

Polio Supplementary Immunization Activities During COVID-19 Pandemic: Experience from Penampang District, Sabah, Malaysia

Journal of Primary Care & Community Health
Volume 12: 1–9
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DOI: 10.1177/21501327211029800
journals.sagepub.com/home/jpc



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Abstract

Background: Polio Supplementary Immunization Activities (SIAs) were carried out in the State of Sabah in response to the Vaccine Derived Poliovirus outbreak declared in December 2019. Prior to this, Malaysia had been polio-free over the past 27 years. This paper reported on the successful implementation of SIAs in the district of Penampang, Sabah, adapting (vaccine administration) to the COVID-19 pandemic. **Methods:** A series of meticulous planning, healthcare staff training, advocacy, and community engagement activities were conducted by the Penampang District Health Office. Bivalent Oral Polio Vaccine (bOPV) and monovalent Oral Polio Vaccine were administered over the period of 1 year via these methods: house to house, drive-through, static, and mobile posts. The targeted group was 22 096 children aged 13 years and below. **Results:** Polio SIAs in Penampang managed to achieve more than 90% coverage for both bOPV and mOPV. The overall vaccine wastage was reported to be 1.63%. No major adverse reaction was reported. **Conclusion:** High vaccine uptake during Polio SIAs in Penampang was attributed to good inter-agency collaboration, community engagement, intensified health promotion activities, and drive-through vaccination campaign.

Keywords

polio, Supplementary Immunization Activities, Sabah, collaboration, community engagement, health promotion, drive-through vaccination, Malaysia

Dates received: 23 April 2021; revised: 14 June 2021; accepted: 15 June 2021.

Introduction

Poliomyelitis is an acute infectious disease caused by a virus that mainly affects young children. The responsible pathogen is poliovirus which has 3 serotypes in total, namely poliovirus types 1, 2, and 3.¹ It belongs to the Enterovirus family and human-to-human transmission can occur via fecal-oral. After multiplication in the intestine, the virus can invade the nervous system. Those who are asymptomatic can excrete the virus in their feces, hence transmitting the infection to others. The typical neurological manifestation of paralytic poliomyelitis is acute flaccid paralysis (AFP) of limbs, predominantly on lower limbs, usually asymmetric with intact sensation. Poliovirus is highly infectious, seroconversion rates among susceptible household contacts of children are nearly 100%, which is 90% greater than susceptible household contacts among adults.

Global Polio Eradication Initiative was launched during the 1988 World Health Assembly to eradicate poliovirus.² It involves multi agencies effort which is led by the World Health Organization (WHO), the US Centers for Disease Control and Prevention (CDC), Rotary International, and the United Nations Children's Fund (UNICEF). Since then, the world has seen a tremendous decline in poliomyelitis. Vaccination has been established as one of the world's most successful and cost-effective public health interventions.

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Tremendous progress has been made within the past 60 years in reducing the morbidity and mortality related to vaccine-preventable diseases (VPDs).³ Polio eradication approaches operate by focusing on 2 main activities namely immunization coverage and acute flaccid paralysis (AFP) surveillance.

In Malaysia, ever since the oral polio vaccine (OPV) was introduced into the childhood immunization program in 1972, the incidence of poliomyelitis declined with no reported cases starting from the year 1986.⁴ No wild poliovirus has been detected in the environment since 1993. The oral polio vaccine was subsequently changed to Inactivated Polio Vaccine in 2008. Every child in Malaysia irrespective of citizenship status possesses the right to vaccination. The National Immunization Programme has been implemented in Malaysia since the 1950s to control infectious diseases.⁵ Children in Malaysia receive vaccines within the first 2 years of life to prevent 12 types of vaccine-preventable diseases: tuberculosis, Hepatitis B, diphtheria, tetanus, whooping cough (pertussis), polio, Haemophilus influenzae type b, measles, mumps, rubella, Japanese encephalitis (JE), and cancer caused by the human papilloma virus (HPV). The routine immunizations are delivered via primary care facilities, mobile clinics private healthcare facilities. Inactivated Polio Vaccine (IPV) is given to every child at the age of 2, 3, 5, and 18 months.

