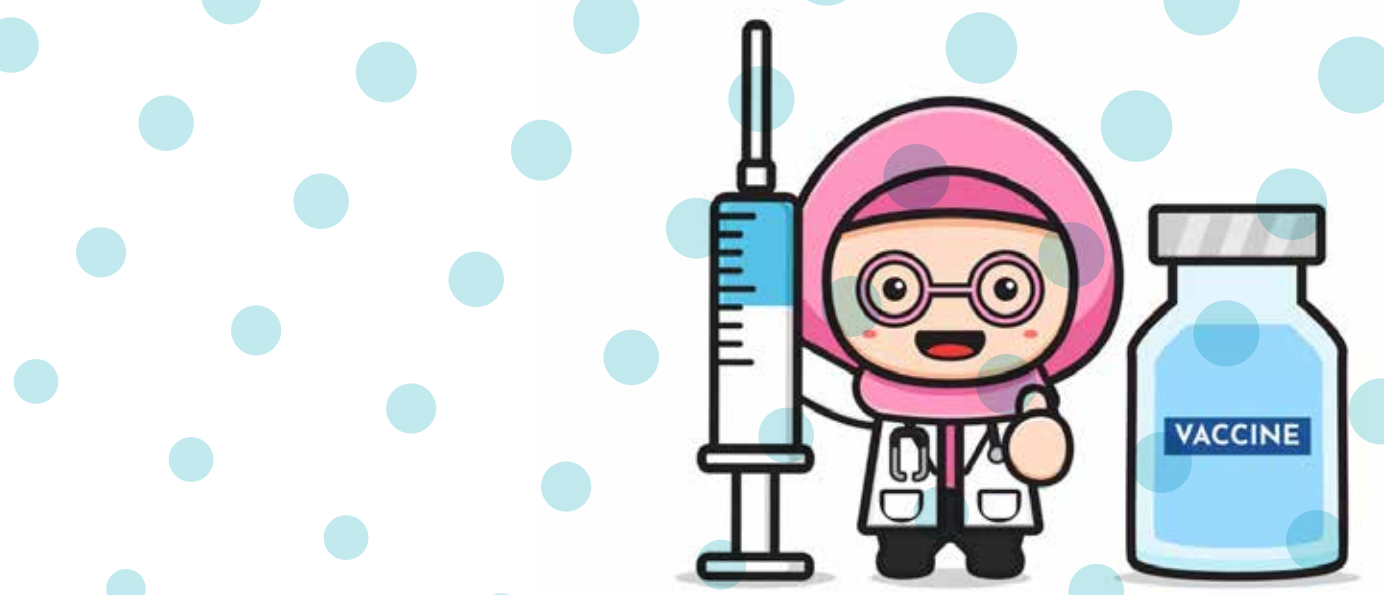# Complete primary vaccination coverage and its association with children's sociodemographic factors in Malaysia: findings from the National Health and Morbidity Survey (NHMS) 2022: Maternal and Child Health (MCH)

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INTRODUCTION

- Childhood vaccination is the most effective and efficient activity in public health to prevent serious infectious diseases.
- In 1974, the World Health Organization (WHO) established the Expanded Program on Immunization (EPI) to assure global vaccination coverage, which has resulted in a considerable reduction in the prevalence of vaccine-preventable diseases (VPD) and prevented more than 2 million child deaths annually [1,2].
- In addition, vaccination plays a critical role in achieving the Sustainable Development Goals (SDGs). It contributes to 14 of the 17 Sustainable Development Goals (SDGs), including SDG 3, which aims to ensure healthy lives and promote well-being for all at all ages [3].
- Vaccination coverage is the percentage of a target population receiving the full vaccination schedule. The schedule includes all the vaccinations recommended by the National Immunization Program (NIP), applied at the correct ages and intervals.
- The Global Vaccine Action Plan has set a target of a 90% vaccine coverage rate for all vaccines included in the child vaccination programs.
- The Malaysian National Immunisation Programme (NIP) [4] was introduced in the early 1950s, designed based on the WHO Expanded Programme on Immunisation (EPI), and today it protects against thirteen illnesses.
- Therefore, this study aimed to evaluate the complete verified primary vaccination coverage and its sociodemographic association among children aged 12–23 months in Malaysia

