



VACCINATION COVERAGE QUALITY INDICATORS (VCQI)

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**A Flexible Collection of Stata
Programs for Standardized
Survey Data Analysis**

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VCQI WAS DEVELOPED WITH SUPPORT FROM:

World Health Organization

Pan-American Health Organization

GAVI – The Vaccine Alliance

Bill & Melinda Gates Foundation

We thank them for their partnership & collaboration!

Opinions expressed today are those of the presenter...not of these organizations.

CONTEXT

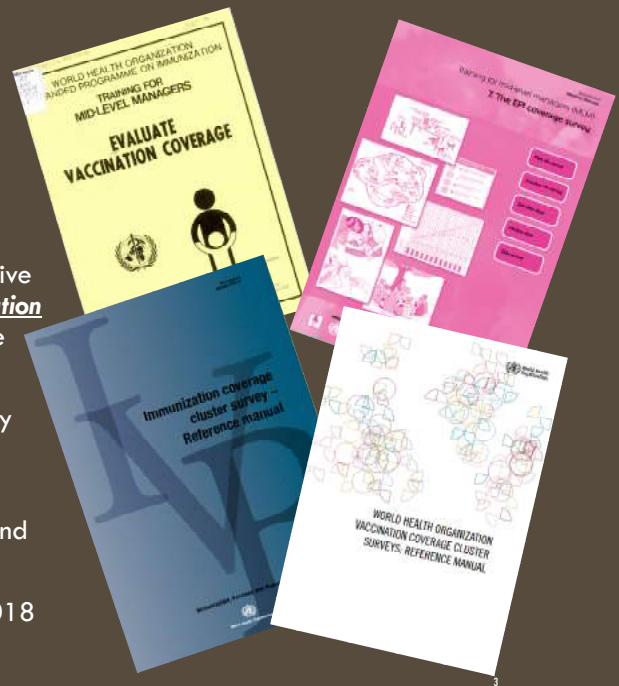
Vaccination is one of the most effective public health interventions known to mankind

In low- and middle-income countries, administrative systems do an imperfect job quantifying **vaccination coverage** (the % of eligible children who receive each vaccine)

So, household surveys are conducted periodically to furnish independent coverage estimates

The World Health Organization (WHO) has provided resources on how to design, conduct, and analyze these surveys since the 1970s

We helped update their reference manual in 2018



VACCINATION COVERAGE SURVEYS

Use a multi-stage stratified cluster design with rigorously random selection

Target population is often children 12-23m old

Interviewer asks the child's caregiver some demographic questions & to see home-based record (HBR) of vaccinations (aka card)

Records the doses and dates from card; if no card present, records data from caregiver recall

Sometimes visits the nearby health center to obtain documented evidence from facility-based record (FBR) if HBR is not available



VACCINATION COVERAGE SURVEYS

Conducted as part of large standardized multi-topic surveys

- Demographic and Health Surveys (USAID)
- Multi-Indicator Cluster Surveys (UNICEF)

Also conducted by country-led teams

- WHO Expanded Programme on Immunization (EPI)



VACCINATION COVERAGE SURVEYS

Always report:

- % with card
- % vaccinated according to card, recall, and card or recall
- % fully-vaccinated
- % not vaccinated at all (so-called *zero-dose kids*)
- Drop-out
(% of children who start but do not finish a series)

If % with card is high, can report informative indicators that use the dates from cards

- Timeliness of vaccination
- Whether doses were administered at the earliest opportunity or no



ISSUES ADDRESSED BY



Surveys vary in numerous details

No recognized standard for how to name & code variables or how to calculate indicators – practices differ somewhat

Writing specialized analysis code for a single survey is resource-intensive and error-prone

Most surveys collect dates from HBR/FBR, but do not report date-based outcomes

Most surveys do not report coverage confidence intervals

The big standardized surveys share their data their and stratum-level outcomes, but not the derived variables at the respondent level or the code used to calculate outcomes

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The following slide lists some ways that countries / surveys / analyses can vary – VCQI handles logical combinations of these factors.

SURVEY FEATURES THAT REQUIRE FLEXIBILITY IN ANALYSIS



- Country vaccination schedule
- Doses required to be *fully-vaccinated*
- Scheduled interval between series doses: is it equal to or is it greater than the minimum interval between valid doses
- Type of sampling (cluster, simple random, etc.)
- Vaccination evidence sought from card or recall or register
- Evidence sought from BCG scar
- SIA evidence from finger mark
- Ages of eligible respondents
- Names of geographic strata (nested up to 3 levels deep)
- Demographic stratifiers (urban/rural, male/female, etc.)
- Order of strata in tables and figures
- List of doses in the analysis & their order in tables
- Should boosters be *shifted down* to count as primary doses
- Which indicators to calculate
- Weighted analysis or no
- Type of confidence interval
- Table titles & footnotes
- Language for text in tables and figures*
(i.e., English, French, Spanish, Russian, Arabic, etc.)

* Not yet implemented in VCQI, but planned for future upgrade

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VCQI VACCINATION COVERAGE QUALITY INDICATORS

Working List of Vaccination Survey Analyses and Software Specifications

Draft Version 2.2
Revised February 2021

VCQI VACCINATION COVERAGE QUALITY INDICATORS

User's Guide

Draft Version 2.9
Revised February 2021

VCQI VACCINATION COVERAGE QUALITY INDICATORS

Vaccination Coverage Surveys – Forms & Variable Lists (FVL) Structured for Compatibility with VCQI

