Child Health and Mortality Prevention Surveillance: A Deeper Dive into CHAMPS Data

31 March 2022
CHAMPS Network – Overarching Objectives

**Track definitive causes** of child mortality in sites throughout Sub-Saharan Africa and South Asia

- *Using Minimally-Invasive Tissue Sampling (MITS)*

**Produce and disseminate high-quality data** to inform policy and public health action

**Enable sites** to leverage CHAMPS investments to prevent mortality

- *Data-to-Action*
CHAMPS Surveillance Sites – March 2022

- Kisumu, Kenya
- Manhiça, Mozambique
- Soweto, South Africa
- Harar/Kersa, Ethiopia
- Baliakandi, Bangladesh

Active sites
- Raibareli District, India
- Bamako, Mali
- Makeni, Sierra Leone
- Kisumu, Kenya
- Harar/Kersa, Ethiopia
- Quelimane, Mozambique
- Manhiça, Mozambique
- Soweto, South Africa

Launching in future
- Raibareli District, India
- Baliakandi, Bangladesh
- Makeni, Sierra Leone
- Quelimane, Mozambique
- Manhiça, Mozambique
CHAMPS Surveillance Sites – After March 2022

- Kisumu, Kenya
- Manhiça, Mozambique
- Soweto, South Africa
- Harar/Kersa, Ethiopia
- Baliakandi, Bangladesh

Active sites:
- Raibareli District, India

Launching in future:
- Quelimane, Mozambique

Contract initiation:
- Bamako, Mali
- Makeni, Sierra Leone
- Soweto, South Africa
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CHAMPS Methods
CHAMPS Aims to Deepen Understanding of Causes and Contributors to Under-5 Deaths

- Community Engagement
- Surveillance
- Case Enrollment
CHAMPS generates causes of death on under-five children using Minimally Invasive Tissue Sampling, diagnostic testing, clinical records, verbal autopsy

Under-5 deaths, stillbirths detected within 24 hrs
Parental consent for MITS

Verbal autopsy interviews
Clinical records abstraction

Blood
CSF
NP/OP swab
Stool
Liver
Lung
Heart
Brain
Bone Marrow
Placenta (when available)

Photographs
Physical measurements
CHAMPS generates causes of death on under-five children using Minimally Invasive Tissue Sampling, diagnostic testing

- Culture
- HIV, TB, malaria testing
- TaqMan Array Cards
- Pathology
CHAMPS Aims to Deepen Understanding of Causes and Contributors to Under-5 Deaths

- Surveillance
- Community Engagement
- Cause of Death Determination
- Case Enrollment
CHAMPS Determination of Cause of Death (DeCoDe)

- Demographic Data
- Verbal Autopsy
- Clinical Abstraction
  Available medical records
- Maternal Abstraction

DeCoDe Panel

Cause of Death Assignment
ICD-10 and ICD-PM

MITS Collection Data
- Anthropometrics
- Photographs

Molecular Diagnostics
- TAC Results

Other Diagnostics
- Blood and CSF culture
- HIV (PCR)
- TB (GeneXpert)
- Malaria blood smears & RDT

Pathology Results
- Site pathology report
- CDC Central Pathology Laboratory:
  special stains, immunohistochemistry
- Whole slide images
Immediate cause of death
"the disease or complication which directly preceded or directly led to death"

Morbid causes of death

Significant contributor
Other conditions that contribute to death

In the causal chain

Not in the causal chain

Part 1
1. Report disease or condition directly leading to death on line a
   - Report chain of events in due to order (if applicable)
   - State the underlying cause on the lowest used line

2. Other significant conditions contributing to death (time intervals can be included in brackets after the condition)

Part 2

Underlying cause of death
"disease or injury that initiated the train of events leading directly to death, or circumstances of accident or violence which produced the fatal injury"
CHAMPS DeCoDe Standardizations

- Adhere to WHO ICD-10 and ICD-PM guidelines for determining and classifying perinatal and child deaths

- Standardized training provided

- Developed diagnosis standards for interpretation of complete CHAMPS data

- External quality assurance process
CHAMPS Aims to Deepen Understanding of Causes and Contributors to Under-5 Deaths

- Surveillance
- Community Engagement
- Cause of Death Determination
- Case Enrollment
CHAMPS Case Example 1

- **Female, Stillbirth**
  - 35 week estimated gestation age (by LMP)
  - Weight 3.8 kg

