Benefits and Implementation Considerations for Electronic Immunisation Registries (EIRs)

July 7, 2022

IHP
INSTITUTE FOR HEALTH POLICY

RESULTS FOR DEVELOPMENT

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Welcome & Introductions

Please type your **name, organization and country** in the chat section!

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Изменение языка синхронного перевода

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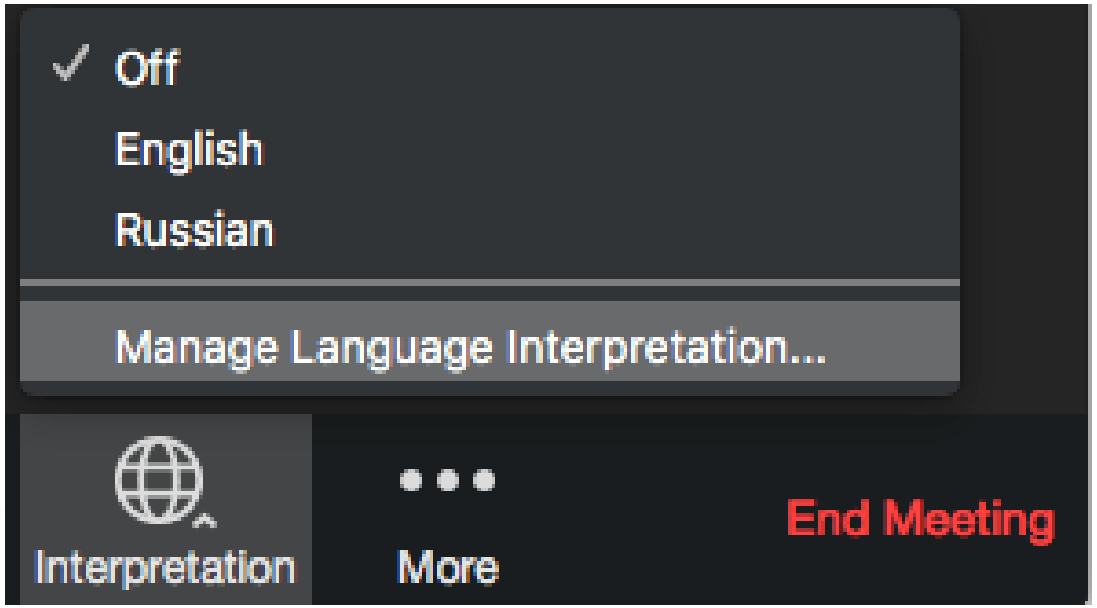

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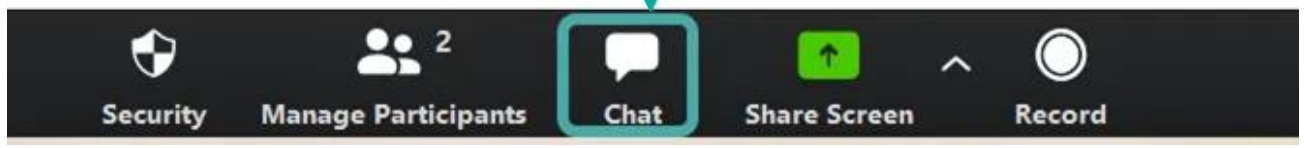

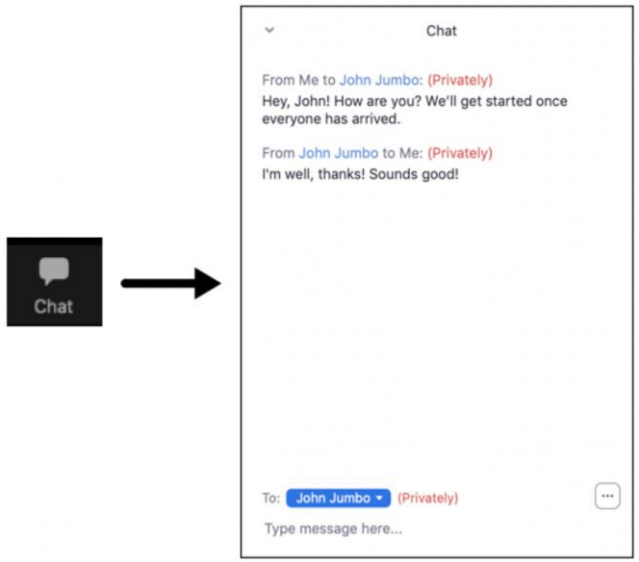

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About Linked

Gavi's collaborative learning network for middle-income countries

WHAT

Collaborative peer-learning and problem-solving network to support strong, sustainable immunisation programs

WHY

To help MICs prevent and mitigate backsliding in coverage & sustainably introduce key missing vaccines (HPV, Rota, PCV)

HOW

Action-oriented learning engagements and ongoing linkages with immunisation stakeholders at country and regional levels

Gavi The Vaccine Alliance

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RESULTS FOR DEVELOPMENT

- Former Gavi countries in South Asia Pacific (6), Euro and Central Asia (7), Latin America (5), Africa (1)
- Never Gavi countries TBA

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Agenda

- Use of Electronic Immunisation Registers to strengthen immunisation programs
  - Q&A
- Vietnam's experience using EIRs for routine & COVID-19 vaccinations
  - Q&A
- Bhutan's experience using a COVID-19 registry
  - Q&A
- Closing remarks

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Learning Objectives

1. To describe EIRs and their potential benefits to routine immunisation programs.
2. To learn from countries that have utilized EIRs for both routine and COVID-19 vaccination about their transition from paper-based systems and their EIR evolution over time.
3. To identify implementation challenges for EIRs (finance, design, technical, training).
4. To understand barriers and challenges to adoption in countries that do not have EIRs.

Use of Electronic Immunisation Registers to strengthen immunisation programs

- A/Prof Meru Sheel
- Sydney School of Public Health
- University of Sydney
- e: meru.sheel@sydney.edu.au
- @merusheel

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THE UNIVERSITY OF SYDNEY

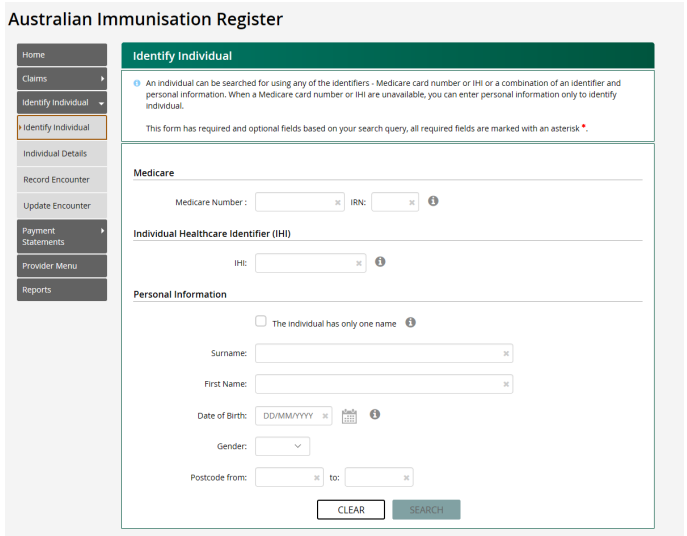
Scholars | Westpac Research Fellow

Outline

1. Electronic immunisation registries (EIRs) and immunisation information systems
   - Health Information Management Systems
2. Usefulness of EIRs in strengthening immunisation programs
   - Individual level
   - Population level
3. Considerations for implementation

Electronic immunization registries (EIRs)

- Tools that facilitate the monitoring of individual immunization schedules and the storage of individual immunization histories, and, consequently, help enhance the performance immunisation program.
- Immunisation registries can also be paper-based and non-individual



Paper-based registry maintained by Tonga Ministry of Health since 1970s

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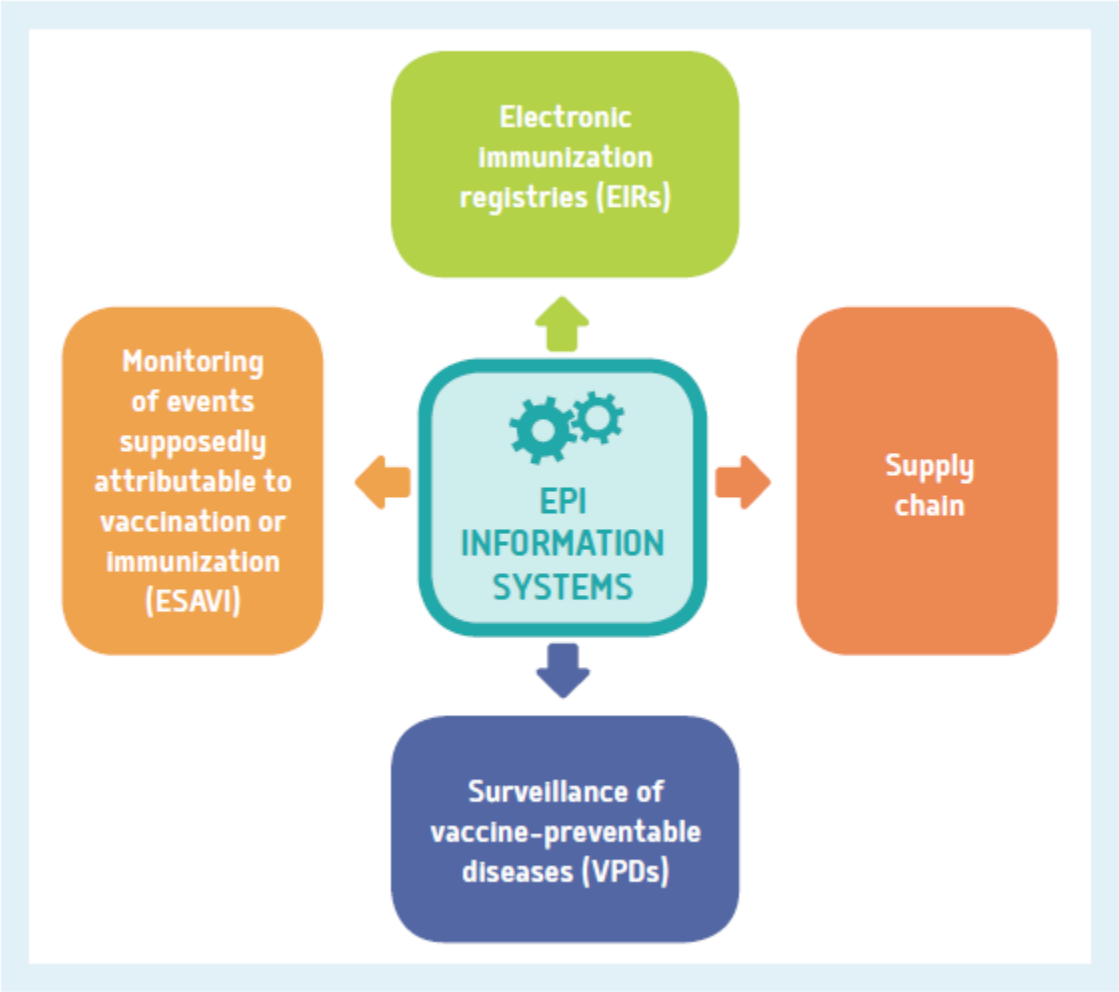
Immunisation information systems (IIS)

- Produce information that will guide the strategic, managerial, and operational decisions of the EPI within each country.



