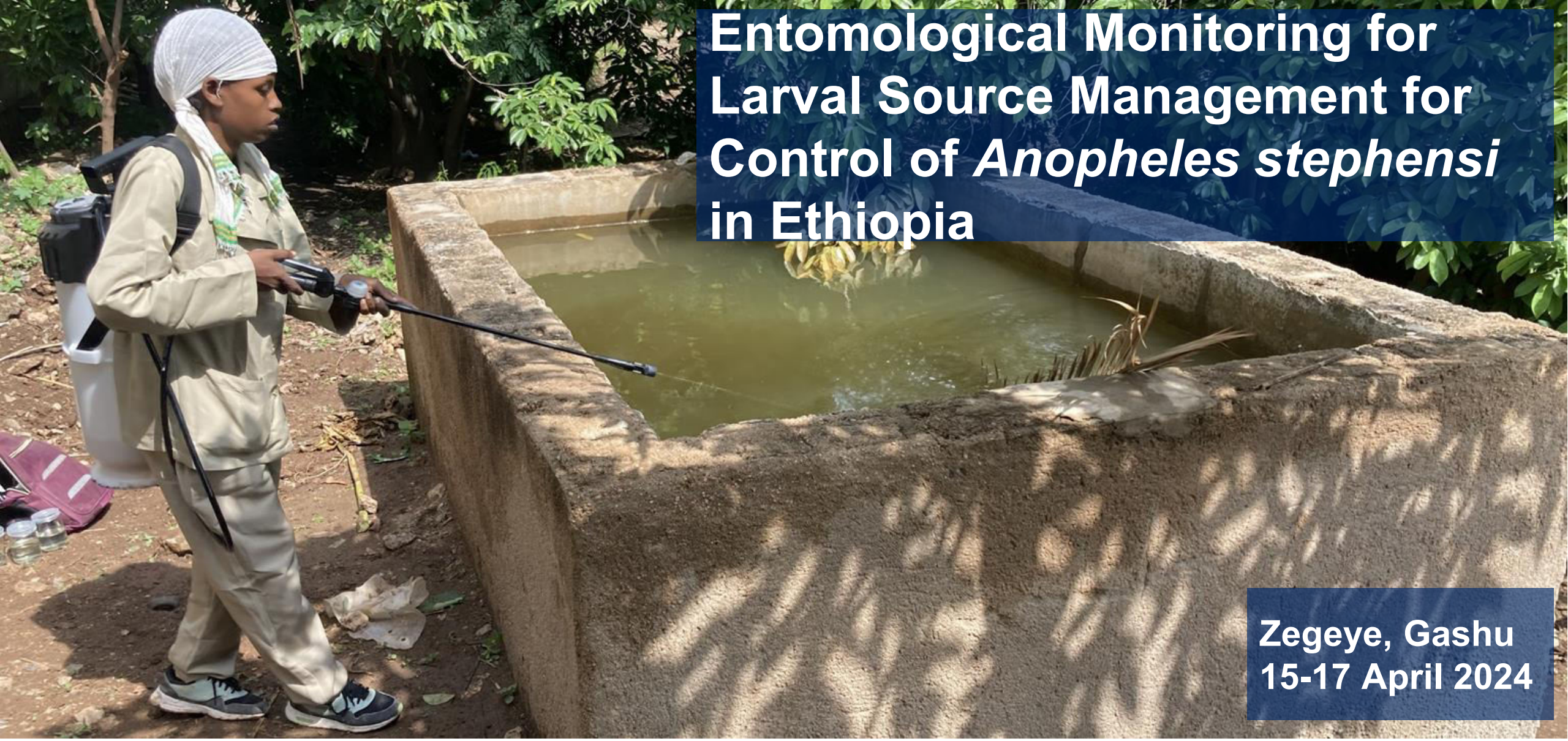

Entomological Monitoring for Larval Source Management for Control of *Anopheles stephensi* in Ethiopia

