 years, contrasting with declines seen in the middle wealth quintiles. At first glance rich – poor differences do not look to have changed much over the years, but the mortality rate ratio of rich to poor may have increased substantially.

The results of the Poisson regression analysis for all cause and maternal mortality are presented in Tables 1 and 2 respectively. The tables show mortality rate ratios that are significantly different from 1.0 (where the rate for the poorest quintile is the reference category) in bold face. The overall story is of significantly decreased ratios for the richer quintiles for both all cause and maternal mortality – and in the case of maternal mortality – lower ratios for richer quintiles in the later surveys – indicating a tendency for widening inequalities. Both mortality measures show more significant differences between poor and rich for the later surveys.

As expected, the adjusted rates show less significant poor-rich disparities than the crude rates – this shows that the basic socioeconomic indicators chosen for the controls have key associations with mortality. But the focus for interpretation should be on the adjusted rates. Here the most interesting results are among the maternal mortality wealth differentials, which are more marked that those for all causes. Whereas in the 1994 survey the adjusted rates for the richer groups are 64% or 75% of those for the poorest, this drops substantially to 23% and then 13% for the subsequent two surveys. Moreover the adjusted comparisons between rich and poor become statistically significant in the later surveys. The ratio of 13%

implies more than a sevenfold ratio of maternal mortality for poorer groups as compared to richer groups.

Discussion

According to commentators on the BDD policy, the sluggishness of the move towards universal coverage in skilled attendance at birth in Indonesia has been because communities have not been prepared either for the new BDD services or for the need to pay for them (Koblinsky 2003). The difficulty for the new midwives to retain their confidence and skills based on only 23 births per year or less (Koblinsky 2003) has been exacerbated by the economic crisis of the late 1990s which, by pushing more families into poverty has undermined willingness to pay for services. The result has been substantial drop-out of the new 'bidans' from the scheme. The recent World Health Report has called for midwifery-led centers, where midwives can maintain their standards of care by working in teams rather than in solo practice.

These developments may have led to the increasing inequalities seen in the analysis presented in this paper. In terms of coverage, there has been progress in Indonesia, albeit slower than may have been expected. However the rate of C section has hardly changed during the period – with around 6% of urban births and 2% of rural births being delivered by Caesarian. These continued low levels, especially in rural areas, suggest that access to back up care in the case of a complication has not changed during the BDD period – that policy having focused mainly on first level care. Although universal coverage of good quality first level care can substantially reduce the number of complicated cases that need to be referred, and bring down maternal mortality rates, these conditions do not apply universally in Indonesia, and ability to pay expensive hospital costs in the event of a complication may be beyond poor families.

Given the need to move towards national and international goals in poverty reduction, the issue of widening mortality gaps within countries should be addressed as part of the goal-setting process. This paper shows that maternal mortality is particularly linked to poverty. It is likely that failing to tackle lack of access to services for poor subgroups will only serve to push them deeper into poverty. The hope is that the new move towards decentralized

governance of the health system in Indonesia can respond to the remaining exclusion from maternity services in the many provinces where it is experienced and address the widening mortality gaps between rich and poor according to local situations.

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Table 1: Crude and adjusted adult female mortality rate ratios, by wealth index

Survey	Wealth Index	Crude IRR	95%CI		Adjusted IRR	95%CI	
1994 Survey							
	Poorest	1.00			1.00		
	Poorer	1.02	(0.67	1.54)	1.04	(0.71	1.54)
	Middle	0.74	(0.52	1.07)	0.74	(0.51	1.07)
	Richer	**0.68**	**(0.50**	**0.93)**	**0.66**	**(0.47**	**0.94)**
	Richest	**0.46**	**(0.33**	**0.65)**	**0.41**	**(0.26**	**0.65)**
Linear trend		**0.82**	**(0.75**	**0.89)**	**0.80**	**(0.72**	**0.90)**
1997 Survey							
	Poorest	1.00			1.00		
	Poorer	**0.61**	**(0.44**	**0.85)**	**0.63**	**(0.45**	**0.89)**
	Middle	0.70	(0.48	1.02)	0.72	(0.48	1.08)
	Richer	0.71	(0.48	1.04)	0.71	(0.46	1.10)
	Richest	**0.58**	**(0.39**	**0.85)**	**0.53**	**(0.33**	**0.87)**
Linear trend		0.91	(0.83	1.01)	0.90	(0.79	1.01)
2002/3 Survey							
	Poorest	1.00			1.00		
	Poorer	**0.53**	**(0.38**	**0.76)**	**0.54**	**(0.38**	**0.78)**
	Middle	**0.40**	**(0.26**	**0.62)**	**0.42**	**(0.26**	**0.67)**
	Richer	**0.65**	**(0.44**	**0.94)**	0.68	(0.44	1.05)
	Richest	**0.68**	**(0.48**	**0.97)**	0.72	(0.45	1.13)
Linear trend		0.92	(0.84	1.02)	0.93	(0.83	1.05)

