

# Neonatal resuscitation programme in Malaysia: an eight-year experience

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## ABSTRACT

**Introduction:** The neonatal resuscitation programme (NRP) published by the American Academy of Paediatrics and American Heart Association was launched in Malaysia in 1996. This study aimed to review the outcome of NRP in Malaysia during the first eight years.

**Methods:** Information on basic demographical data and training activities of NRP providers were collected prospectively from NRP instructors from all over Malaysia during the eight years following the inception of the NRP. The national perinatal and neonatal mortality data during the five-year period before and eight years following implementation of the NRP were compared.

**Results:** During the eight years following the launch, 14,575 personnel were trained. 40 percent of NRP-certified personnel worked in areas where delivery services were provided, viz. labour room, operation theatre, obstetric ward, emergency department and maternal and child health clinic. There were very few NRP-certified providers working in emergency departments and most of them were medical assistants. Most of the providers working in neonatal intensive care units (NICUs) and labour rooms were nurses while those in paediatric wards were doctors. All NRP-certified doctors working in NICUs and labour rooms obtained full certificates. Only 80 percent of NRP-certified nurses in these two areas obtained full certificates. There was further serial decrease in perinatal mortality and neonatal mortality rates in Malaysia during the years following the launch of the NRP programme.

**Conclusion:** The launch of the Malaysian NRP was associated with further improvement in perinatal and neonatal mortality rates.

**Keywords:** neonatal mortality rates, neonatal resuscitation programme

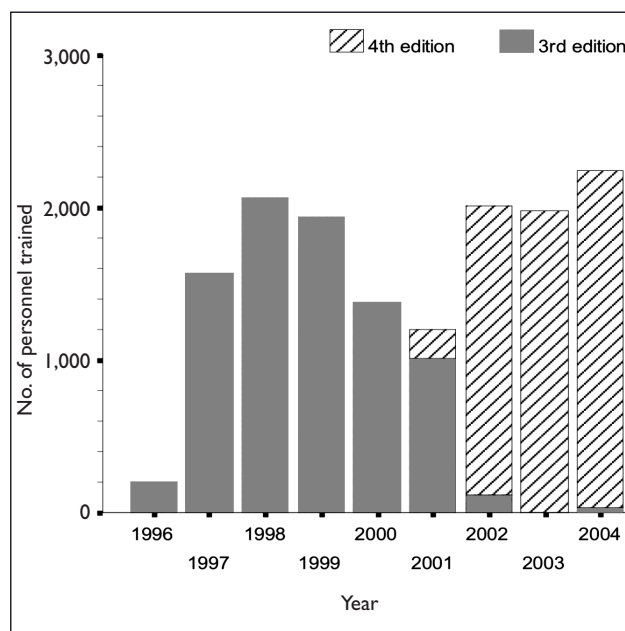


Fig. 1 Number of personnel trained using the third and fourth editions of the Neonatal Resuscitation Programme textbooks in Malaysia, 1996–2004.

## INTRODUCTION

The neonatal resuscitation programme (NRP) is a systematic training programme for perinatal caregivers developed jointly by the American Heart Association (AHA) and the American Academy of Paediatrics (AAP).<sup>(1,2)</sup> The training provided by the NRP consists of both theoretical and practical aspects of neonatal resuscitation, covering areas in the initial steps of resuscitation, bag and mask ventilation, cardiac compression, endotracheal intubation and medication. The primary goals of the NRP are to ensure that at least one person skilled in newborn resuscitation is in attendance at every delivery and an additional skilled person is readily available to assist should the need arise.<sup>(1,2)</sup>

With the support of the Ministry of Health of Malaysia and the Faculty of Medicine at the Universiti Kebangsaan Malaysia, the NRP was launched by the Perinatal Society of Malaysia as a national training programme for perinatal health professionals in September 1996. Both the NRP textbook and instructors' training manual were translated into the Malay language. Initially, 37 core instructors (with a minimum of two from each of the 13 states in Malaysia) were trained.<sup>(3)</sup> When a new version (fourth

Department of Paediatrics, Clinical School, International Medical University, Jalan Rasah, Seremban 70300, Malaysia

Boo NY, FRCP Professor

Correspondence to: Prof Nem-Yun Boo  
Tel: (60) 6 767 7798  
Fax: (60) 6 767 7709  
Email: nemyun\_boo@imu.edu.my

**Table I. Demographic and outcome variables of health personnel who completed the neonatal resuscitation programme (NRP) in Malaysia, 1996–2004.**

