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ORIGINAL ARTICLE

Urban and Suburban COVID-19 immunization: Comparison of Experiences at Parit Sulong and Puncak Alam

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ABSTRACT

Introduction: Malaysia boasts a diverse geographical distribution ranging from urban, suburban and rural areas. The COVID-19 national immunization program calls for specific strategies to enhance vaccine roll-out. **Methods:** A retrospective study was conducted at two vaccination centres in Parit Sulong and Puncak Alam. Registration data from 150 and 1420 consenting adults receiving their first dose of COVID-19 vaccination from Parit Sulong and Puncak Alam were included, respectively. **Results:** The vaccination center at Parit Sulong utilised three methods: 1) satellite vaccination camp; 2) mobile outreach camp; and 3) home-to-home visits to improve vaccine reach in a rural district. The vaccination center at Puncak Alam utilised two methods: 1) vaccination in a large hall; and 2) drive-through vaccination to enhance daily vaccine administration in an urban district. The vaccine recipients at Parit Sulong were significantly older compared to Puncak Alam (70.39 SD 11.39 vs 51.52 SD 11.02 years) ($p<0.0001$). A significantly higher proportion of vaccine recipients at Parit Sulong were unable to read or write in their mother tongue (41.33%)($p<0.0001$), do not own a mobile phone (53.33%)($p<0.0001$) and do not have access to MySejahtera mobile application(84.57%)($p<0.0001$). **Conclusion:** The mobile vaccination model allows for greater vaccination reach and administration, targeting suburban and rural residents with transportation and technology restrictions. The drive-through vaccination model improved the vaccine uptake among young families with children, heavily pregnant ladies and elderly with physical limitations living in urban areas who have access to MySejahtera.

KEYWORDS: Vaccination, Coronavirus, SARS-CoV-2, pandemic, coverage

INTRODUCTION

The COVID-19 immunization program in Malaysia was being implemented nationwide since its official launch on the 24th of February 2021. This program was coordinated by the COVID-19 Immunization Task Force (CITF), which monitored the framework and overall strategy to support the implementation of the national immunization program. Potential vaccine recipients were required to register themselves for vaccination via five ways including [1]:

1. Self-registration using MySejahtera mobile application
2. Self-registration at www.vaksincovid.gov.my
3. Registration via phone at 1800-888-828
4. Manual registration through certified medical officers working at hospitals and clinics
5. Door-to-door registration

The breadth of registration channels increases opportunities for Malaysian citizens to register for COVID-19 vaccination, which remains voluntary at the time of writing [1].

Malaysia is a multi-ethnic country with diverse geographical distribution ranging from urban, suburban and rural areas. The Department of Statistics Malaysia estimated that the Malaysian population at 32.7 million with 10.7% of the population aged 60 years and above [2]. While most urban recipients preferred self-registration using the MySejahtera mobile application and through the website (www.vaksincovid.gov.my), the elderly recipients living in rural areas were at a disadvantage.

Based on a survey among 2401 mobile phone users, the use of feature phones was seen prevalent among those aged 65 years old and above (70.3%), and even more prevalent among those who reside in rural areas [3]. This and many more factors (Figure 1), may have interplayed in reducing the penetration of vaccine registration among citizens living in the rural areas of Malaysia [4,5,6].