Table 2: Crude and adjusted maternal mortality rate ratios, by wealth index

Survey	Wealth Index	Crude IRR	Crude 95%CI	Adjusted IRR	Adjusted 95%CI
1994 Survey					
	Poorest	1.00		1.00	
	Poorer	1.72	(0.80 , 3.66)	1.97	(0.93 , 4.17)
	Middle	0.78	(0.38 , 1.62)	0.96	(0.45 , 2.03)
	Richer	**0.44**	**(0.20 , 0.97)**	0.64	(0.27 , 1.55)
	Richest	**0.42**	**(0.21 , 0.84)**	0.78	(0.27 , 2.28)
Linear trend		**0.70**	**(0.59 , 0.84)**	0.81	(0.63 , 1.03)
1997 Survey					
	Poorest	1.00		1.00	
	Poorer	0.64	(0.34 , 1.21)	0.67	(0.30 , 1.48)
	Middle	0.44	(0.17 , 1.17)	0.49	(0.14 , 1.63)
	Richer	**0.29**	**(0.10 , 0.84)**	0.34	(0.09 , 1.34)
	Richest	**0.17**	**(0.06 , 0.52)**	**0.23**	**(0.06 , 0.95)**
Linear trend		**0.65**	**(0.50 0.86)**	0.70	(0.47 , 1.03)
2002/3 Survey					
	Poorest	1.00		1.00	
	Poorer	**0.41**	**(0.22 , 0.77)**	0.52	(0.27 , 1.01)
	Middle	**0.23**	**(0.11 , 0.49)**	**0.34**	**(0.15 , 0.77)**
	Richer	**0.08**	**(0.03 , 0.18)**	**0.13**	**(0.05 , 0.37)**
	Richest	**0.39**	**(0.18 , 0.86)**	0.75	(0.22 , 2.59)
Linear trend		**0.68**	**(0.53 , 0.88)**	0.79	(0.58 , 1.09)

Table 3: Crude and adjusted Odd ratios (ORs) of maternal death, by wealth index

Survey	Wealth Index	Crude OR	Crude 95%CI	Adjusted OR	Adjusted 95%CI
1994 Survey					
	Poorest				
	Poorer	**1.68**	**(1.01 , 2.79)**	**1.92**	**(1.13 , 3.26)**
	Middle	1.26	(0.74 , 2.17)	1.59	(0.89 , 2.84)
	Richer	0.58	(0.31 , 1.08)	0.78	(0.37 , 1.62)
	Richest	1.05	(0.60 , 1.84)	1.54	(0.70 , 3.36)
Linear trend		0.92	(0.81 , 1.04)	1.04	(0.87 , 1.23)
1997 Survey					
	Poorest				
	Poorer	0.96	(0.58 , 1.60)	0.93	(0.54 , 1.60)
	Middle	0.81	(0.49 , 1.35)	1.02	(0.59 , 1.76)
	Richer	**0.43**	**(0.23 , 0.79)**	0.57	(0.29 , 1.14)
	Richest	**0.32**	**(0.16 , 0.62)**	0.57	(0.24 , 1.35)
Linear trend		**0.76**	**(0.66 , 0.87)**	0.88	(0.74 , 1.05)
2002/3 Survey					
	Poorest				
	Poorer	0.73	(0.45 , 1.19)	0.87	(0.52 , 1.43)
	Middle	0.65	(0.34 , 1.22)	0.78	(0.39 , 1.55)
	Richer	**0.26**	**(0.13 , 0.53)**	**0.34**	**(0.16 , 0.75)**
	Richest	**0.43**	**(0.24 , 0.76)**	0.64	(0.30 , 1.33)
Linear trend		**0.76**	**(0.67 , 0.87)**	**0.83**	**(0.70 , 0.99)**