Variables	3rd edition of NRP n = 8,302 (%)	4th edition of NRP n = 6,272 (%)
Males	1,329 (16.0)	960 (15.3)
Profession		
Doctors	2,287 (27.6)	2,028 (32.4)
Nurses	5,681 (68.5)	3,936 (62.8)
Medical assistants	225 (2.8)	179 (2.9)
Medical students	106 (1.03)	121 (1.9)
Full certificate	6,242 (75.2)	5,247 (83.7)
Level of training received		
Provider	7,387 (89.0)	5,559 (88.6)
Instructor	915 (11.0)	713 (11.4)
Language used during training		
Malay	2,142 (25.8)	2,507 (40.0)
English	5,969 (71.9)	3,759 (59.9)
Malay & English	191 (2.3)	6 (0.1)
Place of work		
Labour room	2,001 (24.3)	913 (15.9)
Operation theatre	196 (2.4)	110 (1.9)
Obstetric ward	465 (5.6)	630 (11.0)
Maternal and child health clinic	843 (10.2)	647 (11.3)
Emergency department	273 (3.3)	252 (4.4)
Neonatal intensive care unit	1,240 (15.0)	829 (14.5)
Special care nursery	797 (9.7)	548 (9.6)
Paediatric ward	1,434 (17.4)	1,111 (19.4)
Others	994 (12.1)	695 (12.1)
Unknown	59 (0.7)	537 (8.6)

**Table II. Relationship between live births, neonatal resuscitation programme-certified personnel and perinatal mortality rates in Malaysia between 1990 and 2004.**

Year	Annual live births	Personnel certified each year	Annual live births/NRP personnel trained yearly	Perinatal mortality rates*	Still birth rates*	Neonatal mortality rates#
1991	511,527	0	0	12.0	5.8	8.1
1992	528,475	0	0	12.0	5.9	7.9
1993	541,887	0	0	11.7	5.8	7.5
1994	537,654	0	0	10.8	5.2	7.1
1995	539,295	0	0	9.7	4.5	6.8
1996	544,302	198	2,749	9.1	4.3	6.0
1997	540,486	1,567	344.9	9.0	4.4	6.0
1998	524,696	2,064	254.2	7.9	3.9	5.2
1999	521,870	1,940	269.0	7.3	3.8	4.5
2000	530,012	1,377	384.9	7.5	3.7	5.0
2001	494,795	1,201	412.0	6.1	3.3	4.5
2002	482,629	2,006	240.6	6.3	3.8	3.5
2003	473,104	1,979	239.0	6.3	3.7	3.2
2004	463,241	2,244	206.0	6.8	4.1	3.8