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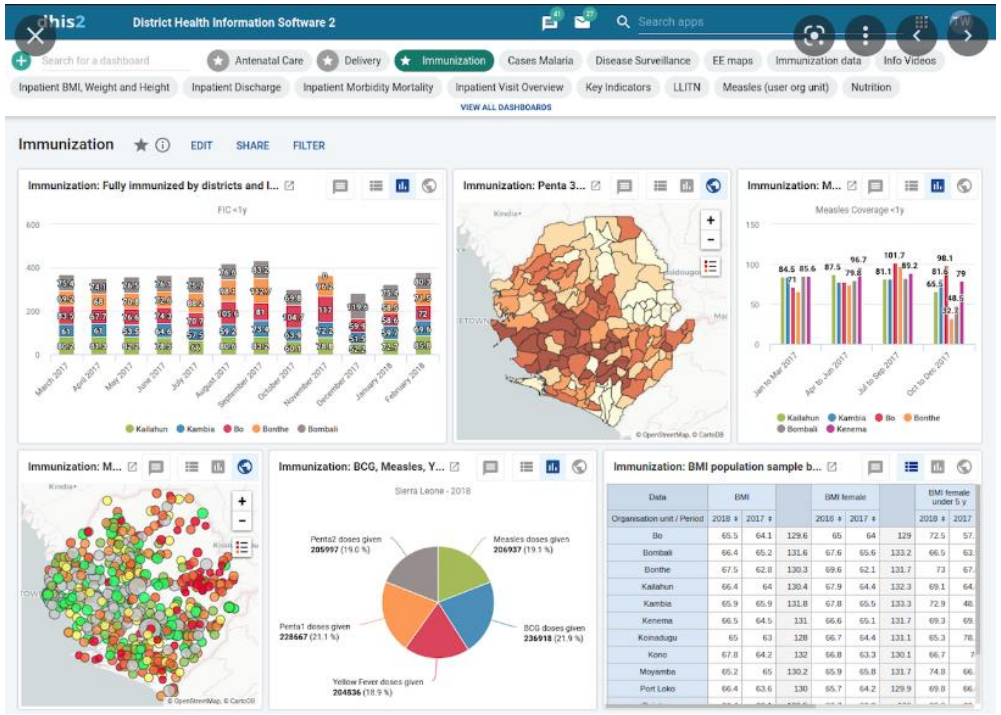
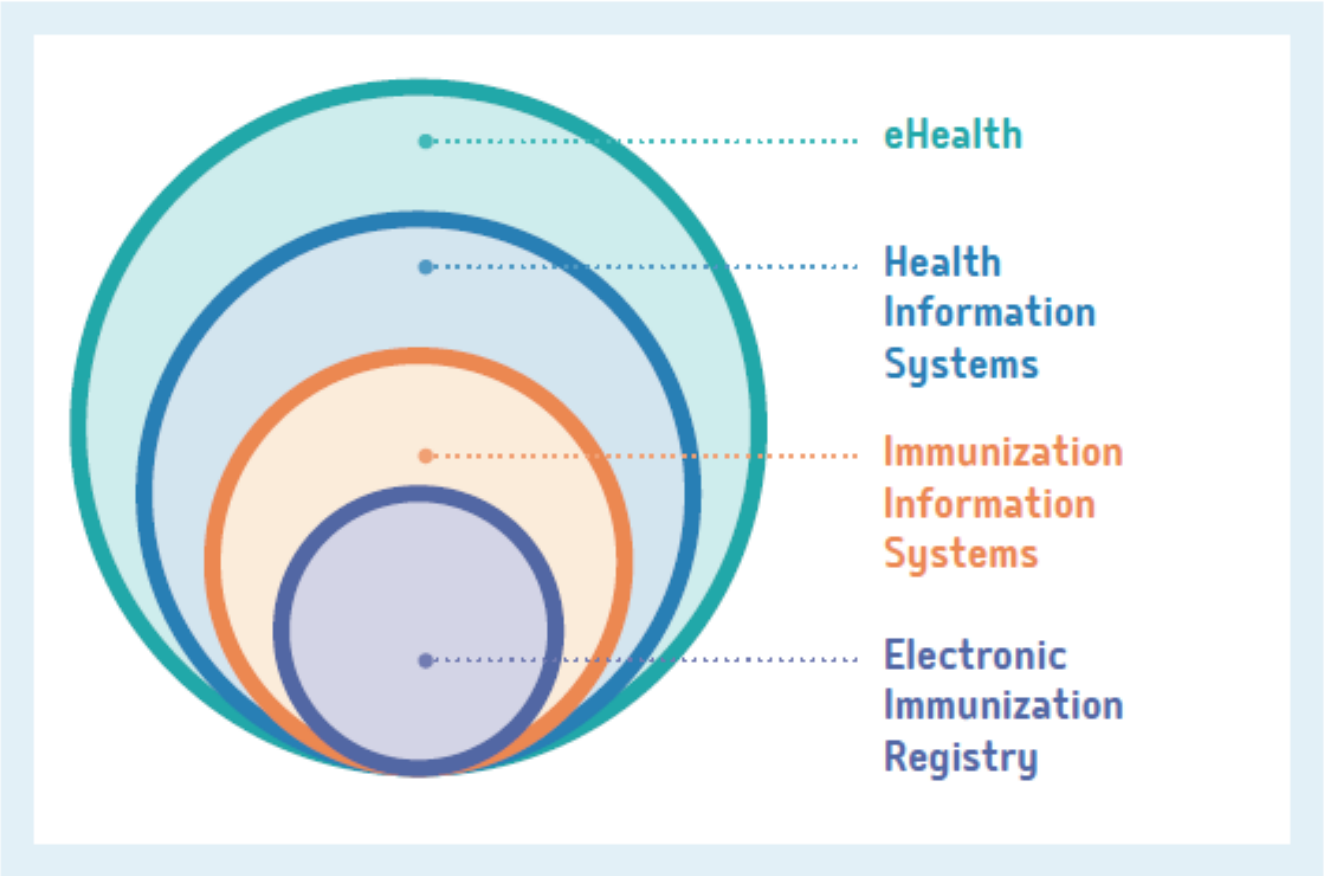
Health information systems (HIS)

- Tool for collection, processing, analysis, and transmission of information required for organizing and operating health services

- Provide useful, high-quality data in a timely fashion. Improvements in health information systems arise from the changing information needs of programs, sectors, users, and the population.



Inter-relationships among HIS and IIS



Pan American Health Organization. Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation. Washington, D.C.: PAHO; 2017.

Do you have an immunisation registry in your area/ country?

How can EIRs be used?

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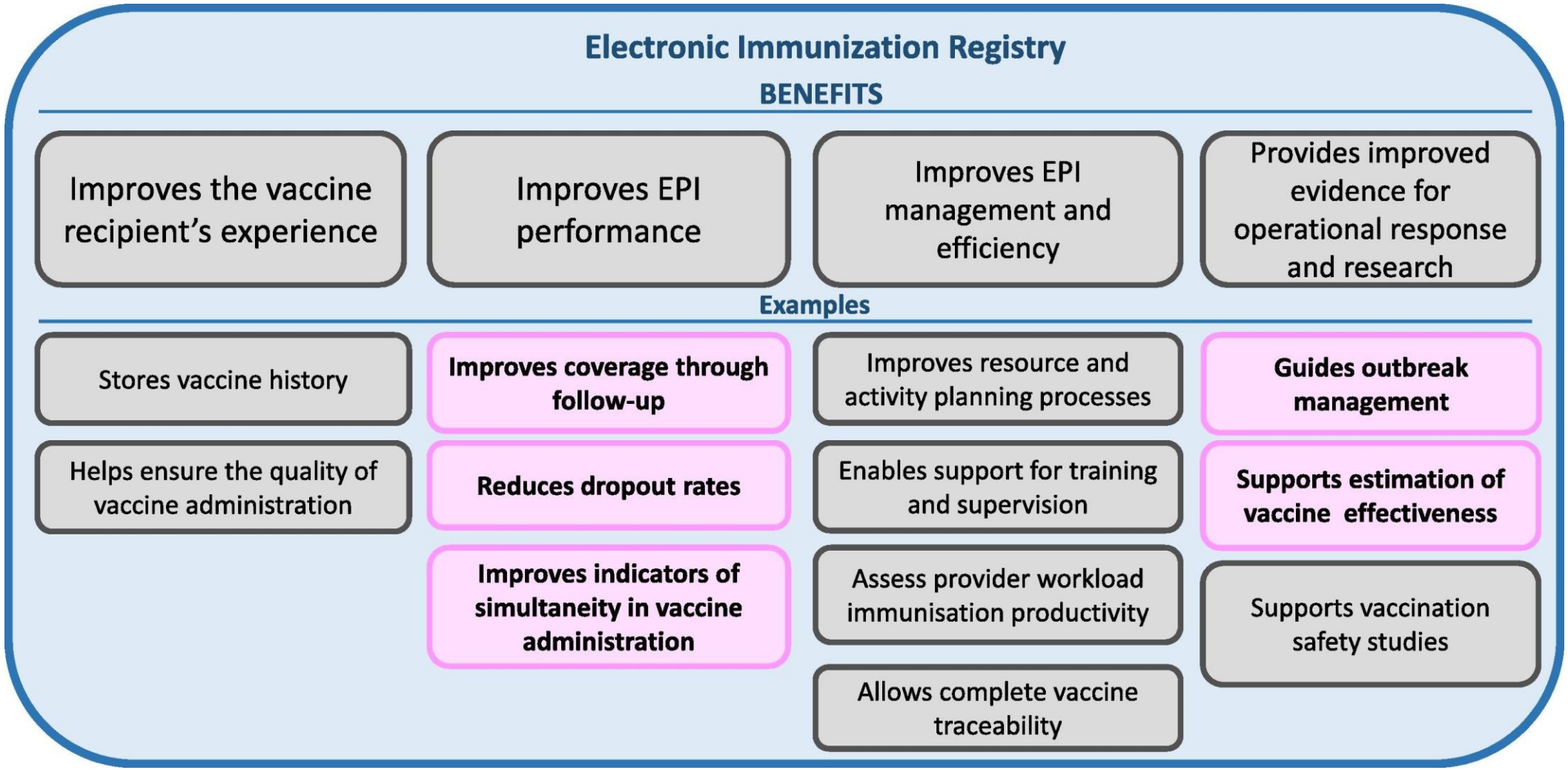