Draft Version 1.7
Revised February 2021

VCQI VACCINATION COVERAGE QUALITY INDICATORS

Results Interpretation Quick-Reference Guide

Draft Version 1.5
Revised February 2021

Getting Started with VCQI **NEW!**

Draft Version 1.0
February 2021

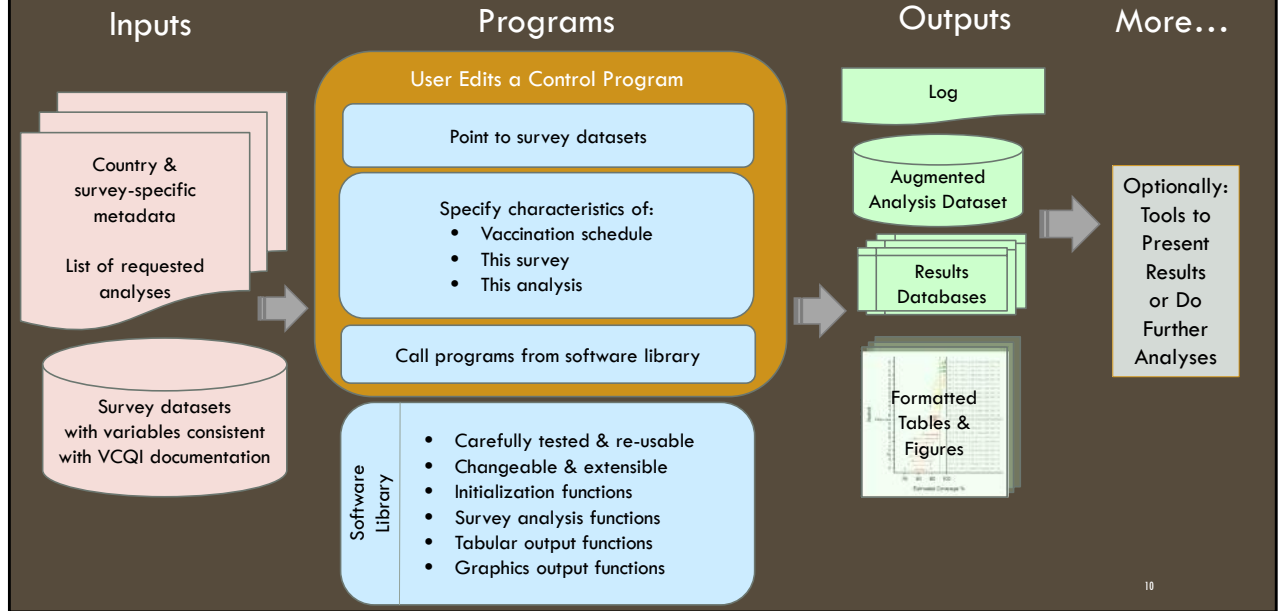
HELPFUL DOCUMENTS

- Describe:
- Variable names
- Variable values
- Indicator definitions
- Steps to calculate indicators from variables
- How to interpret indicator output
- Control program inputs

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Our approach with VCQI is to document everything so our work would be transparent and reproducible. The indicators themselves are defined in the 'Working list of Vx Survey Analyses' and in the 'Results Interpretation Guide'. The software specifications to calculate them are in the specifications document. And the codebook for how to name and code variables to be compatible with VCQI are in the 'Forms and Variables List (FVL)' document. Finally, how to run VCQI is documented in the 'Getting Started' guide and 'User's Guide'.

VCQI VISION: PROJECT AGNOSTIC SOFTWARE

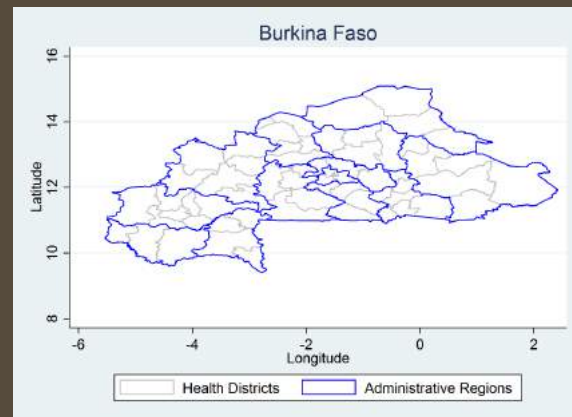


VCQI HANDLES

Survey from a single geographic stratum

Survey from several strata
(Burkina Faso had 63)

Up to 3 nested geographic levels
plus demographic sub-groups, so,
4 levels overall



