What do you want out of your PhD?

My dissertation
- Background
- Aim 1
- Aim 2
- Aim 3

How did I get here?
# WHAT I (THOUGHT) I WANTED IN A PHD

## Skills/Experience
- International fieldwork
- Study management
- Advanced epidemiologic methods
- Grant writing

## Research Areas
- International Health
- Infectious Diseases (non-HIV)
- Vaccines
- Clinical trials

## Good/Present/Helpful Mentors

## Work-life Balance
Figure 4. Number of rotavirus deaths (A) and rates of rotavirus mortality (B) among children <5 years of age, by country, 2013. Abbreviation: PY, person-years.
RV - Universal vaccine introduction over time

**Aim 1:** To evaluate the test-negative design to measure rotavirus vaccine effectiveness in low-income settings.

*Approach:* RCTs for two rotavirus vaccines in sub-Saharan Africa and Asia will be analyzed as test-negative case-control studies. Vaccine effectiveness estimates will be compared to the original RCT efficacy estimates.

**Aim 2:** To estimate the relative reduction of all-cause and rotavirus-specific diarrhea incidence after rotavirus vaccine introduction in Matlab, Bangladesh in children <5 years old.

*Approach:* Routine diarrheal surveillance over a 14 year period in Matlab, Bangladesh will be used to estimate incidence rates over time. Interrupted time-series analyses will compare incidence rates before and after rotavirus vaccine introduction.

**Aim 3:** To test the association between genetic mutations in histo-blood group antigens (HBGAs) and rotavirus diarrhea (vaccine failure) among children with a full course of rotavirus vaccinations in The Gambia, Mali and Kenya.

*Approach:* The Vaccine Impact on Diarrhea in Africa (VIDA) study is an ongoing case-control study to estimate the effectiveness of rotavirus vaccine introduction. Saliva collection will be incorporated into the ongoing study to assess relevant genetic mutations.
ESTIMATING VACCINE EFFECTIVENESS USING CASE-CONTROL STUDIES

CASES

Rotavirus +
Rotavirus +
Rotavirus -

HEALTHY COMMUNITY CONTROLS

HOSPITAL CONTROLS
ESTIMATING VACCINE EFFECTIVENESS USING THE TEST-NEGATIVE DESIGN

CATEGORIES

- CASES
  - Rotavirus +
  - Rotavirus +
  - Rotavirus -

- TEST-NEGATIVE CONTROLS

- HEALTHY COMMUNITY CONTROLS

- HOSPITAL CONTROLS
Rotavirus vaccine effectiveness in low-income settings: An evaluation of the test-negative design

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\textsuperscript{b} Department of Biostatistics, School of Public Health, University of Washington, Seattle, WA, United States
\textsuperscript{c} Vaccine and Infectious Diseases Division, Fred Hutchinson Cancer Research Center, Seattle, WA, United States
\textsuperscript{d} Center for Inference and Dynamics of Infectious Diseases, Seattle, WA, United States
\textsuperscript{e} Center for Vaccine Development, University of Maryland School of Medicine, Baltimore, MD, United States
\textsuperscript{f} Center for Vaccine Innovation and Access, PATH, Seattle, WA, United States
WHERE I AM TODAY…THE NON-TRADITIONAL DISSERTATION

**Aim 1:** To test the validity of the test-negative case-control design to measure rotavirus vaccine effectiveness in low-income settings.

- **Approach:** RCTs for two rotavirus vaccines in sub-Saharan Africa and Asia will be analyzed as test-negative case-control studies. Vaccine effectiveness estimates will be compared to the original RCT efficacy estimates.

**Aim 2:** To estimate the population impact of rotavirus vaccine introduction in rural Matlab, Bangladesh.

- **Approach:** Routine diarrheal surveillance over a 16 year period in Matlab, Bangladesh will be used to estimate incidence rates over time. Interrupted time-series analyses will compare incidence rates before and after rotavirus vaccine introduction.

**Aim 3:** To test the association between genetic mutations in histo-blood group antigens (HBGAs) and rotavirus diarrhea (vaccine failure) among children with a full course of rotavirus vaccinations in The Gambia, Mali and Kenya.