Vaccine-derived polioviruses are rarely occurring forms of the poliovirus that have genetically changed from the attenuated (weakened) virus contained in the oral polio vaccine.⁶ This situation happens when there is person to person of transmission in areas with insufficient immunization coverage. Poor sanitation and hygiene will facilitate transmission by the fecal-oral route. After a certain period, it can regain the ability to cause disease. On the 8th of December 2019, Malaysia declared the return of Polio involving a 3-month-old Malaysian boy, with type 1 of poliovirus sequence detected in the state of Sabah.⁷ Supplementary Immunization Activities (SIAs) by oral polio vaccine is important to provide gut immunity to stop transmission of the virus. In response to the outbreak, Polio SIAs were launched on 27th December 2019 involving the whole state of Sabah.

Penampang is one of the districts on the west coast of Sabah, located on Borneo Island with the size of 424.73 km². The ethnic majority is Kadazan-Dusun, followed by Chinese, Bajau, and other Bumiputeras. The people of Penampang are involved in activities such as public/private services, business, transportation, construction, and agriculture. Geographically, Penampang is divided into the city, suburban, and rural areas. Approximately 70% of Penampang is considered suburban and rural localities. The district of Penampang is subdivided into 8 sub-districts (Donggongon, Sugud, Bahang, Kepayan, Kobusak, Penampang Baru, Inobong, and Moyog) and comprised of 9 government health clinics and 17 private clinics. It also has

a total of 33 government preschools, 25 private preschools/schools, 22 primary schools, and 5 secondary schools. The coverage of IPV for the year 2015 until 2019 ranged between 82% and 98%. The percentage of coverage fluctuates according to population mobility, especially among undocumented migrants.

In SIAs, immunization campaigns are carried out rapidly to scale up coverage of key immunizations. They are commonly used for polio and measles vaccination.⁸ Conventionally, Supplementary Immunization Activities have been proven to be successful to increase in vaccination coverage in countries like Afghanistan and Somalia.^{9,10} The COVID-19 pandemic has exerted great pressure on health-care systems globally. Since the first reported COVID-19 case in Malaysia on 4th February 2020, Movement Control Order was enforced to contain its transmission.¹¹ From March until December 2020, the district of Penampang reported a total of 2008 COVID-19 cases. Healthcare workers are expected to adhere to strict safety and health guidelines in their daily tasks, including SIAs.

“Communities” are groups of people that may or may not be spatially connected, but who share common interests, concerns, or identities.¹² According to the World Health Organization, community engagement is “a process of developing relationships that enable stakeholders to work together to address health-related issues and promote well-being to achieve positive health impact and outcomes.”¹³ Focusing on community engagement is important to stay on track for Universal Health Coverage. Inter-agency collaboration remains an important goal for any public health program in Malaysia as the construction of a supportive environment for the well-being of the population does not belong to 1 professional group.¹⁴ Globally, intersectoral collaboration and community engagement have been proven to be successful in large-scale disease control activities, for instance, malaria elimination.¹⁵ This report describes the implementation of Polio SIAs in the district of Penampang, Sabah. We also highlight the importance of multi-agency collaboration, community engagement, and utilization of the drive-through vaccination service.

Methods

The coverage for this SIAs was aimed at children 13 years old and below, with a total number of 22 096 children (including an attrition rate of 10% to cover for undocumented migrants). Data were obtained from the Maternal and Child Health Clinic, School Health service, and population census (estimation). A total of 91 preschools and primary schools' children were also involved in this SIAs.

