Measuring Vaccination in U.S.-Affiliated Island Jurisdictions: Lessons Learned and Results

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Summary of Presentation

- Objectives
- Background
- Methods
- Results
- Lessons Learned
- Future of Household Vaccination Surveys in the Islands
- Future of Assessment in the Islands
Objectives

- Explain the methods used in CDC’s household surveys of vaccination in the US-Affiliated Islands
- Discuss how the data collected and methods used were adjusted to meet each jurisdiction’s needs
- Describe the vaccination coverage among children in these islands
- Explore lessons learned from these surveys and identify next steps for vaccination assessment in these islands
BACKGROUND
US Relationship to the Islands - Caribbean

Map by: www.worldatlas.com
## Childhood Vaccines of Interest

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Diseases Prevented</th>
<th># of doses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>19 - 35 month-olds</td>
</tr>
<tr>
<td>DTaP</td>
<td>Diphtheria, Tetanus, and acellular Pertussis</td>
<td>4</td>
</tr>
<tr>
<td>Polio</td>
<td>Poliovirus</td>
<td>3</td>
</tr>
<tr>
<td>MMR</td>
<td>Measles, Mumps, and Rubella</td>
<td>1</td>
</tr>
<tr>
<td>HepB</td>
<td>Hepatitis B</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><em>Haemophilus influenzae type b</em></td>
<td>3</td>
</tr>
</tbody>
</table>
### Vaccination Schedules

#### Schedules for Selected Childhood Vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>ACIP Recommendations</th>
<th>American Samoa</th>
<th>FSM</th>
<th>CNMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>N/A</td>
<td>N/A</td>
<td>Birth</td>
<td>N/A</td>
</tr>
<tr>
<td>HepB1</td>
<td>Birth</td>
<td>Birth</td>
<td>Birth</td>
<td>Birth</td>
</tr>
<tr>
<td>DTaP1</td>
<td>2 months</td>
<td>2 months</td>
<td>2 months</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Polio1</td>
<td>2 months</td>
<td>2 months</td>
<td>2 months</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Hib1</td>
<td>2 months</td>
<td>2 months</td>
<td>2 months</td>
<td>6 weeks</td>
</tr>
<tr>
<td>HepB2</td>
<td>1-2 months</td>
<td>1 month</td>
<td>2 months</td>
<td>6 weeks</td>
</tr>
<tr>
<td>DTaP2</td>
<td>4 months</td>
<td>4 months</td>
<td>4 months</td>
<td>4 months</td>
</tr>
<tr>
<td>Polio2</td>
<td>4 months</td>
<td>4 months</td>
<td>4 months</td>
<td>4 months</td>
</tr>
<tr>
<td>Hib2</td>
<td>4 months</td>
<td>4 months</td>
<td>4 months</td>
<td>4 months</td>
</tr>
<tr>
<td>DTaP3</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Polio3</td>
<td>6-18 months</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>HepB3</td>
<td>6-18 months</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>DTaP4</td>
<td>15-18 months</td>
<td>15 months</td>
<td>12 months</td>
<td>15-18 months</td>
</tr>
<tr>
<td>Polio4</td>
<td>4-6 years</td>
<td>4-6 years</td>
<td>12 months</td>
<td>4-6 years</td>
</tr>
<tr>
<td>Hib3</td>
<td>6 months</td>
<td>15 months</td>
<td>12 months</td>
<td>6 months</td>
</tr>
<tr>
<td>MMR1</td>
<td>12-15 months</td>
<td>12 months</td>
<td>12 months</td>
<td>12 months</td>
</tr>
<tr>
<td>DTaP5</td>
<td>4-6 years</td>
<td>4-6 years</td>
<td>4-6 years</td>
<td>4-6 years</td>
</tr>
<tr>
<td>MMR2</td>
<td>4-6 years</td>
<td>4-6 years*</td>
<td>13 months</td>
<td>4-6 years</td>
</tr>
</tbody>
</table>

* The recommended age for the second dose of MMR vaccine has since changed from 4 – 6 years to 15 months.
METHODS
Sample Selection

- Originally cluster surveys but shifted to systematic random samples → more geographically representative sample
- Census on small islands (for example: Kosrae or outer islands of an island jurisdiction)
- Screen households for eligible members
  - Reside in household
  - Meet age requirements (12-35 months, 6 years, ≥ 65 or ≥50)
- Two consents
  - Interview
  - Vaccination records review for children
Data Collected

- **Interview:**
  - Household demographics
  - Child demographics, date of birth
  - Maternal characteristics
  - Child vaccination information from shot card

- **Record Review**
  - Medical charts or vaccination record sheets (for example: 844 Form in FSM)
  - Vaccination log books
  - Electronic registries
RESULTS

