

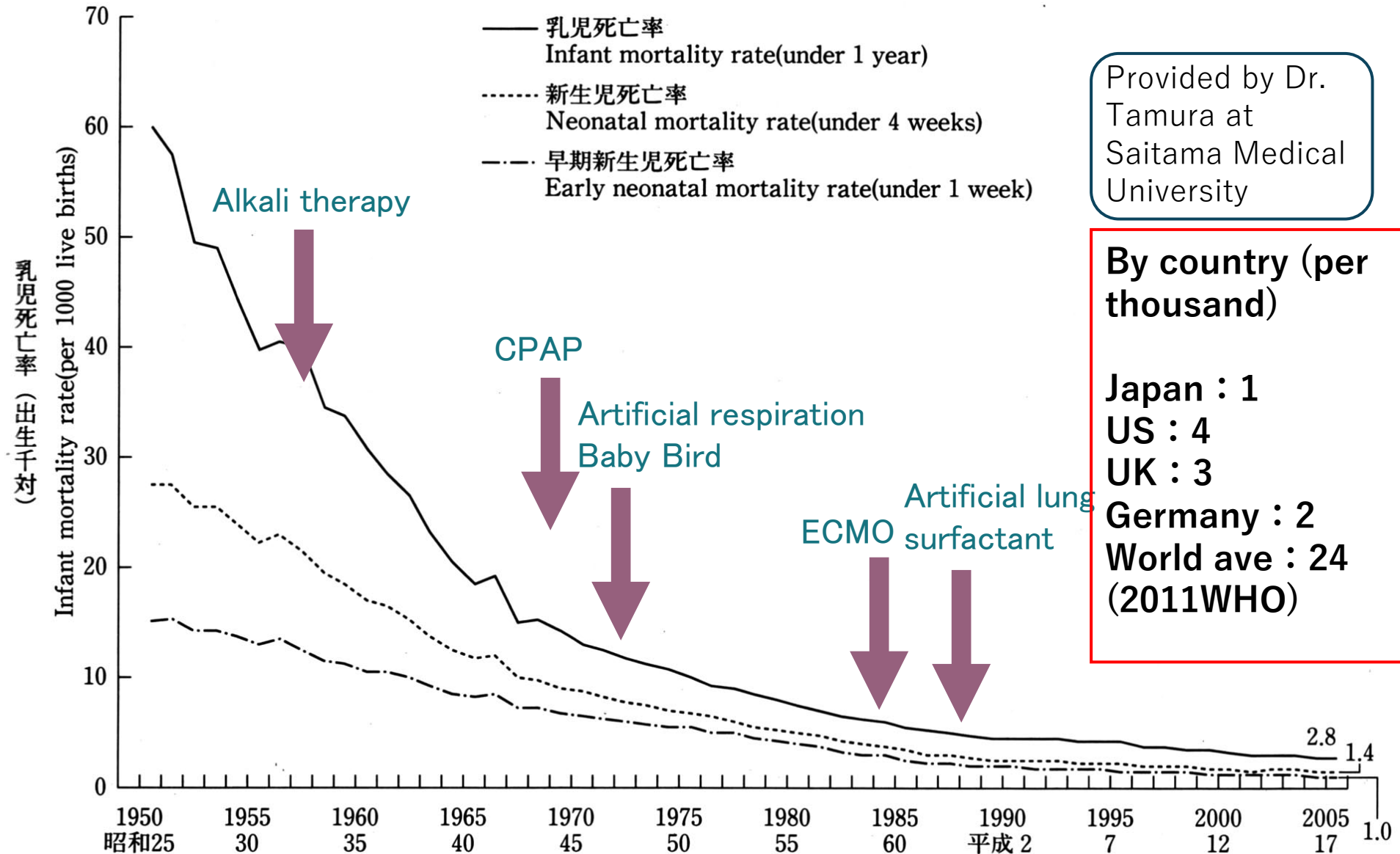
Empowering the Next  
generation  
Investment in Preventable  
Infant Death  
by a Healthy Start

**Overview of Infant Mortality  
and Morbidity  
in Japan**

27<sup>th</sup> March, 2024

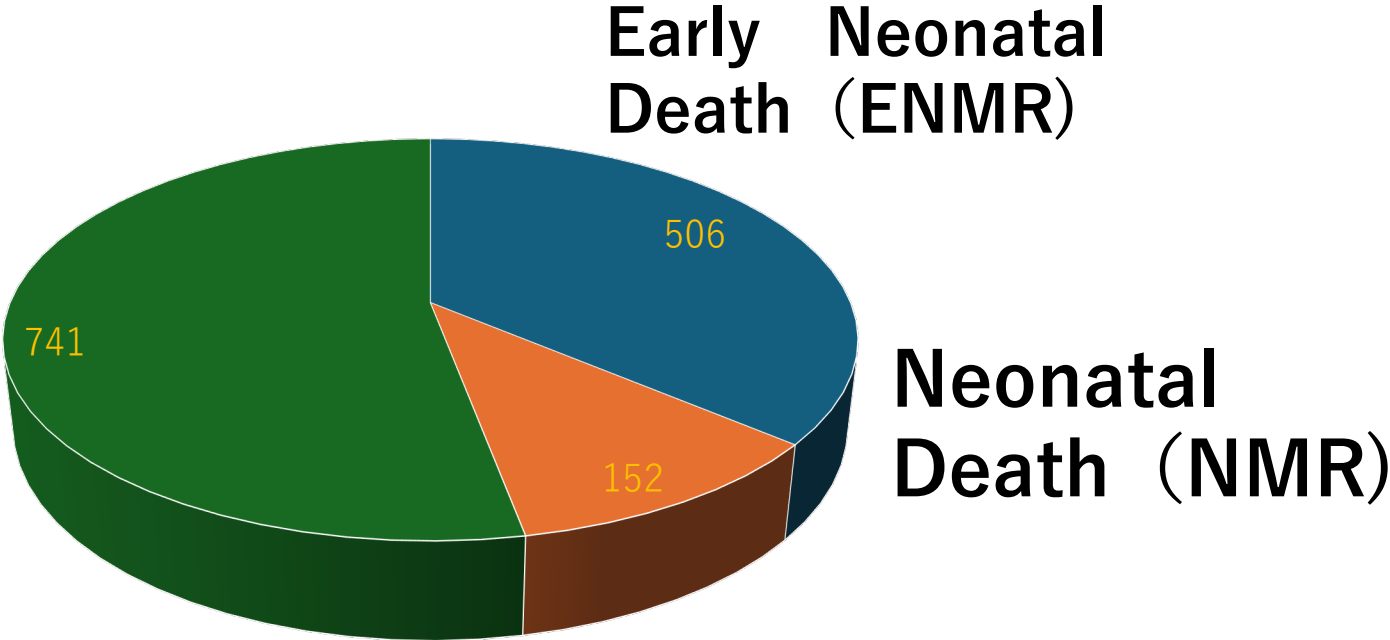
Hakuyo Ebara M.D

# Changing of Infant Mortality in Japan →



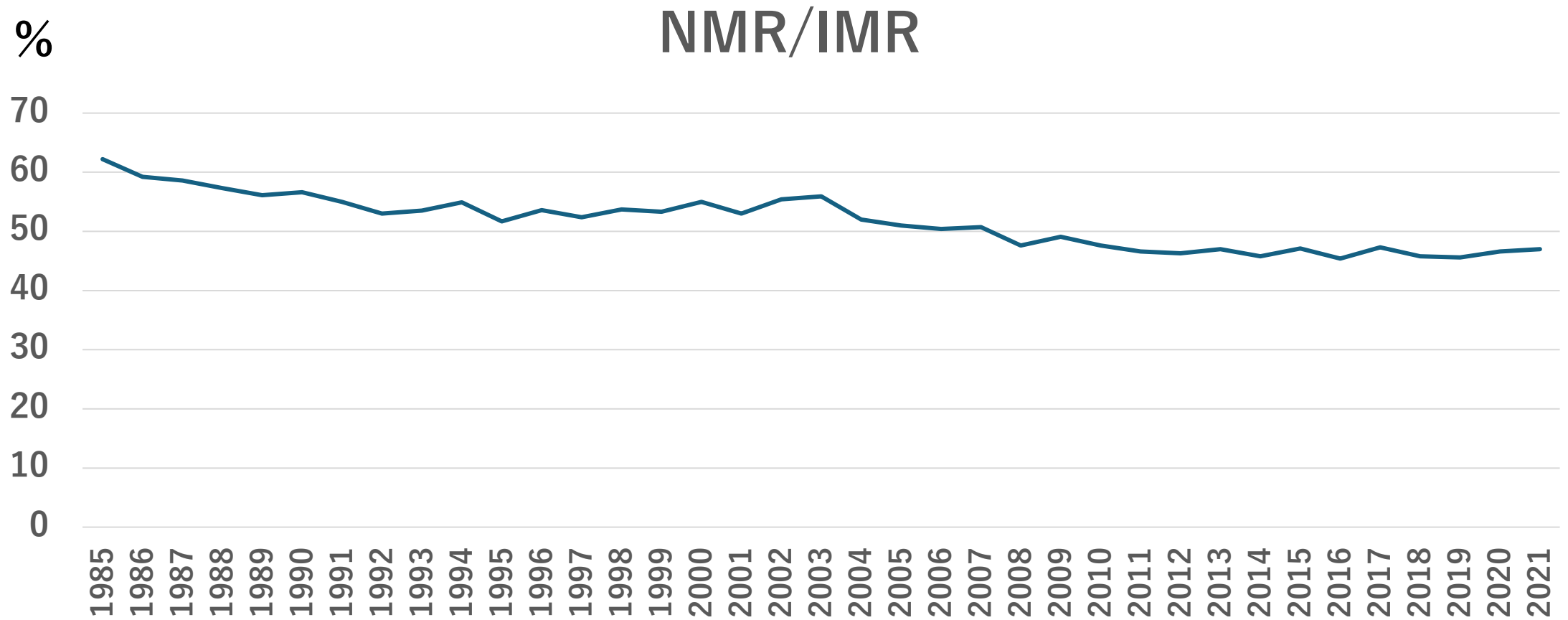
# Infant Death Number 2021 in Japan

**POST  
NEONATAL  
DEATH**



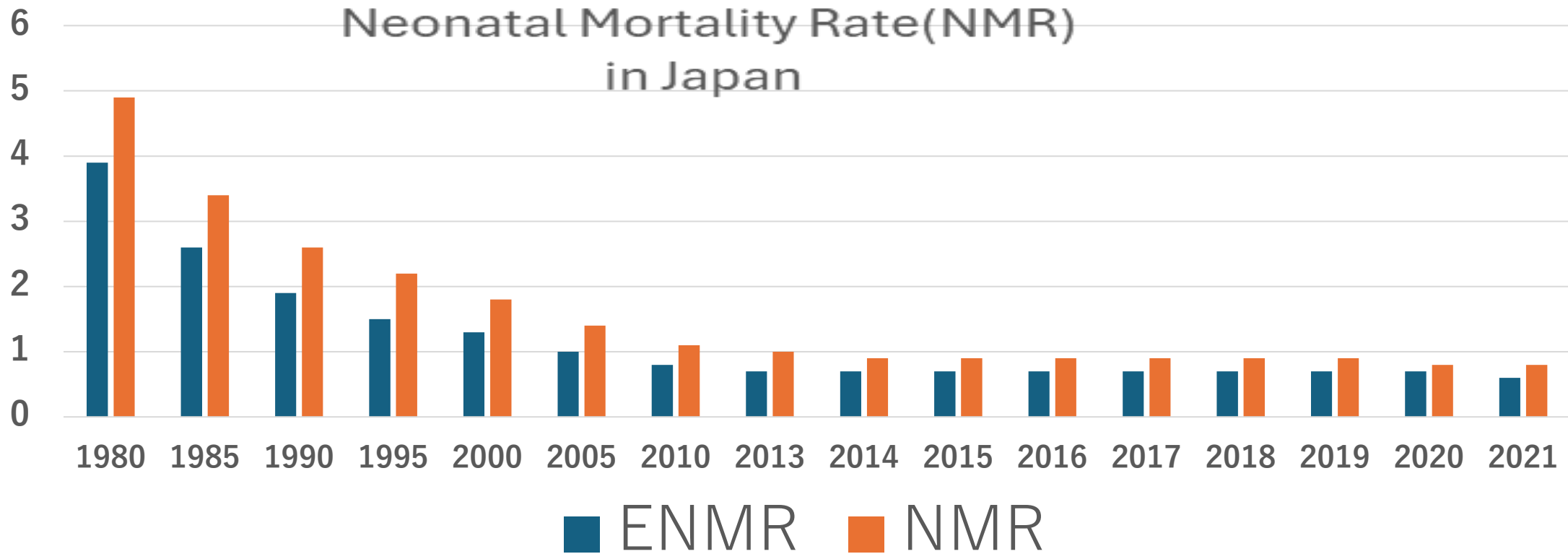
■ 0-6 days    ■ 7-27 days    ■ 28-364 days