Pre-implementation Activities

Before the planning of SIAs, a situational assessment was carried out to study the population of interest and issues that

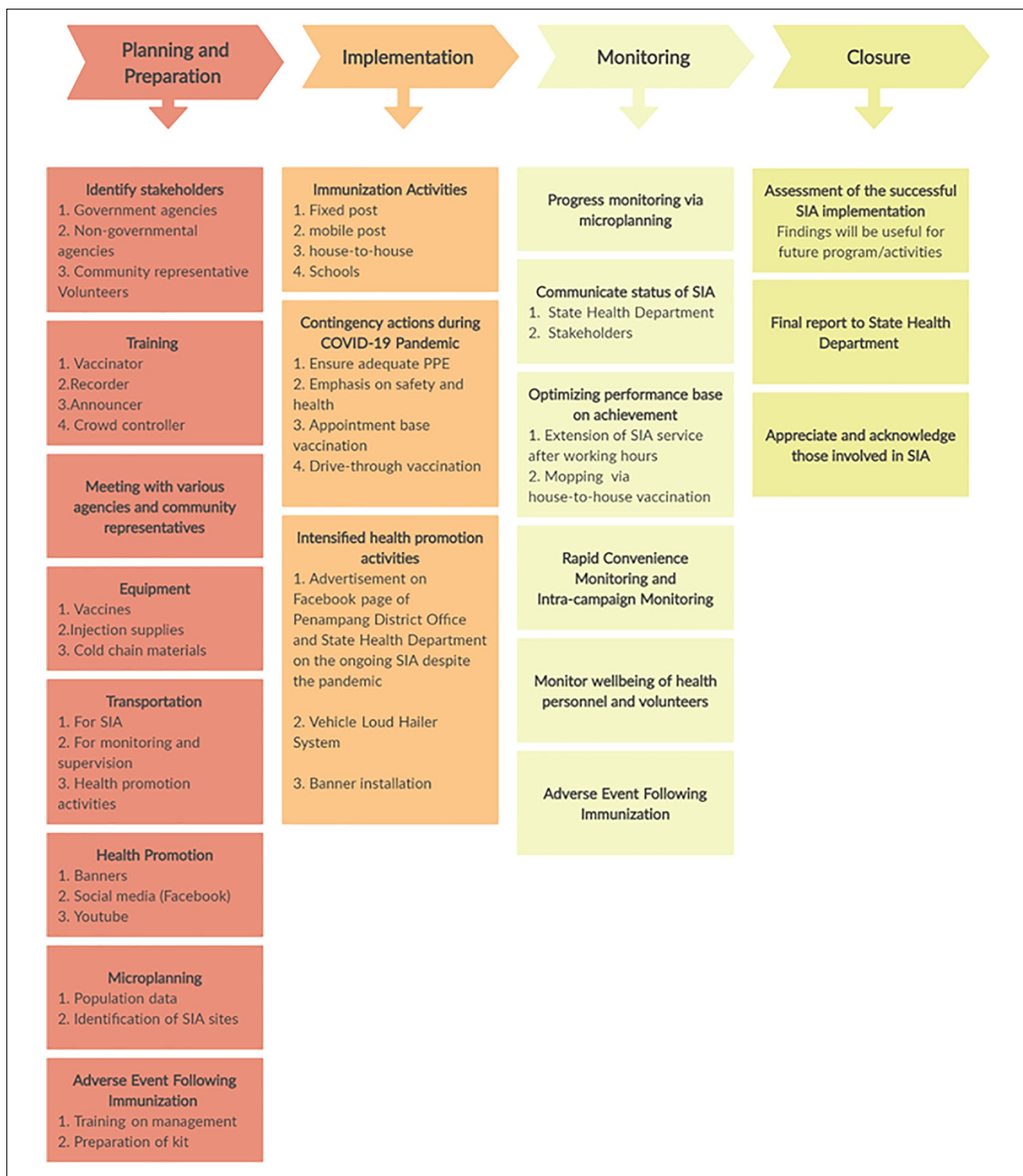


Figure 1. Process flow of polio SIAs in Penampang.

may affect implementation (Figure 1). Micro-planning was then developed to (1) elaborate on strategies to cover the immunization at hard-to-reach areas, (2) identify the nearest facilities in every locality, (3) manage human resources,

transportation, maintenance and capacity of a cold chain, supplies, and (4) measures to increase the uptake of immunization. All the appointed team members were trained on the administration of Oral Polio Vaccine (OPV),

Table 1. Method of Polio Implementation in Penampang (Adapted from World Health Organization, Field Guide for SIAs).¹⁷