TABULAR OUTPUT – NESTED GEOGRAPHIC STRATA

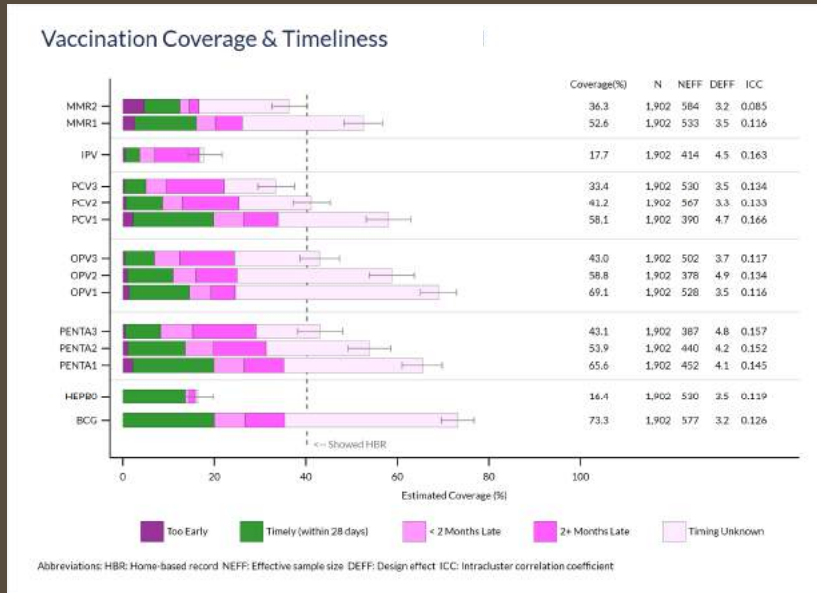
Protected at Birth from Neonatal Tetanus								
	Protected at birth (%)	95% CI (%)	95% LCB (%)	95% UCB (%)	DEFF	ICC	N	Weighted N
Harmonia	81.5	(79.9, 83.0)	80.1	82.8	1.3	0.0054	3,064	6,417,278
Southern Province	81.8	(79.6, 83.8)	80.0	83.5	1.1	0.0135	1,493	3,044,108
District 01	82.1	(77.8, 85.7)	78.6	85.1	0.8	-0.0262	308	1,028,427
District 02	82.2	(75.9, 87.1)	77.1	86.4	1.6	0.0729	310	284,985
District 03	81.6	(74.4, 87.1)	75.7	86.3	1.8	0.0762	285	611,843
District 04	81.1	(76.8, 84.7)	77.5	84.2	0.7	-0.0278	269	530,378
District 05	82.2	(77.8, 85.9)	78.6	85.3	0.9	-0.0147	321	588,474
Northern Province	81.2	(78.7, 83.4)	79.2	83.1	1.4	-0.0022	1,571	3,373,170
District 06	83.7	(78.3, 88.0)	79.3	87.3	1.2	0.0110	301	223,164
District 07	84.0	(80.5, 86.9)	81.1	86.5	0.5	-0.0604	292	870,605
District 08	77.5	(72.0, 82.1)	73.0	81.4	1.1	0.0063	305	1,330,046
District 09	81.9	(76.9, 85.9)	77.8	85.3	1.1	0.0283	336	622,294
District 10	85.8	(82.2, 88.8)	82.8	88.3	0.7	-0.0272	337	327,062

Abbreviations: CI=Confidence Interval; LCB=Lower Confidence Bound; UCB=Upper Confidence Bound; DEFF=Design Effect; ICC=Intracluster Correlation Coefficient
 Note: This measure is a population estimate that incorporates survey weights. The CI, LCB and UCB are calculated with software that take the complex survey design into account.

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Here is a sample table showing three levels of nested geographic results. Districts are nested within provinces which are nested within the country. VCQI gives the user flexibility for how to define the rows (strata) but not much flexibility about what is reported in the table columns. If the user wants flexibility in the columns, s/he would need to either change the VCQI code, or make use of the output 'databases' or flat files that document stratum level results and may be easily manipulated by downstream code or tools.

FIGURES



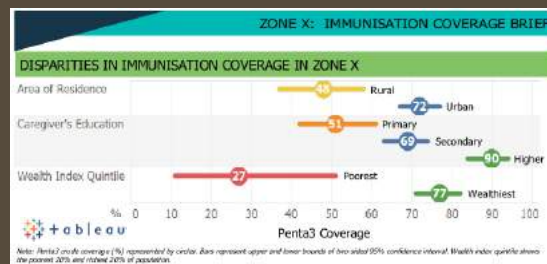
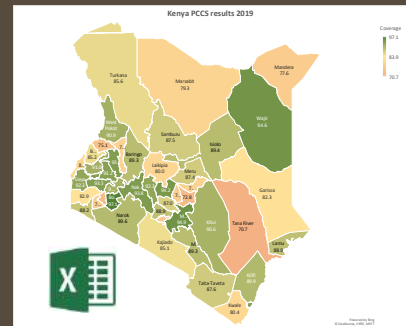
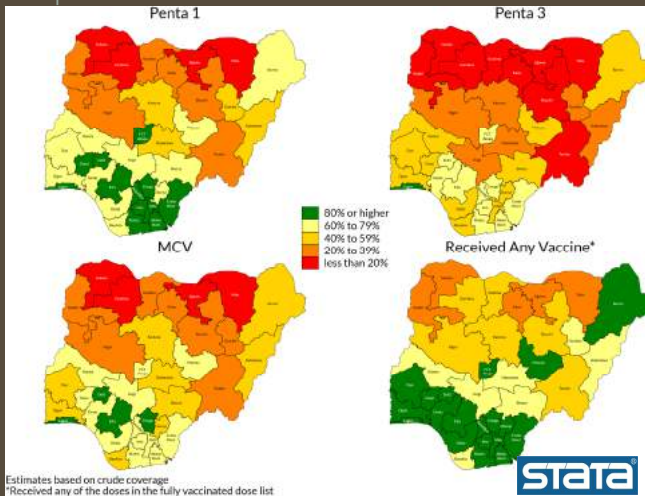
Here's an example of a VCQI figure that summarizes vaccination coverage and timeliness for a single stratum.

ANY TOOL CAN WORK WITH VCQI OUTPUT DATASETS



The augmented dataset might serve as the start for advanced analyses, like logistic regression. The outcome variable might be one of VCQI's derived variables like whether the child is fully vaccinated. The independent variables could include demographic predictors and other covariates from the survey dataset, or merged in with the survey dataset. Alternatively, the user may wish to view VCQI output in an interactive tool, or make tables and figures using tools their team is skilled at using.

OUTPUT FROM DOWNSTREAM TOOLS



The Stata maps on the left side of the slide were made with Maurizio Pisati's wonderful program: `spmap`. The map of kenya provinces at upper right was made in Excel by John Wagai. The Tableau figure at bottom right was intended to give an *infographic* feeling, and was made by Wenfeng Gong.

EXPLORE MISSED OPPORTUNITIES WITH R SHINY

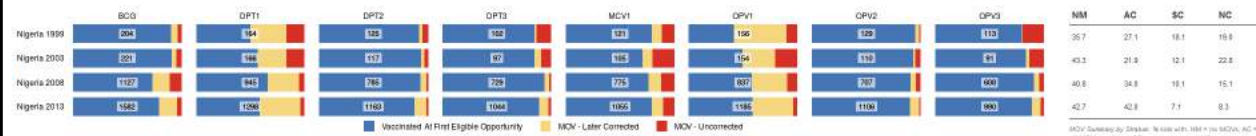
Missed Opportunities for Vaccination



Crude/Valid: crude | Grouping Level: Level 2

Getting Started | **MOV Occurrence** | Time to Completion

Data from Nigeria. Displaying crude measures of MOV.



