Root cause analysis underscores the importance of understanding, addressing and communicating cold chain equipment failures to improve equipment performance

Shahrzad Yavari
Nexleaf Analytics
Before Adjustment

- > 8°C: 12.1%
- 2°C - 8°C: 69.3%
- < 2°C: 18.6%

After Adjustment

- > 8°C: 2.7%
- 2°C - 8°C: 89.8%
- < 2°C: 7.5%
Daytime: Fridge in range

Night time: Fridge heats up
Is freezing an on going issue in the vaccine cold chain? A systematic literature review

C. Hanson; A. George; B. A. Sawadogo; B. Schreiber

UNICEF PD
Temperature Sensitivity of Vaccines

*The diluent for MenA PS-PCV contains alum adjuvant and is freeze sensitive

The in-country vaccine journey

Updated Literature Review

- Updated Review from Matthias, et al., 2007
- From 1985 to June 2006, 35 articles assessed vaccine exposure to freezing, averaging 1.7 articles per year
- This update identified 29 articles in the last 10 years, averaging 2.9 articles per year
- Analysis examined studies that assessed temperature at specific time points and those that continuously monitored temperature (rigorous studies)
  - More rigorous studies in transport in HIC/UMICs
- Sample sizes Varied Widely:
  - 3 to 440 storage units
  - 1 to 103 shipments
  - 3 to 103 for outreach sessions

Source: Serge Ganivet (WHO)
Freezing Exposure During Storage Increased

- 2007: 13.5%
- 2016: 33.3% for HIC/UMIC
- 2007: 21.9%
- 2016: 37.1% for LMIC/LIC
Exposure to Freezing Temperatures and Possible Links to Outbreaks: Pertussis

R = 0.76
P < 0.05

Yes! Freezing is Still an Issue
Key Lessons:

- More countries implementing continuous temperature monitoring
- More countries are conducting temperature monitoring studies
- New technology: visual sticker on vial to detect freezing
- Training and Supervision of vaccinators and cold chain staff
THANK YOU