SIAs strategy	Location/operational area	Targeted communities
Static post	Involving all the primary care facilities in Penampang: Penampang Health Clinic, Terian Health Clinic, Cybersquare Community Clinic, Limbanak Rural Clinic, Moyog Rural Clinic, Nosoob Rural Clinic, Sungoi Rural Clinic, and Babagon Rural Clinic.	Easily accessible for communities that accept vaccination. This group of the population was willing to travel to a static SIAs station.
Mobile post	Under the operational areas of every primary care facilities. Every primary care facility has designated teams and logistics for mobile post. Strategic location in the locality were identified and booth/canvas tent was set up.	The main purpose of this method was to serve communities who accepted vaccination and they were located at the difficult-to-reach areas. This includes rural settlements, villages, and localities with a high density of undocumented migrant population.
House-to-house	Operated by primary health facilities and Penampang Health Office.	Communities who were unaware of the ongoing SIAs, those who were not concerned or difficult to convince. Predominantly used as mop-up intervention when the uptake from static and mobile post was low.
Schools	Coordinated by School Health Team in collaboration with the school authorities.	Involving all the preschools and primary schools. On-site activities were temporarily halted during the first phase of the movement control order.
Drive-through vaccination	Operated by Penampang Health Clinic with the assistance of the District Health Office.	Easily accessible for communities who accept vaccination. Also, to reduce congestion in the clinics to reduce the risk of healthcare-associated infection.

dosage, vaccine handling, data management, surveillance, waste management, assessment, and management of adverse events following immunization (AEFI). Community Health Volunteers (KOSPEN), the health advisory panel, religious leaders, and government retirees were also involved as community mobilizers and recorder.

The Implementation of SIAs

The implementation of Polio SIAs was divided into 2 phases (1) bivalent OPV, started from January 2020 and followed by (2) monovalent OPV which commenced from July 2020. Bivalent OPV contains only attenuated virus of serotypes 1 and 3, while monovalent OPV cover type 2 poliovirus.¹⁶ Both the vaccines consist of 2 doses with the interval of 1 week to 10 days. Multiple vaccination strategies were utilized: static posts, mobile posts, house to house visits, school visits, and mobile clinics (Table 1). All vaccinated children received an indelible marking on one of their fingers or toenails and were given a vaccination card to keep track of their immunization status. Intra-campaign monitoring was carried out occasionally to monitor the quality of SIAs. Schools' authorities were one of the most important partners in Polio SIAs since more than half of the targeted population were preschool and primary school children. Healthcare liaison officers were constantly in contact with the teachers to arrange vaccination activities. Additionally, the teachers assisted in mobilizing their students and maintaining order. However, since the enforcement of the Movement Control Orders, kindergarten, and

schools temporarily ceased their operation. Thus, school visits were halted. School-going children were given an appointment for vaccination at the nearest post. Phone calls were utilized to reduce no-shows.

Drive-Through Vaccination Campaign

This method was added starting from August 2020 to reduce congestion in the static and mobile posts. Children received their OPV without getting out of the car.

Advocacy and Community Engagement

Ongoing advocacy on the Polio SIAs was created in collaboration with the District Office, education officials, local radio-television station, head of villagers, private health clinic, Non-Government Organizations, and religious institutions. Information on SIAs were broadcasted via mainstream and social media. Messages on vaccine-preventable diseases were also conveyed during the school's Parent-Teacher Association meetings.

Results

Overall, the OPV coverage has achieved more than 90% for both bOPV and mOPV (Table 2). One minor adverse event reported involving a 2-year-old boy with symptom of diarrhea. It resolved after 2 days.

The first dose of bOPV was started around the mid of January 2020 and completed by November 2020 (Figure 2).

Table 2. OPV Coverage in 2020; Original Denominator, n = 22 096.

Vaccine	Total children vaccinated n (%)
bOPV (Dose 1)	22 123 (100.1)
bOPV (Dose 2)	21 925 (99.2)
mOPV (Dose 1)	21 214 (96.0)
mOPV (Dose 2)	20 649 (93.5)

Meanwhile, mOPV vaccination was initiated in August 2020 and ended in January 2021. In comparison with other SIAs methods, most children received their OPV vaccination by the School Health Teams for both bOPV and mOPV (Figure 3). The drive-through technique, which was started mid-way throughout the SIAs contributed vastly to mOPV vaccination. House-to-house visits, which were mainly used for mop-up activities contributed substantially to ensure the completion of OPV (2 doses) and more than 90% coverage.