Show sample size: | Suppress results when n is less than: 200 | Select doses for MOV summary by stratum: BCG, DPT1, DPT2, DPT3, MCV1, OPV1 | Download Plot

Summary column shows information for the following doses: BCG, DPT1, DPT2, DPT3, MCV1, OPV1, OPV2, OPV3

This slide shows an R shiny app that is available for VCQI analyses to explore missed opportunities for simultaneous vaccination. (See Rhoda et al, 2021)

Block	Control Program Outline	User Edits?
A	Initialize Stata – clean out old data, programs, and macros	No
B	List input and output folders & name for this analysis	Yes
C	Open the log file & document VCQI program versions	No
D	List datasets & metadata re: schedule, survey & analysis	Yes
E	VCQI checks inputs; pre-process analysis dataset	No
F	List which indicators to calculate & specify inputs	Yes
G	VCQI closes log, deletes temp files, informs re: errors	No

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Typically the users fixes most of the parameters in Block D once and then makes minor variations in Blocks B and F to do several runs. Edit; Save As; Run; Edit; Save As; Run; repeat as necessary

SPECIFY THE RI SCHEDULE (BLOCK D)

```
151 vcqi_scalar bcg_min_age_days = 0 // birth dose
152 vcqi_scalar hepbl_min_age_days = 0 // birth dose
153 vcqi_scalar opv0_min_age_days = 0 // birth dose
154
155 * Note: In this country, opv0 and hepbl are only considered valid
156 * if given in the first two weeks of life
157 vcqi_scalar opv0_max_age_days = 14 // birth dose
158 vcqi_scalar hepbl_max_age_days = 14 // birth dose
159
160 vcqi_scalar penta1_min_age_days = 42 // 6 weeks
161 vcqi_scalar penta2_min_age_days = 70 // 10 weeks
162 vcqi_scalar penta2_min_interval_days = 28 // 4 weeks
163 vcqi_scalar pcv1_min_age_days = 42 // 6 weeks
164 vcqi_scalar opv1_min_age_days = 42 // 6 weeks
165 vcqi_scalar rota1_min_age_days = 42 // 6 weeks
166
167 vcqi_scalar pcv2_min_age_days = 70 // 10 weeks
168 vcqi_scalar pcv2_min_interval_days = 28 // 4 weeks
169 vcqi_scalar opv2_min_age_days = 70 // 10 weeks
170 vcqi_scalar opv2_min_interval_days = 28 // 4 weeks
171 vcqi_scalar rota2_min_age_days = 70 // 10 weeks
172 vcqi_scalar rota2_min_interval_days = 28 // 4 weeks
173
174 vcqi_scalar penta3_min_age_days = 98 // 14 weeks
175 vcqi_scalar penta3_min_interval_days = 28 // 4 weeks
176 vcqi_scalar pcv3_min_age_days = 98 // 14 weeks
177 vcqi_scalar pcv3_min_interval_days = 28 // 4 weeks
178 vcqi_scalar opv3_min_age_days = 98 // 14 weeks
179 vcqi_scalar opv3_min_interval_days = 28 // 4 weeks
180 vcqi_scalar rota3_min_age_days = 98 // 14 weeks
181 vcqi_scalar rota3_min_interval_days = 28 // 4 weeks
182
183 vcqi_scalar ipv_min_age_days = 98 // 14 weeks; may be co-administered w/ OPV
184
185 vcqi_scalar mcv1_min_age_days = 270 // 9 months
186 vcqi_scalar yf_min_age_days = 270 // 9 months
187
```

Here is some code from Block D that describes the vaccination schedule in the fictitious country of Harmonia. The program 'vcqi_scalar' sets a Stata scalar and documents it in the VCQI log.

SURVEY METADATA (BLOCK D)

```
188 * -----
189 * Parameters to describe survey
190 * -----
191 * Specify the earliest and latest possible vaccination date for this survey.
192 *
193 * The software assumes this survey includes birth doses, so the earliest date
194 * is the first possible birthdate for RI survey respondents and the latest
195 * date is the last possible vaccination date for this dataset - the latest
196 * date might be the date of the final survey interview.
197
198 vcqi_global EARLIEST_SVY_VACC_DATE_M 1
199 vcqi_global EARLIEST_SVY_VACC_DATE_D 1
200 vcqi_global EARLIEST_SVY_VACC_DATE_Y 2013
201
202 vcqi_global LATEST_SVY_VACC_DATE_M 1
203 vcqi_global LATEST_SVY_VACC_DATE_D 1
204 vcqi_global LATEST_SVY_VACC_DATE_Y 2015
205
206 * These parameters indicate the eligible age range for survey respondents
207 * (age expressed in days)
208
209 vcqi_global VCQI_RI_MIN_AGE_OF_ELIGIBILITY 365
210 vcqi_global VCQI_RI_MAX_AGE_OF_ELIGIBILITY 729
211
212 * These following parameters help describe the survey protocol
213 * with regard to whether they:
214 * a) skipped going to health centers to find records (RI_RECORDS_NOT_SOUGHT 1)
215 * b) looked for records for all respondents (RI_RECORDS_SOUGHT_FOR_ALL 1)
216 * c) looked for records for women who didn't present vaccination cards
217 * during the household interview (RI_RECORDS_SOUGHT_IF_NO_CARD 1)
218 *
219 * These are mutually exclusive, so only one of them should be set to 1.
220 *
221 vcqi_global RI_RECORDS_NOT_SOUGHT 0
222 vcqi_global RI_RECORDS_SOUGHT_FOR_ALL 0
223 vcqi_global RI_RECORDS_SOUGHT_IF_NO_CARD 1
224
```

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This slide shows more code from Block D...these lines are setting the values of parameters that describe the survey...earliest and latest dates that a child eligible for this survey might have been vaccinated. Ages of eligibility...and a parameter to describe whether the survey team sought vaccination evidence from FBRs.