METHODOLOGY

- This study utilised data from the National Health and Morbidity Survey (NHMS) 2022: Maternal and Child Health were analysed, a nationwide cross-sectional survey with a complex sampling design.
- A two-stage stratified random sampling was employed, encompassing all states in Malaysia.
- This survey used a two-stage stratified random sampling design encompassing all states and federal territories in Malaysia to ensure national representation. The primary stratum included all states and federal territories, while the secondary stratum represented urban and rural areas.
- A total of 3,463 children aged 12-23 months participated in this study.
- The Multiple Indicator Cluster Surveys (MICS) from UNICEF were the tools used for the data collection.
- Complete verified primary vaccination was defined as children who received all scheduled primary vaccines by age one, verified through their health record books.
- Descriptive and complex sample logistic regression analyses were performed using SPSS version 28.0.

RESULTS

- A total of 3,463 children aged 12–23 months participated in this survey. Most of the children reside in urban areas, and the majority of them are Malay and Malaysian citizens. (Table 1).
- The overall prevalence of complete verified coverage for BCG, Pneumococcal, DPT-IPV/Hib, MMR and Hepatitis B was 94.9% (95% CI: 93.10, 96.20), 92.8% (95% CI: 90.87, 94.45), 90.7% (95% CI: 88.54, 92.58), 88.1% (95% 85.89, 90.10) and 86.8% (95% CI: 84.28, 88.89) respectively. (Table 2).
- The overall prevalence of complete verified primary vaccination among children aged 12-23 months in Malaysia was 83.5% (95%CI: 80.93, 85.76). (Table 3).
- Multivariable logistic regression analyses revealed that children from Johor, Kedah, Melaka, Negeri Sembilan, Pahang, Perak, Selangor, Terengganu and Sarawak were significantly associated with complete vaccination.
- Furthermore, Malaysian children (aOR: 19.23 95% CI: 5.22, 70.8) are more likely to complete their vaccination schedule, while children of Chinese (aOR: 0:18 95% CI: 0.04, 0.72) and Indian (aOR: 0.12 95% CI: 0.03, 0.58) ethnicity are less likely to have incomplete vaccination. (table 4)

DISCUSSION

- In comparison to NHMS 2016, which was reported at 86.5% [5], our findings indicated a lower rate. Nevertheless, our results were higher when compared to results from Thailand [6] and Vietnam [7].
- Our findings indicate that vaccination uptake in Malaysia may have been affected by the COVID-19 pandemic. This aligns with the World Health Organization's (WHO) statement, which revealed significant disruptions in routine immunization programs across 68 countries, impacting over 80 million children globally [8].

CONCLUSION

- The present study demonstrated that vaccination coverage is still unsatisfactory according to WHO criteria.
- The current intervention programs must be intensified to trace defectives or children who missed vaccinations.
- Also, there is a need to enhance vaccination documentation by utilizing Information and Communication Technology (ICT) through NIP MyVAS at all levels, which includes the private sector.
- Ultimately, it is crucial to elevate advocacy and promotional education concerning the significance of childhood vaccination.

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Table 1: Sociodemographic characteristics of the respondents (n=3,463)

	Frequency (n)	Percentage (%)
State		
Johor	209	6.0
Kedah	294	8.5
Kelantan	268	7.7
Melaka	251	7.2
Negeri Sembilan	226	6.5
Pahang	236	6.8
Pulau Pinang	269	7.8
Perak	249	7.2
Perlis	256	7.4
Selangor	212	6.1
Terengganu	253	7.3
Sabah & WP Labuan	228	6.6
Sarawak	274	7.9
WP Kuala Lumpur & Putrajaya	238	6.9
Location		
Urban	2431	70.2
Rural	1032	29.8
Sex		
Male	1768	51.1
Female	1695	48.9
Ethnicity		
Malay	2732	79.0
Chinese	164	4.7
Indian	123	3.6
Other Bumiputeras	359	10.4
Others	82	2.4
Citizenship		
Malaysian citizen	3379	97.6
Permanent resident/ non-citizen	83	2.4