Community Engagement and Health Promotion Activities

The District Health Office organized monthly meetings with the District Office, Education Officers, representatives of the communities, and non-governmental agencies to discuss strategies to address issues and matters related to polio SIAs. Every primary care facility (Health Clinic, Community Clinic, and Rural Health Clinic) engaged with the head or representative of localities under its operational areas including the migrants' communities. Throughout the implementation of polio SIAs, a total of 426 sessions of public announcement activities were carried out by the Mobile Health Promotion Unit. Most of it took place in the hard-to-reach areas and localities with a high density of undocumented migrants. Approximately a total of 49 000 health promotion flyers were distributed all over Penampang, primarily in the commercial premises, residential areas, government premises, villages, healthcare facilities, and schools. Small group talks, discussions were conducted frequently with caution during the COVID-19 pandemic. Weekly sessions were conducted in several schools, commercial premises (shopping malls, supermarkets, and eateries), and residential areas throughout the SIAs.

Discussion

Supplementary Immunization Activities (SIAs) can be a very challenging and difficult task if it is solely the responsibility of the health workforce. A prompt response and high coverage immunization program were needed to rapidly stop the transmission of poliovirus. Multi-agency collaboration, community engagement, and drive-through vaccination allowed us to achieve more than 90% for both

bOPV and mOPV in Penampang within a year, despite having to deal with the COVID-19 pandemic.

Addressing Vaccine Hesitancy

At the planning stage of implementation, we were prepared for one of the biggest threats to global public health: vaccine hesitancy. The World Health Organization has listed vaccine hesitancy as one of ten threats to global health in 2019. The resurgence of people who refused the vaccine, regardless it is for themselves or their children has seen an increase in measles by 30%, globally.¹⁸ According to a systematic review by Larson and colleagues (2014) on the behavior of vaccination, the acceptance of vaccination is a result of a complex decision-making process that can be potentially influenced by a wide range of factors: complacency, confidence, and convenience.¹⁹ Addressing the problem of vaccine hesitancy must be done at every level of society. The public health practitioners were tasked to play an important role in promoting vaccination and educating the general public by providing a platform for interaction and communication with the clients. Any doubts or myths related to vaccination were addressed accordingly. Vaccination complacency occurs when perceived risks of vaccine-preventable diseases are low, and vaccination is not deemed a necessary preventive action. This can be contributed by low-level knowledge on vaccine-preventable diseases among the community. The term confidence refers to trust in (i) the effectiveness and safety of vaccines; (ii) the system that delivers them, including the reliability and competence of the health services and health professionals; and (iii) the motivations of policymakers.

Parents were made to understand that, not vaccinating may lead to contracting vaccine-preventable diseases and the disruption of herd immunity. During the public dialog sessions, it was important to engage with the audience and communicate risk effectively.²⁰ Communicating with both parents and their children was a good way to identify and address barriers related to vaccination delay. Health professionals were also emphasized on giving information about common but minor side effects, and rare but serious ones. Visual aids proved to be very useful in disseminating information. It allows for a better presentation of information in the form of graphics which makes it easier to digest for the public. In primary care facilities, health education materials were available in the form of electronic and paper format. Informed parents were more likely to appreciate the benefits of vaccines.

Importance of Health Promotion in Supplementary Immunization Activities

According to the Ottawa Charter Conference, health promotion requires the attention of various aspects such as economic, political, local authorities, industry, social,