Sheel et al, Vaccine, 2020, Electronic immunization registers – A tool for mitigating outbreaks of vaccine-preventable diseases in the Pacific

Australian Immunisation Register

- Established 1996 – childhood vaccines <7 years
- Maintained by Services Australia on behalf of Australian Government Department of Health
- Jan 2016 – expanded to age 19 years
- Oct 2016 – expanded to include all ages
- 2018 – National HPV vaccine register data transferred to AIR

Australian Childhood Immunisation Register (ACIR)

Identifying and definitional attributes

Item type: ⓘ	Data Source
Description: ⓘ	The Australian Childhood Immunisation Register (ACIR) is a national register administered by Medicare Australia that records details of vaccinations given to children under seven years of age who live in Australia. It was established in 1996 in response to a decline in childhood immunisation levels and an increase in preventable childhood diseases.
Link to data source: ⓘ	http://www.humanservices.gov.au/customer/services/medicare/australian-childhood-immunisation-register

National Immunisation Program
A joint Australian, State and Territory Government Initiative

Australian Immunisation Register (AIR)

Slide courtesy: A/Prof Frank Beard

How does AIR work?

- Anyone Medicare-registered automatically added and assigned PIN
- If not Medicare-registered but vaccination reported assigned SIN
- Overseas vaccinations can also be added
- Limited data fields
  - Vaccine, dose number, date
  - Age, sex, Indigenous status, postcode of residence
  - Provider type
  - Exemptions (validated by authorised providers)
- But Medicare number is not a unique ID…

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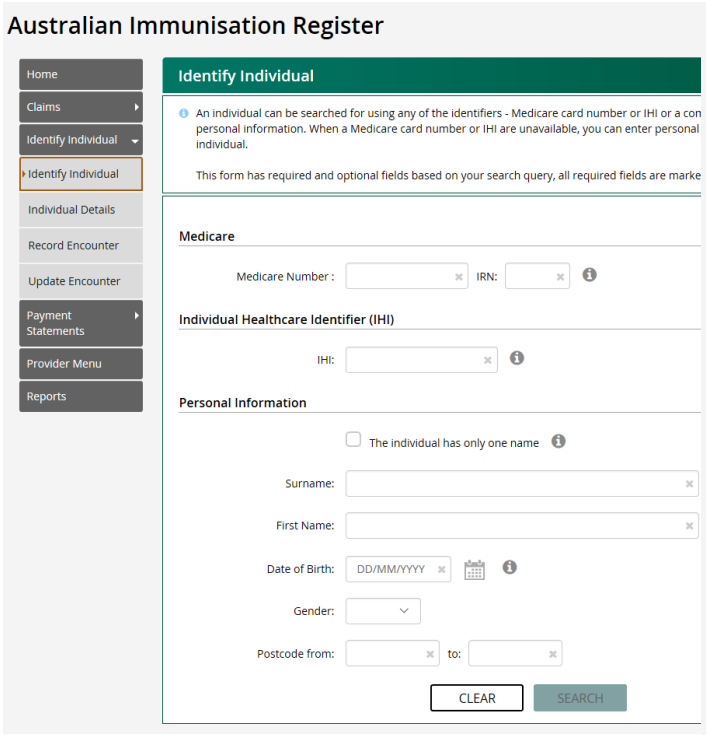
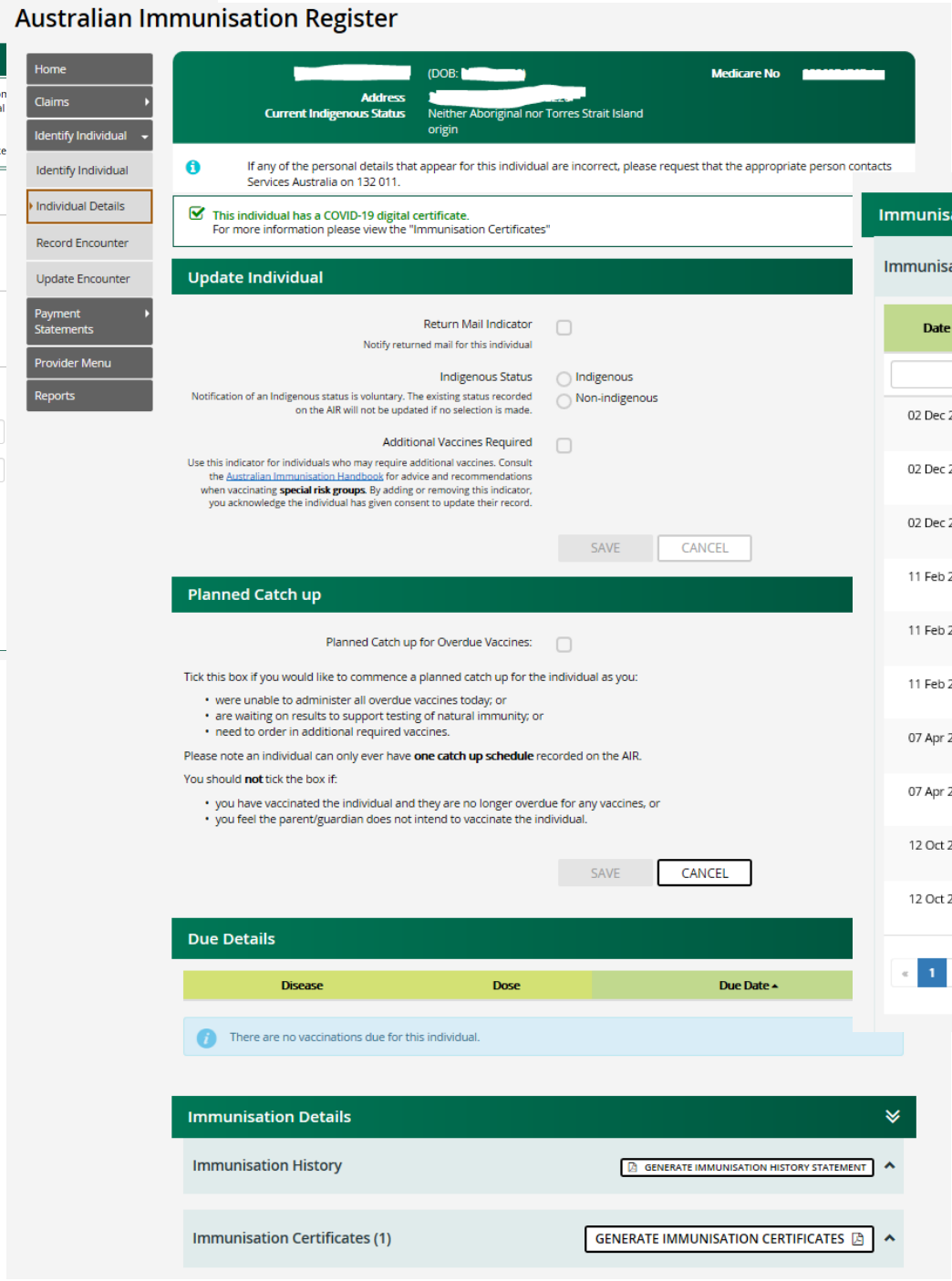
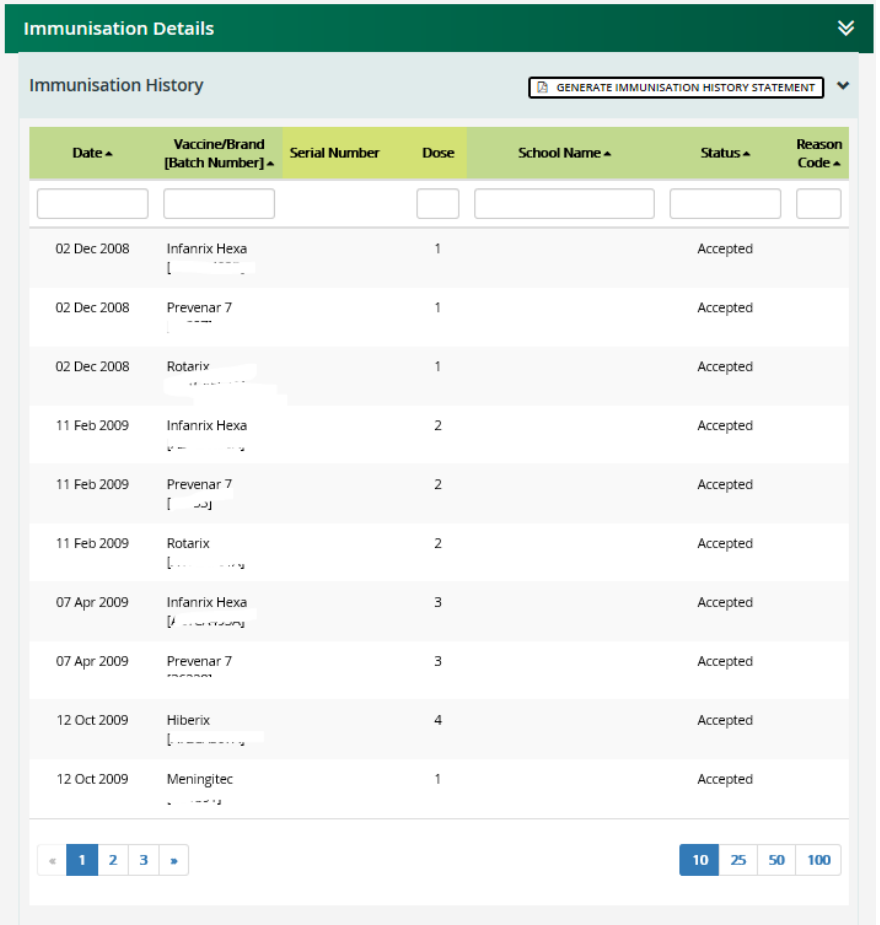
Slide courtesy: A/Prof Frank Beard
https://www.health.gov.au/sites/default/files/documents/2021/05/australian-immunisation-register-fact-sheet.pdf