Figure 1 – Most qualified attendant and place of childbirth over successive surveys in Indonesia

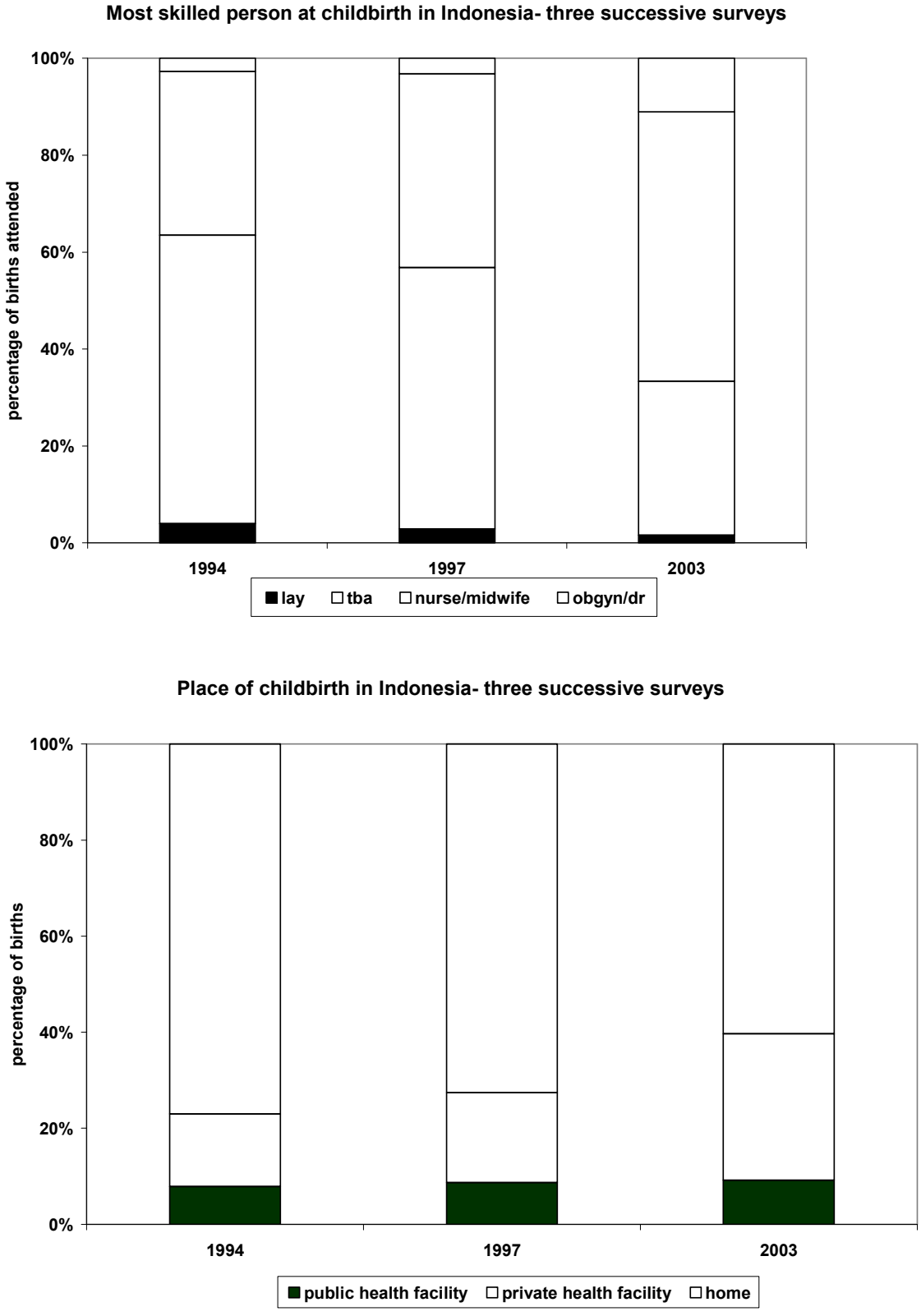
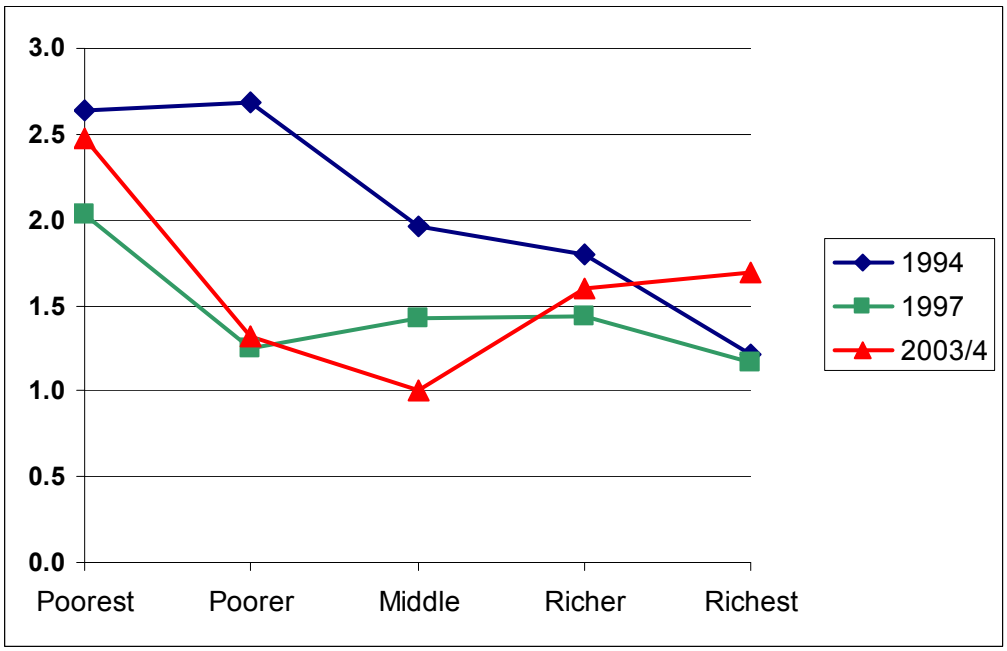
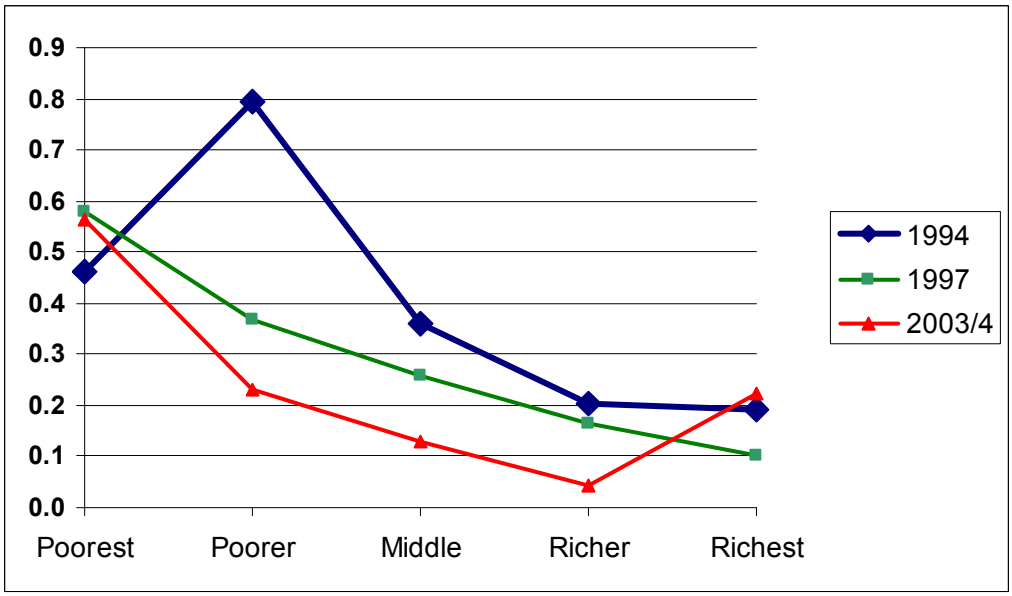