- **Mother - 20 y/o HIV positive on ART (Dx’ d prior to pregnancy)**
  - Twin pregnancy
  - 4 ANC visits

- Post-mortem HIV, malaria and TB testing negative
- Other twin born alive, APGAR 7/8, weight 2000g.
- Condition felt to result in stillbirth: Obstructed labor

- TAC was positive for *Treponema pallidum*
Case 1- Immunohistochemistry Results

Liver

Lung

Brain
Case 1- Placenta Pathology

Mother and twin tested and treated
CHAMPS Enrolled (n=8090)

- Stillbirth: 2848, 35%
- Neonates: 2977, 37%
- 1-59mo: 2265, 28%

CHAMPS Current Cases

- Stillbirth: 1154, 26%
- Neonates: 1754, 39%
- 1-59mo: 1154, 28%

MITS Completed (n=4475)

- Stillbirth: 1567, 35%
- Neonates: 1754, 39%
- 1-59mo: 1154, 26%

DeCoDed (n=2992)

- Stillbirth: 799, 27%
- Neonates: 1183, 39%
- 1-59mo: 799, 27%

SOURCE: CHAMPS data as of 10 March 2022
CHAMPS Network Case, MITS & DeCoDe Progress

E - Enrolled in CHAMPS
M - MITS Performed
D - DeCoDe Cases

SOURCE: CHAMPS data as of 16 February 2022
Location of Death by Age Group

- **Stillbirth**: 96% in Community, 96% in Facility
- **Death in first 24 hr**: 95% in Community, 95% in Facility
- **Early neonate**: 95% in Community, 95% in Facility
- **Late neonate**: 90% in Community, 90% in Facility
- **Infant**: 69% in Community, 70% in Facility
- **Child**: 70% in Community, 70% in Facility

SOURCE: CHAMPS data as of 10 March 2022
## Underlying Cause of Death Summary

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Maternal, Neonatal, Nutritional</th>
<th>Communicable</th>
<th>Noncommunicable</th>
<th>Undetermined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirth</td>
<td>79.1%</td>
<td>9.5%</td>
<td>7.0%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Neonates</td>
<td>72.0%</td>
<td>17.2%</td>
<td>9.2%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Infant/Child</td>
<td>24.4%</td>
<td>48.8%</td>
<td>24.0%</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

SOURCE: CHAMPS data as of 10 March 2022
Stillbirth Underlying Cause of Death (n=1010)

- Perinatal asphyxia/hypoxia: 73%
- Infection/Sepsis: 6%
- Congenital birth defects: 7%
- Undetermined: 4%

SOURCE: CHAMPS data as of 10 March 2022
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital malformations, deformations and chromosomal abnormalities</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Perinatal asphyxia or hypoxia</td>
<td>233</td>
<td>47</td>
<td>130</td>
<td>227</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Infection</td>
<td>48</td>
<td>5</td>
<td>1</td>
<td>28</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other specified antepartum or intrapartum disorder</td>
<td>13</td>
<td>3</td>
<td>2</td>
<td>12</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Disorders related to fetal growth</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Undetermined</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>296</td>
<td>58</td>
<td>139</td>
<td>273</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

SOURCE: CHAMPS data as of 10 March 2022
Neonates Underlying Cause of Death (n=1183)

- Neonatal preterm birth complications: 36%
- Perinatal asphyxia/hypoxia: 29%
- Neonatal aspiration syndromes: 8%
- Other neonatal disorders: 10%
- Umbilical cord syndromes: 4%
- Congenital sepsis: 4%
- Lower respiratory infections: 10%
- Congenital infections: 4%
- Congenital birth defects: 8%
- Undetermined: 10%

SOURCE: CHAMPS data as of 10 March 2022
Contribution of Respiratory Distress Syndrome in Neonatal Deaths

- Of 1183 neonatal deaths 44% (517) had preterm birth complications in causal chain
  - Of those preterms 65% (335) had RDS in causal chain
- Overall RDS in causal chain of 28% of all neonatal deaths and an additional 2% (32) of neonatal deaths had RDS as contributory condition

* Arrows indicate hyaline membranes
Infant/Child Underlying Cause of Death (n=799)