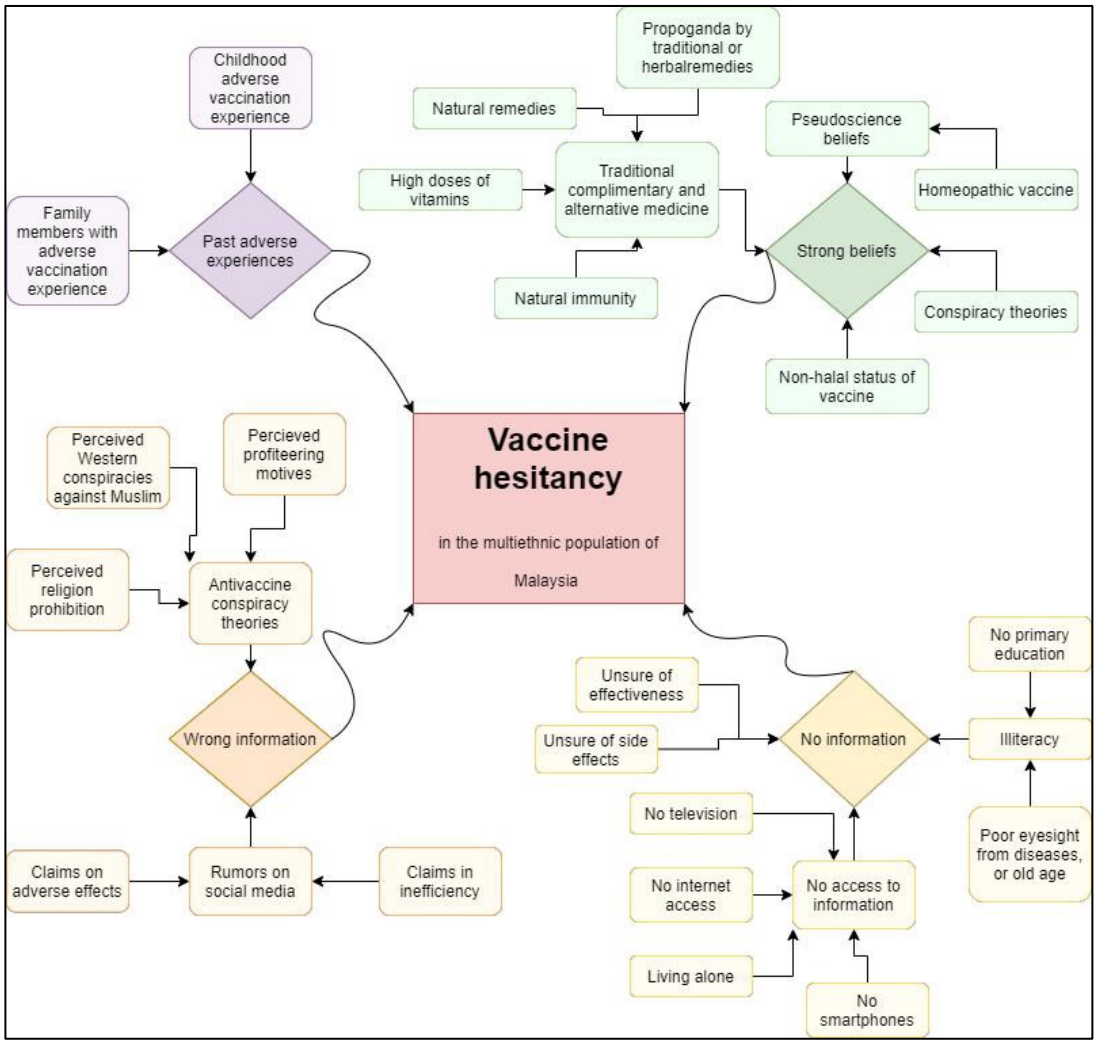

Figure 1 Factors contributing towards vaccine hesitancy in Malaysia (Adapted from Syed Alwi SAR et al., 2021, Wong LP et al., 2020 and Mohd Azizi FS et al., 2017)

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Malaysia's target is to achieve 80% of her fully vaccinated population by the year end of 2021. Initial roll-out was laggard with only 10% of the population being vaccinated in the first three months compared to 20% in Singapore and 40% of the United Kingdom [7]. Overnight, there was a push for Vaccine Administrative Centres (VAC) resulting in Public VAC, Mega VAC, industrial initiated VAC and higher learning institution VACs [8]. As part of the higher learning institution VAC efforts, a pilot project on a mobile vaccination drive was set up at the district of Parit Sulong, Johor. Parit Sulong is a suburb within the district of Batu Pahat housing 19 villages within, allowing it to be considered a rural area. At the same time, Universiti Teknologi MARA (UiTM) Hospital has successfully set up a Mega VAC, located in Puncak Alam, Selangor. Puncak Alam is a town within the Kuala Selangor district, giving it an urban area. Both vaccination centers were selected as they provided vaccination under the effort of the higher learning institutions VACs.

The objective of this study was to compare the vaccination setup and demographic characteristics among vaccine recipients in Parit Sulong, Johor and Puncak Alam, Selangor being suburban and urban areas respectively. The findings from this study could potentially suggest strategies to improve vaccination rates in the rural areas of Malaysia.

MATERIALS AND METHODS

Study Setting

This study included two VACs in Malaysia, the Parit Sulong mobile VAC and the UiTM Puncak Alam mega VAC. Both VACs are part of higher learning institution VACs which has already received approval by the COVID-19 Immunization Task Force (CITF), to be involved in the implementation of the national vaccination program.

Study Design and Sampling Method

A retrospective study design was utilised where observations and registration data from both institute of higher education VACs were included in the study. The VAC setup was observed by investigators, who served as volunteers in the respective VACs, in the midst of national lockdown. The registration data from consenting patients receiving their first dose of COVID-19 vaccination on the 25th and 26th June 2021 from both vaccination centers in Puncak Alam and Parit Sulong were sampled. Universal sampling was utilised. Vaccine recipients with incomplete data were excluded. Demographic characteristics including gender and age were obtained from history and identification cards. Data on phone use, ability to read, or write and accessibility to MySejahtera mobile application was assessed using history from the patient or caregiver.

At the Parit Sulong mobile VAC, a total of 153 potential vaccine recipients presented to the centre. Three were screened as unsuitable to receive vaccination and were scheduled for a later date due to active upper respiratory tract infection symptom (2) and carcinoma of the colon awaiting chemotherapy, where details on commencement of chemotherapy was not available (1). All 150 vaccine recipients were enrolled into the study. The Parit Sulong vaccination center was termed a mobile vaccination center as it was manned and managed by Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia from Kuala Lumpur, Malaysia. The machinery travelled and set up the temporary vaccination center at a school hall in Parit Sulong.

The UiTM Puncak Alam mega VAC serves as a non-mobile vaccination center whereby a total of 1430 vaccine recipients were sampled. Ten vaccine recipients were excluded due to incomplete data. The remaining 1420 (99.30%) vaccine recipients were enrolled into the study.