# NMR/IMR CHANGING in JAPAN

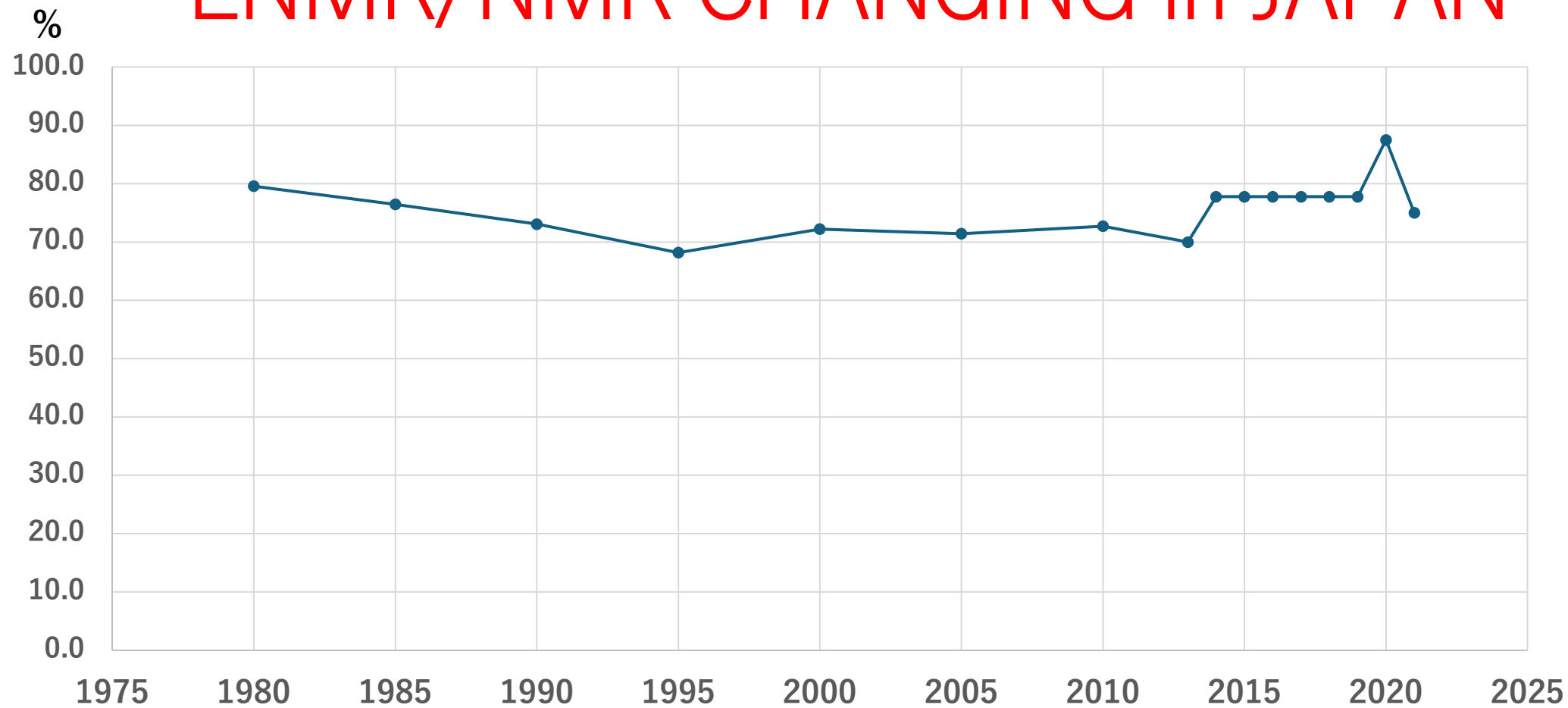


# Early Nonatal Mortality Rate (ENMR) & Neonatal Mortality Rate(NMR) in Japan

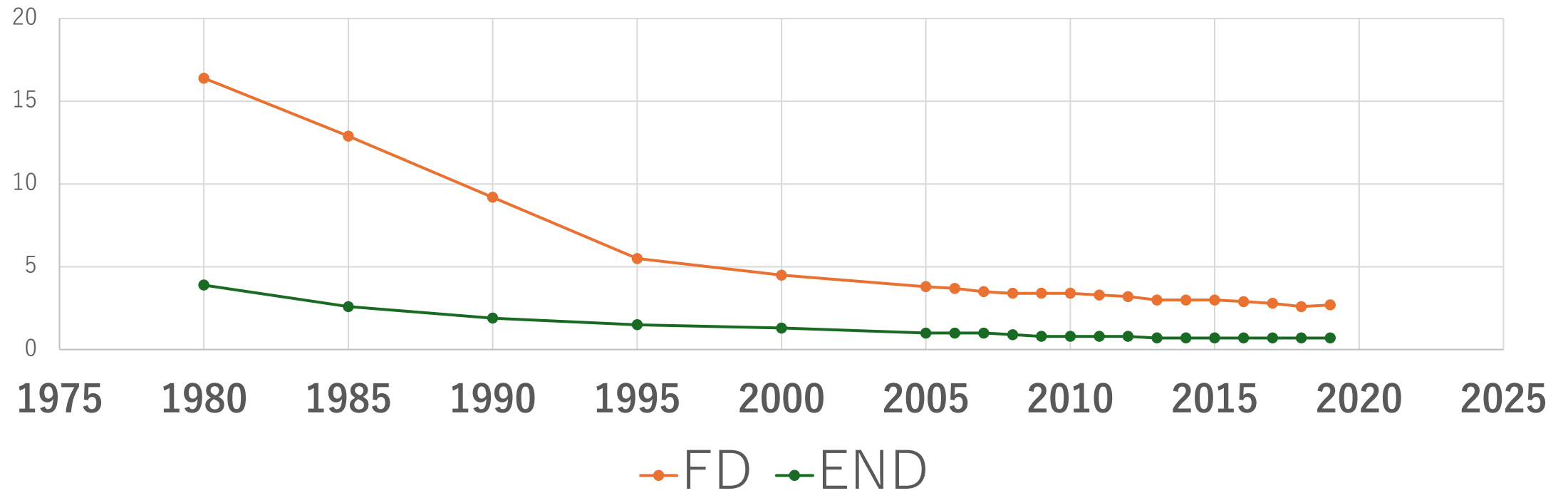
圖表標題



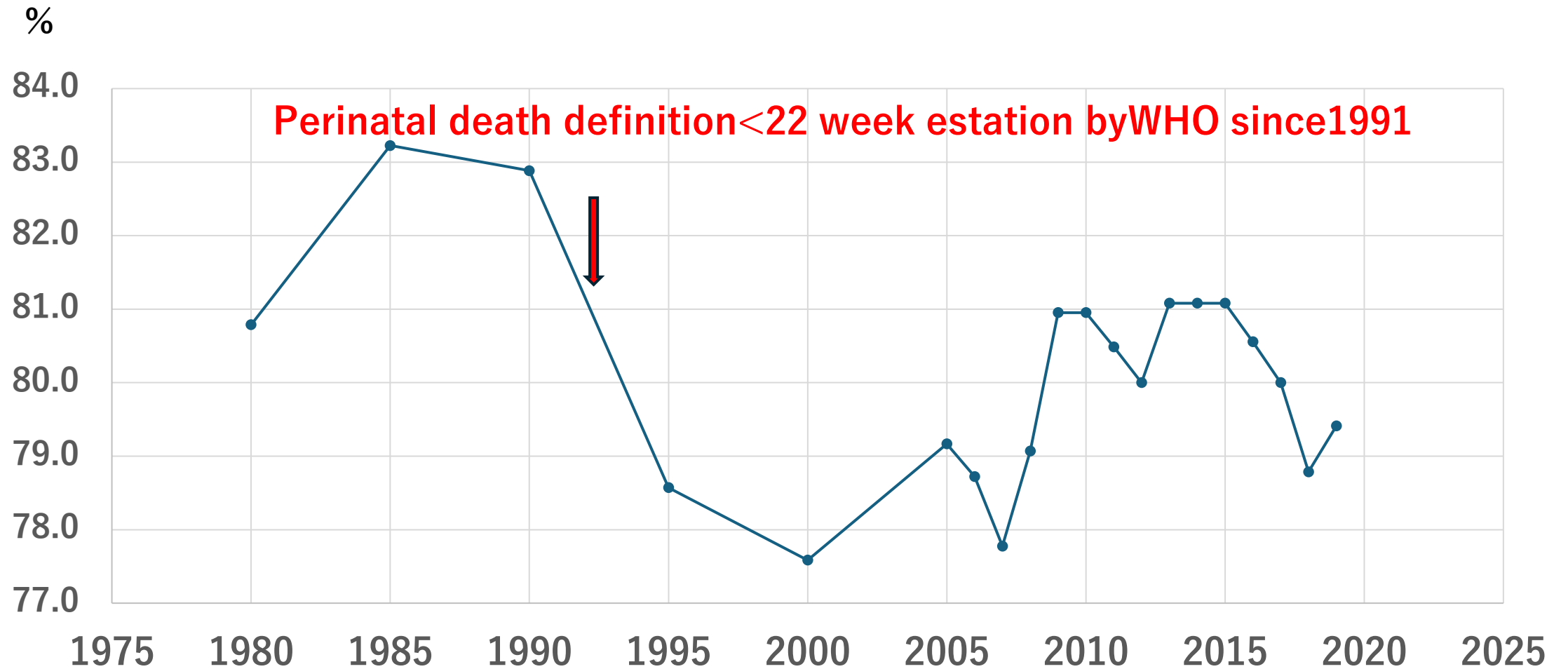
# ENMR/NMR CHANGING in JAPAN



グラフ タ **Changing of perinatal death rate** イトル



# Fetal Death/Perinatal Death



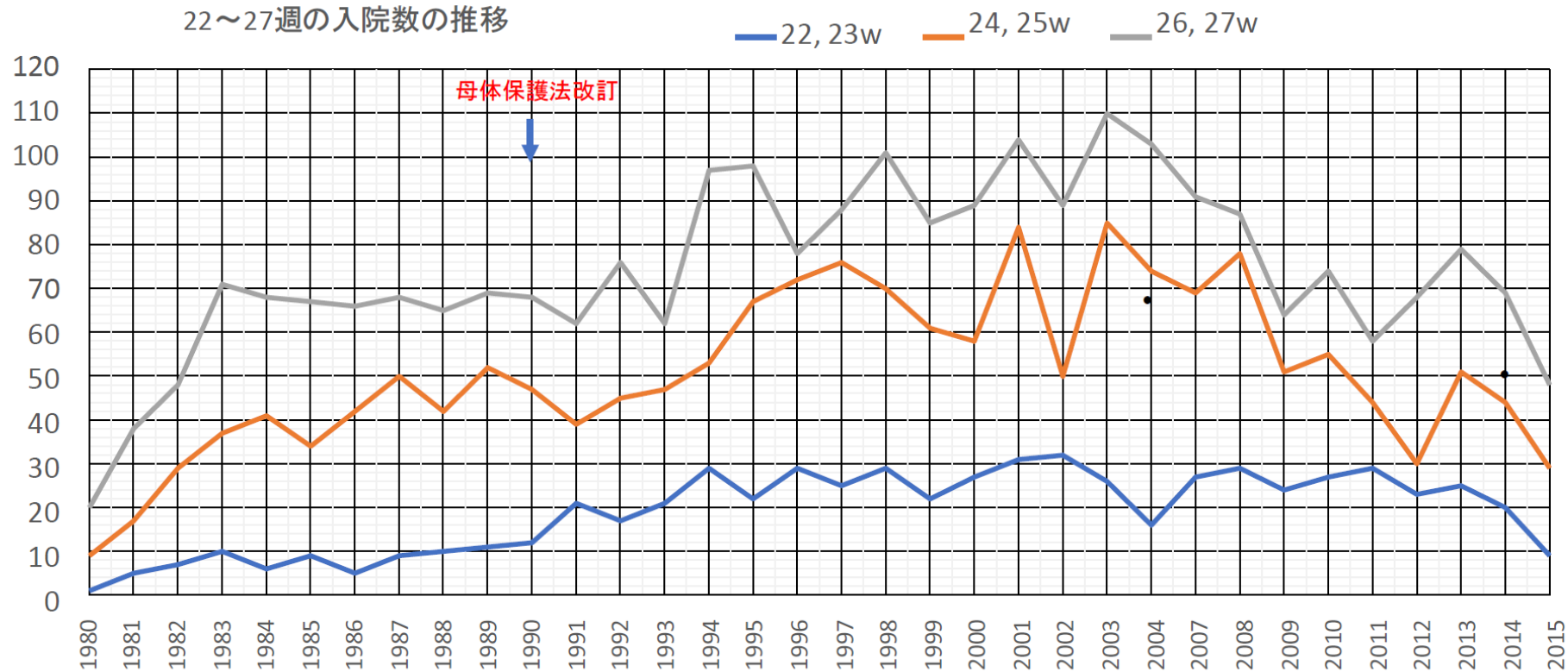




## Changing of 22 – 27wks admission Numbers

- ◆ 1995年まで増え続けていた早産、低出生体重児の割合がそれ以後減速し、出生数全体の減少に平行して2003年頃から急減
- ◆ 母体保護法の22週への改訂は1990年。それ以前から22、23週の出生は見られる

● : 22-27週 大阪府の出生数/人口動態統計の出生数 × 2000

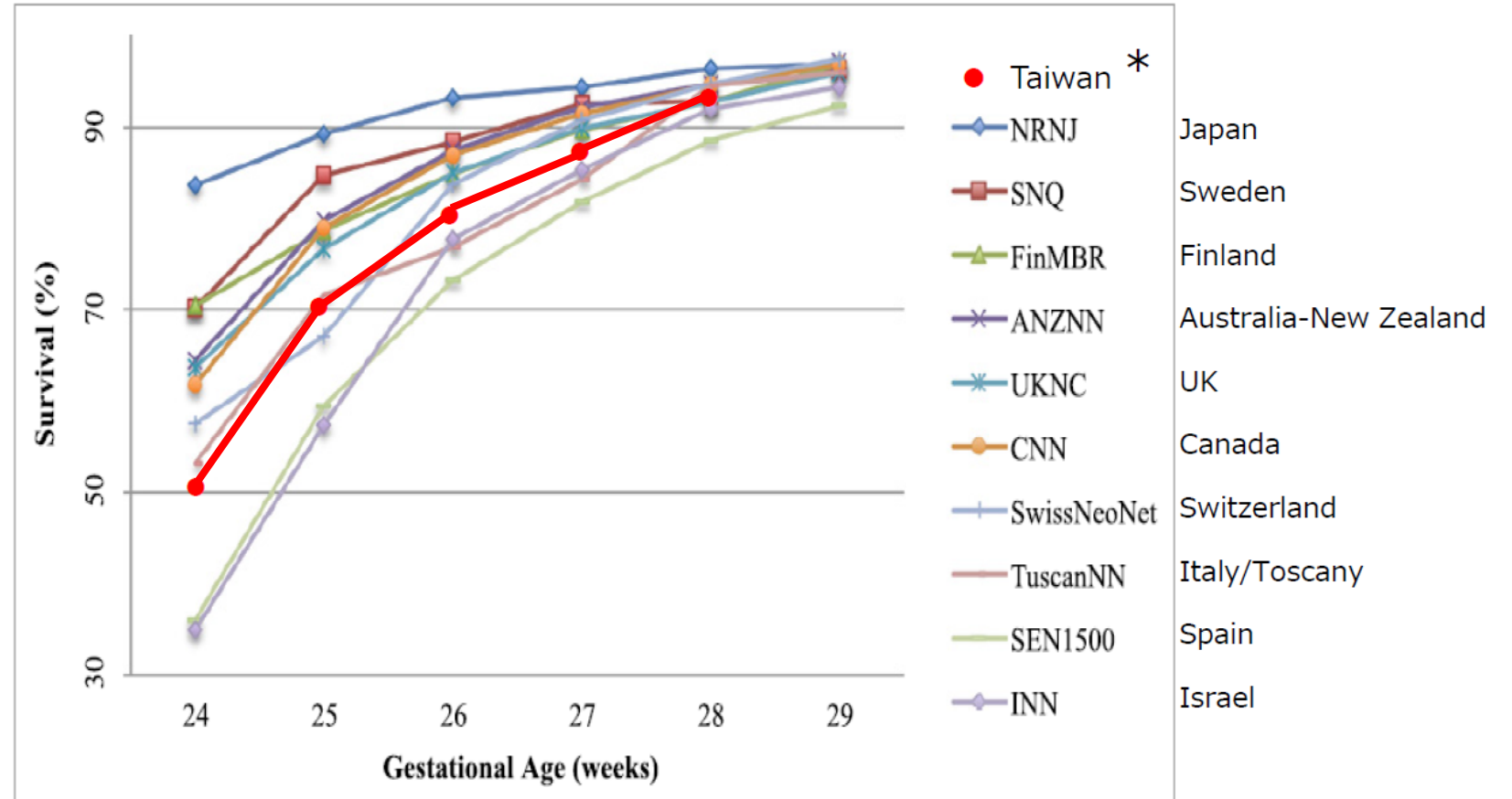


2005、2006年是一部データ紛失で未掲載

## Survival in Very Preterm Infants: An International Comparison of 10 National Neonatal Networks.

Helenius K, Sjörs G, Kusuda S et al. [Survival in Very Preterm Infants: An International Comparison of 10 National Neonatal Networks](#). *Pediatrics*. 2017 Dec;140(6):e20171264. doi: 10.1542/peds.2017-1264.

\*Taiwan ● (2007-2012)  
From: Bai-Horng Su et al. Neonatal Outcomes of Extremely Preterm Infants from Taiwan: Comparison with Canada, Japan, and the USA *Pediatrics and Neonatology* (2015) 56, 46-52



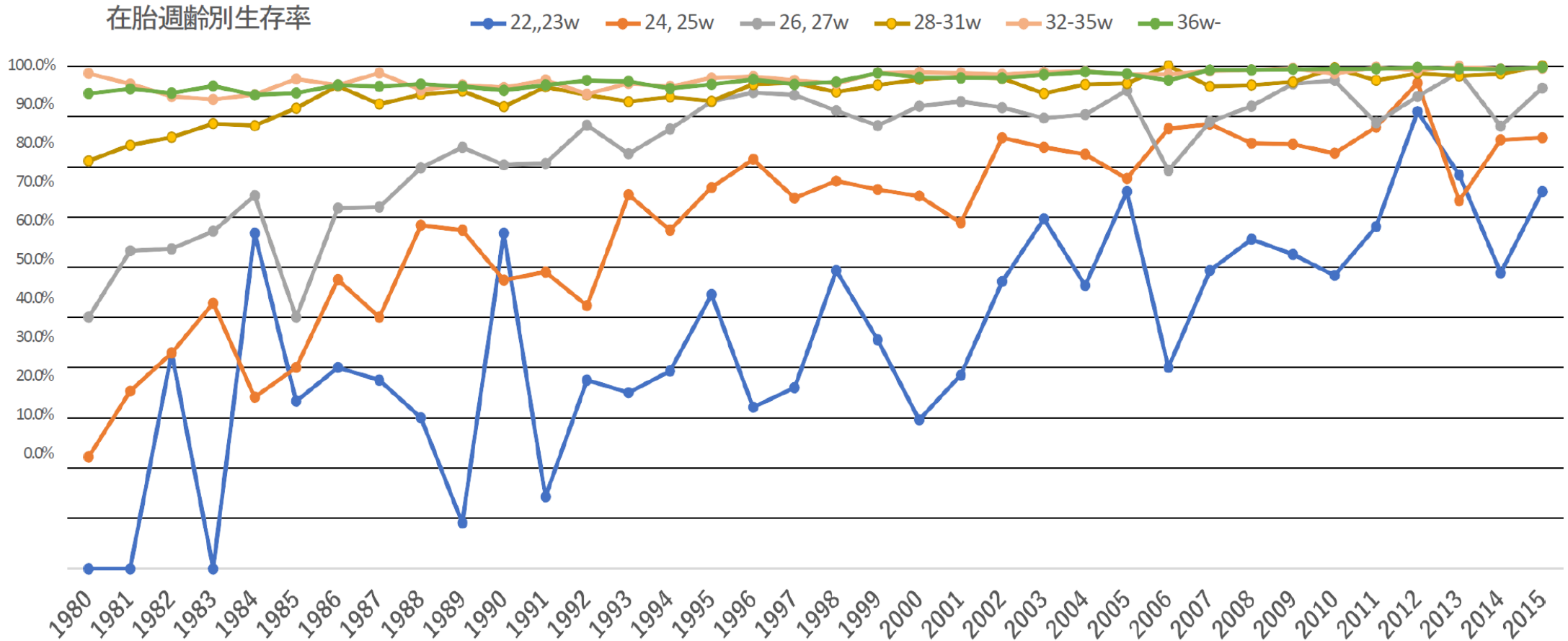
**FIGURE 1**

GA-specific survival for infants (24–29 weeks' gestation, birth weight <1500 g) born between 2007 and 2013 and admitted to neonatal care in the iNeo networks.



## Changing of Gestational wk survival rates in Osaka

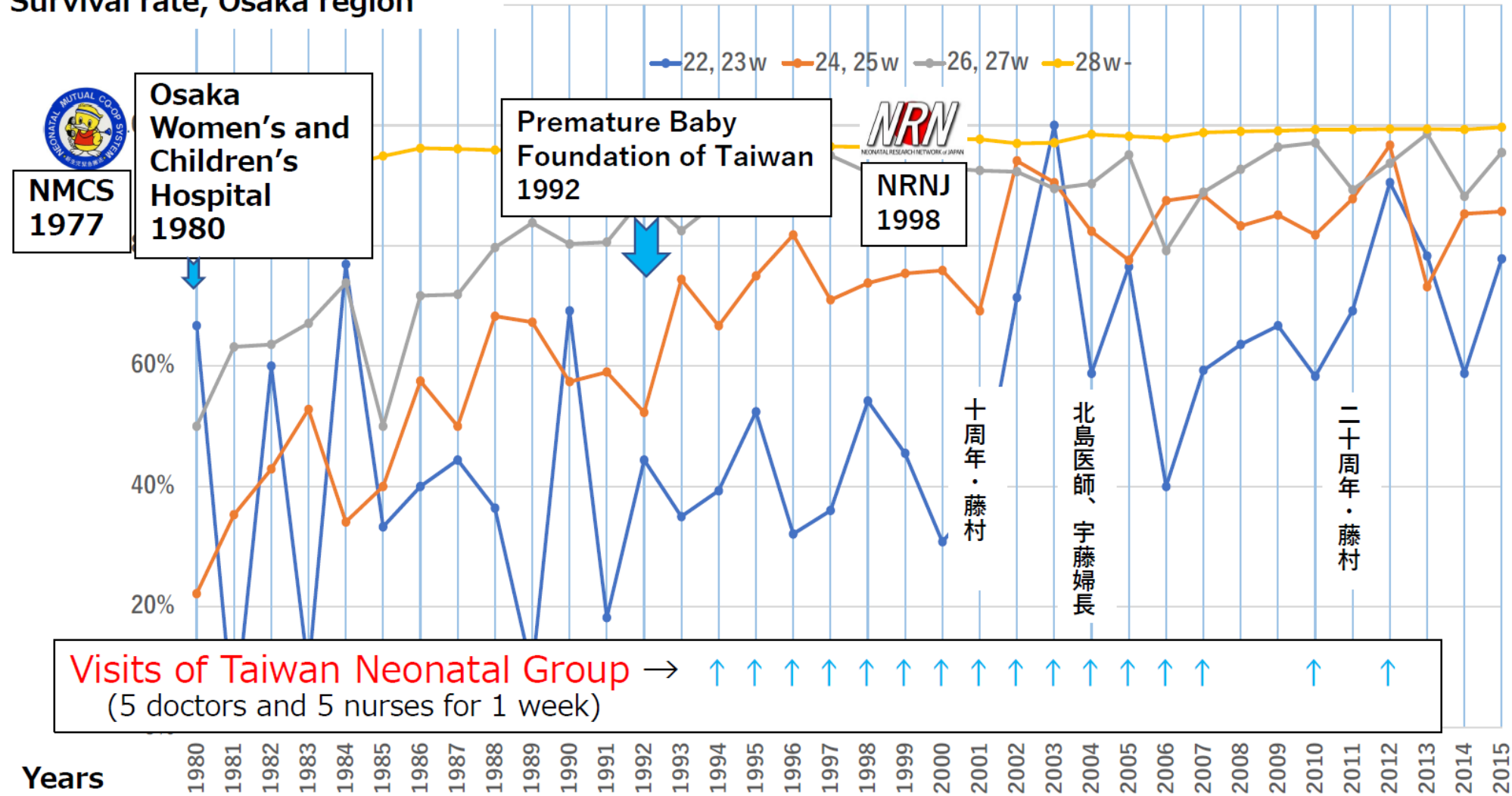
◆ 22,23wの生存率は1980年代—3割、90年代—4割、2000年代—6割、2010年代—7割と向上した。