Figure 2 – Mortality rates calculated from three successive surveys in Indonesia

a) All cause mortality



b) Maternal mortality



Appendices

Table A1: Grouping of Regions, by survey round

Survey	Region				
	Sumatra	**Java**	**Bali & Nusa Tenggara**	**Kalimantan**	**Sulawesi**
1994	North Sumatra	DKI Jakarta	Bali	West Kalimantan	North Sulawesi
	West Sumatra	West Java	West Nusa tenggara	South Kalimantan	South Sulawesi
	South sumatra	Central Java	East Nusa tenggara	Central Kalimantan	Cenrtal Sulawesi
	Lampung	DI Yogyakarta		East Kalimantan	Southeast Sulawesi
	Riau	East Java			
	Jambi				
	Bengkulu				
1997					
	North Sumatra	DKI Jakarta	Bali	West Kalimantan	North Sulawesi
	West Sumatra	West Java	West Nusa tenggara	South Kalimantan	South Sulawesi
	South sumatra	Central Java	East Nusa tenggara	Central Kalimantan	Cenrtal Sulawesi
	Lampung	DI Yogyakarta		East Kalimantan	Southeast Sulawesi
	Riau	East Java			
	Jambi				
	Bengkulu				
2002/3					
	North Sumatra	DKI Jakarta	Bali	West Kalimantan	North Sulawesi
	West Sumatra	West Java	West Nusa tenggara	South Kalimantan	South Sulawesi
	Riau	Central Java	East Nusa tenggara	Central Kalimantan	Cenrtal Sulawesi
	Jambi	DI Yogyakarta		East Kalimantan	Southeast Sulawesi
	South sumatra	East Java			Gorontalo
	Bengkulu	Banten			
	Lampung				
	Bangka Belitung				

Table A2: Analysis populations by survey

	Indonesia 1994[1]		**Indonesia 1997**[1]		**Indonesia 2002/2003**	
	Household	Women	Household	Women	Household	Women
Overall response rate		96.9		97.1		97.3
Sample size						
Original	33,738	28,168	34,255	28,810	33,088	29,483
After excluding regions	32,494	24,261	32,947	25,135	33,088	29,483
No. of female siblings		76,554		71,539		77,963
No of female siblings aged 15-49[2]		46,683		48,780		55,306

[1] the following four regions were excluded from 1994 and 1997 surveys: Di Aceh, East Timor, Maluku, and Irian Jaya
[2] i.e., aged 15-59 at the time interview if alive or died in the last ten years at the age 15-49 years

Table A3: Adult female mortality rates by wealth and other characteristics in Indonesia- 3 successive surveys

	1994 Survey			1997 Survey			2002/3 Survey		
	WYRS	rate	95%CI	WYRS	rate	95%CI	WYRS	rate	95%CI
Overall	477,266	1.969	(1.694 , 2.245)	485,822	1.405	(1.224 , 1.587)	558,029	1.621	(1.420 , 1.821)
Wealth Index									
Poorest	51,067	2.634	(2.093 , 3.175)	59,242	2.028	(1.447 , 2.610)	113,902	2.473	(1.897 , 3.049)
Poorer	99,359	2.683	(1.726 , 3.640)	93,022	1.244	(0.902 , 1.586)	108,074	1.322	(0.982 , 1.661)
Middle	102,050	1.960	(1.399 , 2.522)	109,261	1.423	(1.071 , 1.775)	113,720	0.999	(0.644 , 1.354)
Richer	112,341	1.800	(1.364 , 2.235)	111,227	1.432	(1.047 , 1.817)	107,488	1.599	(1.123 , 2.076)
Richest	112,450	1.215	(0.880 , 1.549)	113,072	1.168	(0.863 , 1.474)	114,845	1.693	(1.257 , 2.129)
Region									
Sumatera	92,278	1.976	(1.615 , 2.337)	99,226	1.632	(1.342 , 1.922)	124,695	1.769	(1.452 , 2.087)
Java	301,012	1.862	(1.456 , 2.268)	300,245	1.209	(0.943 , 1.476)	330,767	1.482	(1.194 , 1.770)
Bali & Nusa Tenggara	23,216	2.208	(1.672 , 2.744)	25,275	2.047	(1.597 , 2.498)	26,653	2.160	(1.272 , 3.049)
Kalimantan	28,770	2.513	(1.516 , 3.510)	28,318	1.822	(1.424 , 2.220)	34,470	2.033	(1.462 , 2.604)
Sulawesi	31,991	2.300	(1.811 , 2.789)	32,758	1.659	(1.219 , 2.100)	41,445	1.594	(0.862 , 2.326)
Place of residence									
Urban	145,156	1.641	(1.327 , 1.956)	148,624	1.369	(1.051 , 1.687)	265,130	1.464	(1.178 , 1.749)
Rural	332,110	2.113	(1.740 , 2.485)	337,198	1.421	(1.199 , 1.643)	292,899	1.763	(1.484 , 2.043)
Level of Education									
Primary or less	349,776	2.143	(1.785 , 2.502)	336,708	1.491	(1.262 , 1.720)	337,843	1.748	(1.477 , 2.018)
Secondary or higher	127,490	1.493	(1.153 , 1.832)	149,114	1.212	(0.947 , 1.477)	220,185	1.426	(1.149 , 1.704)
Sister's age group									
15-24	197,202	1.420	(1.028 , 1.812)	185,775	0.611	(0.442 , 0.779)	194,275	0.972	(0.631 , 1.312)
25-34	177,379	1.731	(1.340 , 2.122)	181,528	1.281	(1.023 , 1.539)	207,140	1.127	(0.894 , 1.359)
35-49	102,685	3.437	(2.829 , 4.045)	118,520	2.841	(2.368 , 3.315)	156,614	3.080	(2.587 , 3.573)
Time before survey (years)									
0-4	255,497	1.900	(1.548 , 2.253)	258,273	1.572	(1.297 , 1.847)	293,550	1.765	(1.484 , 2.046)
5-9	221,769	2.049	(1.689 , 2.410)	227,549	1.216	(0.998 , 1.435)	264,479	1.461	(1.177 , 1.745)