Data Analysis

SPSS version 23.0 was used for data analysis. Descriptive statistics such as frequency and percentage, mean and standard deviation were calculated. Independent t-test was used to determine the difference of mean age between VACs, and chi-square was calculated to determine the difference of sex, race, literacy, mobile phone use and access to MySejahtera between VACs. The level of significance was set at 0.05.

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RESULTS

Mobile Vaccination Setup at Suburban Parit Sulong, Johor

The mobile vaccination drive or more aptly referred to as outreach vaccination services provides solutions to the predicament faced by healthcare governance in increasing the vaccine delivery to rural areas with limitations. There were three methods of vaccine delivery that made this mobile suburban or rural vaccination drive possible:

1) Satellite camp at the school hall of the Batu Pahat MARA Junior Science College (MRSM). The satellite camp served as a vaccination centre for stable patients who were able to travel for their vaccines. The Batu Pahat MRSM is strategically located at Kampung Separap, at the heart of Parit Sulong district. With an estimated land area of 50 acres, the campus houses a school hall with a capacity of 700 people. Factoring in the 1 metre physical distance and the volunteers, the maximum capacity of vaccine recipients was estimated at 100 at a particular time. Citizens presenting to the mobile vaccination centre do not need to have prior registration using the MySejahtera mobile application. Registration was performed on-site for all vaccine recipients. Considering the limitation in space, line-listing by the head of villages assisted in reducing congestion at the vaccination centre. This practice is very important so that social distancing can be observed. The satellite camp houses medical supplies, two medical grade fridges and emergency drugs. Here, all healthcare professionals meet, plan their events of the day and stock up on medical supplies.

2) Mobile outreach camps at community halls within villages of Semerah and Seri Medan. The vaccination team will travel from the satellite camp via district roads on pre-arranged time and dates. Patients within the vicinity will be brought to these community halls via transportation arranged by the head of villages. Due to space limitations and compliance to social distancing, a smaller number of vaccines of 40 per day was administered. The set up for both methods are similar to Public VAC whereby there are several stations namely registration, counseling and consent taking by certified medical officers, vaccination and observation bays.

3) Home visits within villages of Semerah and Seri Medan for bed-bound or immobilized patients i.e. post-stroke patients who are dependent on activities of daily living, spinal cord injury patients and frailty for various reasons (such as Alzheimer's dementia). Home visits were based on stipulated guidelines whereby those with Clinical Frailty Scale of 1-5 (fit to mild) and 6-7 (moderate to severe) can be administered a vaccine. However, scores of 8 and above (very severe/ terminally ill/ palliative) are advised against vaccination (Figure 2). In this method, a volunteer registers the recipient and a certified medical officer counsels, takes consent, administers the vaccine, and observes for 15 to 30 minutes after vaccination. A guide also provides for peri-vaccination assessment and post vaccination home assessment (up to 72 hours) by carers (Figure 3)

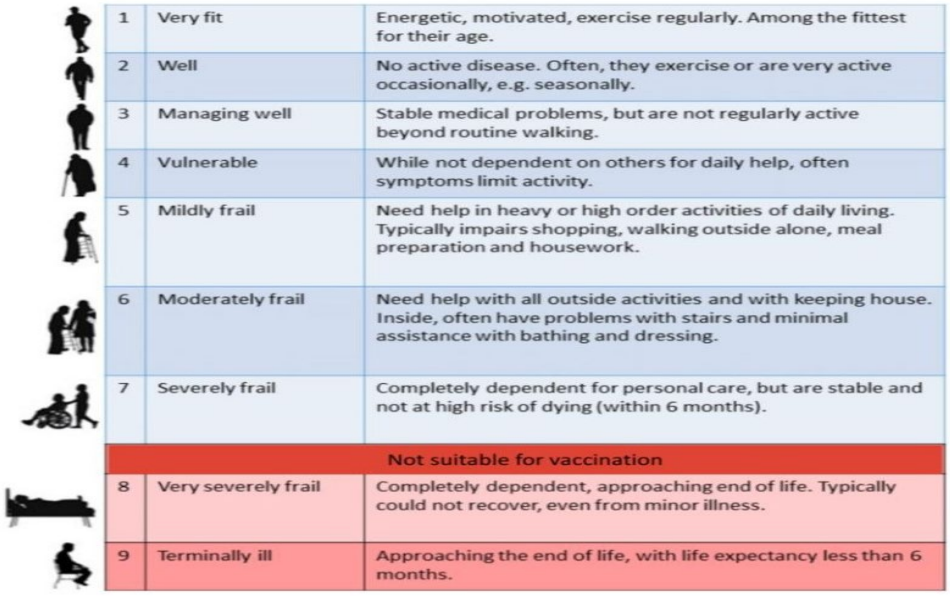

Figure 2 Selection criteria for home vaccination service based on Clinical Frailty Scale[9] (Adapted with permission from Rockwood K et al., 2005)