# The friendship between Taiwan Neonatal Group and Osaka Women's and Children's Hospital

在胎週齡群別生存率の年次推移

## Survival rate, Osaka region



NMCS data-base (1980-2015)  
All admissions N=75,405

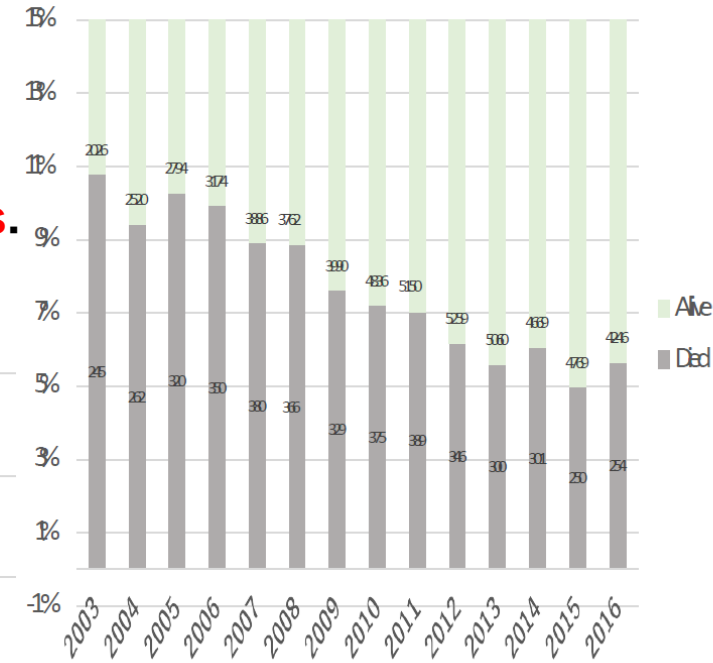
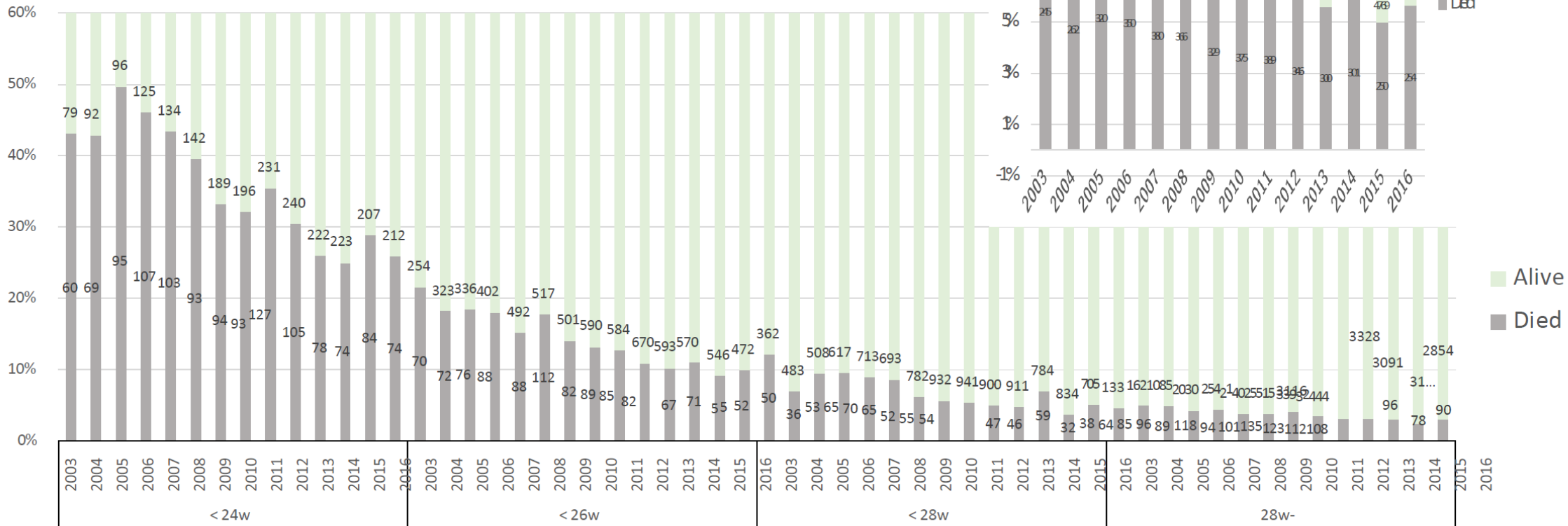
# Annual mortality rates in NRNJ database



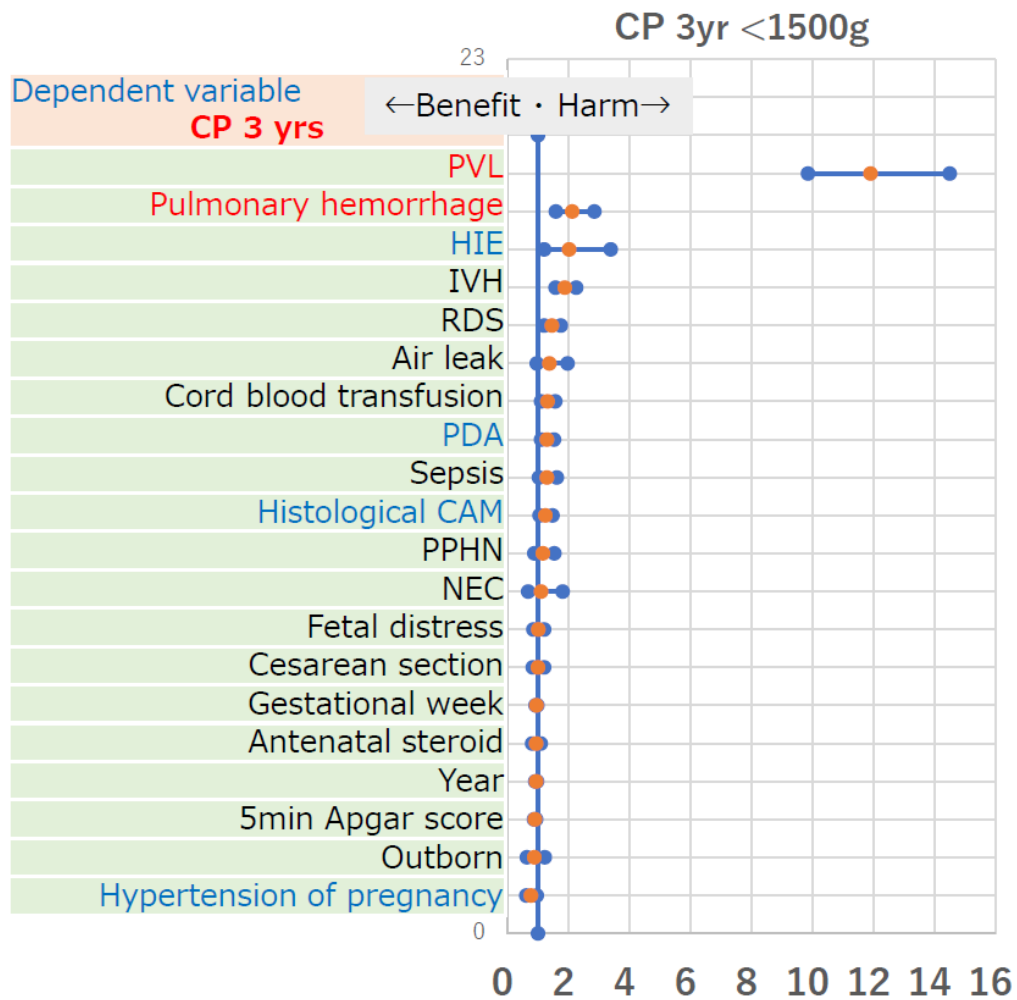
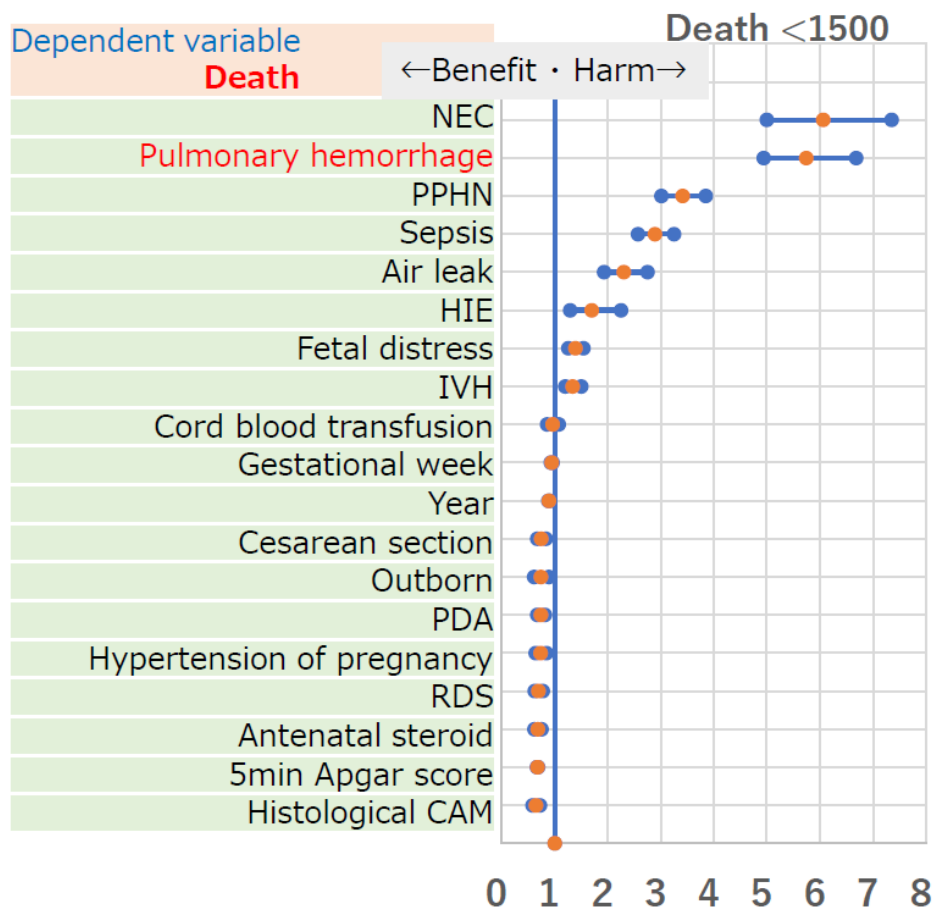
①

(1) Mortality rates have been cut in half over the past 14 years.  
 (2) Rapid rate of decline in <26 weeks

②



◆ Logistic regression analysis of NRNJ database disclosed that **pulmonary hemorrhage** is the second largest odds both for death and cerebral palsy.

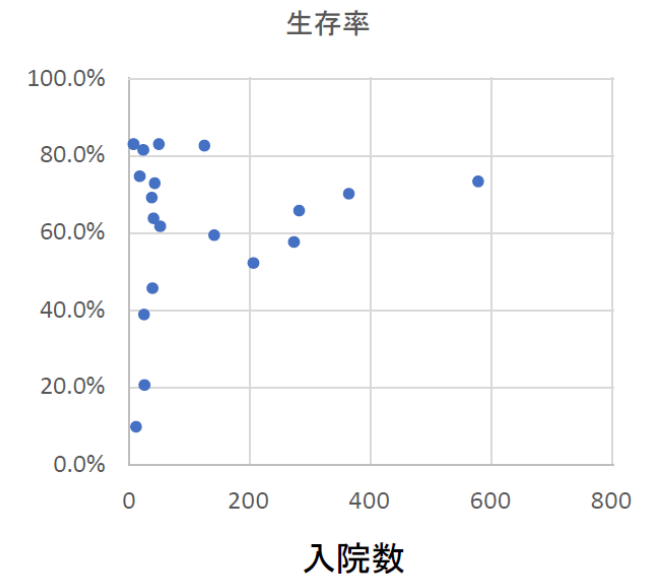
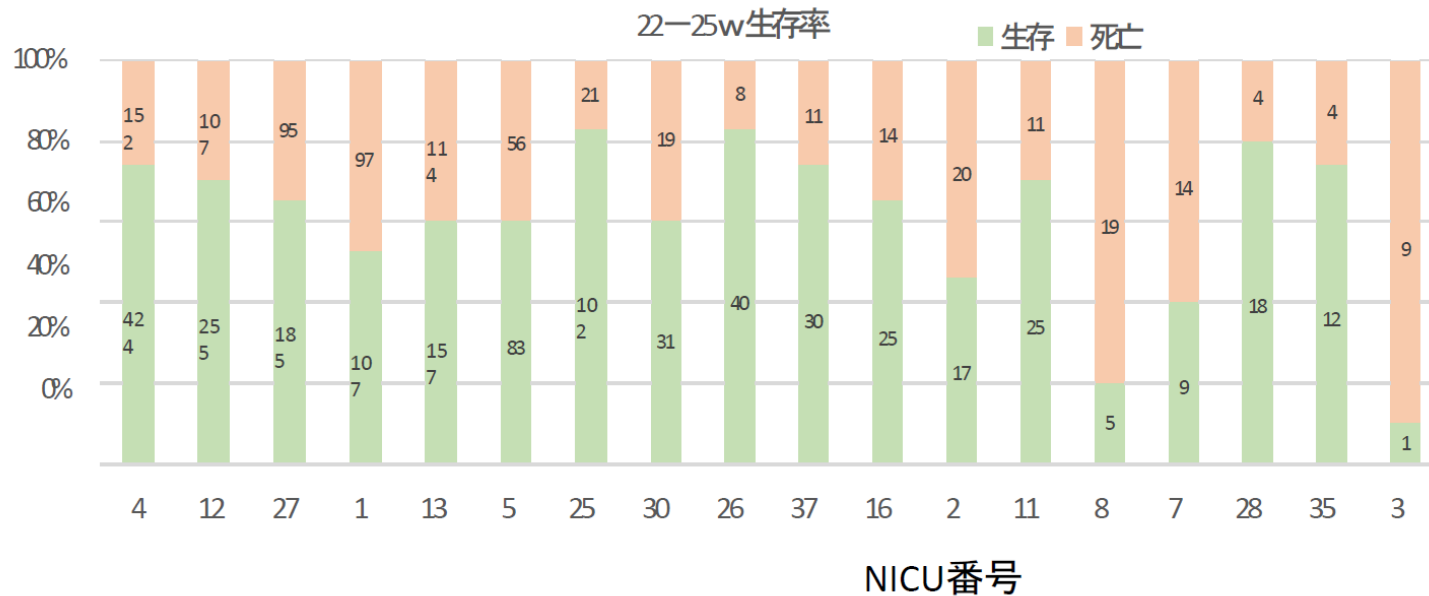




# NICU specific Survival Rate

Survival rate of 22-25 wks. No relation with Admission numbers. Need be adjusted by gestational wks

NICU No.	4	12	27	1	13	5	25	30	26	37	16	2	11	8	7	28	35	3	32	33	6
生存	424	255	185	107	157	83	102	31	40	30	25	17	25	5	9	18	12	1	8	7	5
死亡	152	107	95	97	114	56	21	19	8	11	14	20	11	19	14	4	4	9			1
総計	576	362	280	204	271	139	123	50	48	41	39	37	36	24	23	22	16	10	8	7	6
生存率	73.6%	70.4%	66.1%	52.5%	57.9%	59.7%	82.9%	62.0%	83.3%	73.2%	64.1%	45.9%	69.4%	20.8%	39.1%	81.8%	75.0%	10.0%			83.3%





# Changing of survival rate (22-27wks) in each NICU in Osaka

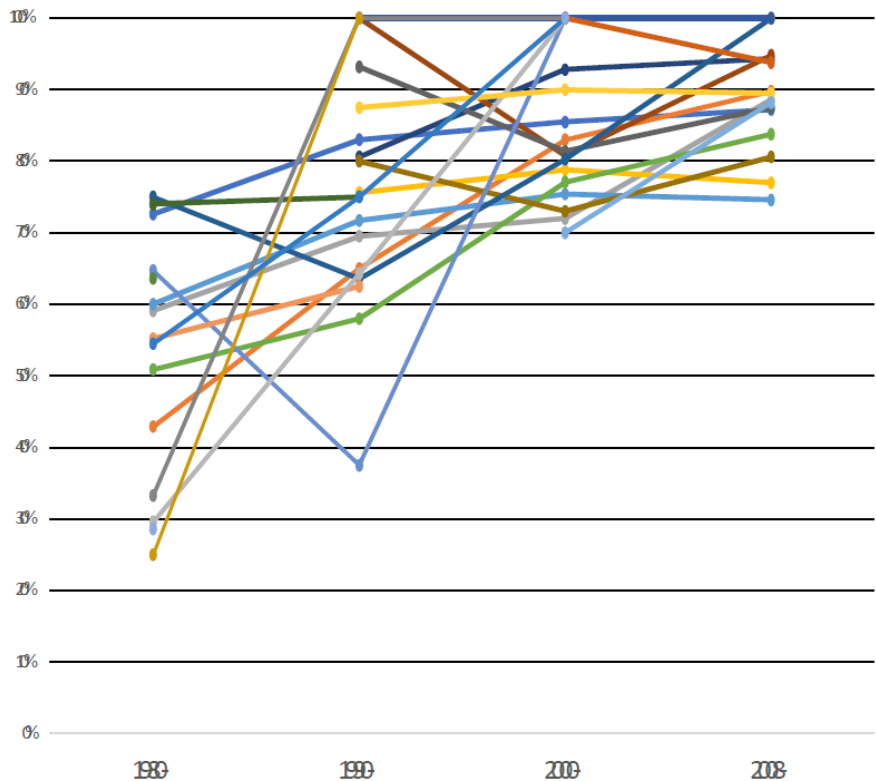
◆ 入院数上位施設と全施設の生存率の比較では、多数施設が際立って高いわけではない