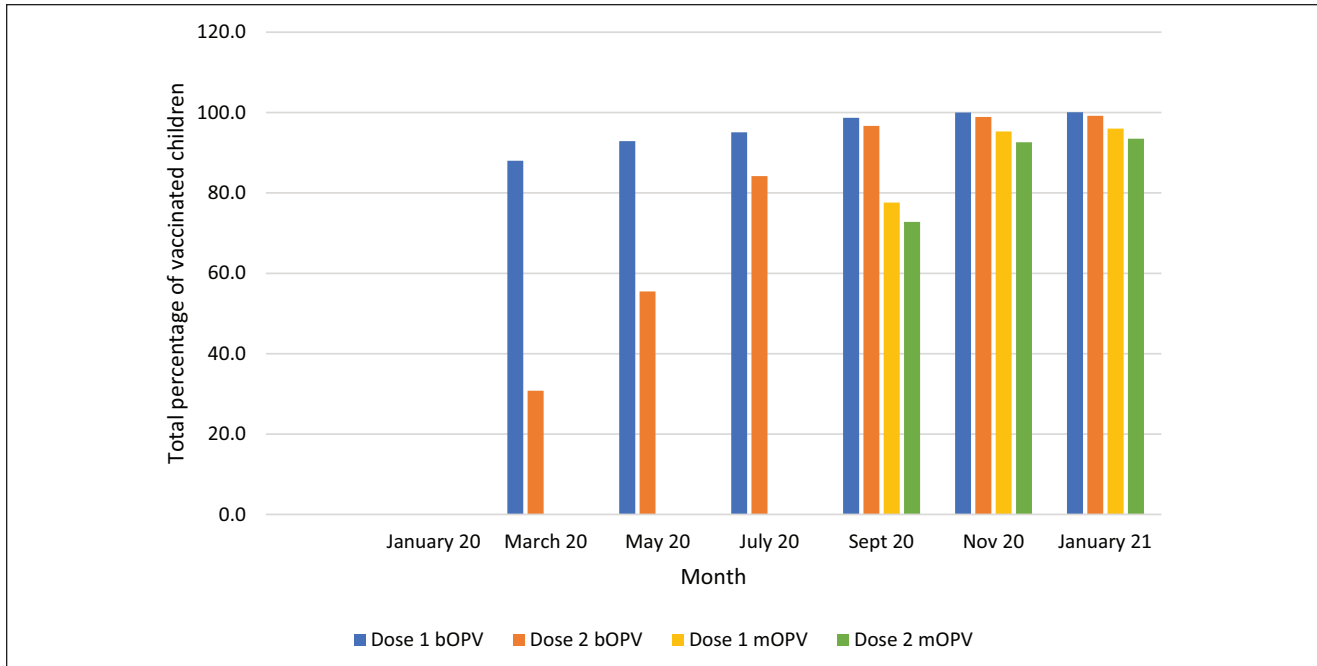


Figure 2. Total percentage of coverage throughout the implementation of Polio SIAs. Original denominator, n = 22,096 (children aged 13 years and below).