ANALYSIS SETTINGS (BLOCK D)

```
372
373 * Make organ pipe plots? Set to 1 for yes.
374 vcqi_global VCQI_MAKE_OP_PLOTS      1
375
376 * Save the data underlying each organ pipe plot? Set to 1 for yes.
377 *
378 * Recall that organ pipe plots do not include many quantitative details
379 * and do not list the cluster id for any of the bars.
380 *
381 * If this option is turned on, (set to 1) then the organ pipe plot program
382 * will save a dataset in the Plots_OP folder for each plot. The dataset will
383 * list the cluster id for each bar in the plot along with its height and width.
384 * This makes it possible to identify which cluster id goes with which bar in
385 * the plot and to understand the quantitative details of each bar.
386
387 vcqi_global VCQI_SAVE_OP_PLOT_DATA    1
388
389 * Specify whether the code should save Stata .gph files when making plots.
390 * Usually 0. These files are only made if MAKE_PLOTS is 1.
391 * Set to 1 if you want to be able to edit plots in the Stata Graph Editor
392 * or re-export them in a different size or graphic file format.
393
394 vcqi_global SAVE_VCQI_GPH_FILES       1
395
396 * Specify whether the code should save VCQI output databases
397 *
398 * WARNING!! If this macro is set to 1, VCQI will delete ALL files that
399 * end in _database.dta in the VCQI_OUTPUT_FOLDER at the end of the run
400 * If you want to save the databases, change the value to 0.
401 * (Usually 1)
402
403 vcqi_global DELETE_VCQI_DATABASES_AT_END 1
404
```

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These lines are setting options for what sort of output to produce, or save, or delete in this VCQI run.

CALL THE INDICATOR FOR DROP-OUT

```
724 * -----
725 * Calculate issues with continuity (dropout) for three dose pairs:
726 * 1. Dropout from Penta1 to Penta3
727 * 2. Dropout from OPV1 to OPV3
728 * 3. Dropout from Penta3 to MCV1
729 * -----
730 vcqi_global RI_CONT_01_DROPOUT_LIST PENTA1 PENTA3 OPV1 OPV3 PENTA3 MCV1
731
732 vcqi_global RI_CONT_01_TO_TITLE Dropout
733 vcqi_global RI_CONT_01_TO_SUBTITLE
734 vcqi_global RI_CONT_01_TO_FOOTNOTE_1 Note: This measure is an unweighted summary of a proportion from the survey sample.
735 vcqi_global SORT_PLOT_LOW_TO_HIGH 0 // 1 means show strata w/ low outcomes at bottom and high at top
736 // 0 is the opposite
737
738 RI_CONT_01
739
```

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Here is some code from Block D to calculate vaccination dropout “RI_CONT_01” stands for “routine immunization continuity indicator 01”. That .ado file is shown on the next slide.

TOP-LEVEL INDICATOR SOURCE

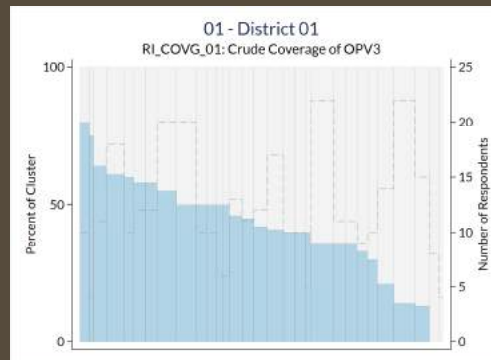
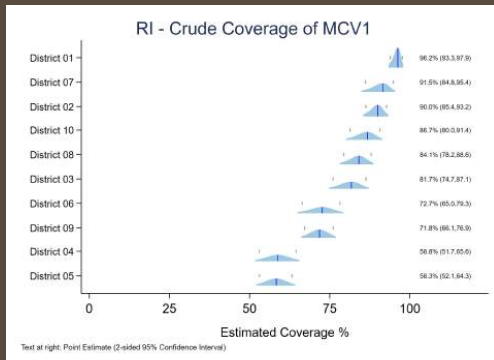
```
1  *! RI_CONT_01 version 1.01 - Biostat Global Consulting - 2017-08-26
2  *****
3  * Change log
4  *
5  *      Updated
6  *      version
7  * Date      number  Name      What Changed
8  * 2017-08-26  1.01  Mary Prier  Added version 14.1 line
9  *****
10 program define RI_CONT_01
11     version 14.1
12
13     local oldvcp $VCP
14     global VCP RI_CONT_01
15     vcqi_log_comment $VCP 5 Flow "Starting"
16
17     noi di as text "Calculating $VCP ..."
18
19     noi di as text _col(3) "Checking global macros"
20     RI_CONT_01_00GC
21     if "$VCQI_PREPROCESS_DATA" == "1" noi di as text _col(3) "Pre-processing dataset"
22     if "$VCQI_PREPROCESS_DATA" == "1" RI_CONT_01_01PP
23     *if "$VCQI_PREPROCESS_DATA" == "1" noi di as text _col(3) "Checking data quality"
24     *RI_CONT_01_02DQ
25     if "$VCQI_GENERATE_DVS" == "1" noi di as text _col(3) "Calculating derived variables"
26     if "$VCQI_GENERATE_DVS" == "1" RI_CONT_01_03DV
27     if "$VCQI_GENERATE_DATABASES" == "1" noi di as text _col(3) "Generating output databases"
28     if "$VCQI_GENERATE_DATABASES" == "1" RI_CONT_01_04GO
29     if "$EXPORT_TO_EXCEL" == "1" noi di as text _col(3) "Exporting to Excel"
30     if "$EXPORT_TO_EXCEL" == "1" RI_CONT_01_05TO
31     if "$MAKE_PLOTS" == "1" noi di as text _col(3) "Making plots"
32     if "$MAKE_PLOTS" == "1" RI_CONT_01_06PO
33
34     vcqi_log_comment $VCP 5 Flow "Exiting"
35     global VCP `oldvcp'
36
37 end
```

RI_CONT_01 calls five more VCQI .ado files, in turn.