## 全施設

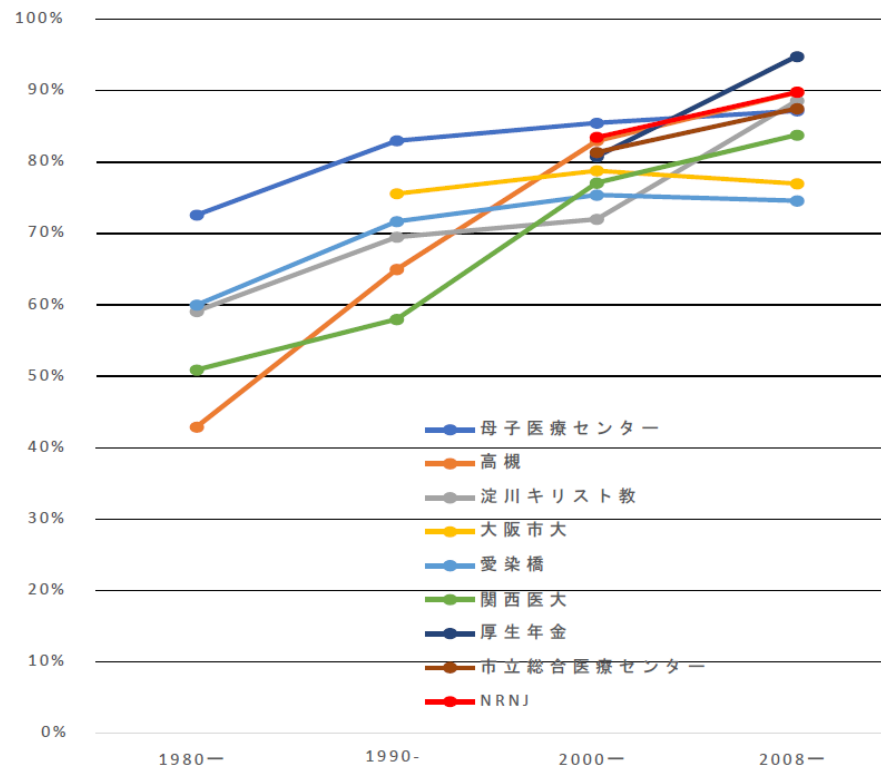
## 入院数上位施設

◀ 28w NICU別の生存率推移

◆ 4 ◆ 12 ◆ 13 ◆ 28 ◆ 1 ◆ 5 ◆ 26 ◆ 29 ◆ 27  
 ◆ 31 ◆ 17 ◆ 11 ◆ 2 ◆ 7 ◆ 8 ◆ 30 ◆ 36 ◆ 35

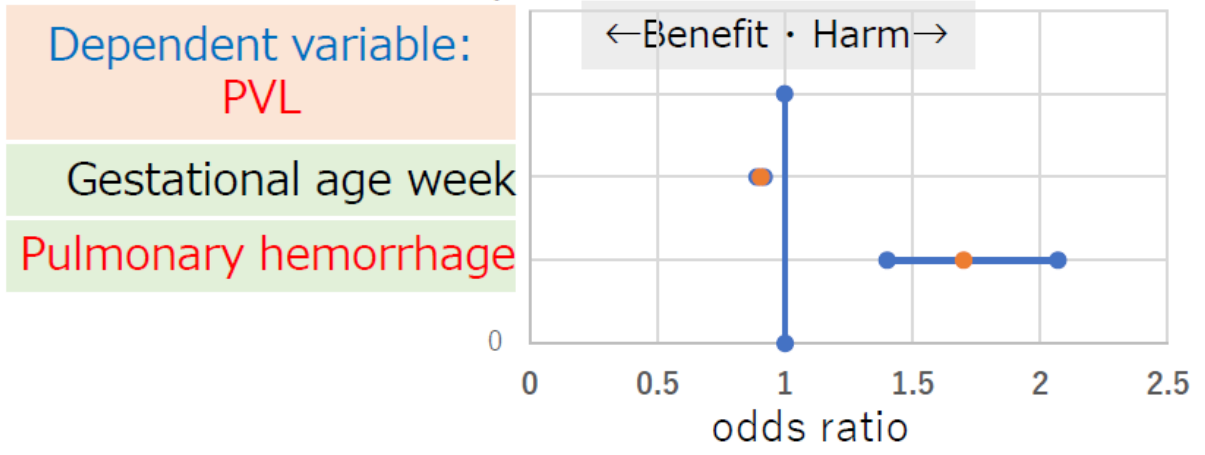


NRNJ(<28w)との比較





◆ PVL significantly correlated with pulmonary hemorrhage



Dependent variable PVL	odds ratio	95%CI	P
24, 25W			
Gestation	0.9	0.89-0.91	<0.001
Year	0.98	0.97-0.99	0.002
26, 27w			
Gestation	0.9	0.89-0.91	<0.001
Year	0.98	0.97-0.99	0.002

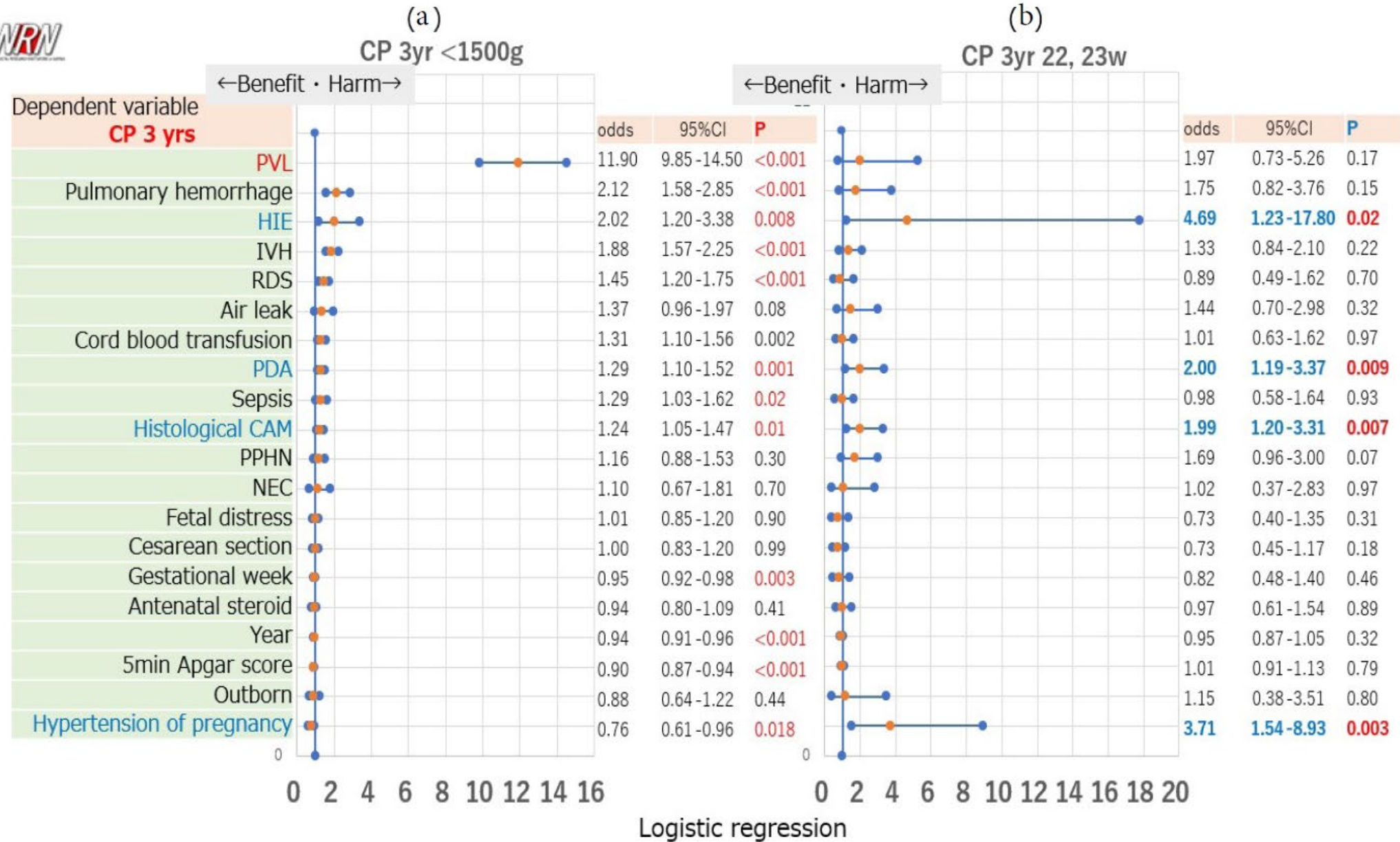


Figura 9: Perinatal factor for CP 3 years (comparing <1500g and 22-23w).

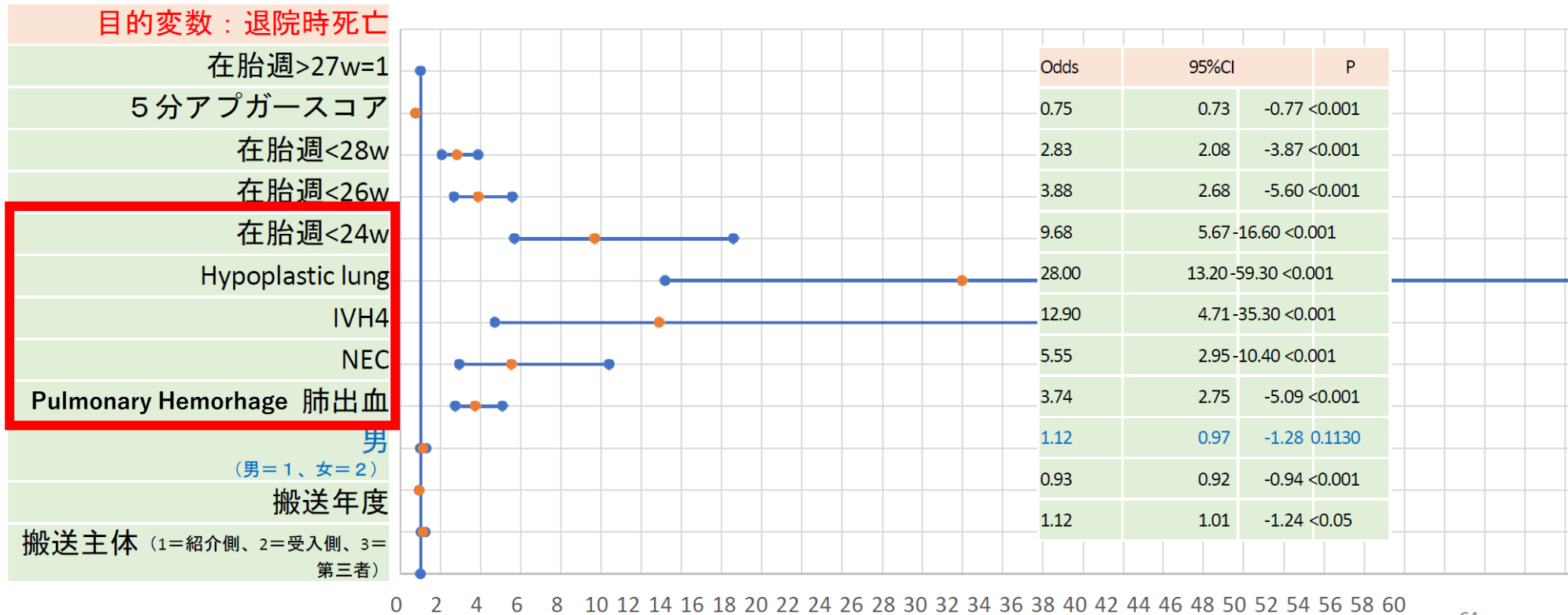
PVL was the strongest factor for birth weight<1500g, but for infants of 22-23 weeks HIE, PDA, CAM and hypertension of pregnancy were significant factors.



## Factors related to death at discharge

- ◆ 死亡退院についてオッズ比の大きい疾患は、肺低形成、IVH4, NEC, 肺出血
- ◆ 5分アプガースコアは、スコア1増加する毎に死亡リスクは0.75倍減少する
- ◆ 死亡に有意でない因子: 胎児数, TTNB, Apnea, Infection, IVH3, PIE, RDS, 胎児仮死

目的変数：退院時死亡（NMCS）





# Gestational wks and Birth weight specific mortality rate

2006-2015

0:死亡率0%

死亡率5%以上

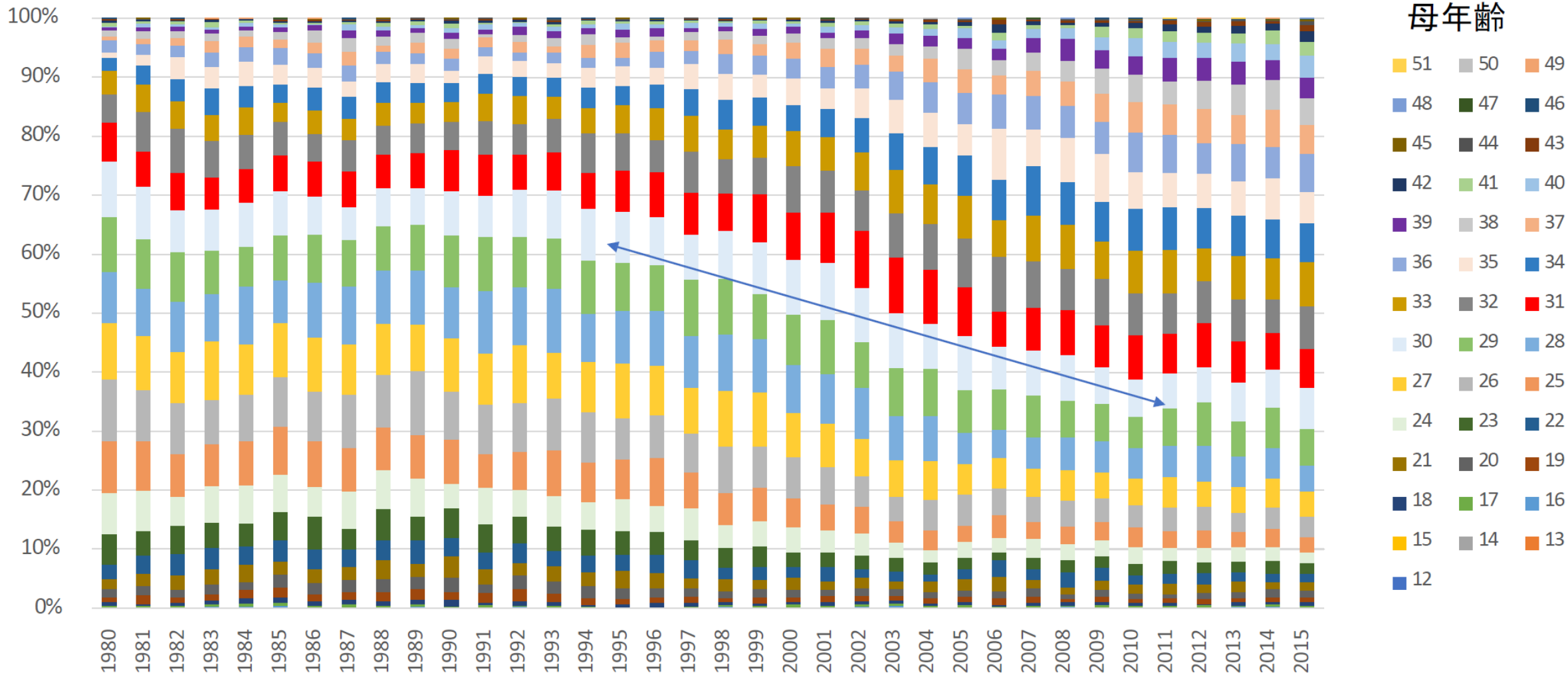
死亡率10%以上

死亡率%	300g	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500								
22w		55.9	42.1																																																
23w	0	27.3	18.6	34.3	100																																														
24w	0	14.3	28.6	18.8	14	0			100	0																																									
25w	50.0	31.3	27.8	6.7	4.2	7.5	0	0																			0																								
26w		16.7	7.1	11.1	7.7	2.8	9.8	6.7	0	0.5																																									
27w	0	37.5	11.1	6.7	5	9.1	3.3	3.1	2.5	14.3	0						100										100																								
28w	0	0	6.7	0	0	4.3	5.1	1.8	1.1	0	0	0	0			20																																			
29w	100	50	33.3	18.2	16.7	3.4	0	4.9	1.8	1.2	0	0	0	0	0	0	0	100																																	
30w		0	0	0	0	0	7.4	0	1.8	2.7	1.2	1.8	0	0	0	8.3	0	100		100	0	0																													
31w				20	0	0	5	0	6.1	0	0	0.8	2.1	2.6	2.3	0	4	0	0	0						0																									
32w					100	33.3	0	3.8	3.3	0	0	3.1	0	0.6	0	0	1.2	0	0	0	0	0			0																										
33w			0		0	0	0	12.5	0	0	2.2	0	0	0	0	0	0	0	0.7	0.8	1.5	0	0	0	0	0	0																								
34w		100			0		20	0	12.5	0	0	3.1	3.3	2.2	0	0.6	0.4	0.9	0.4	0	0.7	1	0	0	7.1	0	0	0	0	33.3	0	100	0																		
35w							0	40	0	0	0	2.4	5.6	1.3	1.8	0.7	0	0	0.4	0	0	0.5	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
36w						0				0	0	0	11.5	2.3	0	2.1	0	0.6	1.3	1.6	0.5	0	0.4	1.1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
37w									100	0	50	20	0	1.9	5.7	4.5	0	0	1.2	0.4	0.8	0	0	0.4	0	0	0	0	0.7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
38w												0	16.7	13.3	6.3	0	3.2	0	1.2	0.8	1.3	0	0	1.1	0.4	1	0.9	0.4	0	0.7	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
39w			0									0		0	0	0	0	0	2.9	0	1.1	0.8	0	1.2	0.5	0.9	0.4	0	0.8	0.5	0	1.5	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0		
40w											0		0		0	14.3	0	0	5.9	0	0	0	0	0	2.9	0	1	0.8	0	0	1.1	0.3	0	0.6	0	0	1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	
41w													100	0	0	66.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	11.1	0	0	0	0		
42w																				0	0	0	0	0	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
43w																																																			