Individual level follow-up

- Compliance with vaccination schedule
- Reminder for those who maybe overdue (eg SMS)
- Safety monitoring for individuals
- Vaccine certificates (eg COVID-19 vaccine certificate)
- Immunisation history statement (eg for school entry program)





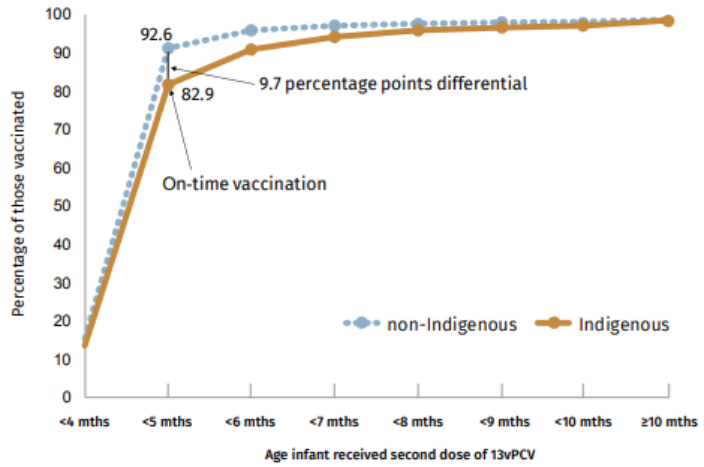


Courtesy: Lauren Dalton

Program evaluation for population impact

Coverage

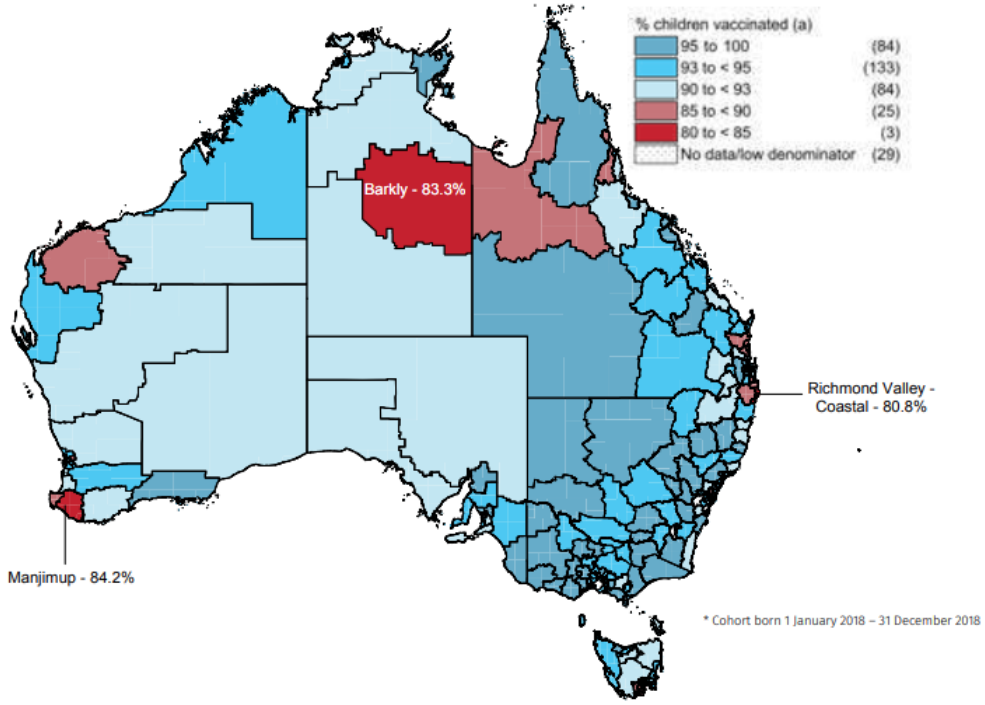
Figure 6: Cumulative percentage of infants vaccinated with the second dose of 13vPCV* by age in months and Indigenous status, Australia, 2020



* Shown as cumulative percentage vaccinated (number of infants who received vaccine dose at particular age / total number of infants who received the vaccine dose, expressed as a percentage).
13vPCV = 13-valent pneumococcal conjugate vaccine
Cohort born in 2019.
Source: Australian Immunisation Register, data as at 31 March 2021.

https://ncirs.org.au/our-work/vaccine-coverage

Figure 11. Coverage of 4 doses of diphtheria-tetanus-acellular pertussis (DTPa)-containing vaccine at 24 months of age* by Statistical Area 3, Australia and major capital cities, 2020



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Program evaluation for population impact

Coverage using administrative and survey methods

Routine administrative method

Advantages:

- Based on data necessary for service provision Timely management monitoring tool
- Provides data at local level

Disadvantage / Limitations :

- Denominator (target population may be projected based on old/poor census data)
- Transcription or calculation errors
- Incomplete reporting
- May include vaccination conducted outside the target group
- May not include private sector

Survey method

Advantages:

- Estimate of coverage can be obtained if the denominator is unknown.
- Provides additional information on social economical status, maternal characteristics, sex, etc of reached and unreached children
- Vaccinations given by the private sector reflected
- Allows assessing timeliness (among those with cards)

Disadvantage / Limitations:

- Bias – selection, information and sampling error
  - Provides information on the previous birth year's cohort.
  - Immunization card availability and quality
  - Reliance on recall in absence of card
  - Representativeness
- Interviewer interaction
- Length or complexity of the questionnaire may compromise accuracy
- Resource intensive

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Cutts et al 2016 Vaccine. https://pubmed.ncbi.nlm.nih.gov/27349841/
Adapted from WHO, Dr Jan Grevendonk

Program evaluation for population impact

Tailored immunisation programs

ELSEVIER

Vaccine

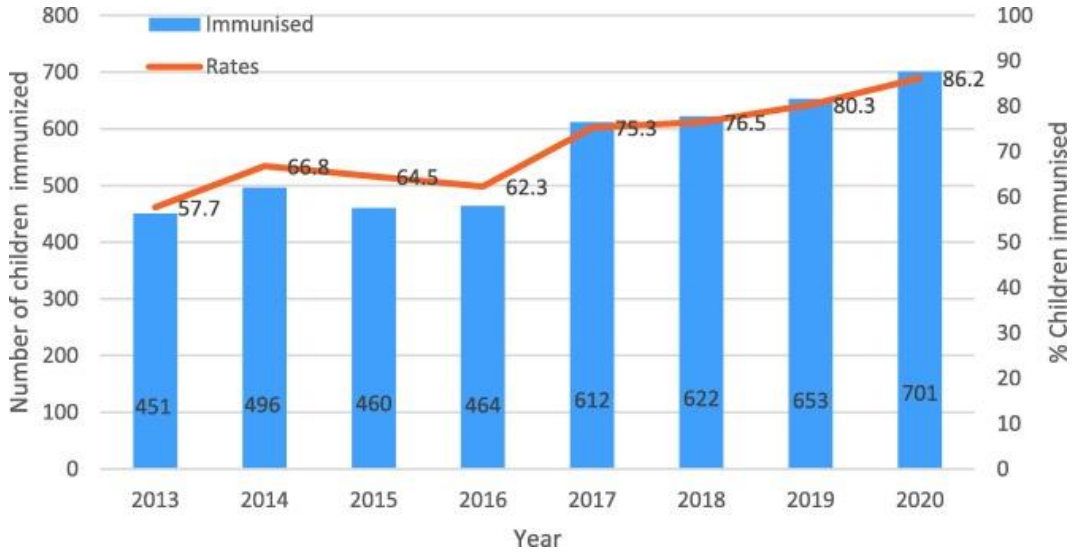
Volume 40, Issue 1, 3 January 2022, Pages 18-20

Short communication

Improved childhood immunization coverage using the World Health Organization's Tailoring Immunization Programmes guide (TIP) in a regional centre in Australia