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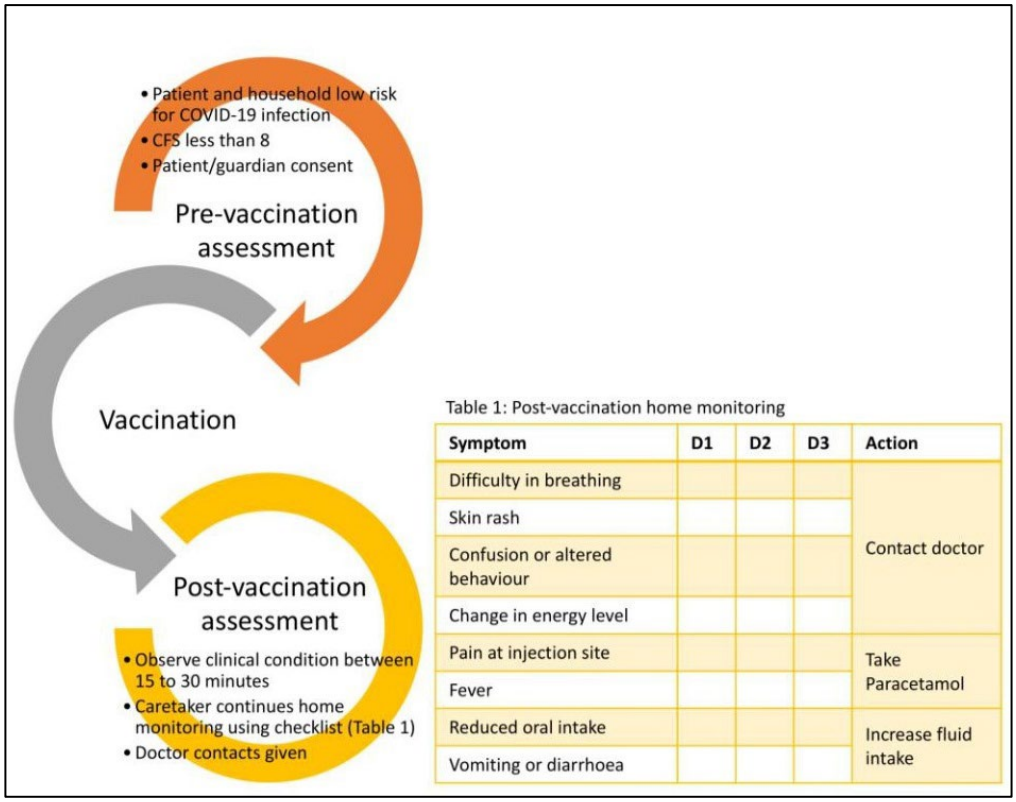

Table 1: Post-vaccination home monitoring

Symptom	D1	D2	D3	Action
Difficulty in breathing				Contact doctor
Skin rash				
Confusion or altered behaviour				
Change in energy level				
Pain at injection site				Take Paracetamol
Fever				
Reduced oral intake				Increase fluid intake
Vomiting or diarrhoea				

Figure 3 Pre and post-vaccination assessment

UITM Non-Mobile Urban Vaccination Setup at Puncak Alam, Selangor

This vaccination center operates using two different methods including vaccination in a hall and drive-through:

1) VAC in UiTM Puncak Alam campus takes place in Dewan Berlian, a hall with massive capacity of 2000 people. It is a form of mega VAC arranged a setup to cater not only for high-volume vaccinations but also provides for the elderly, wheelchair-bound person and people with disabilities (PWD). The first door of the hall closest to the drop-off point, first six registration counters, the first row of consultation stations and first two vaccination rooms were allocated specially for the elderly and PWDs. All potential recipients were scheduled to receive their vaccination using the MySejahtera mobile application. Four volunteers were placed at each station to assist caretakers with their dependents such as helping with transfer of elderly or PWD from car to wheelchair, wheeling them to the hall and from one station to another. In a day, an average of 8.52% of the vaccine recipients were from the elderly population, aged 60 years and above.

2) The drive-through VAC at Hospital UiTM Puncak Alam was initiated two weeks after the start of mega non-mobile VAC operation and it shares the same vaccine allocation with Dewan Berlian mega VAC. The UiTM Hospital is located 1 kilometer from Dewan Berlian in the same Puncak Alam campus. This initiative was set out to help decongest the VAC during peak hours from nine o'clock in the morning to one o'clock in the afternoon. Additionally, this setup suits the needs of several target populations who were unable to comply to the strict operating procedures at the vaccination hall. This include young parents with small children who needed to care for their children while receiving vaccination and less ambulant vaccine recipients including elderly patients with PWDs and heavily pregnant ladies. Similar setup to mega non-mobile VAC was utilized whereby there are several stations namely registration, counseling and consent taking by certified medical officers, vaccination and observation bays. Vaccine recipients can remain sitting in the car throughout the whole process from registration, consent, vaccine injection to observation. The officers on duty move about to the cars using smart tablets for registration. There are two lanes that run concurrently throughout its operation. The average time

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taken for a vaccine recipient for the whole procedure upon arrival at the drive-through VAC was 30 minutes, as compared to 60 minutes average time spent at mega VAC.