NRP: Neonatal resuscitation programme

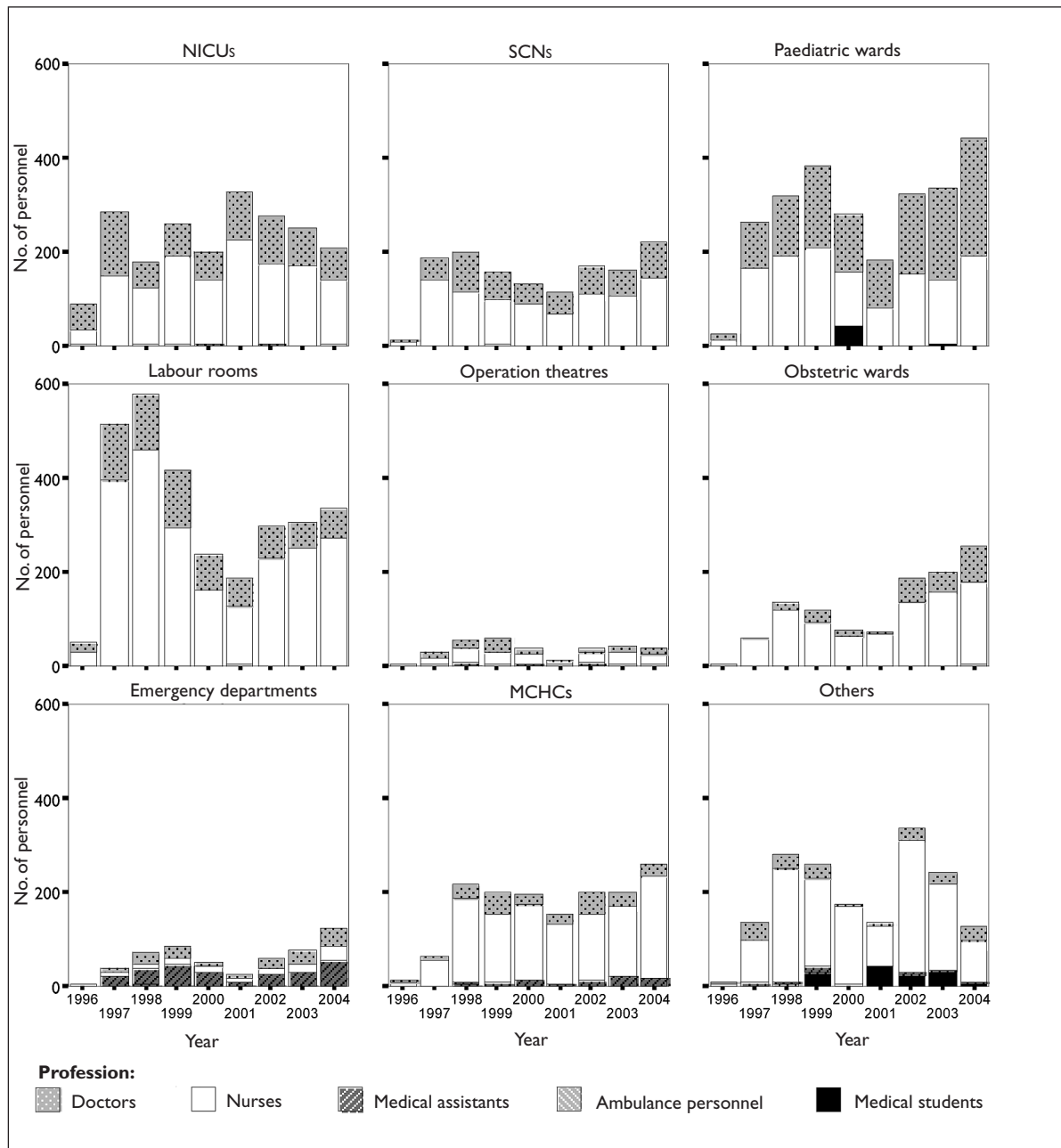
\* per 1,000 births

# per 1,000 live births

edition) of the NRP became available in 2000,<sup>(2)</sup> the NRP textbook and its test questions were also translated into the Malay language with permission from the AHA and AAP. Retraining of the national and state NRP instructors was carried out in August and October 2001. As the Malaysian NRP has been in existence for eight years, this study aimed to determine the number of personnel trained in Malaysia, and whether this programme had any impact on the Malaysian perinatal and early neonatal mortality rates.

## METHODS

This was a prospective observational study carried out over an eight-year period between September 6, 1996 and December 31, 2004. Information on basic demographical data and training activities of each NRP provider were collected and submitted prospectively by their instructors to a national secretariat for issuance of official certificates upon completion of training.<sup>(3)</sup> Each successful provider was issued a full certificate when he passed both the written and practical tests of all the