- **Malaria**: 12%
- **HIV**: 11%
- **Lower respiratory infections**: 8%
- **Diarrheal Diseases**: 6%
- **Neonatal preterm birth complications**: 4%
- **Malnutrition**: 18%
- **Congenital birth defects**: 9%
- **Injury**: 4%
- **Other neurologic disorders**: 17%
- **Sickle cell disorders**: 4%
- **Other endocrine, metabolic, blood, and immune disorders**: 4%
- **Diabetes**: 3%
- **HIV/AIDS**: 2%
- **Cancer**: 2%
- **Poisoning**: 2%
- **Poisoning**: 2%
- **Neonatal preterm birth complications**: 4%
- **Other respiratory diseases**: 4%

**SOURCE**: CHAMPS data as of 10 March 2022
## Malaria in Causal Chain by Age and Site, 1-59mo

<table>
<thead>
<tr>
<th>Case Type</th>
<th>Bangladesh</th>
<th>Ethiopia</th>
<th>Kenya</th>
<th>Mali</th>
<th>Mozambique</th>
<th>Sierra Leone</th>
<th>South Africa</th>
<th>TOTAL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>0</td>
<td>3</td>
<td>16</td>
<td>0</td>
<td>49 (12%)</td>
</tr>
<tr>
<td>Child</td>
<td>0</td>
<td>0</td>
<td>46</td>
<td>3</td>
<td>17</td>
<td>50</td>
<td>0</td>
<td>116 (31%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0</td>
<td>0</td>
<td>76</td>
<td>3</td>
<td>20</td>
<td>66</td>
<td>0</td>
<td>165 (21%)</td>
</tr>
</tbody>
</table>

**SOURCE:** CHAMPS data as of 10 March 2022
Malaria in Causal Chain

- Of 165 cases with malaria in causal chain
  - 53 (32%) had malaria as the only cause of death
  - Of the remaining 112 (68%) other causes included:
    - Malnutrition (53)
    - Sepsis (28)
    - Lower respiratory infections (28)
    - HIV (16)
    - Diarrheal diseases (11)
    - Aspiration pneumonia (9)
    - Cerebral palsy (3)

SOURCE: CHAMPS data as of 10 March 2022
**CHAMPS Identifies Multiple Causes of Death**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirths (n=1010)</td>
<td>44 (4%)</td>
<td>837 (83%)</td>
<td>115 (11%)</td>
<td>14 (1%)</td>
</tr>
<tr>
<td>Neonates (n=1183)</td>
<td>19 (2%)</td>
<td>433 (37%)</td>
<td>313 (26%)</td>
<td>418 (35%)</td>
</tr>
<tr>
<td>1-59 month (n=799)</td>
<td>22 (3%)</td>
<td>189 (24%)</td>
<td>234 (29%)</td>
<td>354 (44%)</td>
</tr>
<tr>
<td>Total (n=2992)</td>
<td>85 (3%)</td>
<td>1459 (49%)</td>
<td>662 (22%)</td>
<td>786 (26%)</td>
</tr>
</tbody>
</table>

*SOURCE: CHAMPS data as of 10 March 2022*
Contribution of Lower Respiratory Infection in 0-59 mo Deaths (n=1982)

**Pie Chart**
- Lower respiratory infections: 4%

**Table**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>N</th>
<th># Deaths with LRI in Causal Chain (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death within first 24 hours</td>
<td>486</td>
<td>8 (2%)</td>
</tr>
<tr>
<td>Early Neonate</td>
<td>480</td>
<td>95 (20%)</td>
</tr>
<tr>
<td>Late Neonate</td>
<td>217</td>
<td>82 (38%)</td>
</tr>
<tr>
<td>Infant</td>
<td>422</td>
<td>197 (47%)</td>
</tr>
<tr>
<td>Child</td>
<td>377</td>
<td>144 (38%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1982</td>
<td>526 (27%)</td>
</tr>
</tbody>
</table>

SOURCE: CHAMPS data as of 10 March 2022
### Lower Respiratory Infection Etiology

<table>
<thead>
<tr>
<th>Etiology</th>
<th># Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klebsiella pneumoniae</td>
<td>173</td>
</tr>
<tr>
<td>Streptococcus pneumoniae</td>
<td>104</td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>101</td>
</tr>
<tr>
<td>CMV</td>
<td>44</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>39</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>36</td>
</tr>
<tr>
<td>Respiratory syncytial virus (RSV)</td>
<td>23</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>22</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>20</td>
</tr>
<tr>
<td>Pneumocystis jirovecii</td>
<td>18</td>
</tr>
</tbody>
</table>