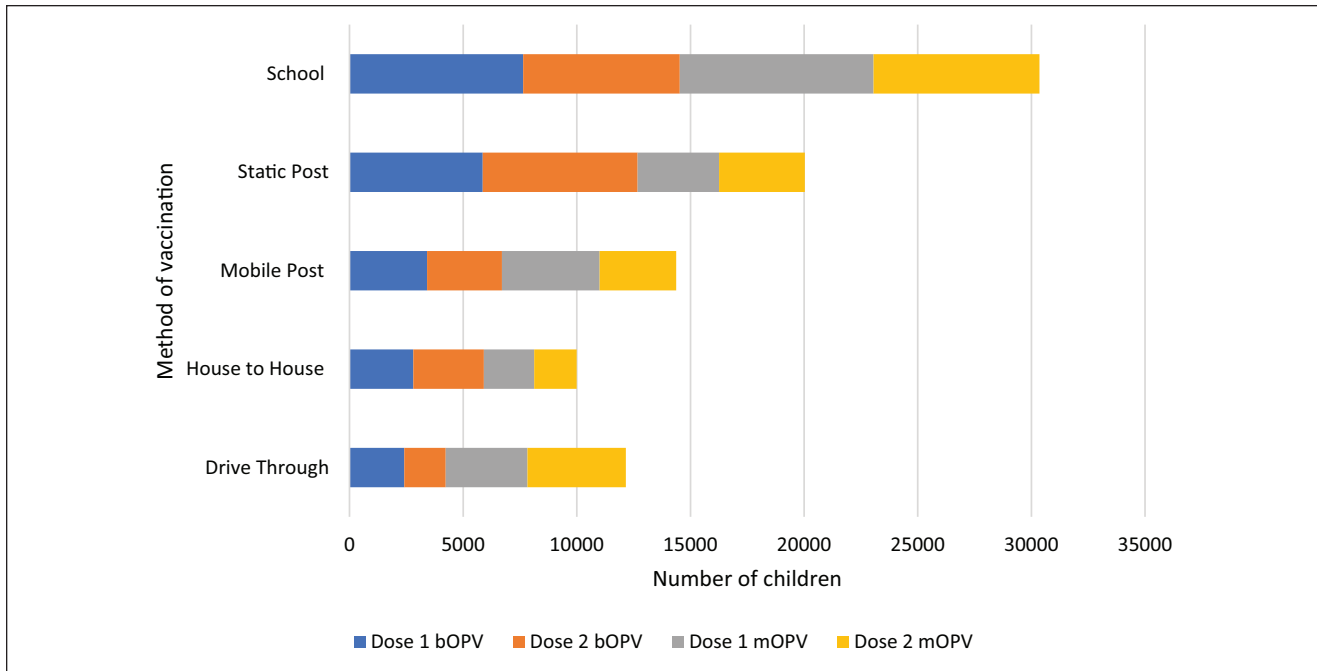


Figure 3. Comparison of achievement according to SIAs methods for bOPV and mOPV in Penampang.

media, and interventions of the non-profit or governmental organization.²¹ It empowers the community to take charge of their health. Health promotion policy combines various but complementary approaches. Collective action contributes to ensuring safer and healthier goods and services,

healthier public services, and cleaner, more enjoyable environments. Health promotion strategy requires us to identify obstacles toward healthy public policies in non-health sectors. Health knowledge can be nurtured through health education activities.

District Health Office together with the Department of Information Services were tasked to publicize the ongoing Polio SIAs. Health Promotion activities were carried out via both mainstream and alternative media. In a more comprehensive understanding, the objective of health education is not only to inspire individual lifestyle decisions but also to instill awareness on determinants of health and encourages individual and collective actions to address these determinants. Thus, it is right for us, the healthcare professional to be the driving force to ensure that the general population understands the concept of herd immunity. Culturally sensitive health education was essential to ensure information can be delivered effectively among undocumented migrants. The outcome of studies in India and Nepal supported the importance of healthcare workers to understand the local culture to promote health programs.^{22,23} Through the health communication concept, all forms of communication (social media and alternative media) were integrated to ensure no one was left behind.²⁴ Information dissemination was done in a very extensive manner to reach out to both the urban and rural communities of Penampang. We were taking advantage of the fact that the number of Internet users in Sabah continues to rise with wider coverage and improved network quality.²⁵ The number of social media users proportionately increased with internet coverage. The Malaysian Communications and Multimedia Commission (MCMC) also stated that Malaysian of all age groups use the internet.

Multi-Agency Collaboration and Community Engagement

The involvement of various agencies (government and non-governmental) and community leaders boosted public confidence toward vaccination. A good working system enabled clear and effective communication between the District Health Office and the local authorities. The health managers were tasked to bridge the silos between agencies by developing clarity of purpose. This was done through the establishment of links and shared vision between all the agencies. Community engagement can lead to a good health outcome among the disadvantaged populations if designed properly and implemented thoroughly.²⁶

A series of meetings and dialogs between the health authorities and community representatives were conducted periodically. Good multi-disciplinary cooperation and community leader's participation was a huge relief as the targeted population for this SIAs was large. Community mobilization is an active process, it does not stop at just getting to know them, but also identifying problems to solving them. Studies have shown that for us to sustain community action, it could take up to years and can be influenced by several factors: awareness, communication, and information sharing.²⁷ Community engagement is more than

involvement, as it encompasses participation, engagement, and ownership by the communities. Large-scale health programs can be geographically challenging. Health inequalities can occur whenever there are disadvantaged groups in achieving health services. Engagement with community leaders or representatives can help to mobilize the rest of the community, especially in the rural areas to gain access to health services. The role of social mobilizers and volunteers was greatly appreciated as we saw high coverage of vaccination in Penampang. Even though community participation is a multi-level complex process, it is nonetheless able to produce a successful health intervention that could impact health outcomes.²⁸ Public relations efforts in Penampang were considered successful as they attracted overwhelming participation of parents, guardians, and teachers to get their children vaccinated. The established relationship between health sectors with other agencies and the community is likely to sustain for the National COVID-19 Immunization Programme.