*4 or more dose of DTaP, 3 or more doses of Polio, 1 or more doses of MMR, 3 or more does of Hib, 3 or more doses or HepB.
MMR Vaccine Coverage among Children in US-Affiliated Islands, 2005-09

- American Samoa 2008-09
- CNMI 2005
- Guam 2007
- Chuuk, FSM 2006
- Kosrae, FSM 2006
- Pohnpei, FSM 2006
- Yap, FSM 2006-08
- Puerto Rico 2006
- USVI (NIS)

- MMR1 19-35 months
- MMR2 6 years

19 – 35 Months Healthy People 2010 Target 90%
K- 1st Grade Healthy People 2010 Target 95%
LESSONS LEARNED
Lessons by Topic

- Survey Organization
- Survey Planning
- Institutional Review Board (IRB) and Federal Wide Assurance Number (FWA)
- Questionnaire Organization and Special Considerations
- Training
- Organization of Fieldwork
- Data Collection Quality Control
- Analyses
- Dissemination and Utilization
**Survey Organization**

- **Planning--1 to 2 years out**
  - Two Principal Investigators (PIs) – CDC Epidemiologist & local program manager
  - Other key staff: CDC Project Officer, CDC statistician, local logistics/budget manager, local health director, other supporting contract epidemiologists

- **Fieldwork – interviews** (from here on protect data like they are the children they represent)

- **Fieldwork – data entry**
- **Double data entry**
- **Data cleaning and recoding**
- **Preliminary analyses and feedback from program**
- **Final analyses for survey report**
Planning I

- **Advance planning**
  - Need adequate time, $\geq 1$ year
  - Budgeting
  - Program’s data needs

- **Timing of the survey**
  - Work around program’s busy seasons
  - Other events - elections
  - Seasonal issues

- **CDC limitations**
  - Time and staffing
  - Limited funding both for staff travel and support for program survey expenses

- **Availability of resources** – planes, ships, staff
Planning II

- Records issues
  - What kinds of vaccination records are available
  - How records are stored and organized

- Partners

- Local staffing
  - Immunization program staff
  - Other public health staff
  - Census enumerators
  - College students
  - Contractors, friends, relatives, neighbors

- Training
  - See staffing – plan around gaps in knowledge or experience
  - Space, audio/visual capacity, IT support
Human Subjects Protections Requirements

- Federal Wide Assurance Number (FWA) updated every 5 years
- Will local institution review the study?
  - Must have current Institutional Review Board registration
  - Must renew approval of the study every year
- Will local institution rely on CDC’s IRB?
  - Must have current FWA
  - Must submit “deferral” document
- CDC’s IRB will always review
  - Must renew approval every year
- Stay on top of deadlines
  - CDC and local IRB approval expirations
  - Local IRB registration and FWA expirations
Questionnaire Organization I

- **Screening and consent**
  - Is anyone in the household eligible?
  - Consent to the interview
  - Consent to collect information from official vaccination records

- **Household Information**
  - Household members and age groups
  - Landline and cell phone
  - Income (asked at the end of the interview to reduce refusals)

- **Child information**
  - Name, date of birth, island of birth, hospital birth, hospital ID number, birth mother’s name and age
  - Race/ethnicity, daycare/school attendance, history of chickenpox
  - Maternal demographics, knowledge of school vaccine requirements, believe child is up-to-date, why not?
Questionnaire Organization II

- **Child’s Shot Card Information**
  - Vaccines & Vaccination dates

- **Adult Information**
  - Standard
    - Age, race/ethnicity, marital status
    - Flu vaccination, when, where, why, why not
  - Options
    - Other vaccines
    - Other health information relevant to vaccination

- **Child’s Official Vaccination Information**
  - From one to three official sources
  - Vaccines
  - Vaccination dates
Questionnaire Considerations I

- **Long enough but not too long**
  - Focus on survey purpose and include only the questions you need
  - Keep interviews short enough to not overburden respondents or interviewers
  - Tendency to add “just one more question”

- **Consistency in key variables**

- **Meet local data needs – varies across islands**
  - Vaccine schedule
  - Vaccination data sources
  - Insurance

- **Data format**
  - Numeric – faster to enter and to analyze
  - Accurate & usable – specific, avoid open-ended items or don’t know
Questionnaire Considerations II

- **Translations - very important**
  - Work from translated questionnaires whenever practical
  - Next best is a translated “cheat sheet” interviewers can carry
  - Don’t expect every interviewer to be an expert at translating on the spot
  - When field translations are necessary coach interviewers on key questions and phrases
  - Back-translations can catch errors and inconsistencies
  - Difficult to analyze data when different language versions of the questionnaire do not match
Training I

- **Purpose:** Make sure survey staff understand
  - The purpose of the survey
  - Their role in the survey
  - The requirements of the protocol
  - The need to protect privacy
  - The subject of the questionnaire
  - The survey procedures
    - how and why households are selected
    - how to conduct the interview and record the responses
    - how to check the quality of their work