# 母の年齢の年次推移(1)

Maternal Age > 31yrs increased during 1994-20120. Then stabilized



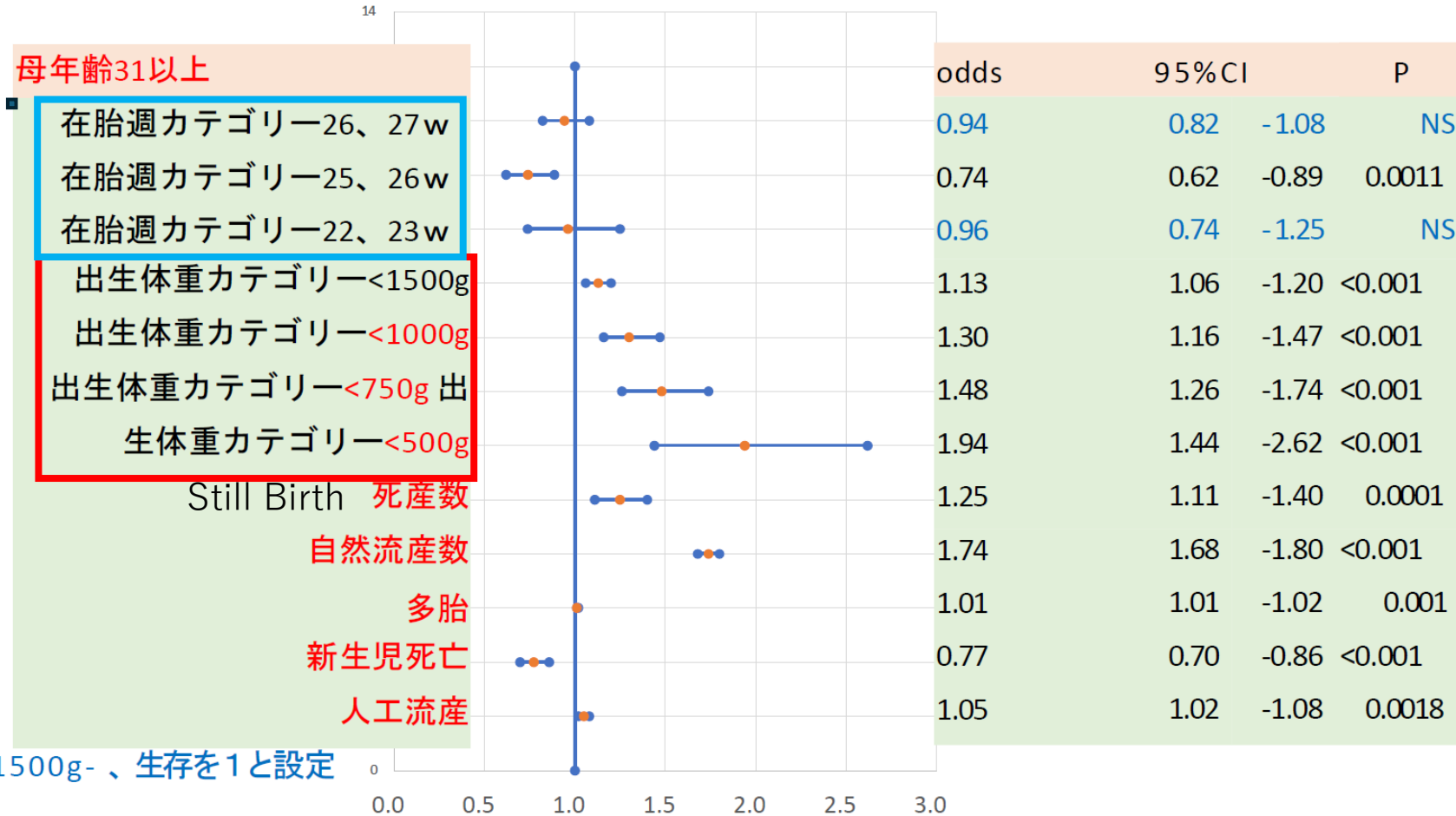


## Risks related to maternal age >31 yrs in Osaka

31歳以上の母に相関しているリスクを解析

- ◆ **超早産のリスクはないが**、1500g未満の各群のリスクが有意
- ◆ 自然流産、死産、多胎、人工流産、新生児死亡との相関が有意

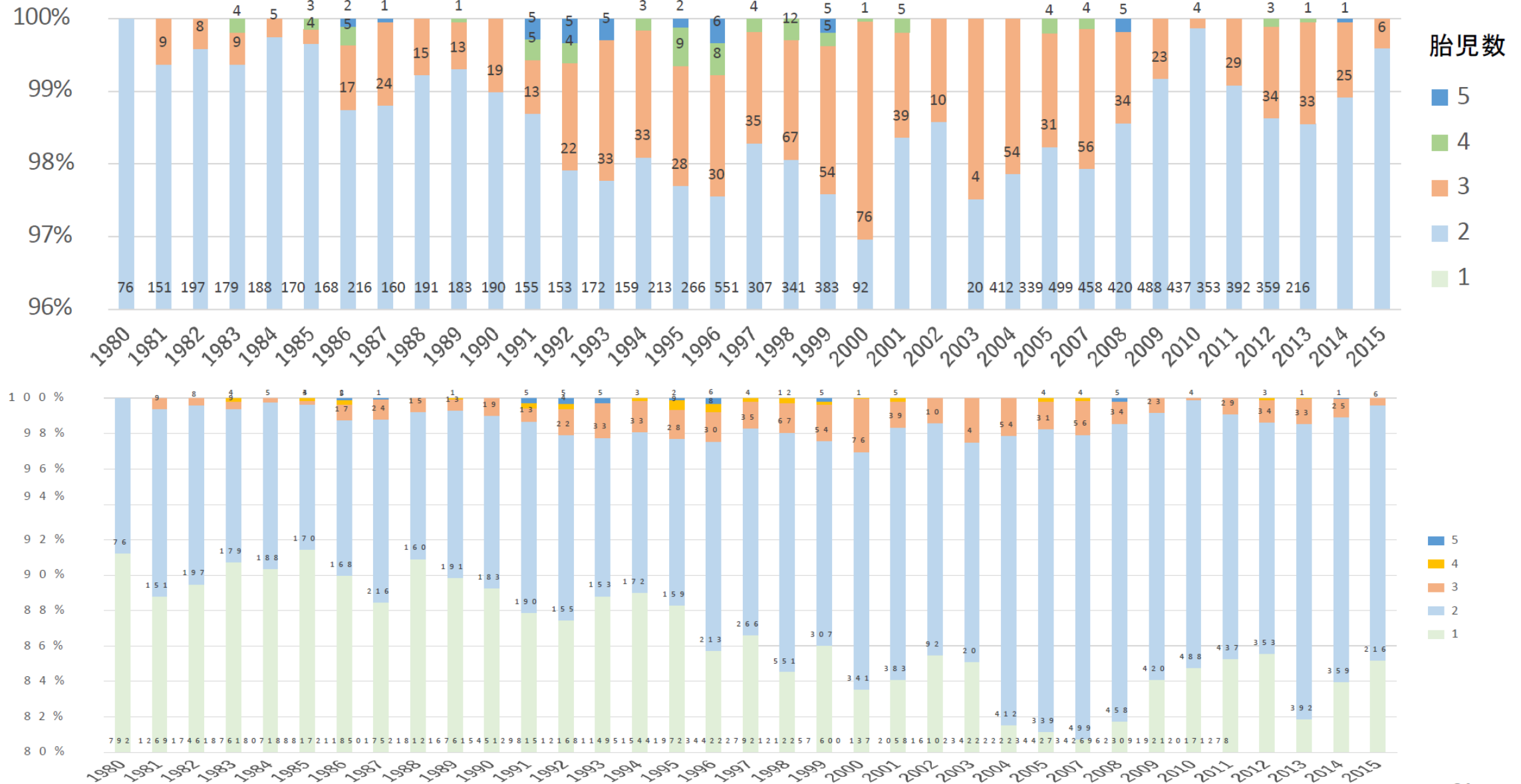
母31歳以上の場合のリスク





# Multiple Births Changing in Osaka

◆ 3胎以上の妊娠増加は3%の2000年をピークに減少に転じ、2010年以降は1%前後。5胎、4胎も2000年以降年に1組程度。

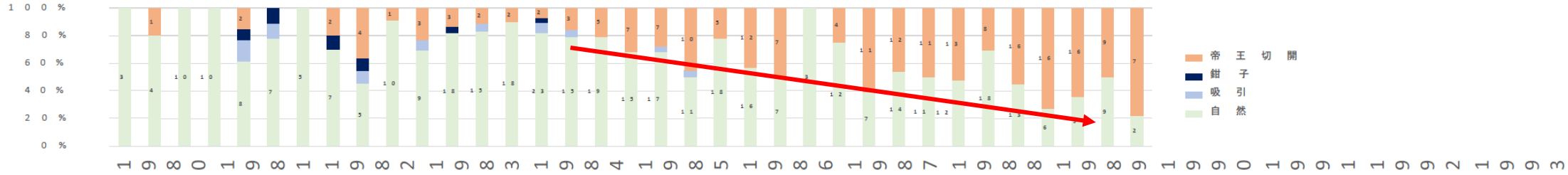




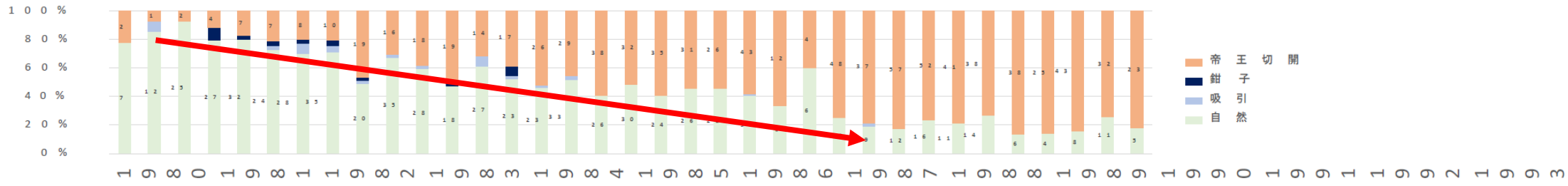
# Changing of mode of Delivery in each gestational wks

Cesarian Section has been increasing in 24-27 weeks gestation. Also increasing in 22-23wks recently