Comparison of Demographic Characteristics between Vaccine Recipients at Parit Sulong and Puncak Alam

Our data confirms that there was a significant difference in the progress of vaccination drive between suburban (Parit Sulong) and urban (Puncak Alam) areas sampled in this study although both were in Phase 2 of vaccination (high-risk, elderly, comorbidities). On both days sampled, the average age of vaccine recipients were 70.39 SD 11.39 and 51.52 SD 11.02 years at Parit Sulong and Puncak Alam centres, respectively. There was a significant difference in the distribution of age between the two vaccination centres sampled (t-value=19.8731 p-value=<0.0001). A larger proportion of elderly patients aged more than 60 years received their first dose of COVID-19 vaccination in the Parit Sulong vaccination centre compared to the Puncak Alam vaccination centre (Table 1).

More females than males (64.00% vs 36.00%) volunteered to receive their vaccination at the Parit Sulong vaccination centre. A larger proportion of male vaccine recipients was seen at the Puncak Alam vaccination centre (53.31% vs 46.69%), where the differences were statistically significant compared to the Parit Sulong data. The racial distribution of vaccine recipients at Parit Sulong was predominantly among Malay (98.00%) compared to other races (2.00%). In the urban area of Puncak Alam, the majority of vaccine recipients were Malay (74.93%), with a higher proportion of Chinese (15.00%) and Indian (9.72%) (Table 1).

A significantly higher proportion of vaccine recipients from Parit Sulong were either unable to read or write in their mother tongue (41.33%) compared to Puncak Alam (2.68%) (p<0.0001) (Table 1). Among the 62 vaccine recipients from Parit Sulong who were unable to either read or write, a small percentage of vaccine recipients did not receive any form of formal education, while others suffered from poor visual acuity, or loss of hand or fine motor coordination from various chronic illnesses.

In the rural area of Parit Sulong, the majority of vaccine recipients do not own or use a mobile phone (53.33%). Among the mobile phone users, there was a larger proportion of recipients using feature phones (68.57%) compared to the smartphones (31.43%). This data was seen reflective of subsequent data on accessibility to the MySejahtera application, where only 23 recipients have access to this national COVID-19 mobile application. Interestingly, despite the large number of elderly recipients, only one recipient received help from his/her children to register using the MySejahtera mobile application. The opposite situation is seen in Puncak Alam vaccination centre where among the 13 recipients with no smartphones, all have access to the MySejahtera mobile application.

Table 1 Demographic characteristics of vaccine recipients in Kuala Lumpur and Parit Sulong

Demographics	Parit Sulong, N(%)	Puncak Alam; N(%)	P- Value
Age			
18-20	0	2 (14%)	<0.0001^
21-30	0	111 (7.82%)	
31-40	0	111 (7.82%)	
41-50	0	106 (7.46%)	
51-60	35 (16.67%)	969 (68.24%)	
61-70	48 (32%)	83 (5.85%)	
71-80	47 (31.33%)	26 (1.83%)	
81-90	27 (18%)	10 (0.70%)	
91-100	3 (2%)	2 (0.14%)	

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Gender			
Male	54 (36%)	663 (46.69%)	0.012*
Female	96 (64%)	757 (53.31%)	
Race			
Malay	147 (98%)	1064(74.93%)	<0.0001*
Chinese	3 (2%)	213 (15%)	
Indian	0	138 (9.72%)	
Others	0	5 (0.35%)	
Literacy			
Able to read and write	88 (58.67%)	1382 (97.32%)	<0.0001*
Unable to read or write in mother tongue	62 (41.33%)	38 (2.68%)	
Mobile Phone Use			
Non	80 (53.33%)	12 (0.85%)	<0.0001*
Feature Phone	48 (32%)	1(0.07%)	
Smart Phone	22 (14.67%)	1407 (99.08%)	
MySejahtera Access			
Yes	23 (15.33%)	1420 (100%)	<0.0001*
No	127 (84.67%)	0	

^significant p=value <0.05 using independent t-test
*significant p=value <0.05 using chi-square test

DISCUSSION

Vaccination is a powerful weapon in our combat against the COVID-19 pandemic. This follows encouraging data that two recently developed vaccines showed a more than 95% efficacy in preventing this infection [10,11]. However, it is reliant on effectiveness of vaccination roll-out, achieving the status of immunity prior to resurgence of infections from vaccine-resistant viral mutations [12]. Understanding the importance of this massive public health measure, various parties worked hand-in-hand to enhance the COVID-19 national immunization program. To the best of our knowledge, this is the first paper to compare VAC setup and demographic characteristics of vaccine recipients in the rural and urban areas of Malaysia.

The layout in the non-mobile mega VACs at urban areas utilises the division of labour concept in industrial assembly line whereby there is control management of each station with a specific task. This is evident by having a MySejahtera registration counter, a waiting bay where vaccine recipients pre-fill the consent forms, a vaccination counselling and consent station, vaccination rooms, and observation bays (Figure 4). This allows smooth flow between counters, high flow of traffic and resolving issues from each station effectively before the next [13,14]. Its downside includes lack of diversity in job skills among volunteers as most healthcare personnel are confined to taking consents while the vaccinator only administers vaccines [13,14]. Although repetitive actions increase the skills within designated tasks, they may easily become disinterested or fatigued. Similar division of labour could not be applied to mobile outreach camps in the suburban village. This is due to lack of workforce available and space limitation to effectively manage all substations. As a result, the vaccine administration and post vaccination observations were combined into one station (Figure 4). A thorough division of labour was also not required due to the smaller cohort of 80 patients that showed up at any one time compared to the

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thousands at mega urban VACs. Moreover, efficacy in satellite and mobile vaccination camps at Parit Sulong could be improved by further combining MySejahtera registration and consent taking as one station and, vaccine administration, post vaccination registration and observation as a second station hastening the in and out process (Figure 4).