- **Audience:** interviewers, team leaders, data entry staff, vaccination data abstractors
Training II

- Lengthened to ~4 days, content depends on staffing
- Vaccine-related information
- Approach, screening & consent, probing, completing questionnaire,
- Check the learning frequently
- Role playing in English & local languages
- Locating households, maps
- Team leaders
- Data entry
- Train more people than needed
Data Collection Quality Control I

- Epi-Info
  - Free software developed and supported by CDC
- On-site data entry by public health staff or contractors
  - Permits real-time checking and correction of data
- CDC staff design the database and data entry screens
- CDC staff write training manual and train staff
- Local data entry supervisor if possible
- CDC PI provides additional support and supervision

Design
- Number keys as much as possible – avoid the mouse to increase the speed and reduce the errors
- Match the questionnaire
- Build in range limits, skip patterns, consistency checks, warnings, soft and hard stops
Data Collection Quality Control II

- Testing…try to break the system
- Monitoring quality of data entry
- Back-up data daily
- Keep the hardcopy and electronic data secure
- Stay to the end of data entry and take all data (hardcopy and electronic) back for cleaning
- Data quality assessment
- Double data entry in Atlanta, another quality check
- Keep hardcopies under lock and key
- Limit access to database
- If any problems with IRB or FWA…everything stops and data are locked
Analyses

- Preliminary results for CDC and local program use
- Final results for public distribution
- CDC and WHO indicators

Results have shown

- Shot cards vs. vaccination records – completeness of these records varies across islands
- Parents think their children are up-to-date, even when they aren’t
- Coexistence of high individual vaccine coverage and low series coverage

Program perspective for context and understanding

Small populations limit possibilities

- Statistical reliability and confidence
- Privacy and confidentiality
Dissemination and Utilization I

- **Program planning**
  - Prioritizing activities
  - Requesting funds for special outreach vehicles or activities

- **Survey reports**
- **Presentations to local program staff**
- **WHO Joint Reporting Forms**
- **Conference Presentations**
Dissemination and Utilization II

- **Stakeholder meetings** (American Samoa, Puerto Rico)
  - Share results
  - Information flows in all directions
  - Identify gaps or areas needing improvement
  - Develop action plan

- **Data generate demand for more data**
  - New or more complex analyses of existing data
  - Next survey or other data sources

- **Lead to improvements in all phases of the survey process**
Assessment Considerations

- **Data sources**
  - Immunization Information Systems

- **New technologies**
  - Handheld data collection devices – very successful in many places
    - Unsuccessful pilot several years ago – need to address those issues
    - Potential to reduce needed resources (staff, IT, space, time, and money)

- **Age groups**
  - Adolescents
  - Records check for adults

- **New analyses**
  - Survival analyses
  - Up-to-date with one more visit
Household Surveys vs. Other Assessment Methods

- **Household Surveys:**
  - **Pros:** all households have an equal chance, demographics, knowledge & attitudes, shot card data
  - **Cons:** expensive, burden on the local program, not feasible to do annually

- **Telephone surveys**
  - **Pros:** shifts burden from the local program, to providers faster turn-around, can be done annually, demographics, knowledge & attitude data
  - **Cons:** need widespread phone service, very expensive, less tailored to program’s needs

- **School surveys**
  - **Pros:** already a requirement, less expensive
  - **Cons:** relies on enforcement of proof of vaccination or no data to collect, kinds of data can vary – “certificate of vaccination” or a list of vaccination dates, may be collected by lay administrative staff

- **Immunization Information Systems (registries)**
  - **Pros:** can be automated, provide good estimates if all children are included, records are complete, little migration into the island
  - **Cons:** requires constant maintenance and quality control
Alternatives to Household Surveys

- **NIS**
  - Child and Teen if applicable
  - USVI for the last three years
  - Pilot in Guam in 2013
  - Pro: easier on local programs, faster turn-around
  - Con: very expensive, only household with phones, not as tailored to the local jurisdiction

- **Behavioral Risk Factor Surveillance System (BRFSS)**

- **IIS- or Registry-Based assessment**

- **School assessments**

- **Mixed methods**
  - Use census or school enrollment lists to select children, then use the registry to collect vaccination dates
Acknowledgements

- American Samoa Immunization Program
- CNMI Immunization Program
- FSM Immunization Program
  - Chuuk State Immunization Program
  - Kosrae State Immunization Program
  - Pohnpei State Immunization Program
  - Yap State Immunization Program
- Guam Immunization Program
- University of Guam
- Marshall Islands Immunization Program
- Palau Immunization Program
- Programa de Vacunación de Puerto Rico
- Universidad de Puerto Rico
- United States Virgin Islands Immunization Program
- Survey Respondents…who kindly shared their time & information
For more information please contact Centers for Disease Control and Prevention

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Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: http://www.cdc.gov

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