* 45% of LRI deaths had more multiple etiologies

**SOURCE:** CHAMPS data as of 10 March 2022
**Klebsiella pneumoniae - Detection and in Causal Chain**

- Detected in blood, CSF and/or lung tissue in 29% of all cases - ranging from 9% in stillbirths to 55% in infants (28 days to 12 months)
- In causal chain leading to death in 14% of all age cases
- 79% of Klebsiella deaths had sepsis involved

<table>
<thead>
<tr>
<th>Syndrome</th>
<th># (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>170 (45%)</td>
</tr>
<tr>
<td>Sepsis and Pneumonia</td>
<td>78 (21%)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>65 (17%)</td>
</tr>
<tr>
<td>Sepsis, Meningitis and Pneumonia</td>
<td>26 (7%)</td>
</tr>
<tr>
<td>Sepsis and Meningitis</td>
<td>22 (6%)</td>
</tr>
<tr>
<td>Meningitis</td>
<td>8 (2%)</td>
</tr>
<tr>
<td>Pneumonia and Meningitis</td>
<td>4 (1%)</td>
</tr>
<tr>
<td>Sepsis and Other infection</td>
<td>1 (0%)</td>
</tr>
</tbody>
</table>

SOURCE: CHAMPS data as of 10 March 2022
Deaths with *Klebsiella* in causal chain by age group, n = 2992

SOURCE: CHAMPS data as of 10 March 2022
Klebsiella Deaths Similar Between Deaths Occurring in Facility or Community

Deaths with Kp in Causal Chain by Place of Death (n=1502)

SOURCE: CHAMPS data as of 10 March 2022
## Contribution of CMV in Stillbirths and Under-5 Deaths (n=2992)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>n</th>
<th># Deaths with CMV detected*</th>
<th># Deaths with CMV in Causal Chain (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirths</td>
<td>1010</td>
<td>60 (6%)</td>
<td>14 (1.4%)</td>
</tr>
<tr>
<td>Death within first 24 hours</td>
<td>486</td>
<td>23 (5%)</td>
<td>3 (0.6%)</td>
</tr>
<tr>
<td>Early Neonate</td>
<td>480</td>
<td>40 (8%)</td>
<td>6 (1.3%)</td>
</tr>
<tr>
<td>Late Neonate</td>
<td>216</td>
<td>14 (6%)</td>
<td>1 (0.5%)</td>
</tr>
<tr>
<td>Infant</td>
<td>422</td>
<td>258 (61%)</td>
<td>54 (13%)</td>
</tr>
<tr>
<td>Child</td>
<td>377</td>
<td>278 (74%)</td>
<td>18 (5%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2992</td>
<td>673 (22%)</td>
<td>96 (3%)</td>
</tr>
</tbody>
</table>

* Detected by TAC in blood, CSF, lung or NP swab

**SOURCE:** CHAMPS data as of 10 March 2022
## Contribution of RSV in Stillbirths and Under-5 Deaths (n=2992)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>n</th>
<th># Deaths with RSV detected</th>
<th># Deaths with RSV in Causal Chain (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirths</td>
<td>1010</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Death within first 24 hours</td>
<td>486</td>
<td>6 (1%)</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Early Neonate</td>
<td>480</td>
<td>3 (0.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Late Neonate</td>
<td>216</td>
<td>9 (4%)</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>Infant</td>
<td>422</td>
<td>43 (10%)</td>
<td>16 (4%)</td>
</tr>
<tr>
<td>Child</td>
<td>377</td>
<td>30 (8%)</td>
<td>7 (2%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2992</strong></td>
<td><strong>91 (3%)</strong></td>
<td><strong>28 (1%)</strong></td>
</tr>
</tbody>
</table>

**SOURCE:** CHAMPS data as of 10 March 2022

RSV in Lung
### Contribution of Undernutrition in CHAMPS DeCoDed Deaths

<table>
<thead>
<tr>
<th>Case Type</th>
<th>Malnutrition as underlying*</th>
<th>Malnutrition in causal chain (but not UC)</th>
<th>Total in Causal chain (%)</th>
<th>Malnutrition in Part 2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late neonate (n=212)</td>
<td>0</td>
<td>1</td>
<td>1 (0.5%)</td>
<td>1 (0.5%)</td>
</tr>
<tr>
<td>Infant (n=419)</td>
<td>78</td>
<td>23</td>
<td>101 (24%)</td>
<td>30 (10%)</td>
</tr>
<tr>
<td>Child (n=370)</td>
<td>95</td>
<td>32</td>
<td>127 (35%)</td>
<td>21 (8%)</td>
</tr>
<tr>
<td>Total (n=1001)</td>
<td>173</td>
<td>56</td>
<td>229 (23%)</td>
<td>52 (7%)</td>
</tr>
</tbody>
</table>

