



COVID-19 Vaccination Delivery to Vulnerable Population In Indiana

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01.

Introduction



Effective countermeasures against exponential expansion of SARS-CoV-2 transmission are needed urgently to induce herd immunity and protect the most vulnerable population groups from COVID-19 infection.

Induction of herd immunity by mass vaccination has been a very successful strategy for preventing the spread of many infectious diseases including smallpox and polio.^{1,2} Therefore, immunization represents one of the most promising counter-pandemic measures to COVID-19. Comprehensive technology platforms can help accelerate the immunization efforts to bring the vaccine to the population that needs it the most.

The structure of this paper is as follows. First, we summarize recommendations from studies on prioritizing population for COVID-19 vaccine allocations. We then review preliminary CDC guidelines provided to state jurisdictions for vaccine delivery preparedness. We also estimate the share of vulnerable population in Indiana and their regional distribution. Further, we discuss the need to focus on the last mile effort for vaccinating such population. A comprehensive list of potential strategies that could be implemented to help vaccinate vulnerable population is explained. Finally, we discuss how technologies can help bridge the gap between supply and demand of vaccination among this population.

02.

Existing studies on vaccine prioritization recommendations



National Academies of Sciences, Engineering and Medicine (2020) [NEM study] recently released a preliminary report on a framework in the United States for distributing COVID-19 vaccine in an equitable and ethical way. The NEM study was sponsored by Centers for Disease Control and Prevention (CDC) and National Institutes of Health (NIH). The study was developed based on allocation frameworks from prior pandemic/infectious disease outbreaks across the world, foundational/guiding principles, and certain criteria for determining equitable allocations and prioritizations of population groups. The

principles derived by the study allocate vaccines to maximize societal benefits to the population through reduced mortality and morbidity, while increasing fairness, reducing disparities and inequities during distribution. . The NEM study recommends a tiered priority approach based on the risk of acquiring COVID-19, risk of severe morbidity and mortality, risk of negative societal impact and risk of transmission of COVID-19 to others. Table 1 shows the summary of tiered four phase structure recommended by the National Academy of Science, Engineering and Medicine for COVID-19 vaccine allocation.

PHASES	PRIORITIZED POPULATION GROUP	REMARKS
1a	High risk workers in health facilities (eg., clinicians, health facility employees and support staffs, home care givers, morticians and funeral home workers)	Such population have high exposure to COVID-19 and has higher risk of transmitting to patients. Estimated 13.5 million health care workers and 2.1 million first responders
	First responders including EMS, police and firefighters	
1b	People with multiple comorbid conditions with significant risk as per CDC's list	Estimated 19 to 20 million population with multiple comorbidity conditions
	Older adults living in congregated/overcrowded settings	Estimated 2 million population in nursing homes or residential care facilities and 4.7 million older adults living below federal poverty level
2	Critical risk workers who are working in essential industries	Workers from food/beverage industry, cashier/food store workers, pharmacy staff, public transit workers, and similar have substantially higher risk of exposure and their work is essential to society. Estimated 3.4 million population.
	Teachers and school staff including child-careworkers/administrators/maintenance workers and school bus drivers	Estimated 9 million population
	People of any age with moderate comorbid conditions	Estimated at least 10 million population
	All older adults	Estimated 13.2 million older adults without comorbid conditions/
	People with disabilities in homeless shelters or group homes and staff of those facilities	Estimated 1 million population
	Population in incarcerated/detained facilities including staff who work in prisons, jails, detention centers	Estimated 2.7 million population
3	Young adults aged 18 to 30	Estimated 46.5 million young adults
	School going children including preschool	Estimated 80 million population

PHASES	PRIORITIZED POPULATION GROUP	REMARKS
	Other critical risk workers not included in earlier phases	Workers from restaurants/ hotels/ entertainment industry, banks/ libraries, salons, exercise facilities, specific manufacturing facilities. Estimated 4.8 million population
4	Rest of the population	

John Hopkins University's Center for Health Security (2020) also released an interim framework for COVID-19 vaccine allocation and distribution in United States with a similar tiered approach based on ethical values.

Studies have found evidence of heterogeneity in COVID-19 infections and deaths across race, ethnicity, and socioeconomic status resulting from comorbidities, working/living conditions, low paying jobs that require face-to-face interactions, and limited access to health care.³⁻⁷



03.