Susan Thomas [a], David Durrheim [a, b], Fakhrul Islam [b], Helen Hig

Show more



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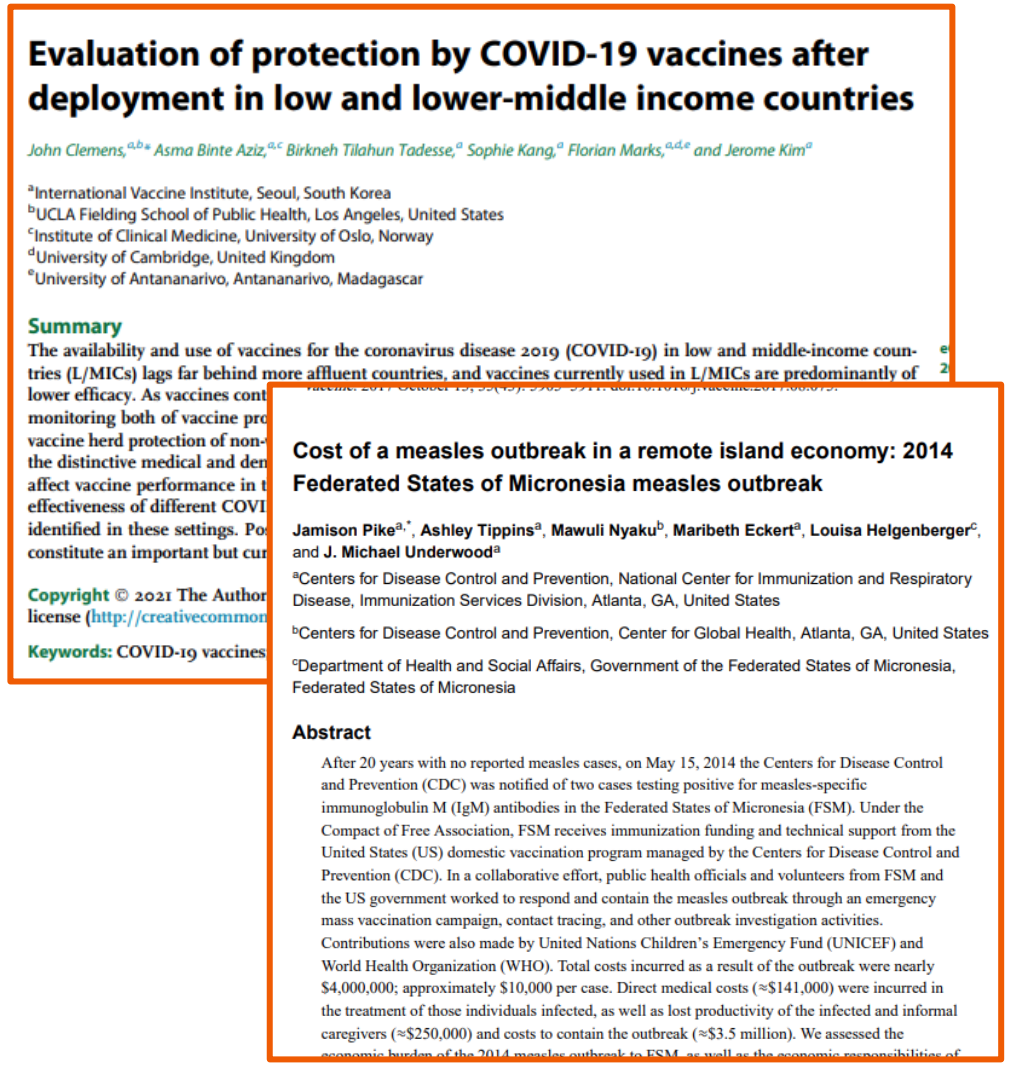
See Thomas et al 2022 Vaccine.
https://www.sciencedirect.com/science/article/pii/S0264410X21015413?via%3Dihub

Program evaluation for population impact

Effectiveness

- Vaccine effectiveness
  - Needs individual vaccine data linked to disease outcome data
  - Context-specific data
  - Builds program confidence
- Cost-effectiveness
- Efficiency, outbreak response

- Adverse events monitoring



Evaluation of protection by COVID-19 vaccines after deployment in low and lower-middle income countries

John Clemens,[a,b,*] Asma Binte Aziz,[a,c] Birkneh Tilahun Tadesse,[a] Sophie Kang,[a] Florian Marks,[a,d,e] and Jerome Kim[a]

[a]International Vaccine Institute, Seoul, South Korea
[b]UCLA Fielding School of Public Health, Los Angeles, United States
[c]Institute of Clinical Medicine, University of Oslo, Norway
[d]University of Cambridge, United Kingdom
[e]University of Antananarivo, Antananarivo, Madagascar

Summary

The availability and use of vaccines for the coronavirus disease 2019 (COVID-19) in low and middle-income countries (L/MICs) lags far behind more affluent countries, and vaccines currently used in L/MICs are predominantly of lower efficacy. As vaccines cont
monitoring both of vaccine pro
vaccine herd protection of non-
the distinctive medical and den
affect vaccine performance in t
effectiveness of different COVI
identified in these settings. Po
constitute an important but cur

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Keywords: COVID-19 vaccines

Cost of a measles outbreak in a remote island economy: 2014 Federated States of Micronesia measles outbreak

Jamison Pike[a,*], Ashley Tippins[a], Mawuli Nyaku[b], Maribeth Eckert[a], Louisa Helgenberger[c], and J. Michael Underwood[a]

[a]Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Disease, Immunization Services Division, Atlanta, GA, United States

[b]Centers for Disease Control and Prevention, Center for Global Health, Atlanta, GA, United States

[c]Department of Health and Social Affairs, Government of the Federated States of Micronesia, Federated States of Micronesia

Abstract

After 20 years with no reported measles cases, on May 15, 2014 the Centers for Disease Control and Prevention (CDC) was notified of two cases testing positive for measles-specific immunoglobulin M (IgM) antibodies in the Federated States of Micronesia (FSM). Under the Compact of Free Association, FSM receives immunization funding and technical support from the United States (US) domestic vaccination program managed by the Centers for Disease Control and Prevention (CDC). In a collaborative effort, public health officials and volunteers from FSM and the US government worked to respond and contain the measles outbreak through an emergency mass vaccination campaign, contact tracing, and other outbreak investigation activities. Contributions were also made by United Nations Children's Emergency Fund (UNICEF) and World Health Organization (WHO). Total costs incurred as a result of the outbreak were nearly $4,000,000; approximately $10,000 per case. Direct medical costs (≈$141,000) were incurred in the treatment of those individuals infected, as well as lost productivity of the infected and informal caregivers (≈$250,000) and costs to contain the outbreak (≈$3.5 million). We assessed the

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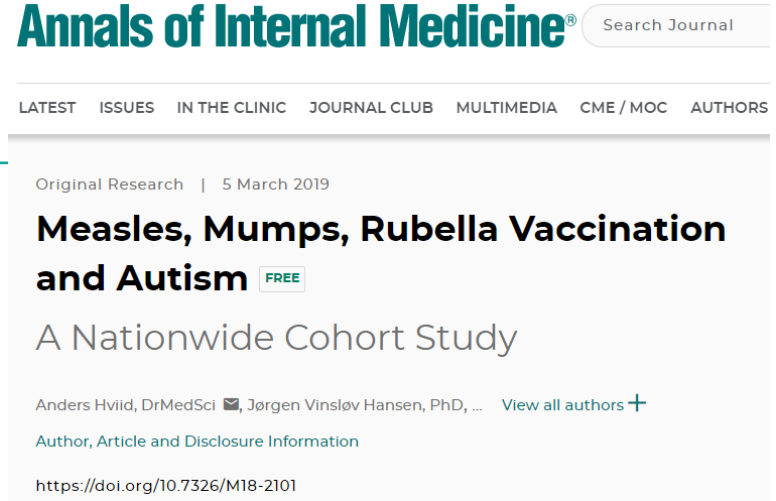
https://www.gavi.org/vaccineswork/what-difference-between-efficacy-and-effectiveness
Clemens et al, 2022, https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00534-4/fulltext

Norway and Denmark

- One of the most advanced
- Unique identifier
- Norwegian SYSVAK (established 1995)
- Danish vaccination register (established 2013)
- Based on unique PIN issued at birth or immigration
- Facilitates linkage to other national health registers
- Eg MMR/autism cohort study (660,000 children) linking data on autism diagnoses and risk factors



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Slide courtesy: A/Prof Frank Beard
Immunisation registries in Europe and Elsewhere:
https://www.eurosurveillance.org/upload/site-assets/imgs/Immunisation%20registers%20in%20Europe%20and%20elsewhere.pdf

Observational data from Tanzania

- Potential to add value to immunization stakeholders at all levels of the health system.
- Individual-level data can enable new analyses to understand service delivery or care-seeking patterns, potential risk factors for under-immunization, and where challenges occur.
- To achieve this potential, country programs need to leverage and strengthen the capacity to collect, analyze, interpret, and act on the data.

Published on 21.1.2022 in Vol 8, No 1 (2022): January

Preprints (earlier versions) of this paper are available at https://preprints.jmir.org/preprint/32455, first published July 29, 2021.

Added Value of Electronic Immunization Registries in Low- and Middle-Income Countries: Observational Case Study in Tanzania

Andrew M Secor [1]; Hassan Mtenga [2]; John Richard [2]; Ngwegwe Bulula [3]; Ellen Ferriss [1]; Mansi Rathod [1]; Tove K Ryman [4]; Laurie Werner [1]; Emily Carnahan [1]

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Secor et al, 2022,https://publichealth.jmir.org/2022/1/e32455

How do you use ?
- individual data
- aggregated data

Considerations for implementation

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To make the most of new EIRs….

- Unique identifier
  - Denmark, Norway, New Zealand
- Clinical decision support systems to aid medical practitioners and improve individual experience Population denominator
- Data quality
  - Incomplete reporting and timeliness
  - Audit of the Australian Register
  - Mandated through COVID-19 in Australia
- All-of-life esp in the context of COVID-19 vaccines

To make the most of new EIRs….