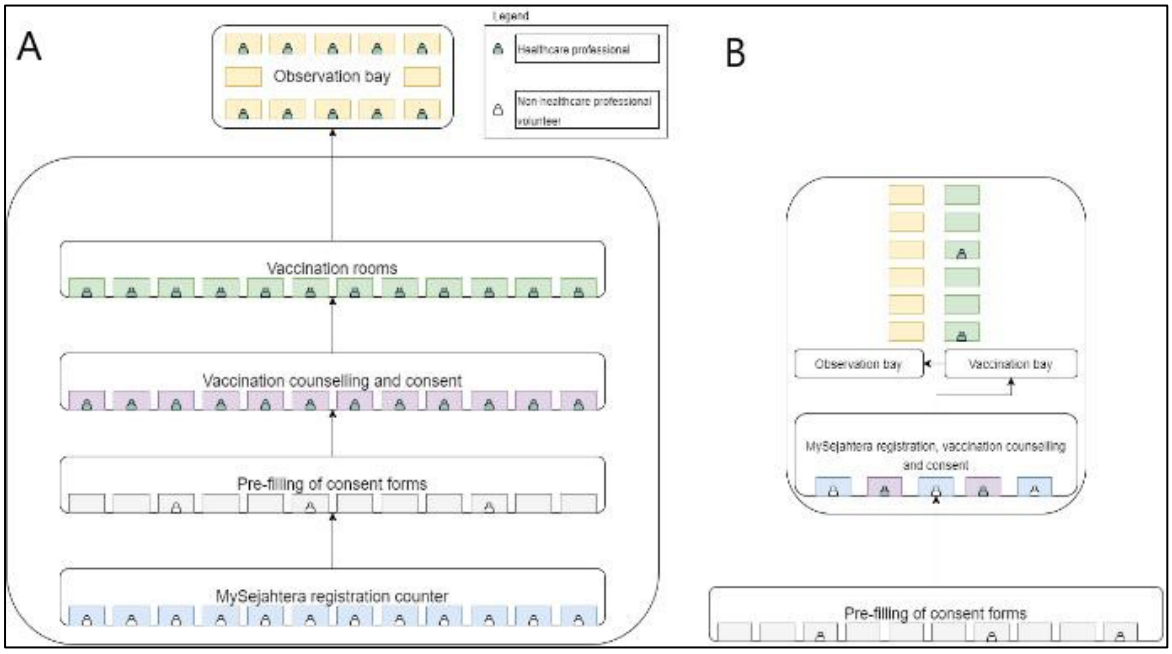

Figure 4 Differences in the layout and number of personnels required at the mega VAC in Puncak Alam (A) compared to the satellite VAC in Parit Sulong (B)

Compared to the Parit Sulong VAC, the Puncak Alam VAC required large numbers of healthcare and non-healthcare professionals, (Figure 4). It utilised a myriad of healthcare professionals which include medical officers, medical specialists, dentists and nurses in the vaccination counselling and as vaccinators. In addition, this center also utilises clinical pharmacists and medical students at the vaccination counselling stations. This is necessary as this centre runs a large vaccine recipient load on a daily basis. When the number of daily vaccine doses was increased from time to time, the efficiency of all stations must also increase where the turn-around time spent for each recipient at each station is lesser because the number of recipients catered at the centre shall double the previous number. Hence, to avoid burn-out among the volunteers, it was suggested that the operation time of the mega VAC is extended until nine o'clock at night, where it means to divide the volunteers pool into two-shift system. By implementing this extended operation hours and shift system, not only it can reduce fatigue among the volunteers, but the amount of daily vaccine doses can also be increased to comprehend the national call for faster vaccination rate. Drive through method is an impressive strategy to cater vaccine delivery in urban areas. This is because the population in urban areas are either equipped with personal transport in each family or they can utilise e-hailing transport to mobilize them to VAC. Furthermore, urban people consist of elderly citizens that have their adult children who can drive them for vaccination, and adults who cannot leave their small child at home. Non-government organizations were also on their toes in helping the PWDs to get their vaccines should they need transport assistance. Since drive through setting cannot cater large number of vaccine recipients at each point of time, it serves as a complementary platform to the mega VAC in the effort to ensure that common issues hindering vaccine uptake are being overcome.