PARTS OF VCQI USEFUL OUTSIDE VACCINATION

Inchworm plots
 Visual Representation of Inferential Uncertainty
 (Stata Conference 2016)

Organ pipe plots
 Visualize Disparities in Cluster-Level Coverage
 (Stata Conference 2018)



We've presented in earlier Stata conferences on portions of VCQI code that might be useful to analysts outside the world of vaccination surveys.

SVYPD.ADO

Estimates survey proportion in line with Dean & Pagano 2015, and handles wonky distributions better than `svy: proportion`

- Stata currently fails to report a reasonable confidence interval when the standard error is 0. (i.e., coverage is uniform in every cluster...special cases are 0% and 100%)
- Surprisingly, Stata even fails to report the intervals that are well defined in that situation, like Wilson, Jeffreys, Agresti-Coull and Clopper-Pearson. (I've lodged a request...)

To fit my own personal preference, when the standard error is zero (or infinitesimal) and the user has asked for a CI that is not defined (Wald or Logit), `svypd.ado` defaults to calculating a Clopper-Pearson interval (assuming a simple random sample)

It calculates not just one interval, but optionally returns intervals for several confidence levels all at once – we use this capability for some of our graphics

It omits Stata's limitation on the confidence level; the user may specify any level between 0.01 and 99.99. (Stata only allows levels from 10.00 to 99.99.)
(I've lodged a request...)

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We have not yet shared this helpful .ado file with the world...it is part of VCQI but we haven't featured its useful properties. If you want to maybe use `svypd.ado`, contact me.

RECEPTION / ADOPTION

Survey data analysis is a specialized field

Vaccination coverage survey analysis is doubly-specialized

We have trained analysts in workshops around the world

Several coverage survey consultants use VCQI

International funders & partners are starting to ask for VCQI involvement in important surveys

No one outside our company has added code to VCQI

We get involved in any complicated applications

There is a desire to build more global capacity, but only a handful of people analyze several such surveys per year

A “centers of excellence” model has been proposed, but not taken up yet



PAIN POINTS

Intermittent funding support

- Stable ongoing funding would facilitate long-term plans & capacity building

Programmatic partners' learning curves

- Don't know that they should ask for a *full analysis* with indicators beyond the basics
- Need training to interpret indicators & use the output & identify what is important

Software

- Not vectorized or even by: compatible. VCQI runs a LOT of nested loops...so is slow for runs with many strata and respondents and indicators
- Still compatible with Stata v14 (for WHO licensing budget reasons) so Excel formatting fails for large runs – need to break up the jobs or format tables by hand

FUTURE ENHANCEMENTS

Multi-lingual labels for all tables & figures

Add new indicators

Upgrade to Stata v17 compatibility

- Possibly make use of new customizable tables features
- Use putdocx
- Capitalize on transparency in graphics

Graphical User Interface (?)

Refactor code for clarity & maintainability & efficiency

Formalize systematic modular repeated testing – what Gould calls *certification*

Port to R ??

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We have lots of ideas for making VCQI more efficient and using capabilities of newer versions of Stata. We also receive queries about porting VCQI to R because of perceptions that our target users might be more likely to receive R training than Stata training at universities around the world, and the idea that the Stata license fee may be a barrier to participation for some would-be VCQI analysts.

SUMMARY

VCQI is a free, flexible, and powerful global resource that instantiates a vision for transparent, documented, reproducible analysis of vaccination coverage household surveys

It is used to analyze many of the most important coverage surveys conducted today (i.e., in countries where polio is still endemic)

It provides a lot of specialized capability and yet only requires users to interact with a single .do file, which exists in template form

Several people use it productively – a few use it proficiently

(It could serve as a rich resource for master's degree students around the world who want to do secondary analyses of publicly available datasets, like Demographic & Health Surveys from USAID or Multi-Indicator Cluster Surveys (MICS) from UNICEF.)

VCQI's long-term prospects for maintenance and expanded user base will depend on vision and resources from funding partners

LEARN MORE

VCQI Documentation, Programs, Example Datasets

www.biostatglobal.com/vcqi_resources.html

WHO Cluster Survey Reference Manual 2018

<https://apps.who.int/iris/handle/10665/272820>

2016 Inchworm Plot Stata Conference Talk

<https://www.stata.com/meeting/chicago16/>

2018 Organ Pipe Plot Stata Conference Talk

<https://www.stata.com/meeting/columbus18/>

Implementing WHO guidance on conducting and analysing vaccination coverage cluster surveys: Two examples from Nigeria
Wagai et al., 2020 in *PLOS ONE*

<https://doi.org/10.1371/journal.pone.0247415>

Using Household Surveys to Assess Missed Opportunities for Simultaneous Vaccination: Longitudinal Examples from Colombia and Nigeria
Rhoda et al., 2021 in *Vaccines*

<https://doi.org/10.3390/vaccines9070795>

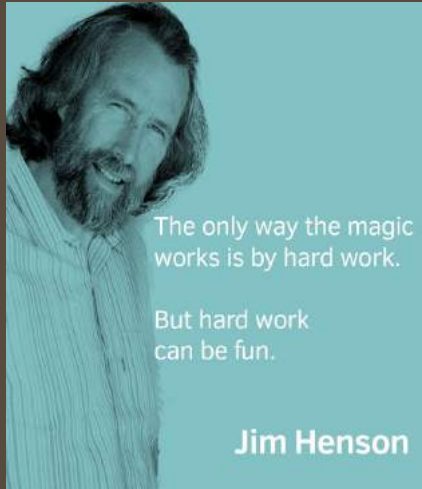
Evaluating Confidence Interval Methods for Binomial Proportions in Clustered Surveys
Dean & Pagano 2015 in *JSSAM*

<https://doi.org/10.1093/jssam/srv024>

Harmonizing vaccination coverage measures in household surveys: A primer

<http://bit.ly/3IGF9U5>

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"The cost of flexibility is complexity. Every time you put extra stuff into your code to make it more flexible, you are usually adding more complexity."