WYRS=Woman-years of exposure

Table A4: Maternal mortality rates by wealth and other characteristics in Indonesia – 3 successive surveys

	1994 Survey			1997 Survey			2002/3 Survey		
	WYRS	rate	95%CI	WYRS	rate	95%CI	WYRS	rate	95%CI
Overall	477,266	0.386	(0.261 , 0.510)	485,822	0.261	(0.157 , 0.364)	558,029	0.241	(0.178 , 0.303)
Wealth Index									
Poorest	51,067	0.463	(0.269 , 0.658)	59,242	0.581	(0.111 , 1.051)	113,902	0.564	(0.350 , 0.779)
Poorer	99,359	0.795	(0.284 , 1.307)	93,022	0.370	(0.145 , 0.595)	108,074	0.232	(0.117 , 0.347)
Middle	102,050	0.361	(0.145 , 0.577)	109,261	0.258	(0.116 , 0.399)	113,720	0.129	(0.044 , 0.215)
Richer	112,341	0.203	(0.066 , 0.340)	111,227	0.166	(0.046 , 0.285)	107,488	0.043	(0.009 , 0.077)
Richest	112,450	0.193	(0.085 , 0.301)	113,072	0.100	(0.022 , 0.177)	114,845	0.223	(0.069 , 0.377)
Region									
Sumatera	92,278	0.444	(0.262 , 0.626)	99,226	0.350	(0.237 , 0.462)	124,695	0.421	(0.245 , 0.598)
Java	301,012	0.329	(0.158 , 0.499)	300,245	0.208	(0.047 , 0.369)	330,767	0.128	(0.059 , 0.197)
Bali & Nusa Tenggara	23,216	0.556	(0.304 , 0.808)	25,275	0.326	(0.154 , 0.498)	26,653	0.646	(0.318 , 0.974)
Kalimantan	28,770	0.772	(0.000 , 1.592)	28,318	0.405	(0.218 , 0.593)	34,470	0.360	(0.143 , 0.577)
Sulawesi	31,991	0.280	(0.115 , 0.446)	32,758	0.300	(0.145 , 0.455)	41,445	0.235	(0.102 , 0.368)
Place of residence									
Urban	145,156	0.167	(0.089 , 0.245)	148,624	0.136	(0.051 , 0.221)	265,130	0.123	(0.061 , 0.186)
Rural	332,110	0.481	(0.306 , 0.656)	337,198	0.316	(0.171 , 0.460)	292,899	0.347	(0.242 , 0.452)
Level of Education									
Primary or less	349,776	0.445	(0.282 , 0.608)	336,708	0.316	(0.170 , 0.461)	337,843	0.262	(0.177 , 0.347)
Secondary or higher	127,490	0.223	(0.111 , 0.335)	149,114	0.136	(0.059 , 0.214)	220,185	0.208	(0.116 , 0.300)
Sister's age group									
15-24	197,202	0.321	(0.150 , 0.493)	185,775	0.116	(0.065 , 0.167)	194,275	0.129	(0.062 , 0.196)
25-34	177,379	0.463	(0.210 , 0.715)	181,528	0.369	(0.210 , 0.528)	207,140	0.252	(0.145 , 0.358)
35-49	102,685	0.376	(0.180 , 0.571)	118,520	0.322	(0.104 , 0.540)	156,614	0.365	(0.217 , 0.512)
Time before survey (years)									
0-4	255,497	0.341	(0.200 , 0.483)	258,273	0.313	(0.129 , 0.498)	293,550	0.250	(0.164 , 0.336)
5-9	221,769	0.437	(0.226 , 0.647)	227,549	0.201	(0.129 , 0.274)	264,479	0.230	(0.138 , 0.321)