- Alignment with other components of immunisation information systems
  - VPD surveillance, notification, hospitalisation, deaths
- Real-time data analyses
- Interaction with electronic medical records/ 2-way interactive platform
- Resource allocation – hardware, software and human resources for data quality
- Data governance and privacy

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Conclusions

- EIRs and Immunisation Information Systems can **improve vaccine coverage** and strengthening immunisation programs
- Data can enable **data-drive decision making**
- Strengthen immunisation information systems
- For settings where COVID-19 registries have been established, **program and process evaluation** can help with integration – don't waste a crisis!
- **EIRs take a long time to mature** - ensure resource allocation

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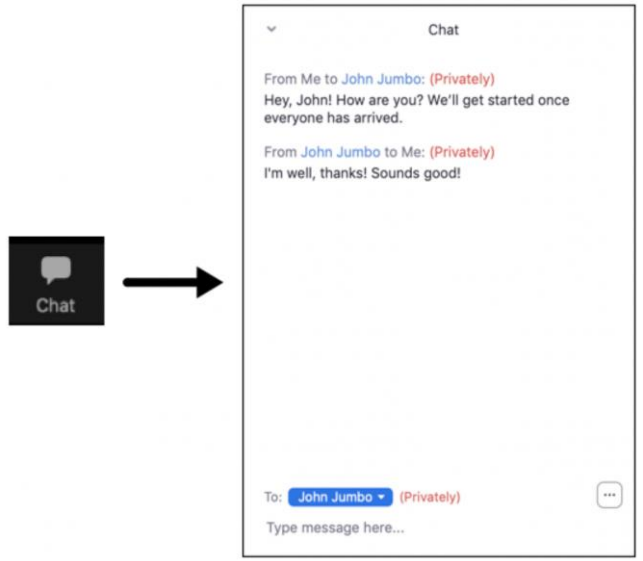
Q&A session

Please type your question in the chat



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Vietnam's experience of using EIRs for routine & COVID-19 vaccinations

Mr. Sang Dao Dinh, MPH
IDEAL-Vietnam Team Lead
PATH, Vietnam

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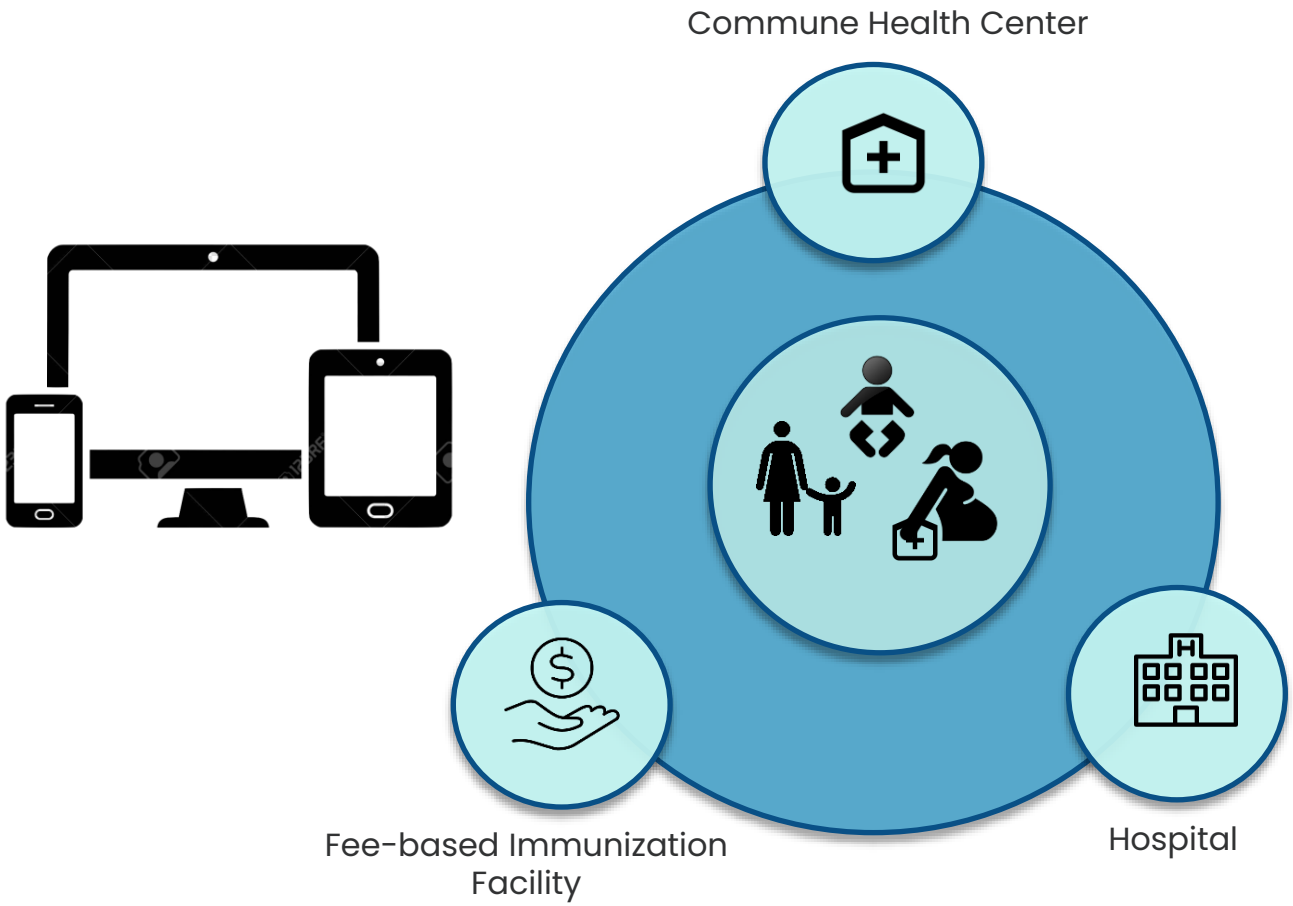
System main functions: Immunization Registry Module




Barcode Scan

SMS Reminder


Immunization Tracker & Planning


Dashboard and reports


E-Immunization Card

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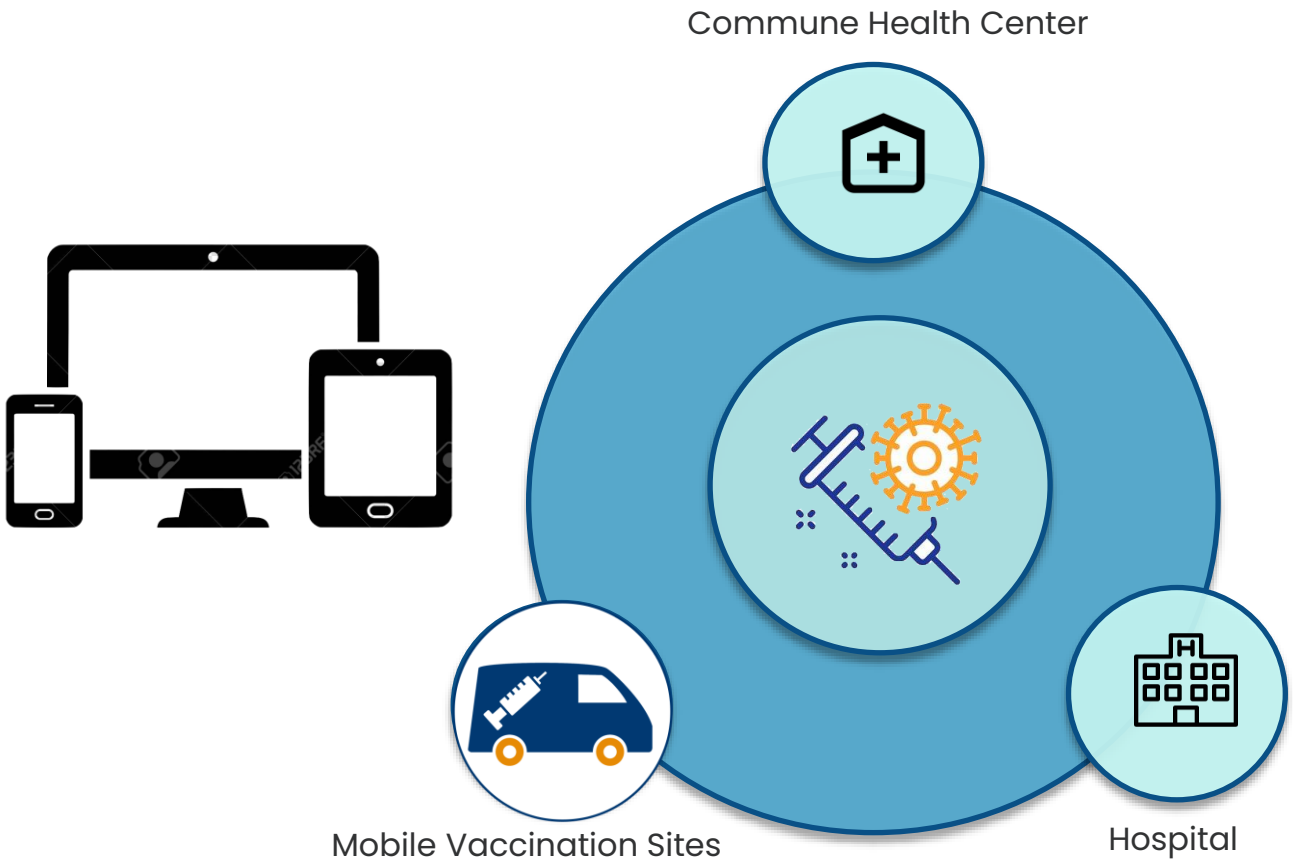
EIR System cloned for COVID-19 vaccination