Vulnerable population and vaccine distribution priorities in Indiana

CDC had developed a Social Vulnerability Index based on 15 variables that are linked to vulnerability of the population (ATSDR, 2018).⁸ This index takes into account the socio-economic status, household composition, disability, minority status, housing type and transportation. The NEM study also recommends providing vaccination in areas where the social vulnerability is high. Figure 1 shows the regional distribution of social vulnerability index as of 2018 by Census tracts in Indiana. Knowing the index at a regional-level helps policymakers to understand regional heterogeneity in access and individual risk while devising vaccine allocation strategies.

CDC - Social Vulnerability Index Percentile Ranking

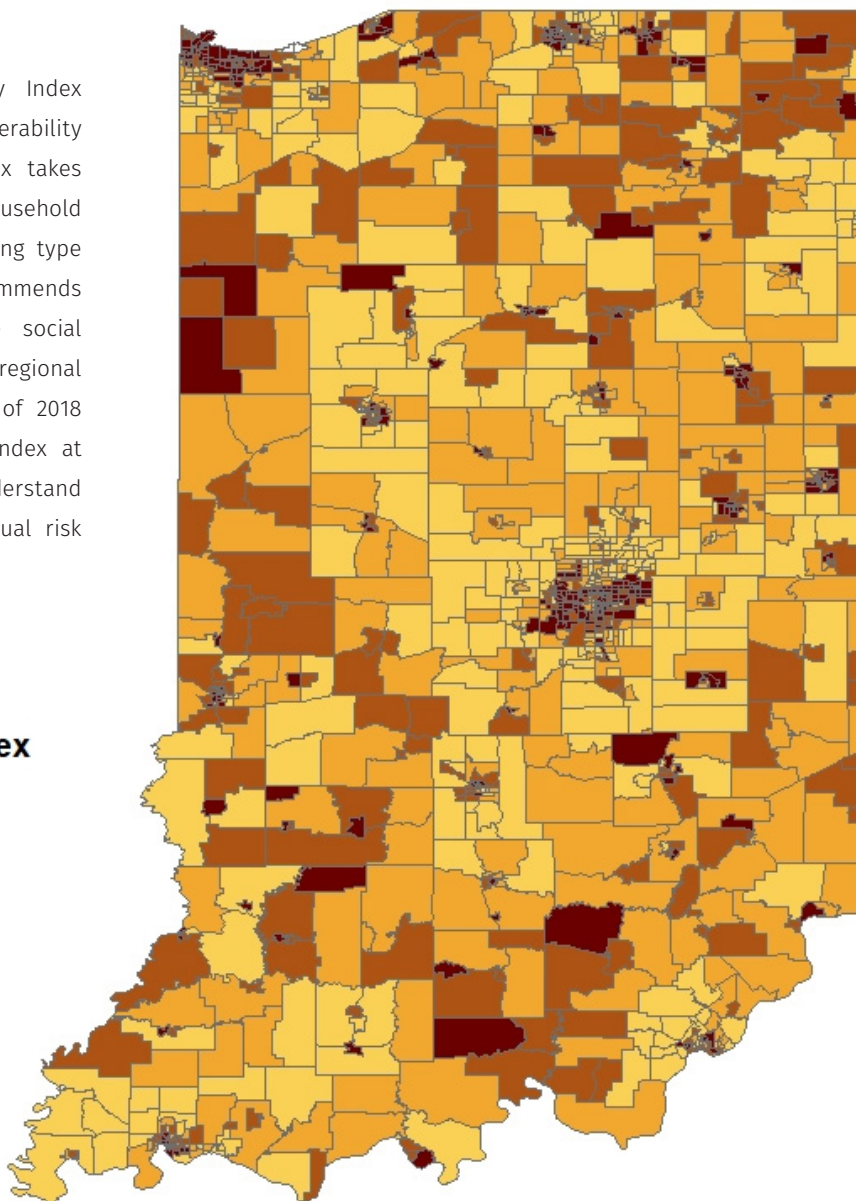
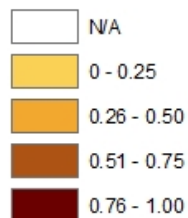


Table 2 shows an estimated targeted population sub-groups identified by NEM study based on priorities specific to Indiana. Note that there may be overlap of population across multiple sub-groups, therefore, computing the estimates cumulatively across phases may not provide accurate estimates.