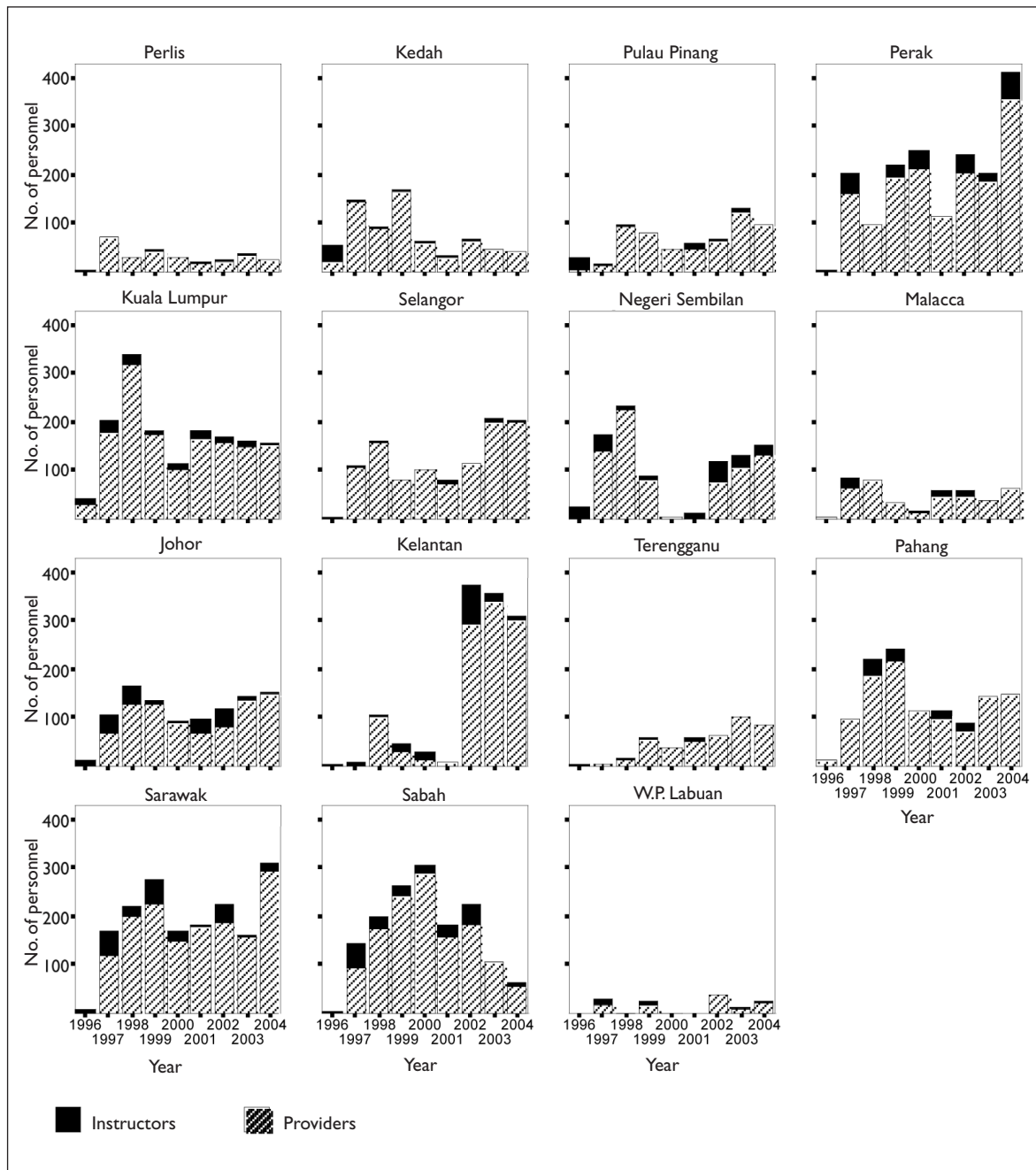


**Fig. 2** Frequency distribution of personnel trained each year according to their profession in various health facilities. NICU: neonatal intensive care unit; SCN: special care nursery; MCHC: maternal and child health clinics.

lessons in the training course. A partial certificate was issued to providers who passed the written and practical tests of the first four lessons and were able to assist in endotracheal intubation during the practical test of the fifth lesson. Instructors were successful providers who were further trained to conduct NRP training courses. These data of NRP-certified providers were compiled prospectively and analysed against the national and state perinatal and neonatal mortality data compiled by the Malaysian Statistics Department and the Information and Documentation System Unit of the Ministry of Health of Malaysia.<sup>(4-7)</sup>

## RESULTS

During this 8¼-year period, 8,302 health personnel were trained based on the third edition of the NRP textbook,<sup>(1)</sup> and 6,272 based on the fourth edition (Fig. 1).<sup>(2)</sup> Except for the first year (1996), more than 1,200 personnel were trained each year. More than 95% of certified NRP providers were nurses or doctors (Table I). More than 75% of these providers obtained full certificates. They constituted 98% of doctors, 70% of nurses, 80% of medical assistants, 20% of ambulance personnel and 100% of medical students trained. Only 11% of the certified personnel were further trained as instructors.



**Fig. 3** Number of instructors and providers trained in the neonatal resuscitation programme in the 13 states and two federal territories of Malaysia, 1996–2004.

Among them, 51% were doctors, 45% were nurses and 4% were medical assistants.

More than 40% of NRP-certified personnel worked in areas where deliveries took place, viz. labour rooms, operation theatres, obstetric wards, emergency departments and maternal and child health clinics (MCHC) (Table I). There were very few NRP-certified providers working in emergency departments and most of them were medical assistants (Fig. 2). Most of the providers working in the NICUs (64%) and the labour rooms (75.8%) were nurses. All NRP-certified doctors

and only 80% of NRP-certified nurses working in the NICUs and labour rooms obtained full certificates.