WYRS=Woman-years of exposure

Table A5: Proportion maternal death, by survey and selected background characteristics, Indonesia 1994-2003

	1994 Survey			1997 Survey			2002/3 Survey		
	Deaths	prop	95%CI	Deaths	prop	95%CI	Deaths	prop	95%CI
Overall	793	0.190	(0.163 , 0.218)	726	0.197	(0.168 , 0.226)	795	0.168	(0.142 , 0.193)
Wealth Index									
Poorest	182	0.176	(0.120 , 0.231)	167	0.261	(0.194 , 0.328)	270	0.234	(0.184 , 0.285)
Poorer	165	0.270	(0.202 , 0.338)	143	0.248	(0.177 , 0.320)	162	0.185	(0.125 , 0.246)
Middle	150	0.210	(0.144 , 0.276)	156	0.218	(0.153 , 0.283)	82	0.165	(0.084 , 0.246)
Richer	149	0.111	(0.060 , 0.161)	133	0.128	(0.070 , 0.185)	130	0.077	(0.031 , 0.123)
Richest	147	0.180	(0.117 , 0.242)	127	0.102	(0.049 , 0.156)	151	0.109	(0.059 , 0.159)
Region									
Sumatera	231	0.221	(0.167 , 0.274)	222	0.237	(0.180 , 0.293)	246	0.176	(0.128 , 0.223)
Java	208	0.161	(0.111 , 0.211)	154	0.136	(0.082 , 0.191)	206	0.109	(0.067 , 0.152)
Bali & Nusa Tenggara	98	0.234	(0.150 , 0.319)	103	0.146	(0.076 , 0.215)	77	0.299	(0.194 , 0.403)
Kalimantan	118	0.203	(0.130 , 0.277)	124	0.262	(0.185 , 0.339)	111	0.144	(0.078 , 0.211)
Sulawesi	138	0.141	(0.083 , 0.199)	123	0.179	(0.110 , 0.248)	155	0.184	(0.123 , 0.245)
Place of residence									
Urban	230	0.152	(0.106 , 0.198)	192	0.099	(0.056 , 0.142)	314	0.108	(0.074 , 0.143)
Rural	563	0.206	(0.173 , 0.239)	534	0.232	(0.196 , 0.268)	481	0.206	(0.170 , 0.242)
Level of Education									
Primary or less	185	0.178	(0.123 , 0.233)	189	0.137	(0.088 , 0.186)	289	0.142	(0.102 , 0.182)
Secondary or higher	608	0.194	(0.163 , 0.225)	537	0.218	(0.183 , 0.253)	506	0.182	(0.149 , 0.216)
Sister's age group									
15-24	182	0.223	(0.162 , 0.283)	133	0.267	(0.191 , 0.342)	135	0.193	(0.125 , 0.260)
25-34	252	0.279	(0.224 , 0.335)	251	0.303	(0.246 , 0.360)	225	0.232	(0.177 , 0.287)
35-49	359	0.111	(0.079 , 0.144)	342	0.092	(0.061 , 0.123)	435	0.126	(0.095 , 0.158)
Time before survey (years)									
0-4	434	0.182	(0.146 , 0.218)	405	0.177	(0.139 , 0.214)	468	0.163	(0.130 , 0.196)
5-9	359	0.200	(0.159 , 0.242)	321	0.223	(0.177 , 0.268)	327	0.174	(0.133 , 0.216)