Table 2: Potential priority population group for vaccine distribution in Indiana based on NEM study

PHASES	PRIORITIZED POPULATION GROUP	BALLPARK ESTIMATED POPULATION	Source
1a	High risk workers in health facilities (eg., clinicians, health facility employees and support staffs, home care givers, morticians and funeral home workers) First responders including EMS, police and firefighters	Health practitioners and technical occupations including EMS (193,730) Healthcare support occupations (114,240) Protective service occupations (60,660)	BLS-Occupational employment statistics, 2019
1b	People with multiple comorbid conditions with significant risk as per CDC's list	5.8% of population; Estimated 387,000 individuals	Based on NEM study and Clark et al. (2020) estimates for US
	Older adults living in congregated/overcrowded settings	Nursing facility residents (37,564) Older adults (65+) under poverty 79,000 individuals	Kaiser Family Foundation, 2019; Kaiser Family Foundation, 2018
2	Critical risk workers who are working in essential industries	Food preparation and service-related occupations (282,350) Cashiers (69,850) Transportation and material moving occupations (313,990)	BLS-Occupational employment statistics, 2019
	Teachers and school staff including child-care workers/administrators/maintenance workers and school bus drivers	Educational instruction and library occupations (163,850)	BLS-Occupational employment statistics, 2019
	People of any age with moderate comorbid conditions	At least 3% of population; Estimated 200,756 individuals	Based on NEM study possible estimation
	All older adults	26.8% of population aged 65 and above without comorbid and underlying conditions; Estimated 281,707 individuals	Based on NEM study estimates
	People with disabilities in homeless shelters or group homes and staff of those facilities	Data not available	

PHASES	PRIORITIZED POPULATION GROUP	BALLPARK ESTIMATED POPULATION	Source
	Population in incarcerated/detained facilities including staff who work in prisons, jails, detention centers	Incarcerated or detained population (47,050) Staff employment in the facilities were included earlier in protective services occupation	Prison policy, 2018
3	Young adults aged 18 to 30	Estimated 1.1 million	U.S. Census ACS 1 year estimates, 2018
	School going children including preschool	Under 18 years population is estimated 1.6 million	U.S. Census ACS 1 year estimates, 2018
	Other critical risk workers not included in earlier phases	Art, Design, entertainment, sports, and media occupations (34,580) Sales and related occupations (284,150) Office and administrative support occupations (369,170) Personal care and service occupations (54,010) Production occupations (386,740)	BLS-Occupational employment statistics, 2019
4	Rest of the Indiana population		

Note - The list of occupations and estimated population are only indicative based on groups identified by NEM study and are presented at a high-level. There may be groups of population not listed in the table due to lack of data. Some of the occupations mentioned in the table may overlap with population across multiple groups in other phases.



04.

Recommendations by CDC to jurisdictions for vaccine preparedness



CDC had recently provided tentative guidelines to local jurisdictions on COVID-19 vaccine distribution preparedness should vaccines are ready for distribution beginning Quarter 4 of 2020. The guidelines call for planning for two vaccine candidates that either/both could possibly be approved under Emergency Use Authorization from FDA. Vaccine candidates may have different storage/handling/administration requirements. The vaccine allocation has to be planned and administered in such a way that each individual received two doses of same vaccine with the second dose administered after 21 to 28 days from the first dose receipt (varies based on the vaccine candidate) for immunity. Appropriate methods for reminding patients for the second dose would be required.

Since the vaccines must be provided to individuals within stipulated time frame based on different storage/handling requirements, CDC recommends that early vaccine should reach intended prioritized population with maximum efficiency as possible. Such population may include recommendations from the NEM study and could take account of local spread/cluster of COVID-19 incidences.

When vaccine becomes available, the jurisdictions may have to plan and prepare for ordering vaccines, real-time shipment of doses from the manufacturer, high vs. low demand scenarios, inventory reporting, provider reporting requirements, and vaccine safety monitoring.

COVID-19 and health care mobility: The last mile

To achieve herd immunity, at least 70 percent of the population needs to be vaccinated. Few effective strategies to vaccinate vulnerable population include providing free vaccination, deploying tiered distribution, establishing community vaccination clinics, and address any patient transportation barriers to COVID-19 immunization efforts.

Provide free vaccination

Successful vaccination campaigns always provide vaccinations for free. In the 1950s, the National Foundation for Infantile funded free polio vaccines for children.⁹ In 2009, the federal government provided H1N1 vaccine and related supplies for free to vaccination sites.¹⁰

Effective Distribution Strategy

The distribution strategy for COVID-19 vaccinations should complement the existing strategies for routine immunizations to ensure leveraging the current methodology and further strength the program in entirety. The federal government can distribute the vaccine to the states based on per capita basis.