Table 3: Prevalence of complete verified primary vaccination coverage among children 12-23 months by sociodemographic characteristics

Sociodemographic	Count	Prevalence (%)	95% Confidence Interval (CI) Lower CI	Upper CI
Malaysia	2957	83.5	85.76	80.93
State				
Johor	170	\82.7	88.11	75.44
Kedah	269	89.1	94.24	80.42
Kelantan	188	69.3	79.18	57.17
Melaka	242	94.6	98.00	86.12
Negeri Sembilan	192	83.0	90.54	71.39
Pahang	218	93.2	95.53	89.80
Pulau Pinang	190	59.6	72.89	44.69
Perak	217	87.4	90.88	82.80
Perlis	231	90.6	94.11	85.39
Selangor	196	91.6	95.91	83.56
Terengganu	218	86.5	90.70	80.81
Sabah & WP Labuan	189	77.9	84.70	69.10
Sarawak	270	97.0	98.93	91.80
WP Kuala Lumpur & Putrajaya	167	65.8	75.01	55.13
Location				
Urban	2060	82.7	85.48	79.56
Rural	897	85.3	89.01	80.71
Sex				
Male	1512	84.3	87.09	81.00
Female	1445	82.7	85.67	79.15
Ethnicity				
Malay	2347	86.0	88.12	83.66
Chinese	132	80.5	87.13	71.60
Indian	97	76.1	85.53	63.18
Other Bumiputeras	342	94.6	96.69	91.23
Others	38	64.7	79.43	46.63
Citizenship				
Malaysian citizen	2921	86.0	87.92	83.83
Permanent resident/ non-citizen	35	60.4	77.31	40.67

Table 2: Complete verified primary vaccination coverage among children aged 12-23 months by vaccine

Vaccine	Count	Prevalence (%)	95% Confidence Interval (CI) Lower CI	Upper CI
BCG	3380	94.9	96.20	93.10
Hep B 3 dose	3055	86.8	88.89	84.29
DTaP-IPV-Hib 3 dose	3219	90.7	92.58	88.54
Pneumococcal 2 dose	3277	92.8	94.45	90.87
MMR 2 dose	3154	88.1	90.10	85.89

Table 4: Factors associated with complete verified primary vaccination among children aged 12-23 months in Malaysia

Variables	Adjusted OR (95% CI)	P-value
State		
Johor	2.39 (1.12, 5.10)	0.025**
Kedah	3.94 (1.66, 9.34)	0.002**
Kelantan	0.96 (0.42, 2.21)	0.927
Melaka	8.33 (2.48, 27.99)	0.001**
Negeri Sembilan	2.36 (0.94, 5.94)	0.069
Pahang	6.39 (2.80, 14.58)	0.000**
Pulau Pinang	1	
Perak	3.46 (1.62, 7.36)	0.001**
Perlis	4.12 (1.82, 9.34)	0.001**
Selangor	9.27 (3.46, 24.85)	0.000**
Terengganu	2.72 (1.27, 5.84)	0.010**
Sabah & WP Labuan	1.74 (0.77, 3.94)	0.181
Sarawak	11.41 (3.44, 37.88)	0.000**
WP Kuala Lumpur & Putrajaya	1.03 (0.48, 2.20)	0.939
Ethnicity		
Malay	0.29 (0.08, 1.08)	0.065
Chinese	0.18 (0.04, 0.72)	0.016**
Indian	0.12 (0.03, 0.58)	0.008**
Other Bumiputeras	0.85 (0.21, 3.39)	0.822
Others	1	
Citizenship		
Malaysian citizen	19.00 (5.22, 70.83)	0.000**
Permanent resident/ non-citizen	1	