- Martin Fowler



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Following the Stata Conference 2021 example of two of my bearded heroes, Nick Cox and Billy Buchanan, I'm closing with quotes from two of my other bearded heroes: Martin Fowler and Jim Henson.



BACKUP SLIDES

INDICATORS IN VCQI TODAY

Routine immunization (20+)

Tetanus protection at birth (1)

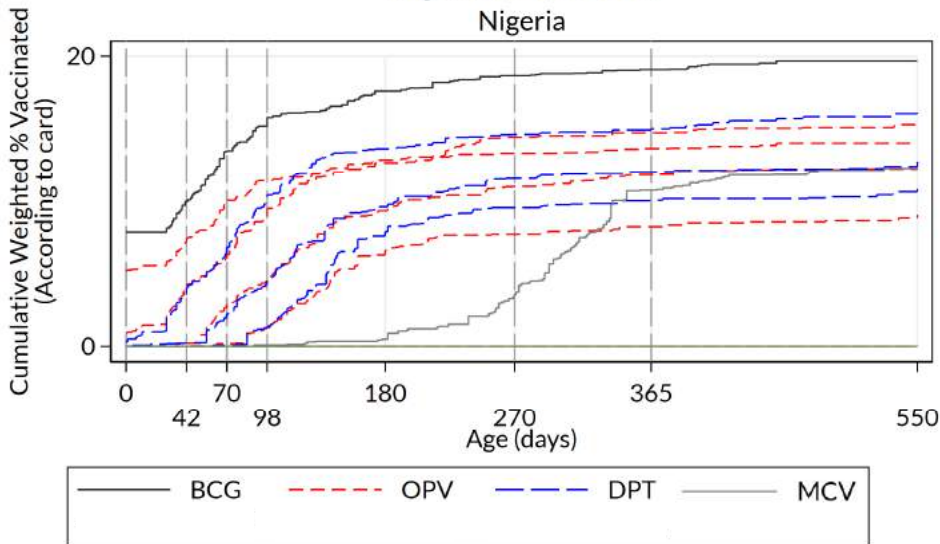
Post-campaign coverage (6)

Dataset description (3)

Hypothesis test for coverage differences (2)

Good ideas for new indicators come up every year...

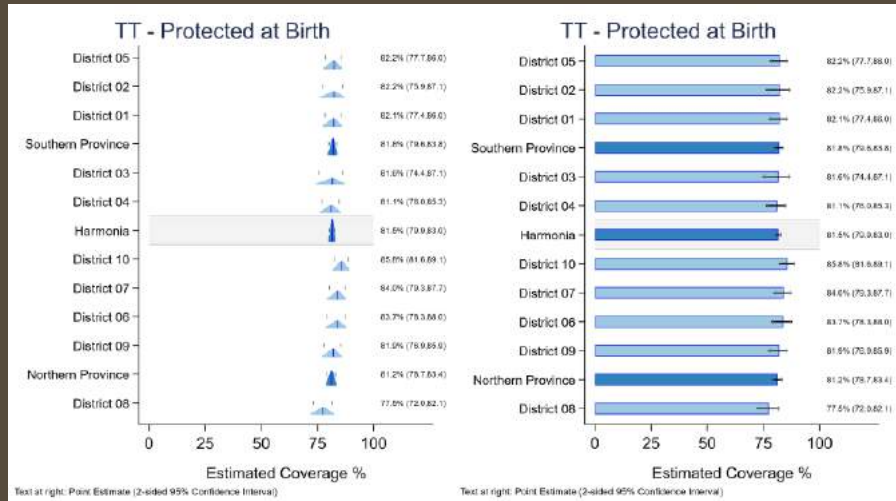
Nigeria DHS 2003 Nigeria



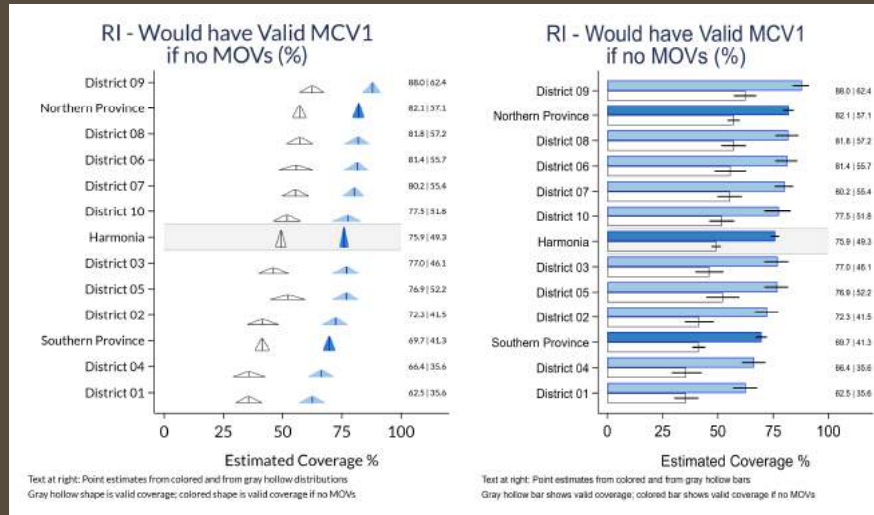
Vertical dashed lines mark scheduled vaccination ages: 0, 42, 70, 98, 270 & 365 days.
Denominator is all eligible respondents.
225 of 987 respondents had card records with dates.