With the limited supply of COVID-19 vaccine upon FDA approval, epidemiology should be a major factor in vaccine distribution decisions. For the state of Indiana, the first distributions of COVID-19 vaccine should be to sites that based on tiering criteria as described in the vulnerable population and vaccine distribution priorities in Indiana section.

For example, vaccines could be distributed to hospitals for tier 1; state health departments for tier 2; and providers and community vaccination clinics for tier 3. These sites must agree to follow the targeting guidelines and document vaccinations. If two doses are required, vaccinated individuals must return to the same site.

All of these distribution approaches require careful monitoring and evaluation to ensure the greatest impact.

Social determinants of health and behavior economics may also play a role in putting special effort for certain populations. Incarcerated individuals and the homeless are both at high risk of infection, transmission, and poor outcomes because of comorbidities and poor healthcare access. Native American populations that live on remote reservations will also require special effort to reach, as will migrant farm workers.³

Establish community vaccination clinics

Based on CDC estimates, the categories that comprise sample tiers 1 and 2 amount to about 26 million people. To achieve herd immunity in the US ~245 million (70%) people need to be vaccinated. Once the population of tiers 1 and 2 are vaccinated, that leaves ~219 million people who need access to a vaccine within a month of general availability. To accommodate this need, the health departments should partner with private sector and establish multiple community vaccination clinics.¹¹

05.

Transportation barriers to COVID-19 immunization efforts

As per the American Hospital Association, about 3.6 million people in the United States do not obtain medical care due to transportation issues.¹²

Potential transportation barriers for COVID-19 immunization efforts



TRANSPORTATION INFRASTRUCTURE

- » Limited availability and router
- » Overcrowding on trains or buses
- » Roads and transport stations in disrepair
- » Safety Issues



TRANSPORTATION COST

- » High cost of fares
- » Personal vehicle expenses such as insurance
- » Credit card or bank account requirements



VEHICLE ACCESS

- » Lack of a personal vehicle
- » Lack of access to a vehicle through friends or family



DISTANCE AND TIME BURDEN

- » Long travel distances and lengthy wait times
- » Erroneous or inconvenient time schedules

Many factors such as lack of vehicle access, inadequate infrastructure, long distances and lengthy times to reach clinics, and transportation costs play a role in suboptimal transportation. These transportation challenges affect rural and urban communities.¹² Rural environments may experience a higher burden of travel for health care when measured by distance and time traveled to meet their healthcare provider.¹³

Patients frequently identify transportation barriers as a major reason for missing health care appointments.¹⁴⁻¹⁶ Transportation challenges may be associated with lack of regular medical care, and missed medical appointments, particularly for those from lower economic backgrounds.^{14,17}

Missed appointments are associated with increased medical care costs for the patient, disruption of patient care and provider-patient relationships, delayed care and increased emergency department visits. One study estimates that the overall cost of each missed appointment to be over \$700 to the health care system resulting in costing the health system \$150 billion each year in the US.¹⁸

Patients are less likely to fill prescriptions if they experience transportation issues. According to one study, 65% of patients said transportation assistance would help with prescriptions fills after discharge. Studies have shown that restriction of Medicaid payments for transportation resulted in decreased prescription refills.^{14,17}

COVID-19 and health care mobility: The last mile

Non-emergency medical transportation services (NEMT) is an important benefit for people who need assistance getting to and from medical appointments. Medicaid covers rides for eligible individuals to and from the providers office, the hospital, or another medical office for Medicaid-approved care under NEMT benefit.¹⁹

Depending on an eligible individual's need, the ride might be by taxi, car, van, public bus, or a subway. They may also share the ride with others. The process to NEMT organized is simple with options for calling and online scheduling.

While NEMT services account for under 1% of healthcare spending, consistent transportation access to healthcare vastly enhances the health outcomes of members and leads to dramatic cost savings.



06.