Barcode Scan

SMS Reminder

Immunization Tracker & Planning

Dashboard and reports

PC-Covid

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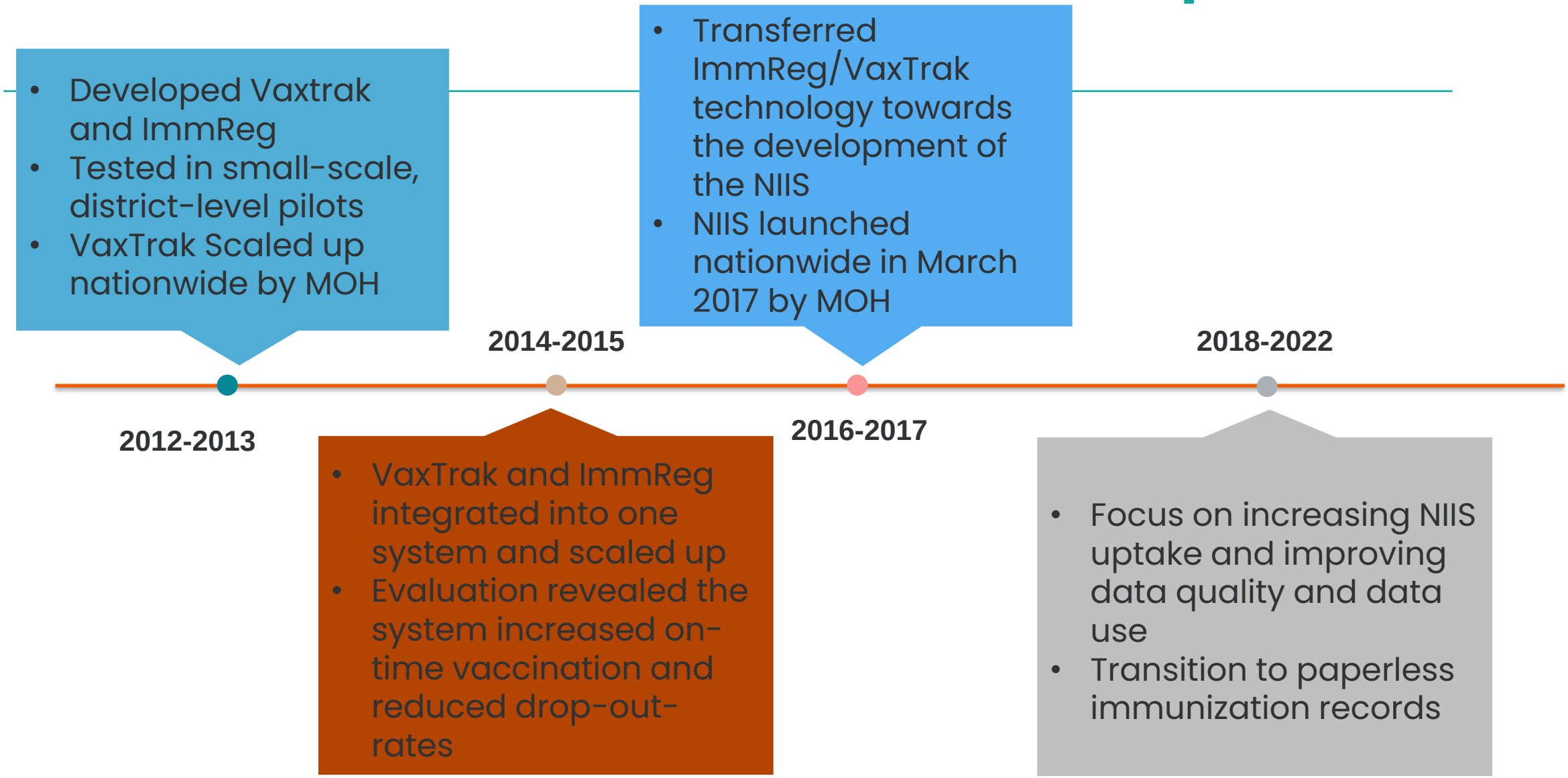
Timeline of the EIR introduction and scale-up in Vietnam



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Facilitators and Barriers

mHealth Assessment and Planning for Scale

1. GROUNDWORK	The initial steps of specifying the key components of the project's approach to scaling up, assessing relevant contextual influences, and taking stock of the scientific basis for the product
2. PARTNERSHIPS	Collaborations with external groups to support the process of scaling up, including strategies for identifying, developing and sustaining fruitful partnerships
3. FINANCIAL HEALTH	The projection of scale-up costs, and the development of a financial plan for securing and managing funds over the long term
4. TECHNOLOGY & ARCHITECTURE	Steps taken to optimize the mHealth product for scaling up based on its anticipated user base, purpose, integration with information systems and compatibility with other components of the information systems architecture
5. OPERATIONS	Organizational and programmatic measures for supporting the implementation, use and maintenance of the product throughout the scaling-up process
6. MONITORING & EVALUATION	Decisions and activities that enable effective process monitoring and in-depth outcome evaluation, based on project and stakeholder need

*MAPS Toolkit: mHealth Assessment and Planning for Scale. Geneva: World Health Organization; 2015

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Groundwork/ Partnerships

Facilitators	Barriers
• Landscape Assessment • Business model framework • Small-scale pilots • Government commitment and priorities • Foundational guidelines • Costing analysis • Support from government partners • Formation of technical working group • Partnership with technology expert as a service provider	• Time • Poor infrastructure • Lack of foundational national policies • Cost of national scale-up underestimated • Population growth was not factored in • Time/learning curve • Lack of initial formal contracts

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Technology

Facilitators	Barriers
• Mobile Network Operator capabilities • Sustainable technical leadership • End-user feasibility and feedback • Data security and quality • Not a handover software • API	• Lack of national ID • Large data • Fee-based and private facilities

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Operations and Monitoring & Evaluation

Facilitators	Barriers
• ToT as a sustainable method for training large audience • Training support from PATH • Training provincial and district staff provided sustainable layers of technical support • Technical support well planned for long-term sustainability • Input data used to determine supervision priorities • M&E framework was developed at an early stage	• More time needed for ToT training than anticipated • Lack of funding for EIR-specific supervision visits • Supervisors do not have enough time to prioritize the NIIS supervision • SOPs for supportive supervision pre- and post- training not developed • Few resources are available for monitoring • Inconsistent data quality remains an issue

Lessons learnt

Phase 1: System Design and Development

- Form TWG
- Conduct Landscape Assessment
- Develop User Requirement Document: User-center Approach
- Select and collaborate with appropriate MNO
- Develop System Technical Specification document: follow both national and global standard
- Develop Detailed Testing Plan to evaluate functions carefully

Phase 2: Small Pilot

- Continue maintain and strengthen roles of TWG
- Pilot in small sites
- Mobilize resources from international organizations
- Advocate and engage the involvement and commitment of authorities at levels from the beginning
- Sufficient timeline for piloting to provide meaningful evaluation
- Develop the implementation guideline and necessary SOPs
- Capture lessons learnt and challenges during the pilot
- Conduct Cost Analysis for Scale-up

Phase 3: Nationwide Scale-up

- Continue maintain and strengthen roles of TWG
  - Develop planning and roadmap for the implementation
  - Develop and issue regulations/policies related to the implementation of the system
- Update and Upgrade the system
  - Maintain the partnership with MNO to update/upgrade the system on time to meet the requirements of end-users, changes of policy.
- Develop the guidelines and SOPs
  - The implementation guideline
  - The guideline on data quality and data use
  - Necessary SOPs

Phase 3: Nationwide Scale-up (Cont.)

- Prepare infrastructures and equipment:
  - Internet connectivity
  - Computers, printers, barcode reader
- Capacity building for health workers at levels
  - Conduct TOT trainings
  - Conduct Cascade trainings with multiple approaches such as on-site training, virtual training and e-learning

Phase 3: Nationwide Scale-up (Cont.)

- Mobilize resources
  - Local budget
  - Support from international organizations
  - Resources from local enterprises
- Monitoring and technical support
  - Develop monitoring and evaluation framework
  - Strengthen technical support from the beginning of the implementation
  - Use multiple approaches for technical support: on-site and virtual

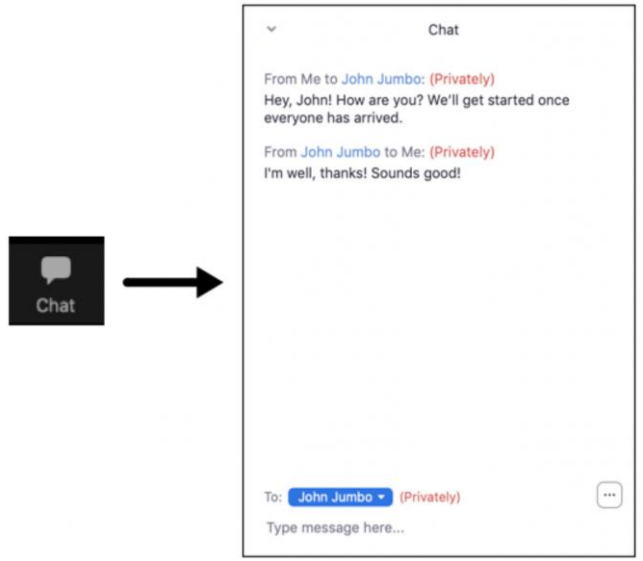
Phase 4: Transition to paperless

- Strengthen commitment of local authority
- Ensure the system operate stably and inter-operably with other systems
- Mobilize and engage the involvement of the hospitals and fee-based-immunization facilities
- Improve data quality and cultivate data use skills for health workers
- Develop and issue guidance and regulations related to the transition to paperless system/retirement of the paper-system

Thank you

Q&A session

Please type your question in the chat



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Bhutan's experience of using COVID-19 registries

Mr. Garab Dorji
Chief ICT Officer
ICT Division, Ministry of Health, Bhutan

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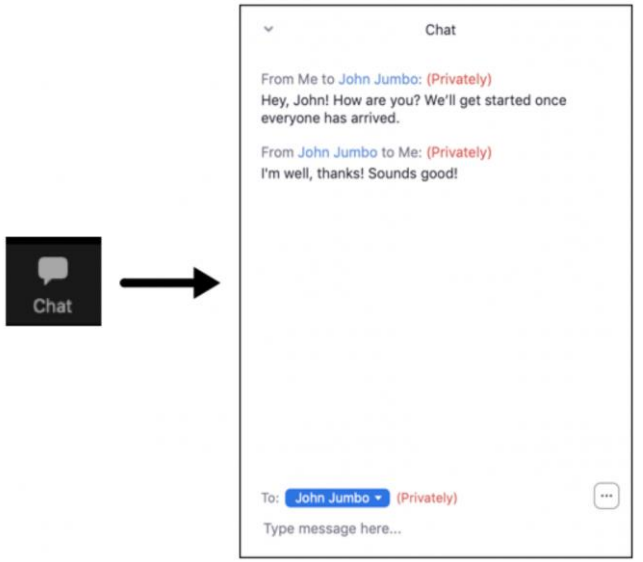
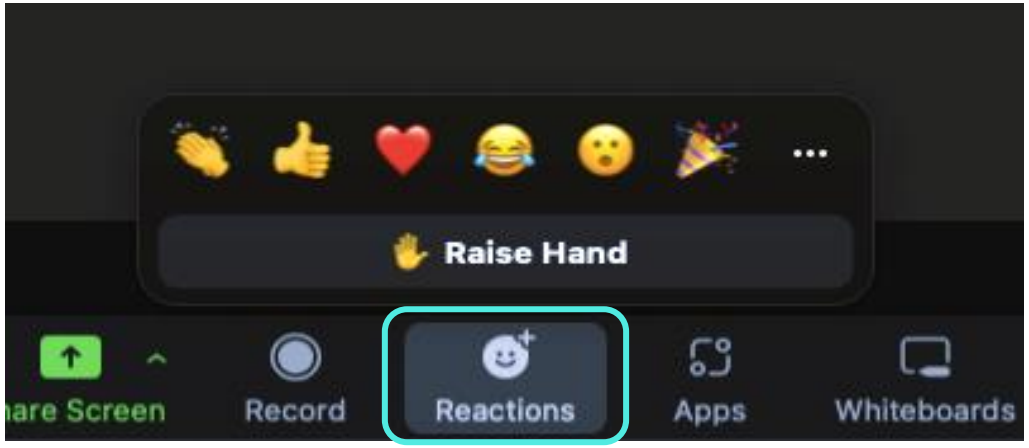
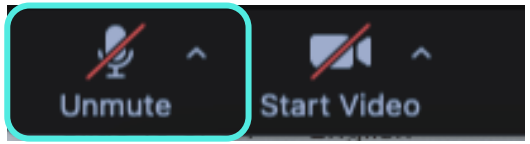
Q&A session

Please type your question in the chat raise your hand







Linked Immunisation Action Network

Feedback survey

Please let us know what you think about this learning engagement & how we can improve us next time!