Statistics showed that a total of 187,877 and 168,956 doses of vaccine were administered nationwide, on the 25th and 26th June 2021 at the time of data collection [15]. At that time, the national vaccination program was at its second phase of

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implementation, reaching out to high-risk groups. A recent systematic review from a global meta-analysis outlined specific patient characteristics at high-risk from developing morbidity and mortality from COVID-19 infection [16]. The pooled risk estimates calculated using meta-analysis regression concluded a significantly elevated risk among patients more than 75 years of age (OR=2.65), male sex (OR=2.05), body mass index of more than 40kg/m2 (OR=2.57) and active cancer (OR=1.46) [16]. Findings from this study compliments the slightly looser definition of high-risk groups recommended by the Ministry of Health, Malaysia [17]. Given that the utmost priority at this stage is to protect the vulnerable population of Malaysia, findings from our study strongly support this initiative, where the average age of vaccine recipients at Parit Sulong was observed to be at 70 years old. Our data also show that the vaccine recipients at Puncak Alam were significantly younger than recipients at Parit Sulong. We offer two postulations which may explain this difference. Firstly, are the many obstacles to COVID-19 vaccine reach in the rural districts of Malaysia, causing late vaccine roll-out among elderly individuals. Secondly, the vaccine distribution and administration are observed to be more active in the urban districts, due to higher number of VACs and dire need from a higher number of active infections.

In the suburban or rural districts of Malaysia, postulated obstacles to COVID-19 vaccine reach were: 1) poor registration (as a result of no information or strong beliefs); 2) no transportation to VACs within the city; and 3) fear of virus transmission when visiting health facilities [4,5,6]. The findings from our study affirm that compared to the urban districts, a significantly higher proportion of Malaysian citizens living in the rural areas do not have access to vaccine information (unable to read or write), or registration via the MySejahtera mobile application. Therefore, there is a need for a concerted effort by various local authorities supported by governmental or non-governmental organisations for a robust vaccine roll-out to the Malaysian public residing in the suburban and rural areas. Taking Parit Sulong as an example, its estimated 60,000 population consists mainly of citizens above 50 years old, working as palm oil and rubber farmers. In addition, the imposed movement control order since March 2020 has further isolated its elderly population, where children can no longer visit their parents. The poor socio-economic status and the social isolation may have hindered the Parit Sulong citizens from getting information, vaccination awareness and in fact, slowed down vaccine registration.

Several methods were employed to increase vaccination registration and uptake in this suburban or rural district. Transportation via camper and mini buses were useful to and fro between residences and satellite or mobile outreach camps. This ensured those without transportation are being brought in to register and receive counselling on vaccinations. Registration assistance was given by collecting and comparing residents' name lists with the District Health Office, parliamentary office and village heads. Village heads were instrumental in reminding patients in person, via telephone or next of kin for their appointments with the vaccination centre. A trustable source of contact is important for reaching out to rural individuals [18]. This was particularly effective for the elderly, illiterate, void of a smartphone and/or no access to MySejahtera mobile application.

Potential vaccine recipients were screened and counselled by certified medical doctors on the importance, benefit, content and potential side effects of each vaccine dose prescribed. Simple explanation using the mother tongue and tactful response to queries raised helped to alleviate vaccine hesitancy among potential recipients [4]. Although a total of three potential recipients had to be reappointed to a later date for various medical reasons, none of the potential vaccine recipients rejected the vaccination following counselling. Onsite registration was allowed upon arrival, with no prior registration required. Bed bound patients were managed by home-to-home visits as it would be costly to hire ambulances to transport them to vaccination centers. These home visits were also vital in raising awareness and counselling other family members and carers to register for a vaccination. Appointments and liaising with village heads were instrumental in preventing overcrowding and timely show and complete utilisation of the day’s vaccines. Other suggestions by the Center for Disease Control and Prevention include offering central public locations of rural areas such as fire stations as vaccination centers

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which are easily accessible [18]. For factory or plantation owners within rural areas, other options of contact will be via unions or mobile vaccination clinics within work sites [19]. The latter is being explored by Malaysia via Public Private Partnership COVID-19 Industry Immunization Programme (PIKAS) which is a programme for employers to vaccinate employees allowing the private sector to have a hand in the economic recovery due to COVID-19 [19].

The findings from our study suggest that a different approach towards vaccine roll-out is necessary to have better coverage, particularly at the suburban or rural districts of Malaysia. Although the government has put in place various options for self-registration to receive COVID-19 vaccination, the take up is low at suburban areas. This is understandable when a higher proportion of residents are older, unable to either read or write and do not have access to a smartphone. Although our data from Parit Sulong included a relatively small sample size, the highly significant differences with the comparative data from Puncak Alam VAC strengthened our study findings. The retrospective study design and short study duration may have posed a limitation towards the study findings. However, only a small number of vaccine recipients were excluded from insufficient data, minimizing the selection bias.

Recommendation includes tailoring the need of vaccination delivery based on suburban or urban areas. As we have seen, the Parit Sulong methods of vaccine delivery suits the rural demographics well. Single dose vaccination may hasten and reduce duration and overhead costs in suburban areas. Involvement of local partners such as district health office, village heads, parliamentary office, police is essential in ensuring a smooth vaccine roll-out within rural areas. Not to forget the need for public private partnerships to keep costs down. Finally, improved transportation and bringing vaccines to the people works well in suburban areas rather than having them come to the vaccines which are employed in urban areas.

CONCLUSION

The mobile vaccination model allows for greater vaccination reach and administration in suburban areas, targeting residents with transportation and technology restrictions. However, a concerted effort from various local authorities and the community is needed to implement such models. In urban areas, the drive-through vaccination model will improve the vaccine uptake among PWDs, young families with children to undertake, heavily pregnant ladies and elderly with physical limitations. It is hoped that these innovative strategies could help to boost the vaccination rate in fighting COVID-19.