Strategies for implementing efficient COVID-19 NEMT transportation for vulnerable populations in Indiana*

1. Expand partnerships to support addressing transportation issues. Collaborative strategies with government agencies, health providers, vaccination clinics, transportation authorities and private transportation providers can create new opportunities to improving efficiencies in COVID-19 immunization effort for the vulnerable population in Indiana
2. Use a screening tool to help identify eligible patients with transportation needs. Patients may be hesitant or may not mention transportation issues while taking vaccination appointments.
3. Educate staff about transportation issues. Knowledgeable staff who build trust and offer services in a respectful, culturally competent manner are key to successfully addressing patients' transportation issues
4. Promote transportation options and increase awareness through outreach. Partnerships with community-based organizations promote interest in shared mobility systems. Many eligible patients do not enroll or are not aware of transportation benefits provided by the state health authorities
5. Support or invest in programming or infrastructure to reduce travel for patients. Some areas have extremely limited travel options. It may be beneficial to bring programming or services to patients instead of patients traveling to providers and other services
6. Providing mobile clinics or direct transportation services through community partnerships or programs
7. Using technology, such as one stop portal for locating vaccination clinics, scheduling appointments, and transportation will ease transportation challenges. Call centers that cater to the same needs will help patients who are less technologically savvy

* Based on ideas proposed in American Hospital Association. Social Determinants of Health Series¹²

By making the commitment to address transportation barriers and building partnerships with community organizations and other entities, hospitals and health systems can improve transportation and timely COVID-19 immunization to eligible populations.

The CDC has provided interim recommendations for NEMT vehicles that may have transported passengers with suspected/confirmed COVID-19 patients.²⁰ People who are known or suspected to have COVID-19 may use non-emergency vehicle services, such as passenger vans, accessible vans, and cars, for transportation to receive essential medical care.

07.

Role of technology in bridging the gap for the last mile program (NEMT)

A COVID-19 immunization management platform can help state and local public health officials manage vaccine distribution and expedite vaccine administration for the vulnerable population in Indiana. The platform should be designed to help vaccination clinics, vaccine recipients, and state and local public health organizations. The platform should include the following features:

Vaccination clinics should enroll in the national COVID-19 vaccination program, make vaccination appointments available to patients, support scheduling, track

vaccination administration and reporting to state and local public health organizations, and manage inventory via a web-based application.

Vulnerable populations seeking vaccinations should be able to locate the vaccination clinic and schedule vaccination appointments, complete prescreening questionnaires to expedite appointments, receive text reminders for appointments and follow-up needs using a mobile device or web-based application

» NEMT scheduling for eligible population

» Call center features for non-technology savvy population

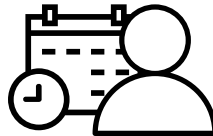
08.

The State of Indiana has successfully deployed the NEMT program to eligible patients using the **Enable Desk** platform developed by RADCube, A STLogics Company based in Carmel, Indiana.

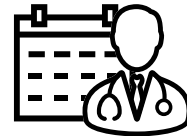
Some important features of the Enable Desk platform include



Eligibility check



Real-time patient
scheduling



Provider scheduling



Integration with call
center platform



Invoicing



Analytics

09.

Vaccination hesitancy: Mass educational campaigns to break the current beliefs

Availability of a FDA-approved COVID-19 vaccine does not guarantee its widespread acceptance. In an April 2020 survey of around 1000 adults representative of the U.S. population, Fisher et al., found that only 57.6% of participants (n = 571) intended to be vaccinated, 31.6% (n = 313) were not sure, and 10.8% (n = 107) did not intend to be vaccinated.²¹

Factors independently associated with reluctance to take COVID-19 vaccination included younger age, African-American population, lower educational attainment, and not having received the influenza vaccine in the prior year. Reasons for vaccine hesitancy included vaccine-specific concerns, a need for more information, antivaccine attitudes or beliefs, and a lack of trust.²¹

Other factors for vaccination hesitancy may include perceptions of problems with safety or efficacy of the vaccine, and distrustful of government or pharmaceutical companies.