Adapting to COVID-19 Pandemic

Since the mid of March 2020, the COVID-19 pandemic affected the progress of polio SIAs. The Movement Control Order (MCO) forced many institutions such as schools to close. Furthermore, several mitigation measures were imposed: closure of borders, inter-district and interstate movement restriction, suspension of international flights, restriction of eateries operating hours, and the prohibition on mass gathering. The pandemic also restricted healthcare operations for both primary care facilities and field activities. Primary healthcare workers were facing tremendous challenges to complete SIAs according to schedule. For instance, they have to deal with parents who were worried to go to healthcare facilities. A few adjustments were made to deal with backlogs and postponement. The contingency plan of action enabled us to adapt to the Movement Control Order. Microplanning was one of the tools that health workers used to ensure the immunization services reach every part of the community.²⁹ Data managers relied on it to identify locality according to priority, managing resources, address barriers, and develop work plans with solutions. During the initial phase of the MCO, vaccination was given in health clinics on an appointment basis via phone call. House-to-house visits in certain localities were only necessary when the uptake was low within a certain time frame. Mobile SIAs was the best approach to reach the undocumented migrants as they were consistently in constant fear of possible arrest and deportation. The migrants need to be aware of what services are currently available to them. Mobile vaccination teams were equipped with adequate Personal Protective Equipment when carrying out SIAs. For the school-going children, the teachers actively coordinating the appointment of vaccination with the nearest primary care nurses.

Drive-through polio vaccination helped to boost the uptake of SIAs. Parents or caretakers were more willing to travel without getting out of their vehicles or public transports. This reflects the willingness of parents to get their child vaccinated despite the pandemic situation. Drive-through polio vaccination station in Penampang was widely publicized and even attracted clients from another district. Good cooperation with District Office and Sabah Cultural Board allowed us to utilize Penampang Cultural Center (Pusat Kebudayaan Penampang) as a polio drive-through vaccination center. Drive-through vaccination has been carried out throughout the world, mostly in the developed countries.^{30,31} In the state of Kansas, USA, drive-through has been going on for the past 20 years.³²

Campaign Monitoring

Monitoring allowed us to identify the gaps and deficiencies to make necessary corrections. It enabled us to analyze if there were any disequilibrium between the staffing needs and workloads. The appropriate distribution of the workforce played a major role in delivering an effective SIAs. It also ensures the safety of the public and protects them from care that is inappropriate, suboptimal, and harmful. The relationship between good monitoring and smooth implementation of mass vaccination has been established in other countries, namely Pakistan and Nigeria.^{33,34} Furthermore, campaign monitoring provides a platform for intellectual interaction with updated information. The State Health Department constantly monitored the progress of SIAs and provided technical guidance whenever necessary. Continuous supervision and training were essential to ensure competency. The productivity and performance of health-care workers are influenced by the workplace environment.³⁵ Continuous monitoring was carried out by the occupational safety and health committee to ensure all the compliance of safety protocol during field activities. Additionally, the health managers were also tasked to identify or detect the possibility of burnout among healthcare workers as large-scale activities can cause physical and mental exhaustion.³⁶

Conclusion

The outcome of SIAs for both bOPV and mOPV proved that a committed and active intersectoral collaboration between agencies and community engagement is beneficial. Effective flow of communication has become very important due to the advancement of communication media which allows a better way to access health information by individuals and communities.

Acknowledgments

We would like to thank the Director-General of Health Malaysia for his permission to publish this paper. We are forever grateful to

everyone who contributed to the success of this SIAs. Special thanks to Sabah State Health Department for the unwavering support throughout this program.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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