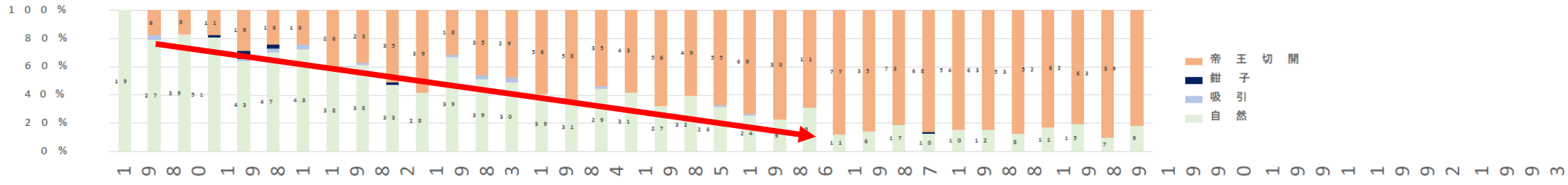
22、23 w



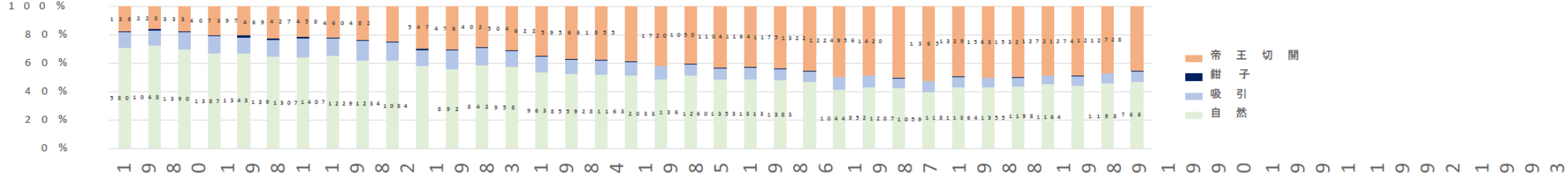
24、25 w



26、27 w



28w-

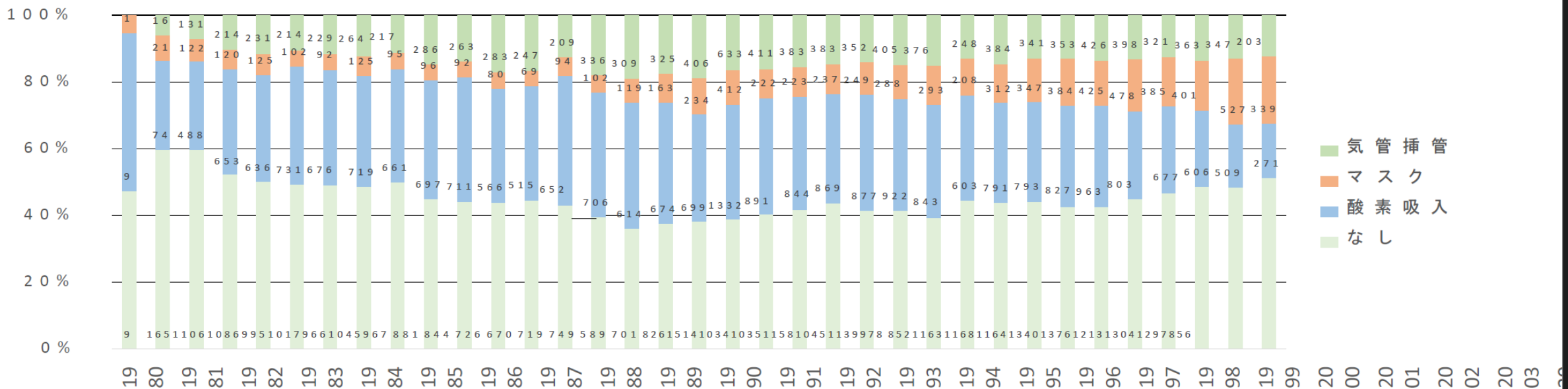




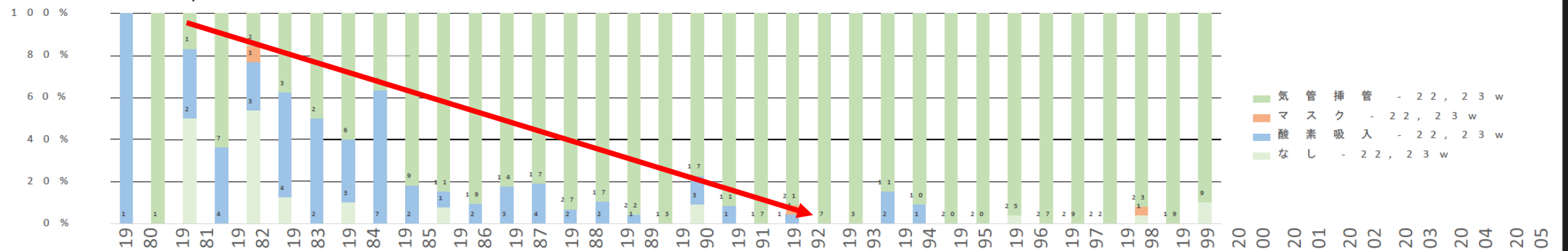


# Mode of Resuscitation Changing in Osaka

Tracheal Intubation reached 80% in 1997, then almost 100% in 22-23 wks gestation



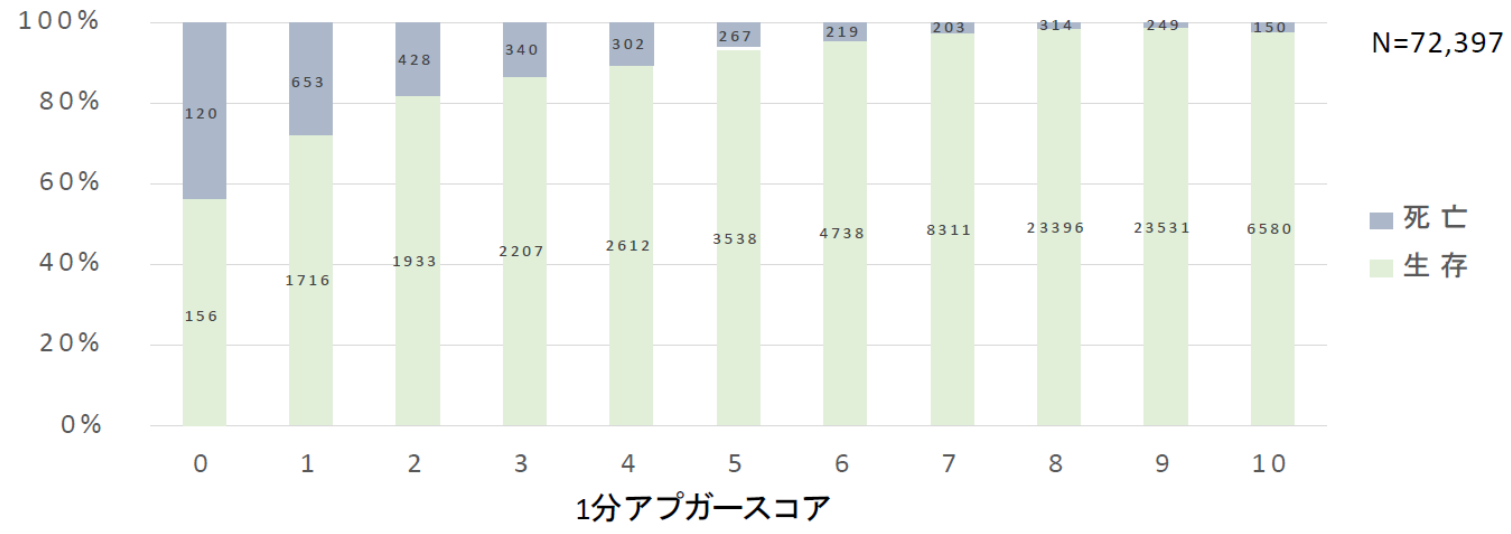
22, 23w



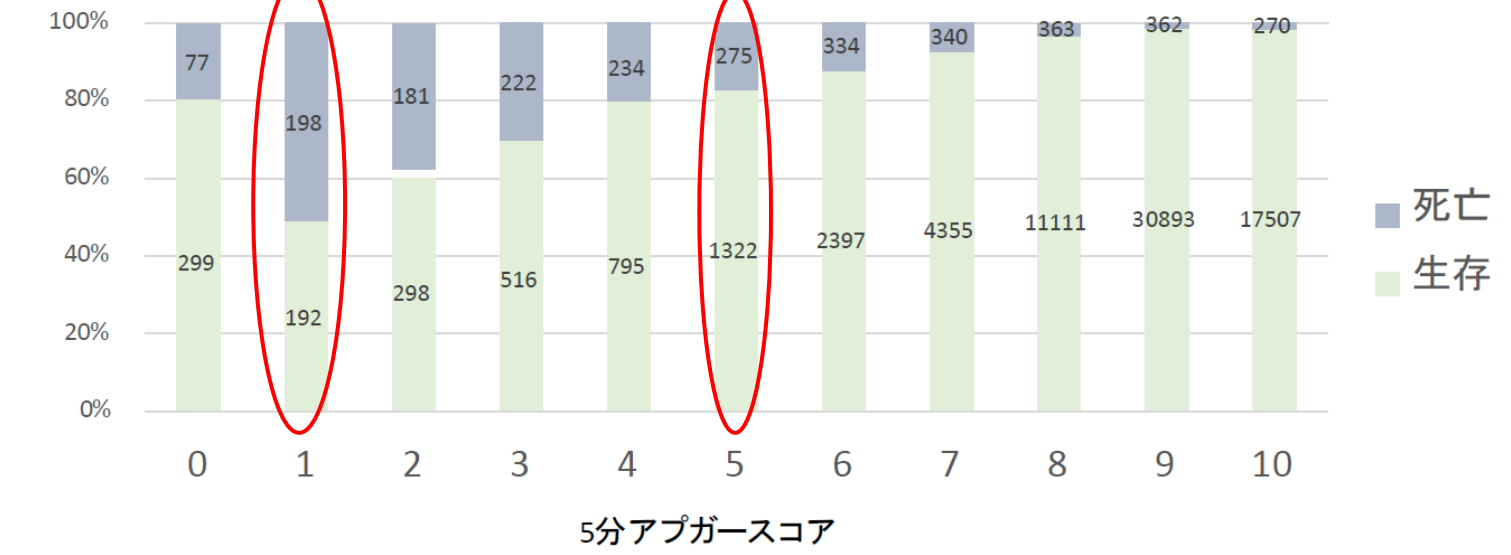


# Apgar Score and Prognosis of Life

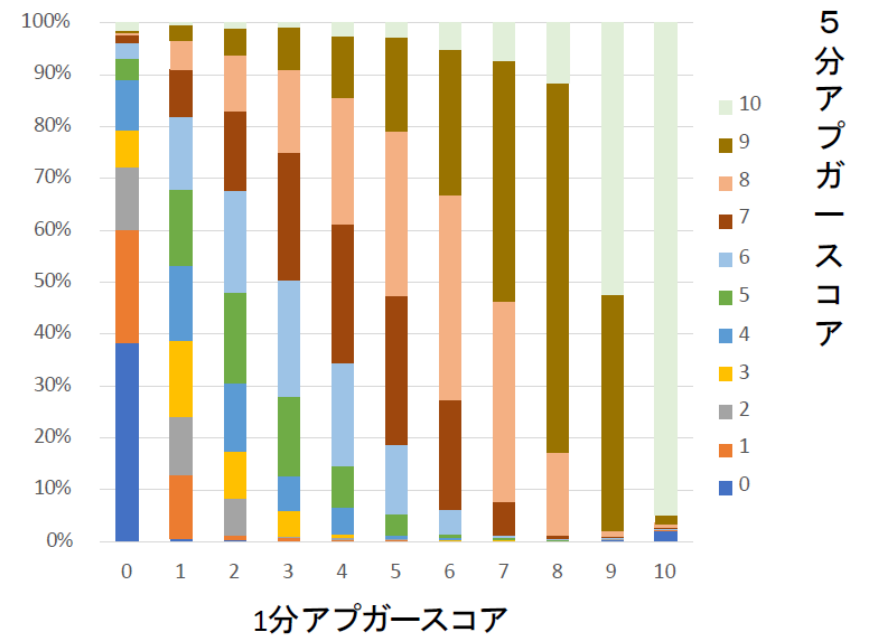
◆ 5min Apgar Score 1=50 % of mortality, Score 5= 20%of mortality



■ 死亡  
■ 生存



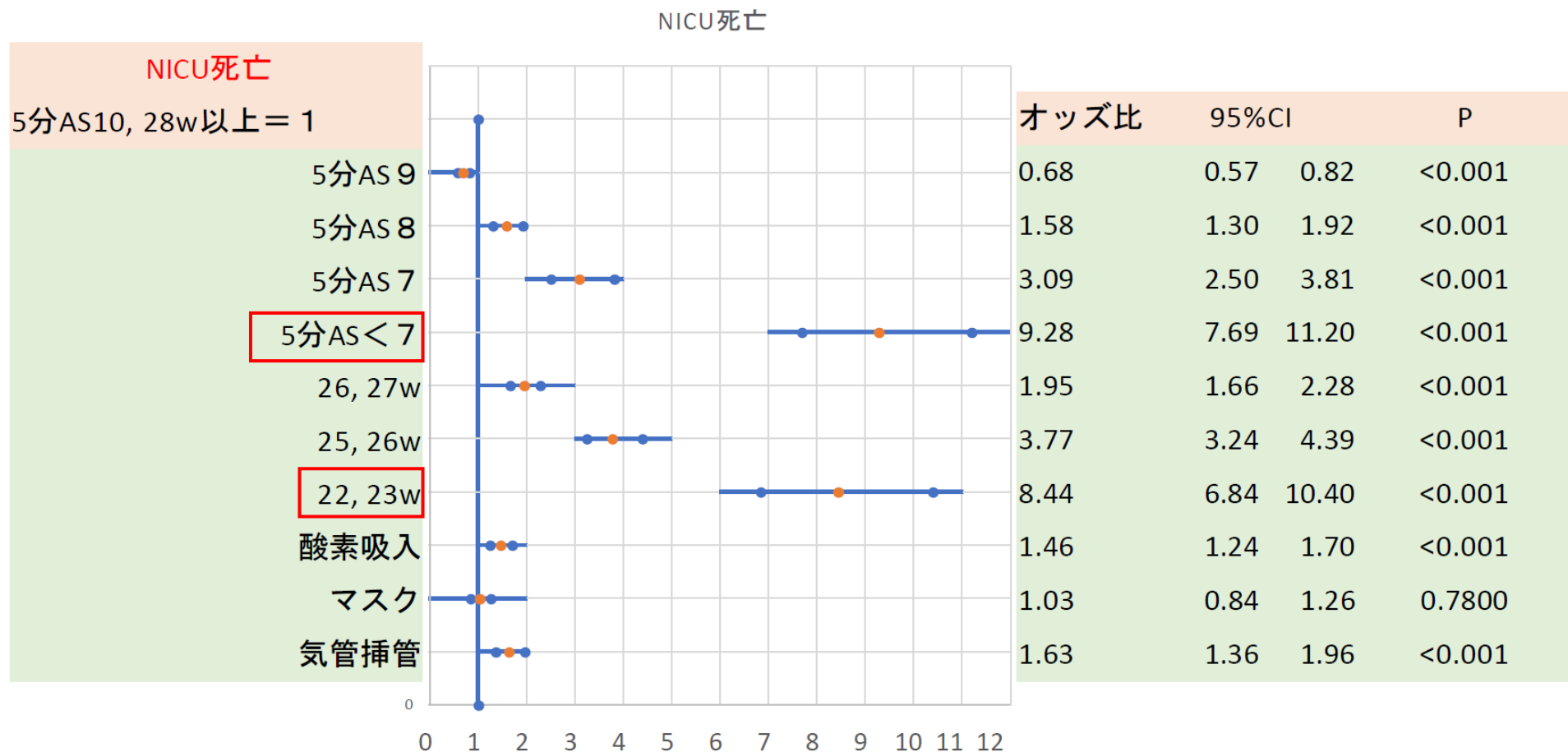
■ 死亡  
■ 生存



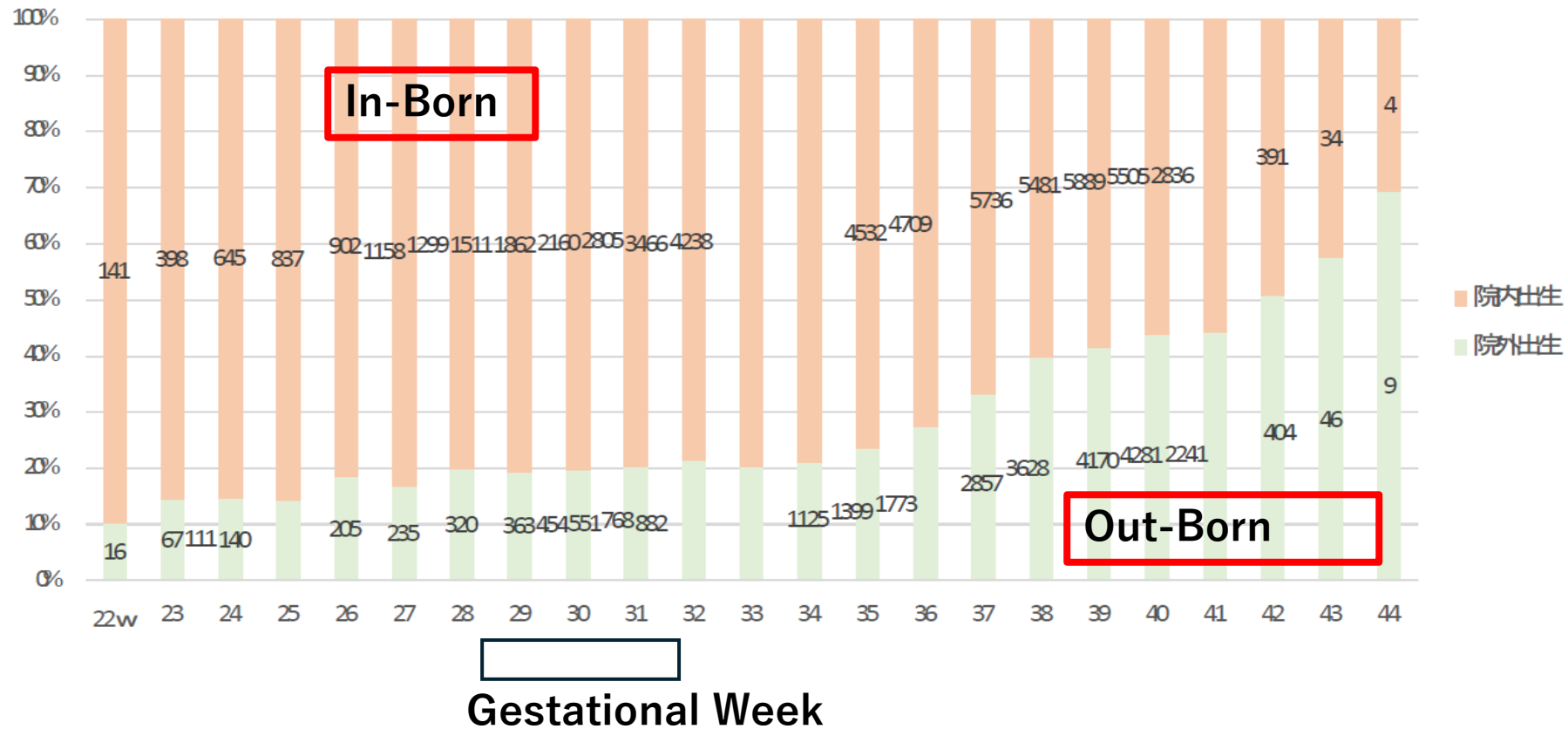


## Odds ratio of 5min Apgar Score and Gestational wks for Death

Odds ratio of Death are higher in 5min Apgar Score < 7 and in 22-23 wks gestation