*includes all malnutrition codes (E40-E46) and HIV disease resulting in wasting syndrome (B22.2)

For cases where Malnutrition was the Underlying cause, the leading comorbid conditions are infectious:

- Sepsis
- Pneumonia
- Diarrheal diseases
- Malaria
- Other infections

SOURCE: CHAMPS data as of 16 February 2022
# Birth Defects in Causal Chain by Age and Site

<table>
<thead>
<tr>
<th>Age Group</th>
<th>BD (n=293)</th>
<th>ET (n=264)</th>
<th>KE (n=550)</th>
<th>ML (n=202)</th>
<th>MZ (n=505)</th>
<th>SL (n=353)</th>
<th>ZA (n=825)</th>
<th>TOTAL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirth (n=1010)</td>
<td></td>
<td></td>
<td>0</td>
<td>8</td>
<td>11</td>
<td>5</td>
<td>6</td>
<td>74 (7%)</td>
</tr>
<tr>
<td>Neonates (n=1183)</td>
<td>11</td>
<td>9</td>
<td>4</td>
<td>20</td>
<td>15</td>
<td>5</td>
<td>55</td>
<td>119 (10%)</td>
</tr>
<tr>
<td>Infant (n=422)</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>29</td>
<td>51 (12%)</td>
</tr>
<tr>
<td>Child (n=377)</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>14</td>
<td>25 (7%)</td>
</tr>
<tr>
<td>TOTAL (n=2992)</td>
<td>21 (7%)</td>
<td>44 (17%)</td>
<td>22 (4%)</td>
<td>34 (17%)</td>
<td>34 (7%)</td>
<td>10 (3%)</td>
<td>104 (13%)</td>
<td>269 (9%)</td>
</tr>
</tbody>
</table>

*SOURCE: CHAMPS data as of 10 March 2022*
Excess Neural Tube Defects in Ethiopia

- Congenital defect caused by folate deficiency in pregnant women
- Excess number identified in Ethiopia
- Prevented by folate fortification in diet, usually in flour
- Working with Gates Foundation, Nutritional International, Ethiopia Public Health Institute on plans to evaluate benefit of folate-fortified salt
Majority of U5 Deaths in CHAMPS are Preventable

- TOTAL: 70.5%
- Stillbirths: 63.4%
- Neonates: 69.1%
- Infant/Child: 78.7%

Percent Preventable
Majority of U5 Deaths are Preventable: Stillbirths

- M1 - Complications of Placenta, Cord, Membranes: 58%
- M2 - Complications of Pregnancy: 86%
- M3 - Complications of Labour and Delivery: 89%
- M4 - Maternal Medical and Surgical Conditions: 78%
Most U5 deaths in the CHAMPS network were deemed preventable

**Stillbirths/neonates**
- Improved clinical management & quality of care
- Improved antenatal/obstetric care
- Access to medicine and supplies
- Fetal heart rate monitoring
- Oxygen therapy
- Cord cleansing with chlorhexidine

**Infants/children**
- Improved clinical management & quality of care
- Improved antenatal/obstetric care
- Training healthcare workers
- Functioning hand hygiene stations
- Artemisinin-based combination therapy
- Improved infection prevention and control
- Improved infection prevention and control
- Improved health education
- Usage of insecticide-treated bed nets
Aggregate Data in Real-Time

The Power of Data

CHAMPS' precise, accurate, real-time data explains why children under five are dying.

HTTPS://CHAMPSHEALTH.ORG/DATA
CHAMPS acknowledges the families and communities that make our work possible.
The CHAMPS Network

- Global Partners Board
- CHAMPS Program Office
- Technical Partners

Scientific Advisory Committee
- Bill & Melinda Gates Foundation

- Emory University
- Public Health Institutes of the World
- CDC
- Public Health Informatics Institute

- ISGlobal
- IANPHI

- WITS University
- LSHTM
- Oxford Research Group
- University of Maryland Baltimore
- Johns Hopkins University
- London School of Hygiene & Tropical Medicine

- Focus 1000
- CROWN AGENTS

Countries:
- South Africa
- Mozambique
- Kenya
- Mali
- Bangladesh
- Ethiopia
- Sierra Leone
- India
To learn more about CHAMPS contact us at info@champshealth.org