- **Approach:** The Vaccine Impact on Diarrhea in Africa (VIDA) study is an ongoing case-control study to estimate the effectiveness of rotavirus vaccine introduction. Saliva collection will be incorporated into the ongoing study to assess relevant genetic mutations.
ISA VILLAGES, 0-<12 MONTHS OF AGE

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 1</th>
<th>Model 2</th>
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</thead>
<tbody>
<tr>
<td>RV+ Diarrhea</td>
<td>RV- Diarrhea</td>
<td>RV+ Diarrhea</td>
<td>RV- Diarrhea</td>
</tr>
<tr>
<td>IRR: 0.72 95%CI: 0.39-1.33</td>
<td>IRR: 0.59 95%CI: 0.43-0.80</td>
<td>IRR: 1.59 95%CI: 1.09-2.31</td>
<td>IRR: 1.15 95%CI: 0.91-1.47</td>
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</table>

Average yearly incidence per 1,000 person-years

Incidence Rate Ratio

Observed Yearly Incidence

IRR (95% CI)
**Where I Am Today…The Non-Traditional Dissertation**

**Aim 1:** To test the validity of the test-negative case-control design to measure rotavirus vaccine effectiveness in low-income settings.

- **Approach:** RCTs for two rotavirus vaccines in sub-Saharan Africa and Asia will be analyzed as test-negative case-control studies. Vaccine effectiveness estimates will be compared to the original RCT efficacy estimates.

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- **Approach:** Routine diarrheal surveillance over a 14 year period in Matlab, Bangladesh will be used to estimate incidence rates over time. Interrupted time-series analyses will compare incidence rates before and after rotavirus vaccine introduction.

**Aim 3:** To assess host genetic determinants of rotavirus vaccine failure among children with a full course of rotavirus vaccinations in The Gambia, Mali and Kenya.

- **Approach:** The Vaccine Impact on Diarrhea in Africa (VIDA) study is an ongoing case-control study to estimate the effectiveness of rotavirus vaccine introduction. Saliva collection will be incorporated into the ongoing study to assess relevant genetic mutations.
VACCINE IMPACT ON DIARRHEA IN AFRICA (VIDA) STUDY

Sites in Africa:
- Basse, The Gambia
- Bamako, Mali
- Siaya County, Kenya

Case-control study of the etiology, and adverse clinical consequences of moderate-to-severe diarrhea (MSD); data from the case-control study will also be used to measure rotavirus vaccine impact and effectiveness
1. To assess the impact of rotavirus vaccine introduction on the
   A. Etiology of moderate to severe diarrhea (MSD)
   B. Adverse clinical consequences of MSD (linear growth, persistent diarrhea, mortality)
   C. Overall incidence of moderate to severe diarrhea
2. Rotavirus vaccine effectiveness using a case-control study (healthy community controls and test-negative controls)
Vaccine Impact on Diarrhea (VIDA) Case-Control Study

Moderate-to-severe diarrhea cases

- 0-12 months, 12-24 months, 24-59 months
  - Identified at sentinel health center

Age, Sex, Community/Nearby, Time

Matched healthy community controls

- 0-12 months, 12-24 months, 24-59 months
  - Randomly selected from DSS and recruited at home

Data collection:

**Clinical characteristics (cases)**
- Demographics
- Stool sample (Enteropathogen)
- Anthropometric measures
- Vaccination history (card/admin center)

**Saliva collection**

Data collection:

- Clinical history within follow-up period
- Anthropometric measures
- Survival/Verbal Autopsy