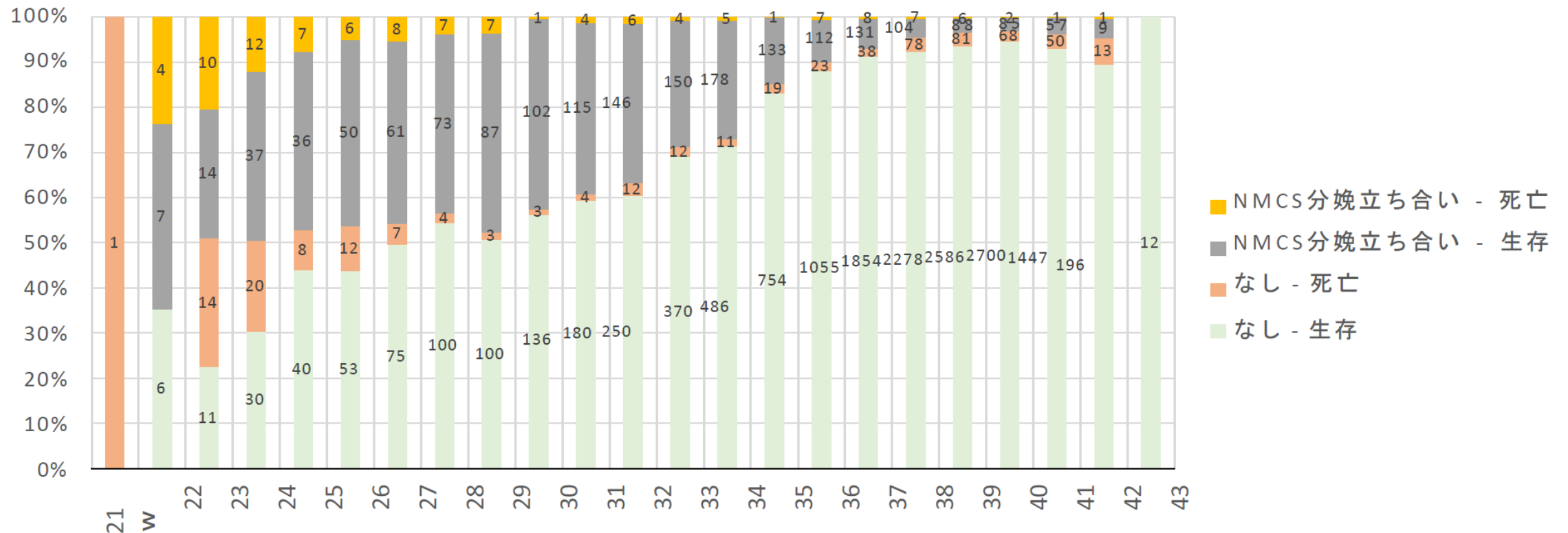
# In-Born and Out-Born Ratio

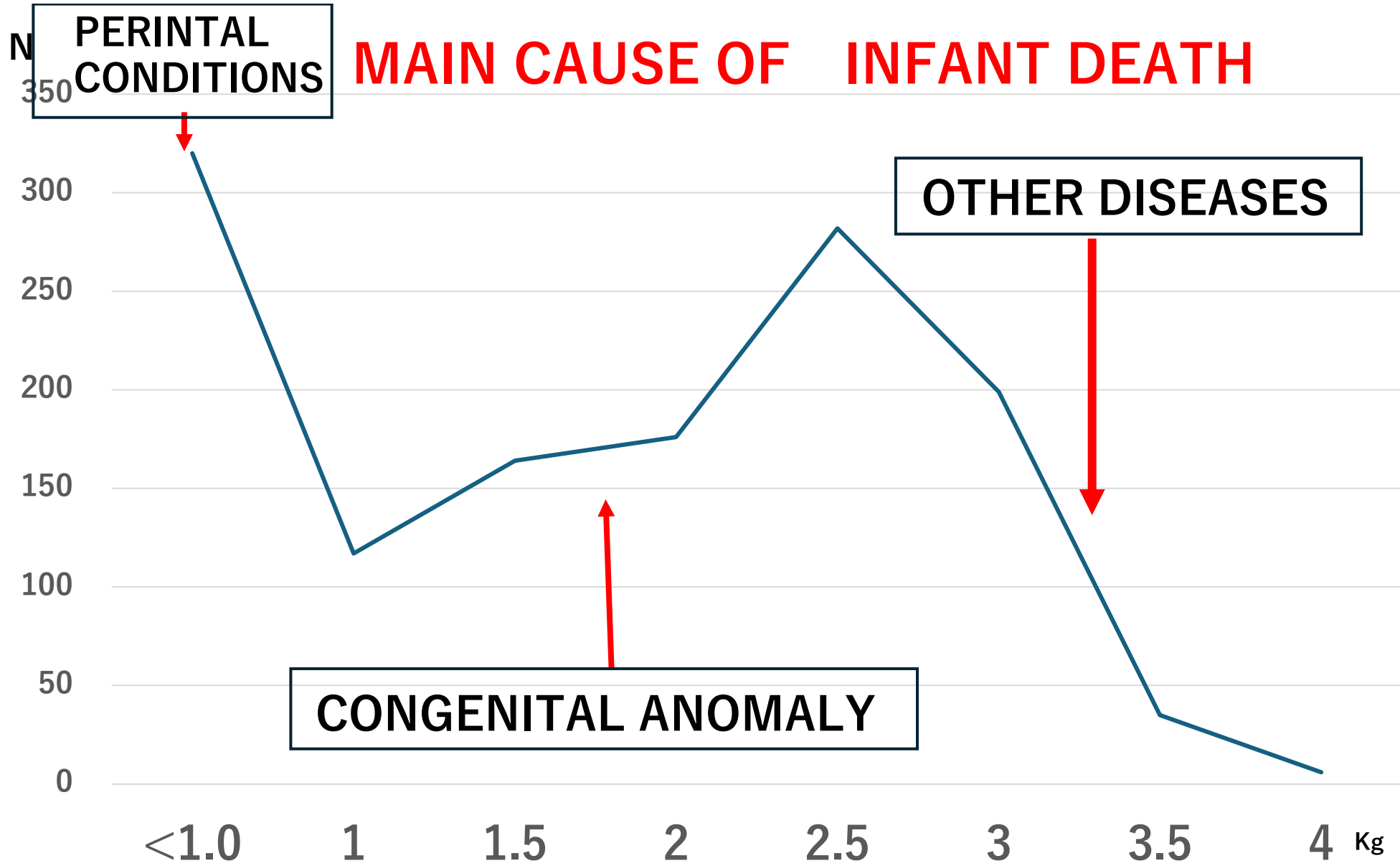




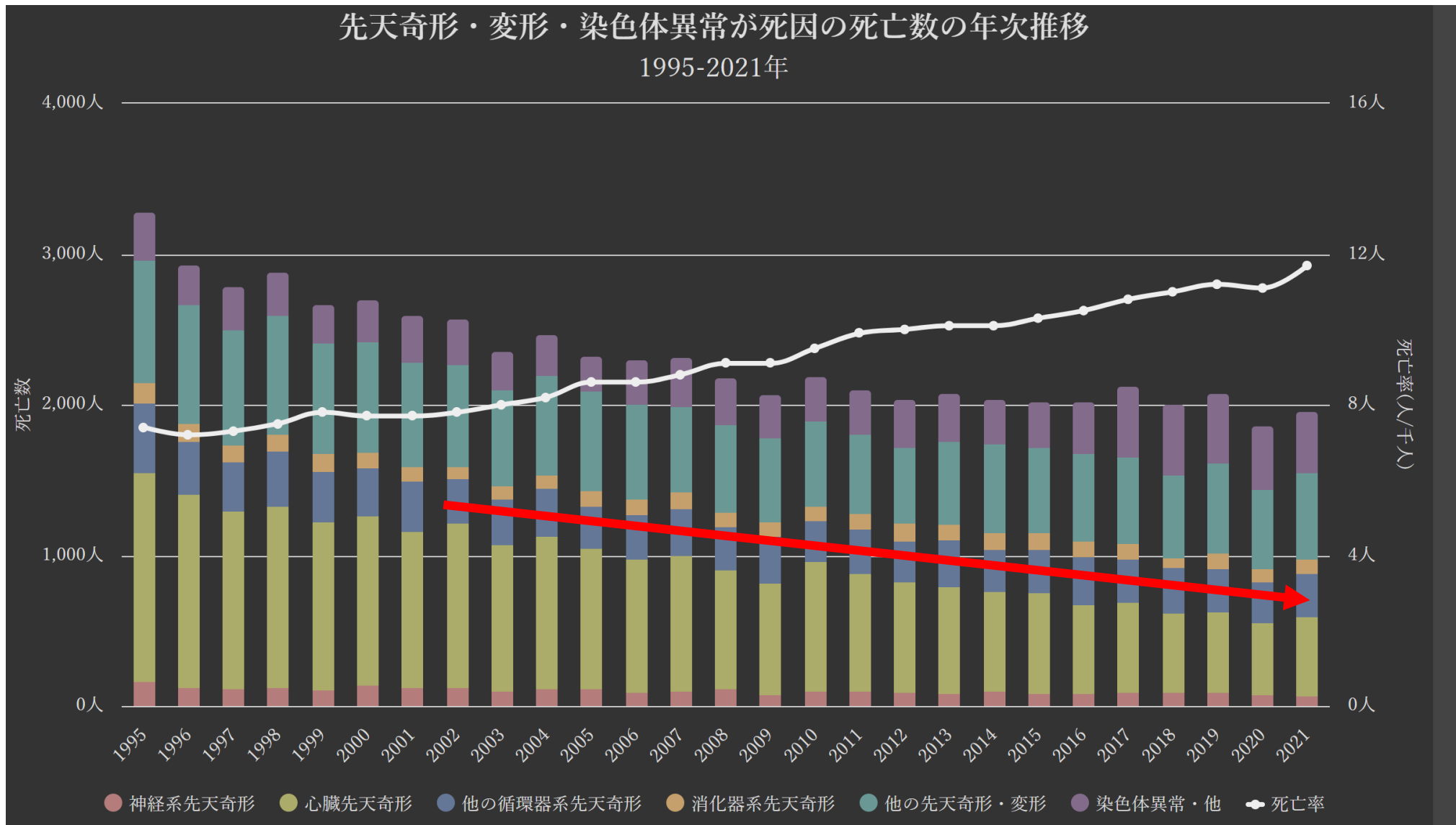
## Attendance of Out-Born Delivery (Prognosis and Gestational wks)

- ◆ Higher attendance rate for smaller gestational wks
- ◆ But no difference <25 wks

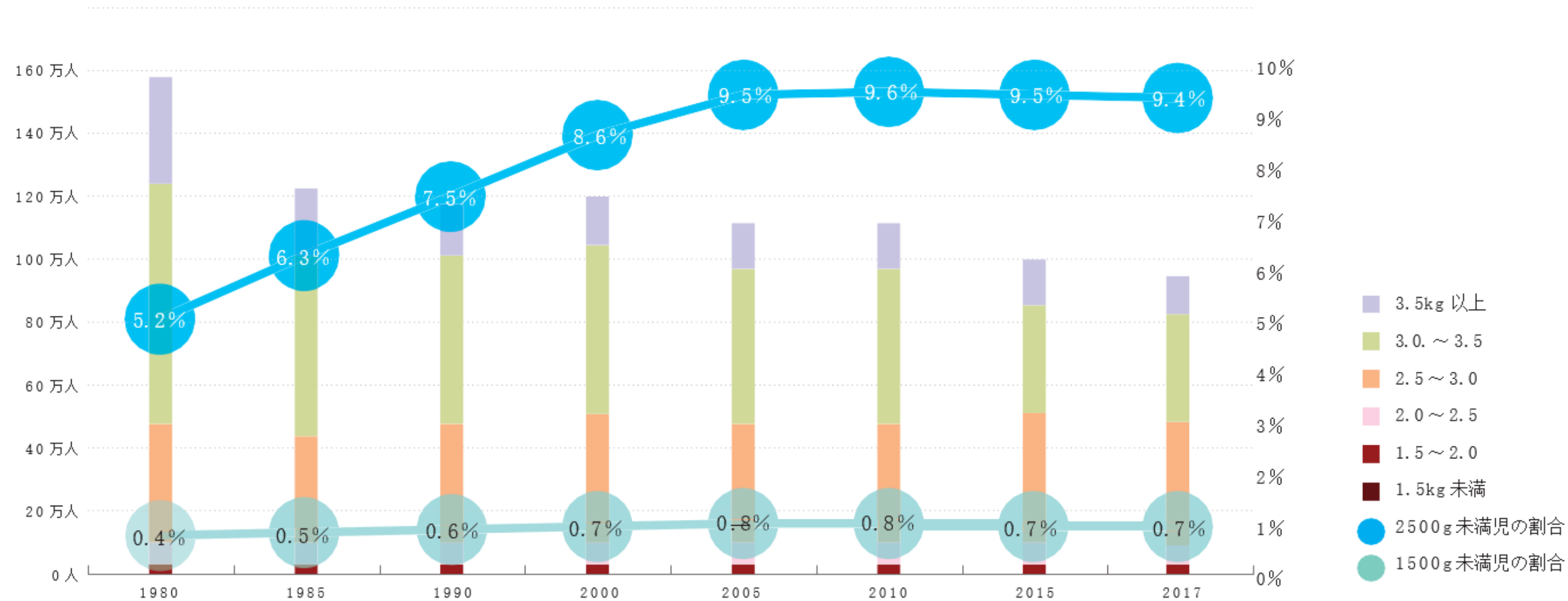




# Changing of Congenital Anomaly/Chromosome Abnormality 1995-2021

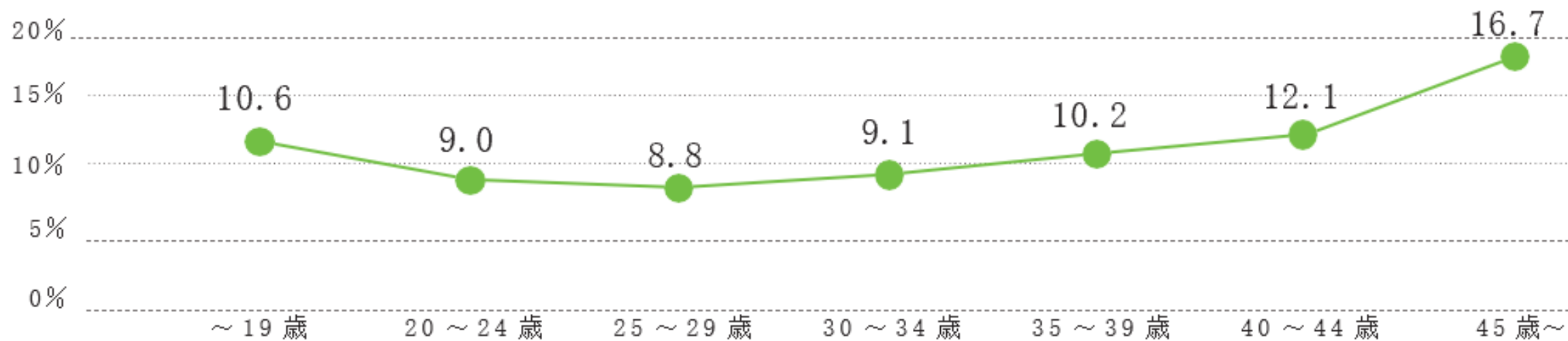


# Birth Weight Number and Ratio Changing in Japan

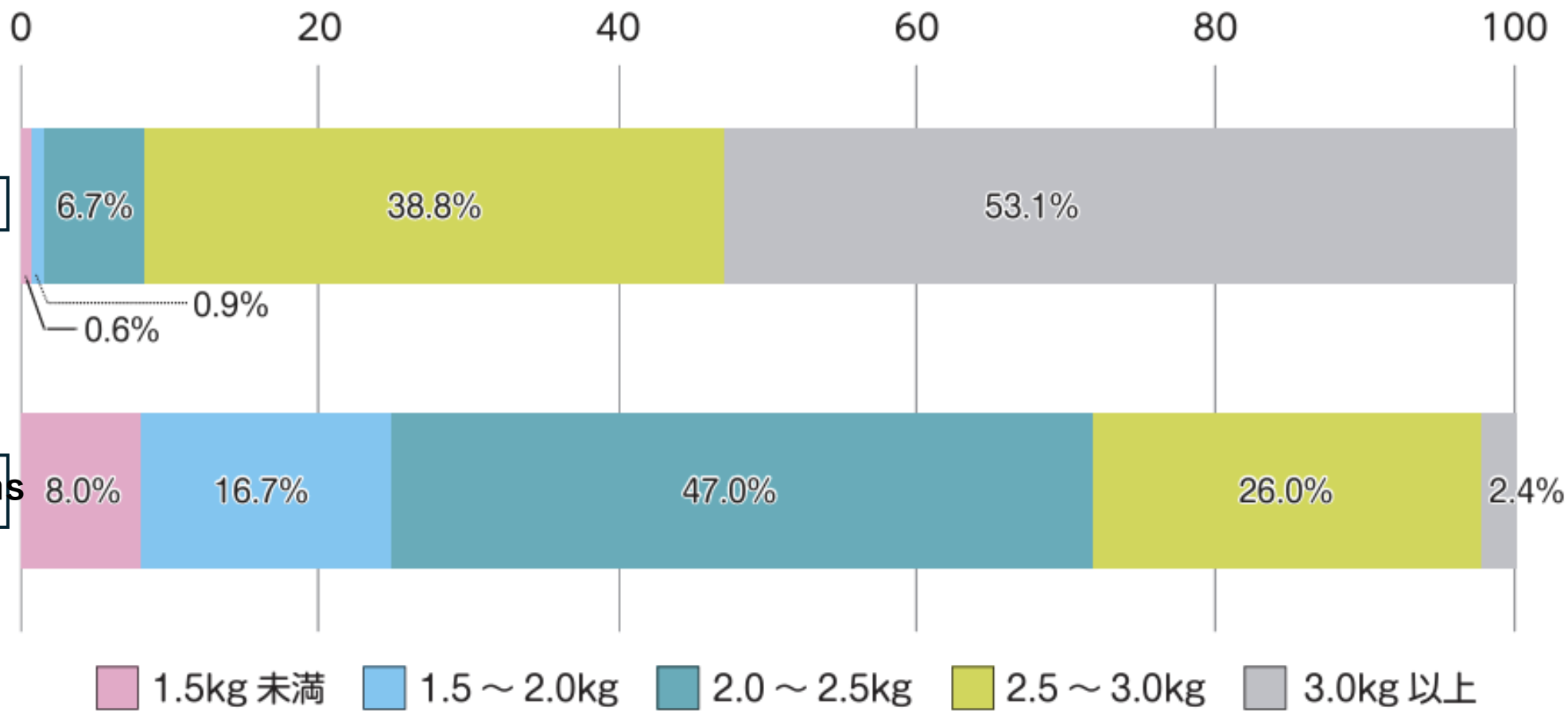




## % of Low Birth Weight Infant by maternal age (2017)



# Proportion of Low Birth Weight Infants (2017)



## Overview of Multiple Birth (1995)

	Twin	Triplet	Quadruplet	Quintuplet
自然妊娠率(%)	67.6	19.6	0	0
流産率(%)	1.7	2.4	15.0	15.0
早産率(%)	42.2	85.0	88.9	100
平均分娩週数(週)	35.1	32.7	29.3	25.0
出生時平均体重(g)	2,153±703	1,673±485	1,203±359	993±249
妊娠合併症(%)	78.1	84.3	95.0	100
胎児の形態学的異常(%)	7.4	8.0	8.8	30.0
<b>IUFD after 22wks gestation</b>	(%) 4.8	3.1	5.6	5.9
<b>Perinatal Death/1000 births</b>	75.0	75.4	102.9	125.0
<b>Neonatal Deaths/1000 birth</b>	44.9	62.6	78.1	66.7
<b>% of Disorder after 1 yr old</b>	4.7	3.6	10.2	30.8

## Fetal Laser Photocoagulation to Twin to Twin Transfusion Syndrome (Osaka MCH Center)

Complication	Total (n=70)		Donor (n=33)		Recipient (n=37)		p
新生児呼吸窮迫症候群(RDS)	25.7%	(18/70)	27.3%	(9/33)	24.3%	(9/37)	1
慢性肺疾患 (日齢28)	14.3%	(10/70)	15.2%	(5/33)	13.5%	(5/37)	1
慢性肺疾患 (修正36週)	4.3%	(3/70)	9.1%	(3/33)	0%	(0/37)	0.104
晚期循環不全	1.4%	(1/70)	0%	(0/33)	2.7%	(1/37)	1
先天性心疾患	4.3%	(3/70)	3.0%	(1/33)	9.7%	(2/37)	1
脳室内出血(IVH)Ⅲ度以上	1.4%	(1/70)	3.0%	(1/33)	0%	(0/37)	1
脳室周囲白質軟化症(PVL)	0%	(0/70)	0%	(0/33)	0%	(0/37)	1
特発性腸穿孔(FIP)	0%	(0/70)	0%	(0/33)	0%	(0/37)	1
壊死性腸炎(NEC)	0%	(0/70)	0%	(0/33)	0%	(0/37)	1
胎便関連性イレウス(MRI)	4.3%	(3/70)	9.1%	(3/33)	0%	(0/37)	0.224
<b>Death</b>	4.3%	(3/70)	3.0%	(1/33)	9.7%	(2/37)	1

# Prognosis of FLP at 3 yrs old

- ・ 当院でFLPを施行され、2010年10月～2014年12月に当院で出生した新生児38例中、3歳時でフォローできた児は36例（2例は死亡）。

	n=36	割合 (%)
身長キャッチアップ	34/36	94.4
体重キャッチアップ	34/36	94.4
脳性麻痺 (CP)	0/36	0
Major handicap	0/36	0
Normal	19/36	52.8
Border+MR	17/36	<u>47.2</u>
Border	11/36	30.6
MR	6/36	<u>16.7</u>

※キャッチアップ：-2SDスコア以上への改善

※ Major handicap：歩行不可・気管切開・  
難聴・失明

※新版K式発達検査

Normal：発達指数 85以上

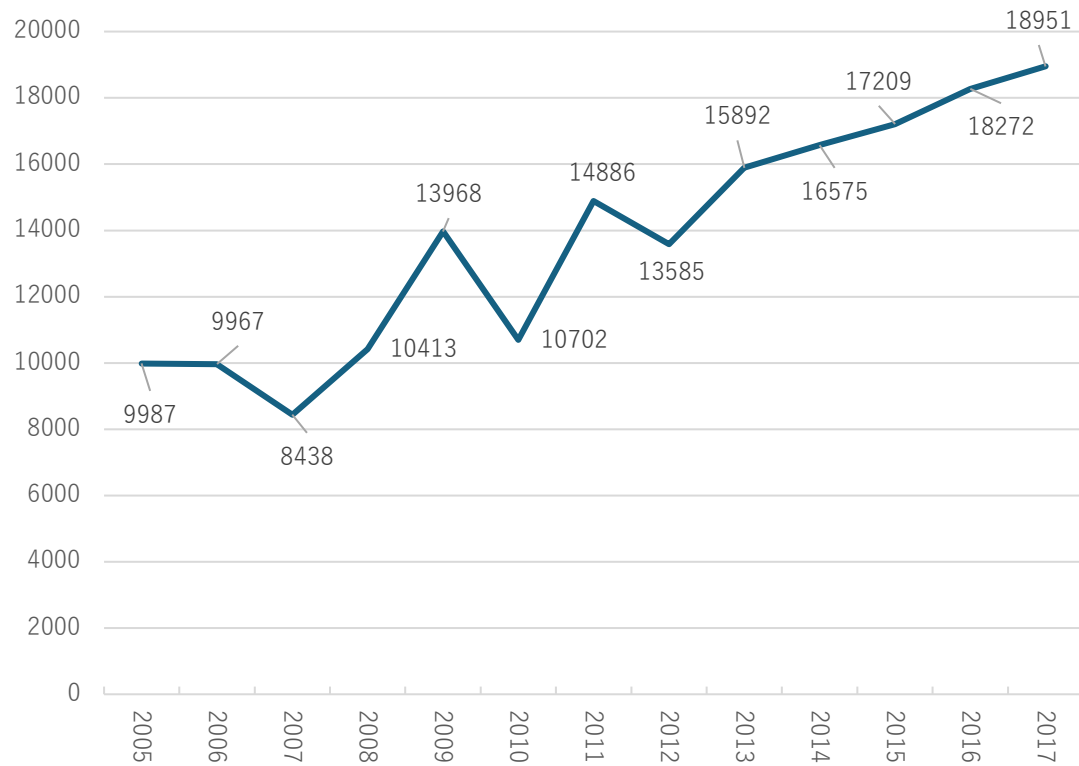
Border：発達指数 70～84

MR：発達指数 70未満

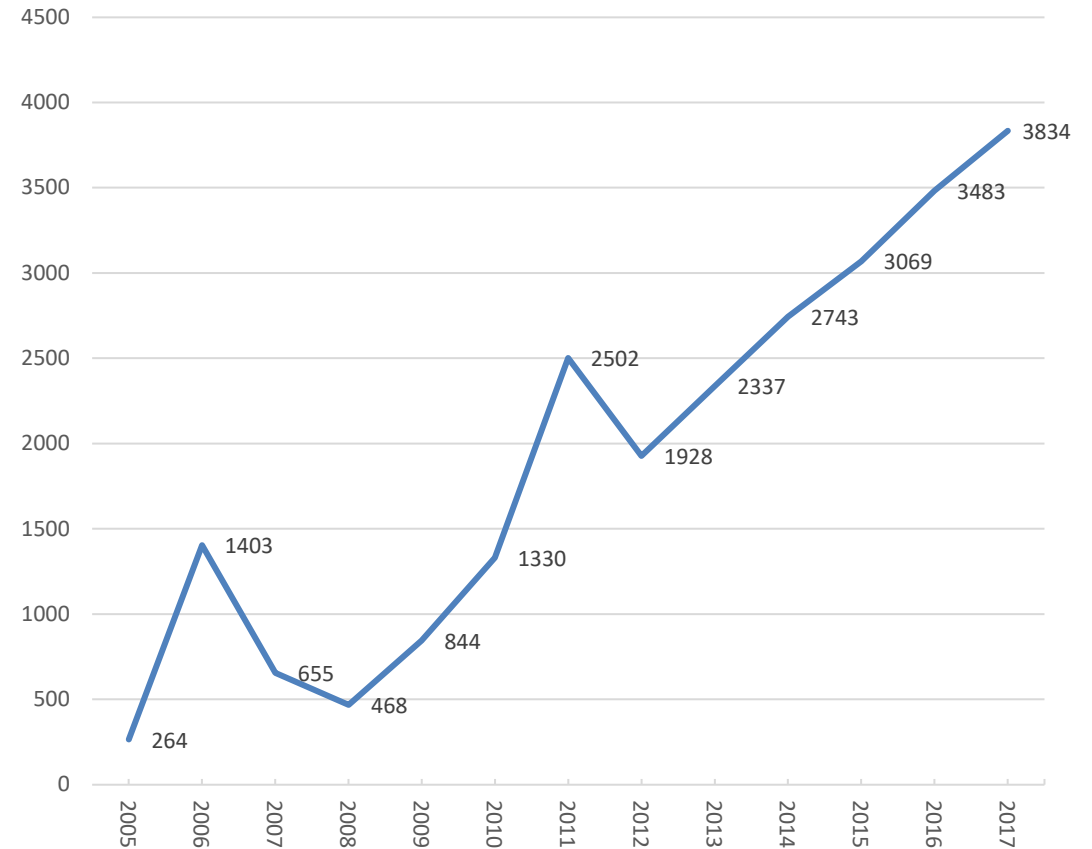
# Changing Number of technology dependent Children in Japan