Although NRP training activities were carried out in all the states and federal territories during the eight years, the level of activities varied according to location (Fig. 3). Seven states (Pulau Pinang, Perak, Selangor, Johor, Sarawak, Terengganu, Pahang) and the federal territory of Kuala Lumpur consistently trained a large number of providers during the eight years. There was a dramatic increase in the number of providers trained following the launch of the fourth edition of the NRP in one of the rural

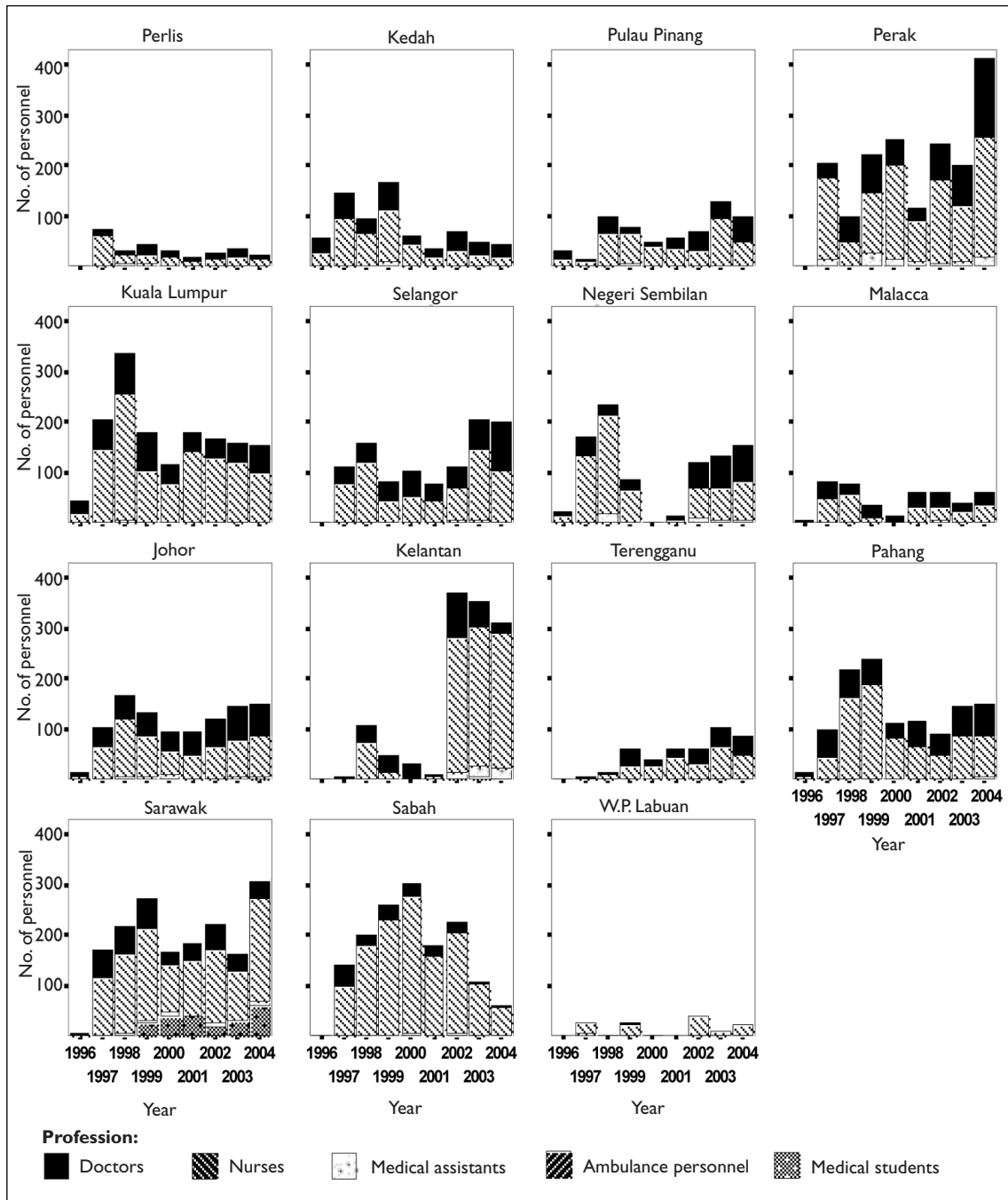


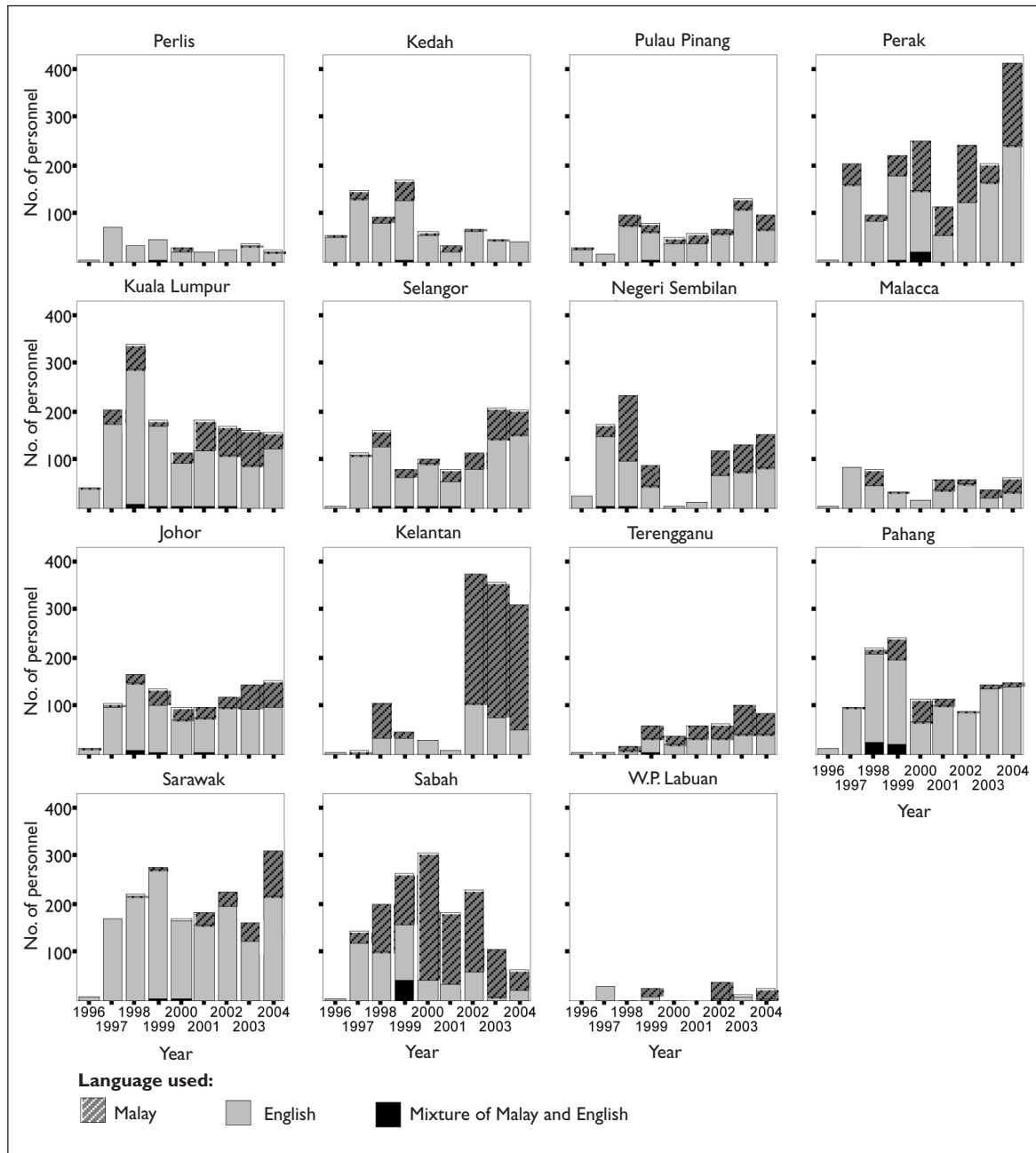
Fig. 4 Relationship between the number of personnel trained and their profession in each of the 13 states and two federal territories of Malaysia, 1996–2004.

states (Kelantan). In the state of Sabah, the NRP training activities seemed to have fizzled out. Except for four states (Perak, Negeri Sembilan, Kelantan and Sarawak), all other states and federal territories did not train as many instructors during the last two years (2003–2004). While most of the states trained doctors and nurses, only five states (Perak, Negeri Sembilan, Johor, Kelantan, Sarawak) trained a small number of medical assistants and one state (Sarawak) trained medical students (Fig. 4).

Although both the English and Malay languages were used as the media of instruction (Table I), an increasingly

higher proportion ( $\geq 40\%$ ) of NRP courses was conducted in the Malay language during the second half of the eight-year period, especially in the states of Perak, Kelantan, Terengganu and Sabah (Fig. 5). This was particularly marked in the MCHCs where, by the year 2004, more than 60% of their NRP-certified staff were trained with the Malay language as the medium of instruction (Fig. 6).