Conflict of interest

Authors declare none.

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Authors' Contribution

Mawaddah Azman was involved in planning, data interpretation and writing of the manuscript.
Hardip Singh Gendeh was involved in planning, data interpretation and writing of the manuscript.
Mohd Shawal Firdaus Mohamad was involved in planning, data interpretation and writing of the manuscript.
Wan Najwa Wan Mohd Zohdi was involved in planning and data interpretation.
Julina Md Noor was involved in planning and data interpretation.
Razman Jarmin was involved in planning and reviewing of the manuscript.
Hanafiah Harunarashid was involved in was involved in planning and reviewing of the manuscript.

REFERENCES

1. How to register for COVID-19 vaccination. 2021. Available from: https://www.vaksincovid.gov.my/en/guide. [Accessed 15th July 2021]
2. Current Population Estimates Malaysia. 2020. Available from: https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=155&bul_id=OVByWjg5YkQ3MWFZRTN5bDJiaEVhZz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09. , [Accessed 15 July 2021]

3. Hand Phone Users Survery 2018, Malaysian Communications and Multimedia Commission. 2018. Available from: https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/HPUS2018.pdf. [Assessed 15th July 2021]
4. Wong LP, Wong PF, AbuBakar S. Vaccine hesitancy and the resurgence of vaccine preventable diseases: the way forward for Malaysia, a Southeast Asian country. Hum Vaccin Immunother. 2020;16(7):1511-20.
5. Mohd Azizi FS, Kew Y, Moy FM. Vaccine hesitancy among parents in a multi-ethnic country, Malaysia. Vaccine. 2017;35(22):2955-61
6. Syed Alwi SAR, Rafidah E, Zurraini A. Juslina O, Brohi IB, Lukas. A survey on COVID-19 vaccine acceptance and concern among Malaysians. BMC Public Health. 2021 21(1):1129.
7. Ab Rahman PDJ. Malaysia's COVID-19 Saga: Dire need for a robust vaccination role out. IIUM Med J Msia. 2021: 20(3): 1-3.
8. Zainul E. Vaccine Shipment and registrations are the two biggest bottlenecks that could impede vaccination trajectory-EMIR research. 2021. Available at: https://www.theedgemarkets.com/article/vaccine-shipment-and-registrations-are-two-biggest-bottlenecks-could-impede-vaccination [accessed 15th July 2021]
9. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, Mitnitski A. A global clinical measure of fitness and frailty in elderly people. CMAJ. 2005;173(5):489-95
10. Voysey M, Costa Clemens SA, Madhi SA, Weckx LY, Folegatti PM, Aley PK et al. Oxford COVID Vaccine Trial Group. Single-dose administration and the influence of the timing of the booster dose on immunogenicity and efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine: a pooled analysis of four randomised trials. Lancet. 2021 Mar 6;397(10277):881-891. doi: 10.1016/S0140-6736(21)00432-3. Epub 2021 Feb 19. Erratum in: Lancet. 2021 Mar 6;397(10277):880. PMID: 33617777; PMCID: PMC7894131.
11. Lopez Bernal J, Andrews N, Gower C, Robertson C, Stowe J, Tessier E et al. Effectiveness of the Pfizer-BioNTech and Oxford-AstraZeneca vaccines on covid-19 related symptoms, hospital admissions, and mortality in older adults in England: test negative case-control study BMJ 2021; 373 :n1088 doi:10.1136/bmj.n1088
12. Jordan SC. Innate and adaptive immune responses to SARS-CoV-2 in humans: relevance to acquired immunity and vaccine responses. Clin Exp Immunol. 2021 Jun;204(3):310-20.
13. Parker SK, Wall TD. Cordery JL. Future work design research and practice: Towards anelaborated model of work design. J Occup Organ Psychol. 2001, 74 (4): 413–40.
14. Wadeson N. The Division of Labour under Uncertainty. J Inst Theor Econ. 2013; 169(2):253–74.
15. Progress statistics for the National COVID-19 immunisation programme. Jawatankuasa Khas Jaminan Akses Vaksin COVID-19. Available at: https://www.vaksincovid.gov.my/statistik. [Assessed on 26 June 2021]
16. Booth A, Reed AB, Ponzo S, Yassaee A, Aral M, Plans D, et al. Population risk factors for severe disease and mortality in COVID-19: A global systematic review and meta-analysis. PLoS ONE. 2021;16(3):e0247461. doi;10.1371/journal.pone.0247461
17. Clinical guidelines on COVID-19 vaccination in Malaysia. Ministry of Health Melaysia, 2nd edition Available at: http://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm/ANNEX_48_CLINICAL_GUIDELINES_ON_COVID-19_VACCINATION_IN_MALAYSIA_28062021.pdf . [Assessed on 15th July 2021]
18. Reaching Rural and Remote Workers with COVID-19 Vaccinations. Available at: https://www.cdc.gov/vaccines/covid-19/health-departments/essential-workers/rural.html. [Assessed on 11th July 2021]
19. Public Private Partnership COVID-19 Industry Immunization Programme. Available at: https://www.miti.gov.my/miti/resources/PIKAS/FAQ_Vaccine.pdf. [Assessed on11th July 2021]

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