☒ - 2

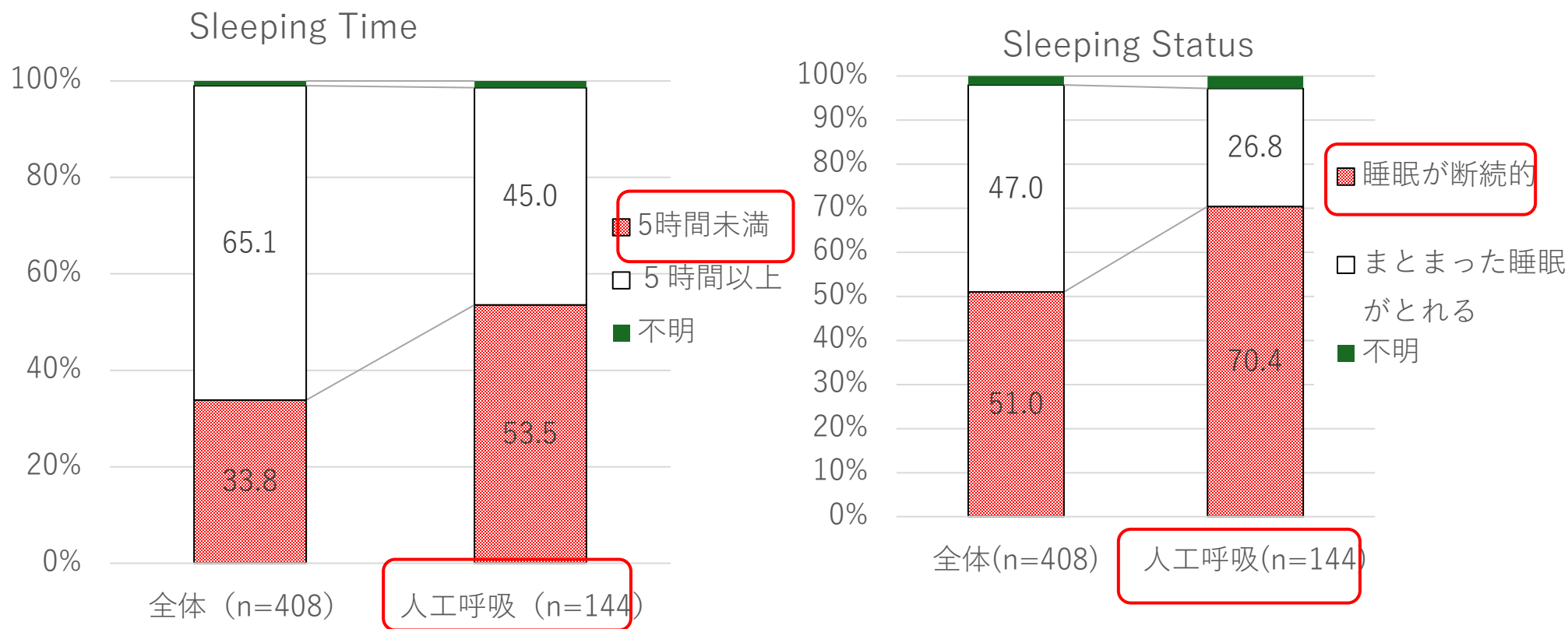
## Number of technology dependent Children <19 yrs old



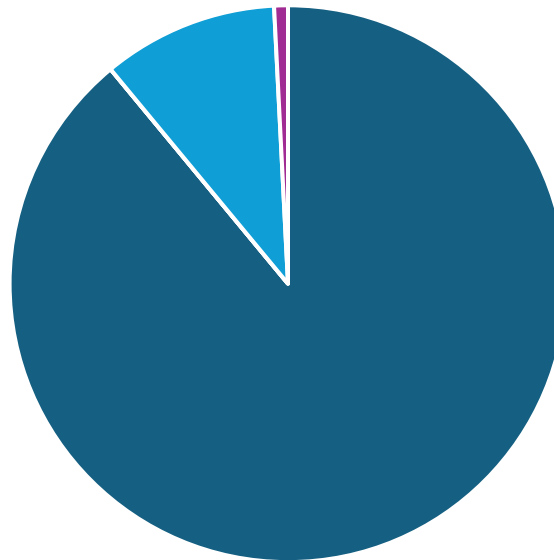
## Number of Home Respirator Children



# Sleeping Time of Caregiver for Respirator dependent children



# Infant Death in Japan 2021



■ Hospital ■ Clinic ■ Midwife ■ Home ■ Others



By Japan pediatric society-designated facility (Unit: facility, cases)

	11 or more	6-10 cases	1-5 cases	0 cases	Unkno wn	Total Hospital Number		Total number of Cases
Core hospital pediatrics department	7	5	3	1	0	16		200
Regional pediatric center	2	2	9	15	0	28		66
Pediatrics advocate hospitals	0	1	5	144	34	150		19
Hospitals that do not advocate pediatrics	0	0	0	322	124	446		0
Pediatrics-advocating clinics	0	0	0	31	27	58		0
Total (number of facilities)	9	8	16	480	185	698		285※
<b>Number of cases that died at facilities in the above categories</b>								
Total (No. of cases)	179	65	41	0	0	285※		

# Results of screening by 5 pediatricians: Cause of death category

Category	Category name and details	High frequency of illness
1	Intentional trauma, abuse, neglect	—
2	Suicide or intentional self-injury	—
3	Trauma and other external causes	Drowning, suffocation
4	Malignant tumors	Refractory solid tumors
5	Acute medical or acute surgical conditions	Reye syndrome, myocarditis
6	Chronic medical conditions	Immunodeficiency
7	Chromosomal /congenital abnormalities	18 trisomy, complex cardiac malformations, diaphragmatic hernia
8	Perinatal/neonatal events	Extreme LBW infants, Asphyxia
9	Infectious diseases	Meningitis, acute bronchiolitis
10	Sudden, unexpected, unexplained death	SIDS

	Cause of death category (%)										
	1	2	3	4	5	6	7	8	9	10	
Less than 28 days	0	0	0	0	0	0	44	33	2	1	80
28 days and under 1 year old	4	0	6	1	3	2	52	12	5	24	109
1-4 years old	1	0	4	10	3	7	31	4	1	7	68
Total	5 (2%)	0	10 (4%)	11 (4%)	6 (2%)	9 (4%)	127 (49%)	49 (19%)	8 (3%)	32 (12%)	257 (100%)

# Screening results by 5 pediatricians: Preventability by age category (showing median of 5)

Preventability 9-point scale	not possible (%)			Preventability unknown (%)			Preventability possible (%)		
	1	2	3	4	5	6	7	8	9
Less than 28 days	67 (84%)			12 (15%)			1 (1%)		
	13	29	25	3	8	1	1	0	0
28 days and under 1yr	62 (57%)			37 (34%)			10 (9%)		
	10	27	25	9	17	11	7	2	1
1-4 years	44 (65%)			19 (28%)			5 (9%)		
	7	16	21	5	7	7	3	2	0
Total	173 (67%)			68 (26%)			16 (6%)		
	30	72	71	17	32	19	11	4	1

# Child Abuse Case Reports by Age 2008 in Japan

子ども虐待による死亡事例等の検証  
結果等について(第6次報告)の概要  
(2008.4~2009.3)

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● Death	67	
● < Year Old	39	(39/67:58.2%)
● <1 Month	26	(26/39:66.7%)
● Day 0	16	(16/26:61.5%)

# Obstetric factors in abuse-related deaths

## 虐待による死亡例の産科要因

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	Day >0	Day 0
● Unwanted Pregnancy	20.4%	68.8%
● No Antenatal Check Ups	16.3%	75.3%
● No Issue of MCH handbook	12.2%	81.3%

- **Social Risk and Perinatal Medicine**
- **From Point View of Fetal Abuse**



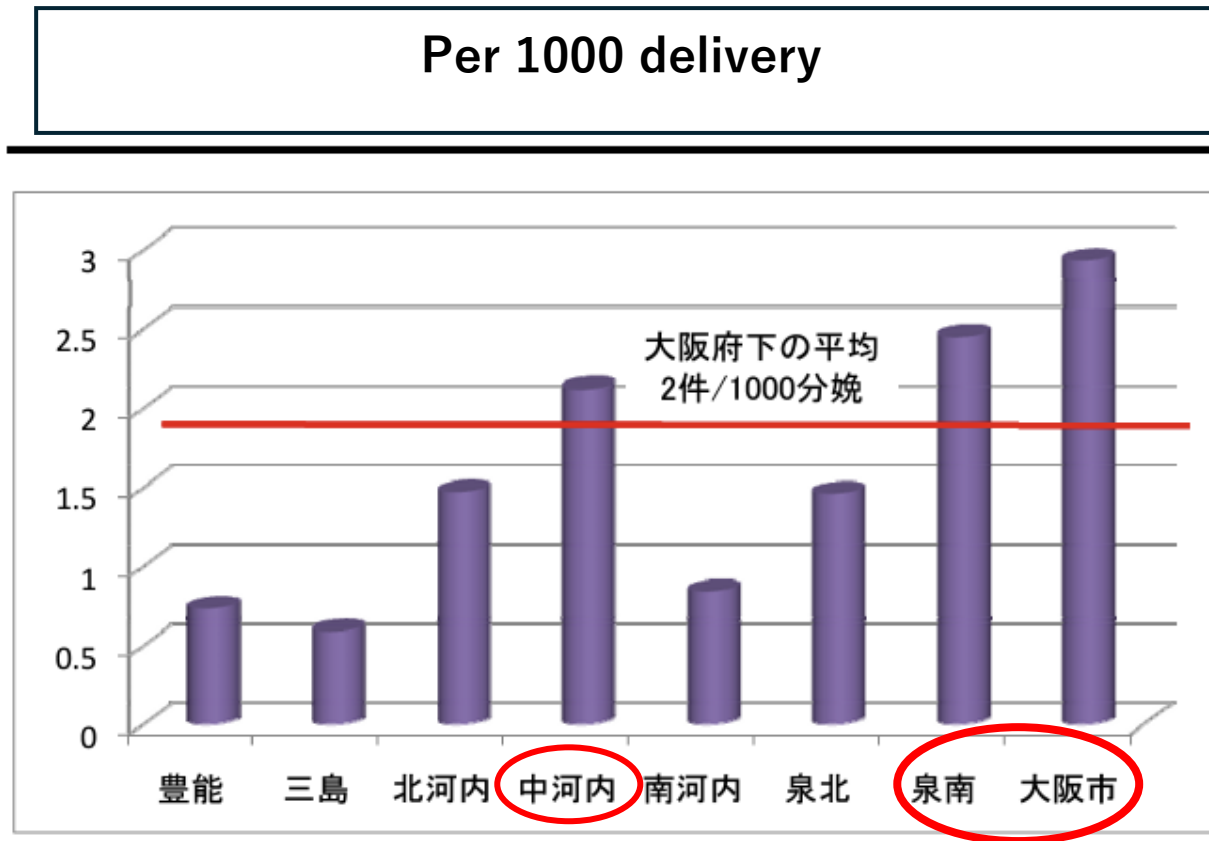
In the perinatal period,  
this takes the form of

**No Antenatal Check-UPS Woman.**

# What is Social Risks?

- **Social isolation due to poverty**
- **domestic violence**
- **unwanted pregnancy**
- **lack of health insurance**
- **lack of residency**
- **foreign nationality**
- **illegal activities**
- **etc.**

# No Antenatal Check-Ups Women rate in Osaka



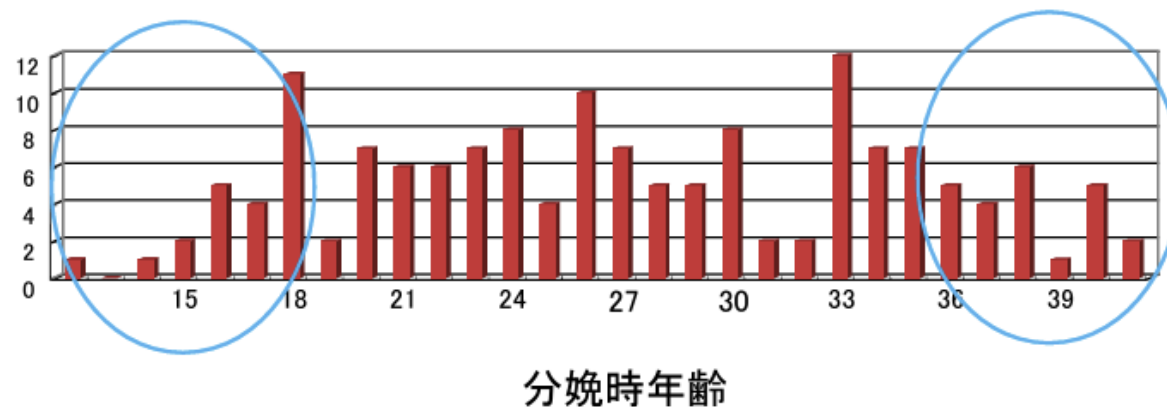


# Age Distribution of No Antenatal Check Ups Women

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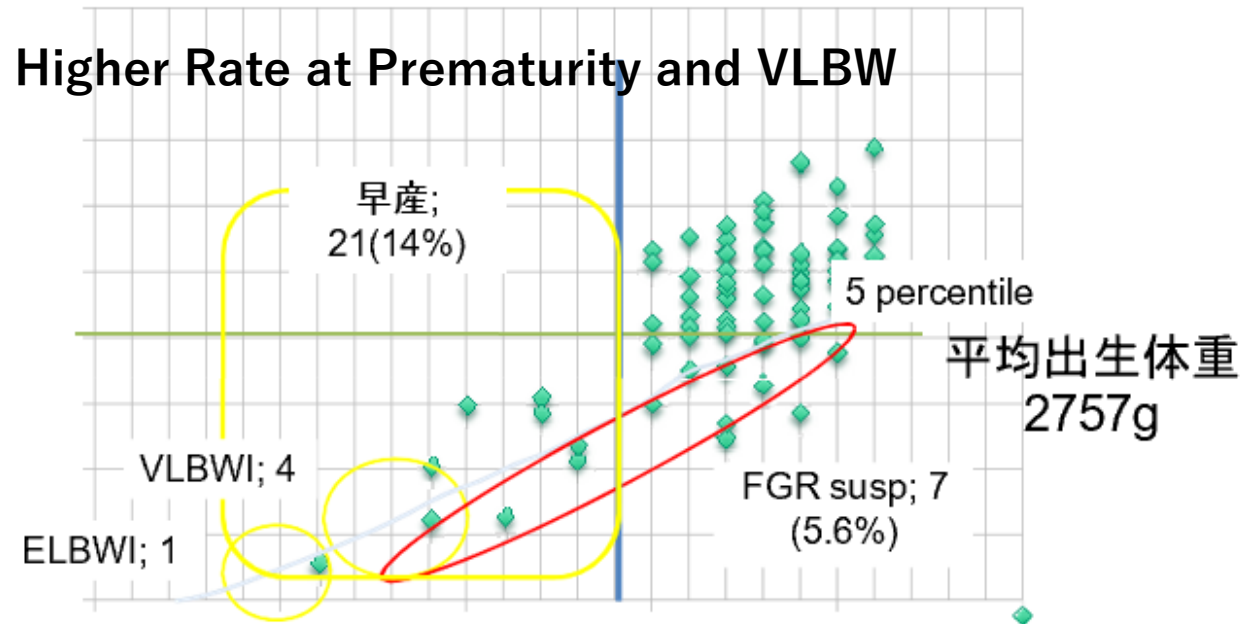
## 未受診妊婦の年齢構成

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# Higher Rate of Prematurity and VLBW

## 新生児体重と推定週数



## Apgar Score and Perinatal Death

Perinatal Death Rate of  
undiagnosed Pregnant Women  
**19.4%**  
VS  
Perinatal Death Rate of Osaka  
**4.0%**

Still Birth :3

Ap1 <3 : 10

Ap 5	0	1	2	3	4	5	6	7	8	9	10
0	3	1									
1					1	2	2				
2							1	1	1		
3									1		
4							1				
5							1		1	1	
6										3	
7									4	1	
8									7	57	2
9										24	13
10											8

未受診妊婦の  
周産期死亡率 19.7%  
大阪府の  
周産期死亡率 4.0%

# Hospital Data Shows Preterm Infants at High Risk for maltreatment in N.Y 1995-2004

- Longitudinally linked discharge data were used to identify birth characteristics that predict the likelihood of subsequent maltreatment-related injuries. This study contributes to the literature on risk factors for child maltreatment and advances previous research by using discharge data rather than official reports of maltreatment cases, which can lead to important inconsistencies