Cumulative
Coverage
Curves

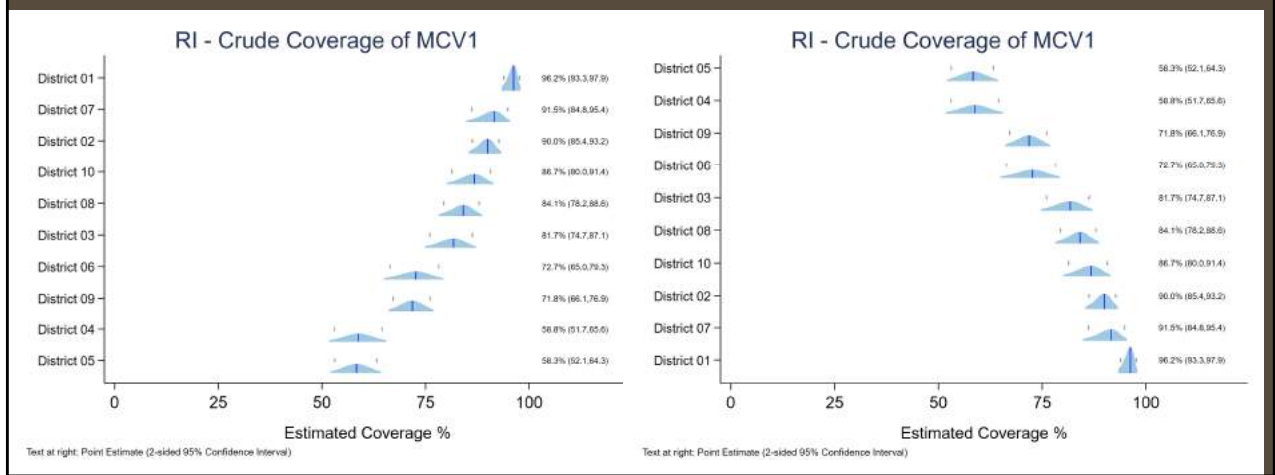
USER SELECTS INCHWORMS OR BAR CHARTS



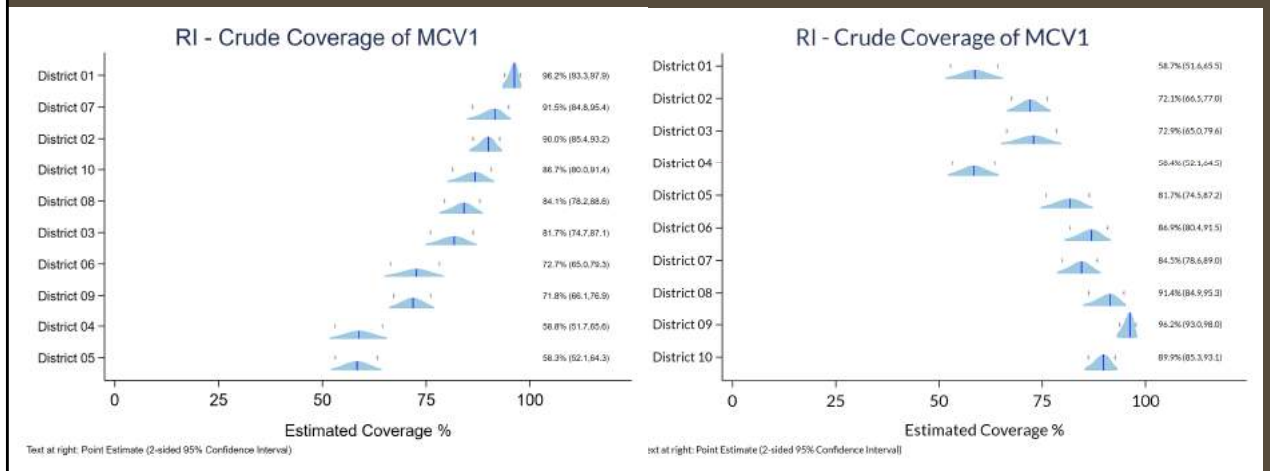
DOUBLE-BAR CHARTS, TOO



USER SELECTS...SORT BY OUTCOME: LOW TO HIGH OR HIGH TO LOW



USER SELECTS: SORT BY OUTCOME OR SAME ORDER AS TABLES

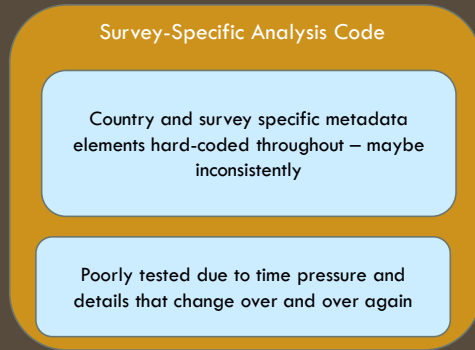


COMMON PRACTICE – SURVEY SPECIFIC CODE

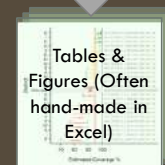
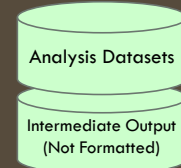
Inputs



Programs



Outputs



COMMON PRACTICE: SURVEY SPECIFIC CODE

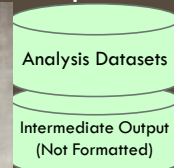
Inputs



Programs



Outputs



Analysis of survey data should be done by a statistician – or under the guidance of a statistician

TARGET USER

User does not need to be an advanced Stata programmer... but must be comfortable modifying & running a .do-file according to a template & User's Guide