The ratio of annual live births per NRP-certified provider in Malaysia improved serially during the eight years since the launch of the NRP (Table II). Before the launch of the Malaysian NRP, there was an



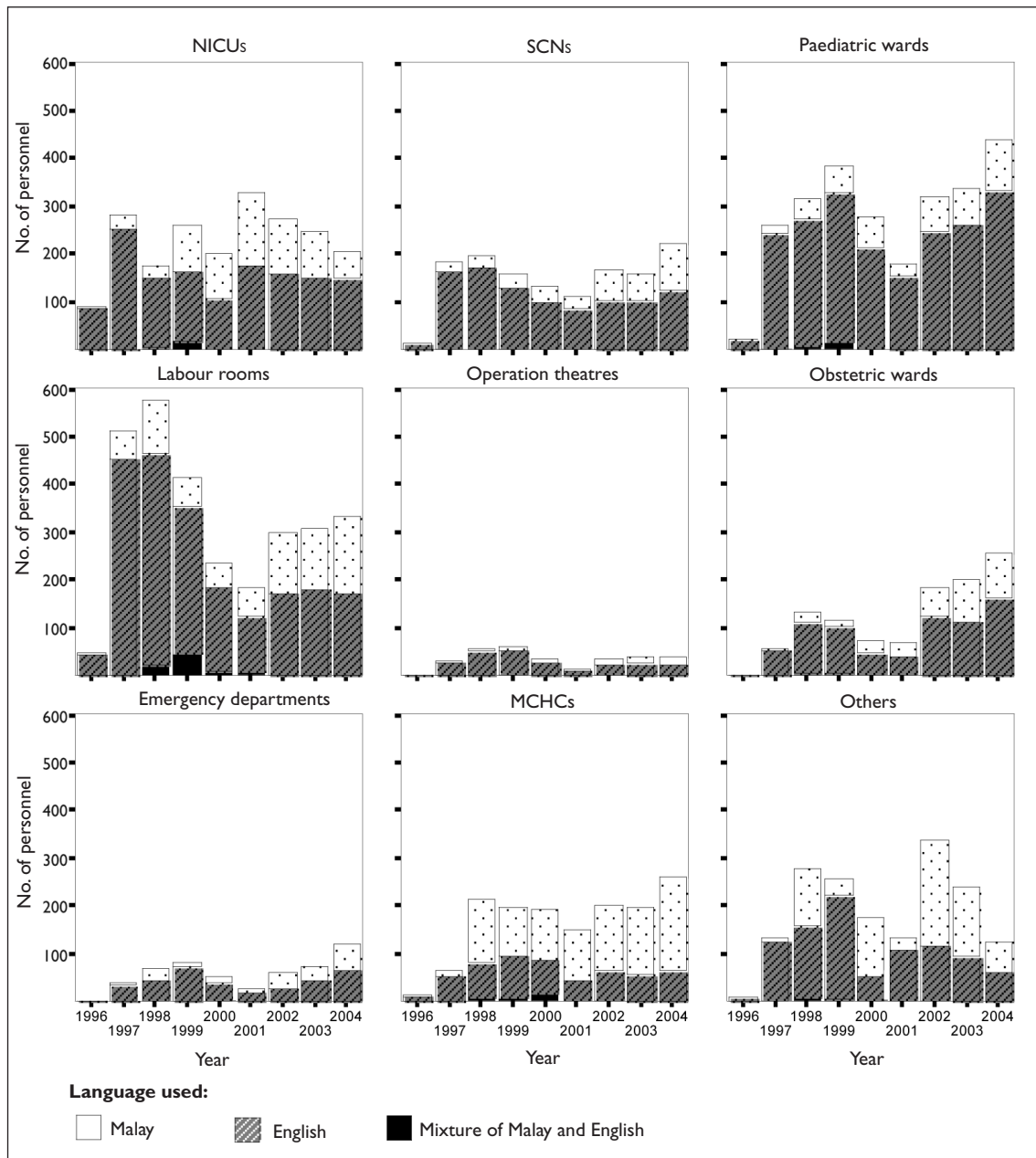
**Fig. 5** Relationship between the number of personnel trained in neonatal resuscitation and the medium of instruction in each of the 13 states and two federal territories of Malaysia, 1996–2004.

annual decrease in the perinatal mortality rates (PMR) and stillbirth rates (SBR) since 1993, and an annual decrease in neonatal mortality rates (NMR) since 1991. Following the launch of the NRP, there was further decrease in the PMR and the NMR, but not the SBR in Malaysia (Fig. 7).