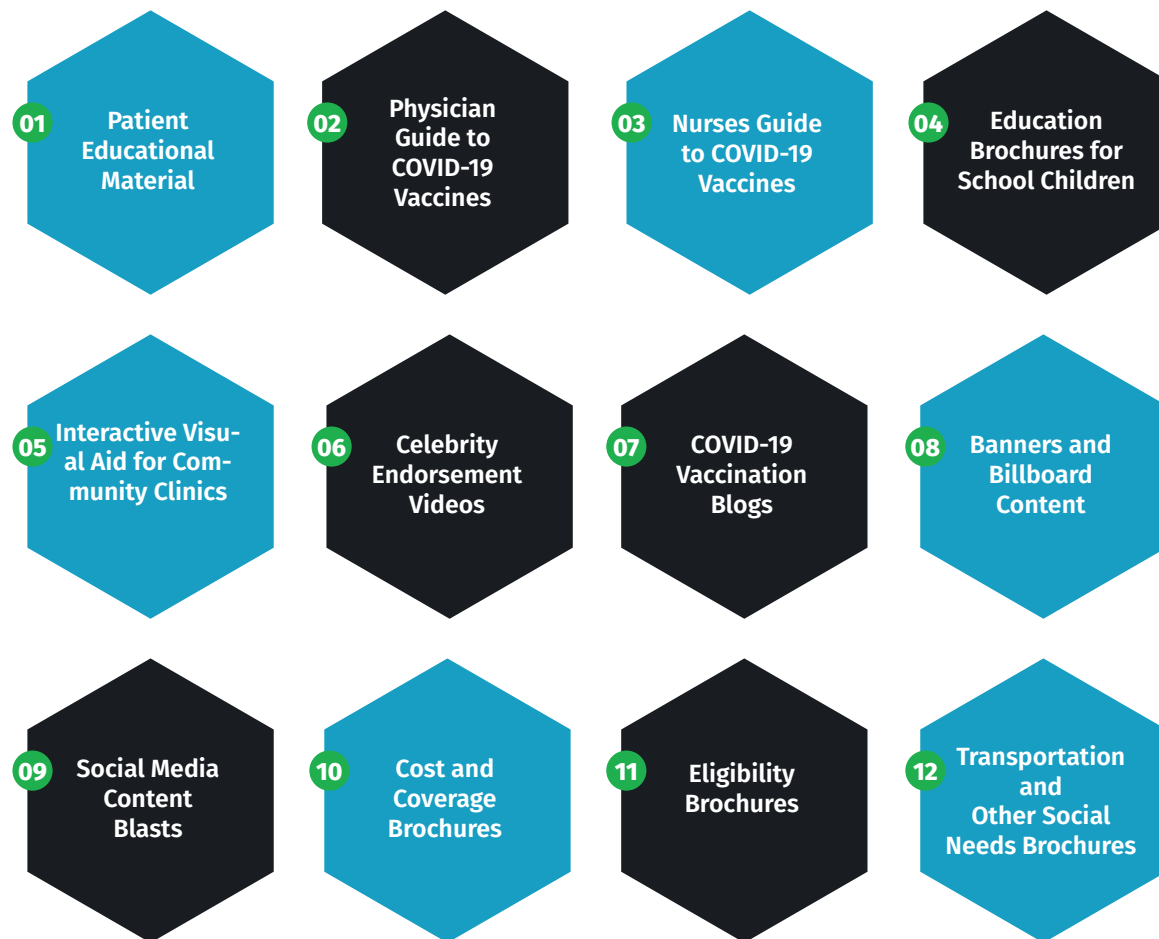
Some may believe the vaccine has not been adequately tested in fast-tracked into different phases of the clinical trials, and others may sense risk of contraction of COVID-19 at a vaccination site.

It will be very important to have a robust communications effort along with the vaccination campaign. Targeted and multichannel efforts will be needed to increase acceptance of a COVID-19 vaccine after their approval. State governments and local health organizations should regularly inform and educate the local communities about the status and availability of COVID-19 immunization services through mass campaigns. Communication should include information on Regular communication will help to reduce confusion and increase awareness on the need for COVID-19 immunization and prepare vulnerable US citizens for vaccinations.

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- » Purpose of immunization against SARS-CoV-2
 - » Efficacy and safety of COVID-19 vaccines
 - » Eligibility criteria for the vaccine
 - » Availability of the vaccine
 - » Location of vaccination clinics/community centers
 - » Precautionary measures at vaccination site
 - » Scheduling details
 - » Transportation requests to the vaccination sites

Using a forward-thinking communication methodology incorporating adult learning principles and strategic, insightful, and engaging educational narratives will help elicit positive behaviors and minimize vaccination hesitancy eventually leading to improved COVID-19 immunization rates.

COVID-19 Education Campaign Resources



Summary

There are many challenges ahead of the us to bring COVID-19 vaccination to the vulnerable population of Indiana. NEMT combined with a comprehensive technology platform can play a key role in bridging the gap between supply and demand for COVID-19 vaccinations especially in the last mile effort to get this population of Indiana vaccinated. Mass educational tactics on the benefits of COVID-19 vaccination should be consistently deployed to the population in order to curb the vaccination hesitancy and improve the overall acceptance rate.

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