**Saliva collection (as needed)**
DUAL TIMELINES:
SCHOOL REQUIREMENTS AND RESEARCH
<table>
<thead>
<tr>
<th>Timeline</th>
<th>Funding</th>
<th>Courses</th>
<th>School Requirements</th>
<th>Dissertation/Research</th>
<th>Aim 1</th>
<th>Aim 2</th>
<th>Aim 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Top Scholar Award</td>
<td>EPI512, BIOSTAT517</td>
<td></td>
<td>Ideas on dengue vaccines in Mexico</td>
<td>Dengue Vaccine Project in Mexico</td>
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<tr>
<td>Q2</td>
<td>Top Scholar Award</td>
<td>EPI513, BIOSTAT518, GH Research Methods</td>
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<td>Dengue Vaccine Literature Review</td>
<td>Dengue Vaccine Project in Mexico</td>
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<tr>
<td>Q3</td>
<td>Top Scholar Award</td>
<td>Exposure Measurement, Pharmacoepi</td>
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<td>Dengue Vaccine Literature Review</td>
<td>Dengue Vaccine Project in Mexico</td>
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<td>Meeting with faculty</td>
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<td></td>
<td>Meeting with PATH**</td>
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<tr>
<td>Summer</td>
<td>Hourly RA</td>
<td>SISMID</td>
<td>Preliminary Exam</td>
<td>3 month research project in Uganda</td>
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YEAR 1 – 2013/2014
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<th>Aim 3</th>
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<tbody>
<tr>
<td>Q1</td>
<td>RA</td>
<td>BIOSTAT356, EPI554, Doctoral Dissertation Seminar</td>
<td>Meeting with faculty/PATH investigators</td>
<td>Development of methods/statistical analysis plan</td>
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<tr>
<td>Q2</td>
<td>PATH RA</td>
<td>BIOSTAT357, R Course, Doctoral Dissertation Seminar</td>
<td>Presentation at doctoral dissertation seminar (short proposal)--with only Aim 1!</td>
<td>Phone calls with University of Maryland (VIDA study)</td>
<td>Development of methods/statistical analysis plan</td>
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<tr>
<td>Q3</td>
<td>PATH RA</td>
<td>Advanced Epi, Grant Writing</td>
<td>Phone calls with University of Maryland (VIDA study)</td>
<td>Analysis</td>
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<tr>
<td>Summer</td>
<td>PATH RA</td>
<td>Vaccines in Enteric Diseases Conference (attendance)</td>
<td>Analysis</td>
<td>Develop methods</td>
<td>Proposal for VIDA - genetic determinants of rotavirus vaccine failure, request for Gates funding</td>
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YEAR 3 – 2015/2016

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<th>Aim 3</th>
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</thead>
<tbody>
<tr>
<td>Q1</td>
<td>PATH RA</td>
<td>F31 weekly meeting</td>
<td>Writing and submitting F31 proposal</td>
<td>Analysis (additional data requested)</td>
<td>Development of methods</td>
<td>Gates Foundation - Funding awarded!</td>
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<td>Writing protocols, choosing appropriate laboratory assays and saliva collection instruments</td>
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<tr>
<td>Q2</td>
<td>RA</td>
<td>Submit Short Proposal, Write Long Proposal</td>
<td>Analysis</td>
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<td>Travel to the Gambia for VIDA investigators meeting, saliva collection training</td>
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<td>Q3</td>
<td>RA</td>
<td>General Exam - written and oral</td>
<td>Writing</td>
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<td>Summer</td>
<td>Hourly</td>
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<td>Writing/Co-author Edits</td>
<td>Travel to Bangladesh</td>
<td>Travel to Kenya, Mali (saliva collection training)</td>
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<td>Timeline</td>
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<td>Q1</td>
<td>F31, EPI512 TA</td>
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<td>Present Aim 1 oral Abstract at ASTMH</td>
<td>Paper submitted</td>
<td>Waiting on data...</td>
<td>Travel to Mali</td>
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<td>Continued study management</td>
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<tr>
<td>Q2</td>
<td>F31, EPI513 TA</td>
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<td>Looking at jobs/post-docs</td>
<td>Paper accepted</td>
<td>Data Arrive! Analysis begins</td>
<td>Continued study management</td>
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<td>Q3</td>
<td>F31</td>
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<td>Looking at jobs/post-docs</td>
<td>Oral presentation at ASTMH</td>
<td>Analysis/Writing</td>
<td>Continued study management</td>
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<tr>
<td>Summer</td>
<td>F31</td>
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<td>Looking at jobs/post-docs, putting together dissertation</td>
<td>Writing</td>
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<td>Preliminary Analysis/Writing, Travel to Kenya</td>
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<tr>
<td>Q1-Q3</td>
<td>F31... Consulting</td>
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<td>Putting together dissertation and defense presentation</td>
<td>Paper Submitted/Poster ASTMH</td>
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<td>Preliminary Analysis/Writing</td>
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