## DISCUSSION

A review of the literature published between 1995 and February 2007 showed that this is the first report on the findings of a national NRP conducted in a systematic

manner over a number of years. A number of countries or regions have reported on the findings of their efforts in initiating either a national or regional NRP, and for only a short period of time.<sup>(8-14)</sup> Our data showed that it is possible to successfully organise an ongoing national NRP using the educational materials designed by the AAP and AHA,<sup>(1,2)</sup> by a non-government organisation (the Perinatal Society of Malaysia) that worked closely with a government organisation (the Ministry of Health, Malaysia). With careful planning at the onset of the programme, we were able to systematically collect a



**Fig. 6** Relationship between the number of personnel trained and the media of instruction in each work area in Malaysia between 1996 and 2004.

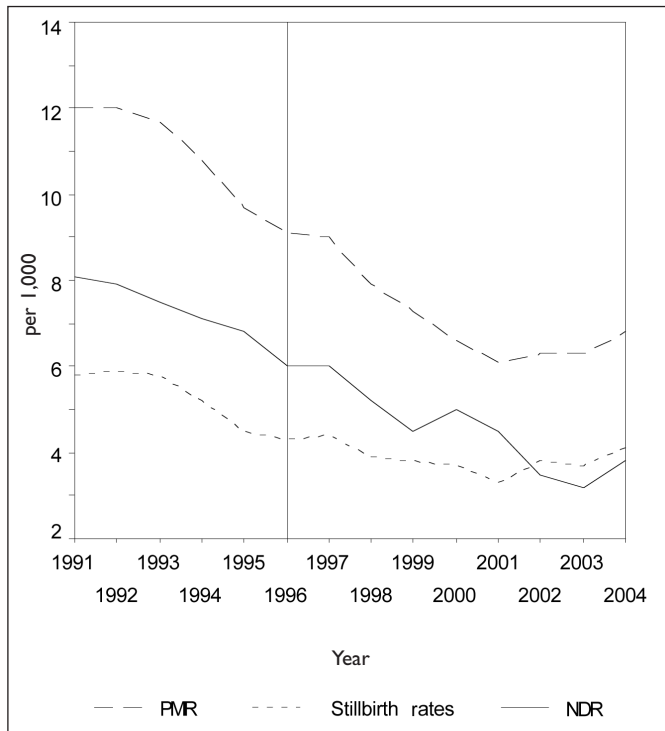
NICU: neonatal intensive care unit; SCN: special care nursery; MCHC: maternal and child health clinics.

substantial amount of useful data to help us continue to run the programme and, to a certain extent, to determine its impact on NMRs in Malaysia. That our data showed further improvement only of the NDR and PMR, but not the SBR, since the launch of the Malaysian NRP (Fig. 2) suggests that the Malaysian NRP has a positive impact on perinatal and neonatal care in this country.

A large number of medical and health personnel of various categories were trained under the Malaysian NRP during these eight years, covering various areas where neonatal resuscitation services were needed. However, it is not certain what percentage of the personnel working

in NICUs, labour rooms, operation theatres, emergency departments, and MCHCs were certified, as this data was not simultaneously collected. Based on the original objective of the NRP, the proportion of certified personnel in attendance of delivery should be 100%. The small number of NRP certified personnel in some areas, such as emergency departments and ambulance services, suggests that this objective might not have been fully met.

A substantial proportion of certified personnel were trained using the Malay version of the textbooks, especially between the years of 2002 and 2004. This suggests that had the English language been used as



**Fig. 7** Perinatal mortality rates (PMR), stillbirth rates and neonatal death rates (NDR) in Malaysia between 1991 and 2004, before and after the launch of the Malaysian neonatal resuscitation programme (NRP).

Note: vertical line indicates the year (1996) when the Malaysian NRP was launched.

the sole medium of instruction, a large number of health personnel might not have been trained. This was particularly obvious in the MCHCs and in some of the states of Malaysia, such as Kelantan and Perak, where the primary language of communication is Malay. Our results suggest that for the NRP to continue to be used extensively all over Malaysia, future versions of the programme should be translated into the Malay language until a large proportion of the health personnel are conversant in of the English language. Although there are 17 medical schools in Malaysia, the majority (except for one medical school in Sarawak) did not include the NRP in their curriculum. As medical students are not the front-liners in the provision of neonatal resuscitation for

perinatal services, it is not certain whether there is any disadvantage if medical students are not trained in the NRP until after they have graduated.

## ACKNOWLEDGEMENT

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