Closing remarks

Mrs. Hashta Meyta
Head Secretariat for coordination and integration of the Gavi Immunization Program
Ministry of Health, Republic of Indonesia
Linked Steering Committee Member

Linked Immunisation Action Network

Thank you!

IHP
INSTITUTE FOR HEALTH POLICY

RESULTS FOR DEVELOPMENT

Linked Immunisation Action Network

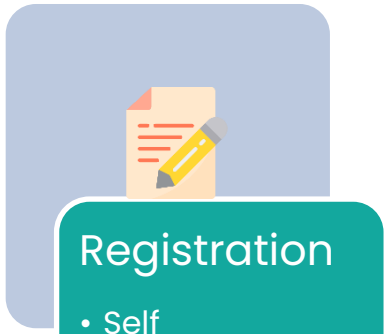
Annexure

Linked Immunisation Action Network

EXTRA SLIDES – Bhutan

Linked Immunisation Action Network

Vaccination System

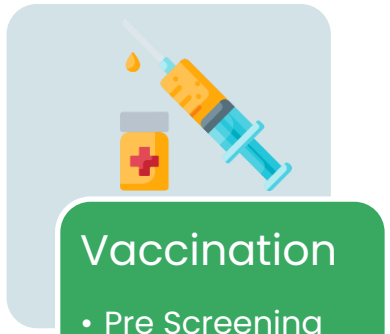


Registration

- Self
- Officials
- Call Center

Line Listing

- Program Officials
- Health Workers



Vaccination

- Pre Screening
- Vaccine Record

AEFI

- Report by Health Workers
- Report through Call center

Certificate

- Online

Menus

Menu:

1. Vaccine (COVID19)
2. Dashboard
3. Vaccination
4. Zero AEFI Reporting
5. Campaign
6. Reports
7. Registration
8. Registration Category
9. Vulnerable Population
10. Vaccines
11. Vaccine Brands
12. Health Facilities
13. Comorbidity
14. Inventory (Sub Menu)
15. Master Setting (
16. AEFI Check List
17. Roles
18. Permissions
19. Schools
20. Disabilities
21. Occupations
22. Occupation Sectors
23. ICE Type
24. Vulnerability Criteria
25. Reports
26. SMS Logs
27. Offline App Data

Sub Menus:

Reports:

a. Vaccination,
b. AEFI,
c. Pre-Screening
d. Monitoring)

Inventory:

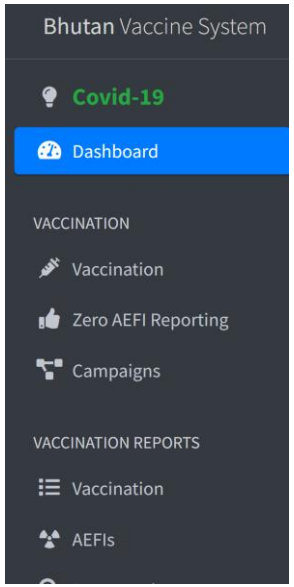
a. Stock,
b. Item Category &
c. Items

Master Setting:

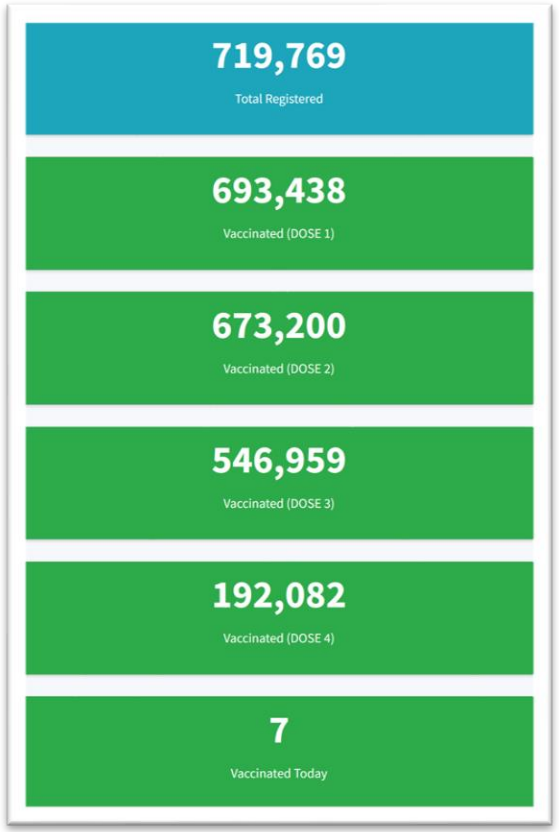
a. User
b. Dzongkhag (Districts)
c. Gewogs (Sub Districts)
d. Chiwogs (Cluster)
e. Villages
f. Zones (For cities)
g. Pre-Screening Questions

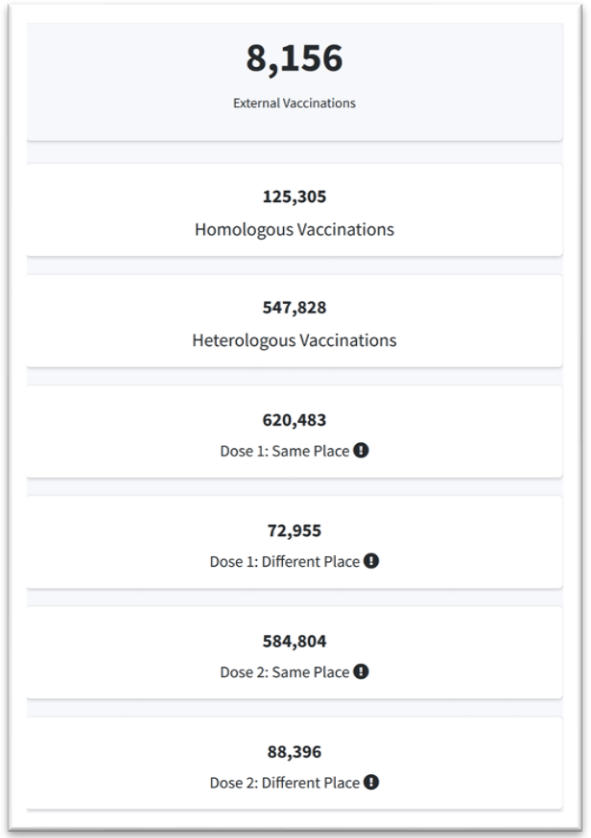
Selecting the vaccine type

Select vaccine



Dashboard





User registration

Update Registration

Registration Information

Resident Type *

Select Type

ID (Citizenship ID /Passport/ Work Permit/ Visa/ MCH)

SEARCH

First Name *

Middle Name

Last Name

Sex *

Date of Birth *

Mobile Number

Category

Present Address/Current Residence

Dzongkhag/Thromde *

Select Dzongkhag/Thromde

Mega Zone

Select Mega Zone

Gewog/Zone *

Select Gewog/Zone

Chiwog *

Select Chiwog

Village

Select Village

Health Conditions/Comorbidities

- ☐ All Cancers on Chemotherapy (under treatment)
- ☐ Allergy
- ☐ Asthma
- ☐ Cardiovascular diseases (heart failure, coronary artery diseases)
- ☐ Chronic kidney diseases (stage 5, adult on dialysis, end stage renal disease/transplant)
- ☐ Chronic lung diseases (uncontrolled asthma, COPD on oxygen therapy, cystic fibrosis, any other lung condition on oxygen therapy)
- ☐ Chronic neurological disease
- ☐ COPD (Chronic Obstructive Pulmonary Disease)
- ☐ Diabetes
- ☐ Epilepsy/seizure
- ☐ Gastritis
- ☐ Heart Disease
- ☐ High Blood Pressure (hypertension)
- ☐ Immuno-compromised/ immunodeficiency / immunosuppressed (issue with immune system)
- ☐ Immuno-suppressant therapy such as monoclonal antibody, Rituximab, long-term high dose steroids like prednisolone
- ☐ Interstitial lung disease
- ☐ Kidney Disease
- ☐ Liver Disease
- ☐ Migrane
- ☐ Old Cerebrovacular Accident (Stroke)/ Cerebral Palsy/ Down Syndrome
- ☐ orphaned person who is aged (65+) or disabled and can not work to feed oneself
- ☐ Others
- ☐ Pneumonia
- ☐ Pregnant with significant heart disease NYHA class II- IV on medication
- ☐ Solid organ transplant recipients including bone marrow or stem cell transplant
- ☐ Splenectomy Patients
- ☐ Tuberculosis
- ☐ Ulcers
- ☐ Uncontrolled Diabetes

In case you are a highly vulnerable individual, are you willing to go to an identified facility for protecting yourself from COVID infection?

○ Yes ○ No

Pregnancy Status (Select due date if pregnant, leave blank if not pregnant)

Clear Pregnancy

System records vaccine dose details