Zegeye, Gashu

15-17 April 2024

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PMI Evolve

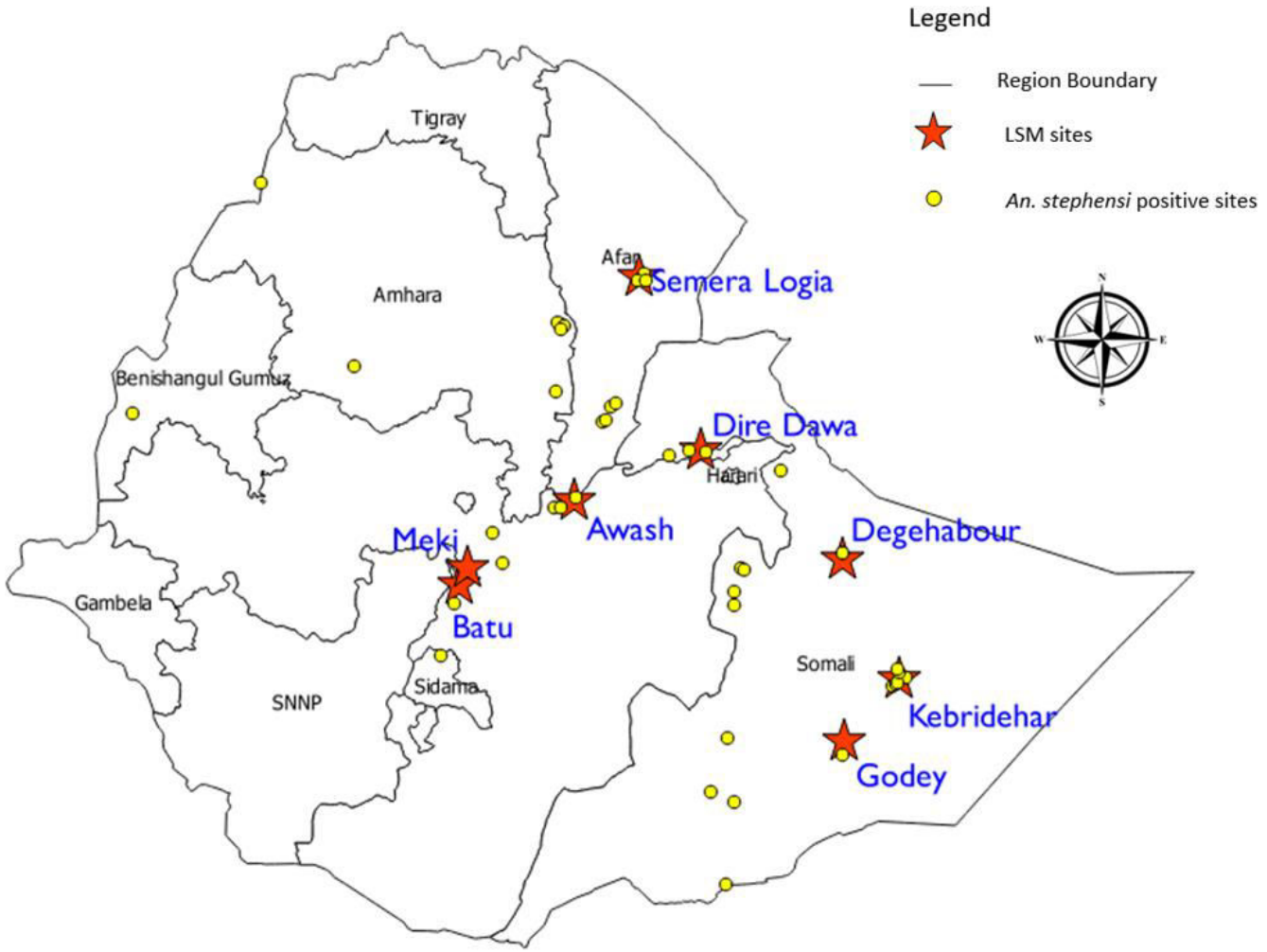
Evolving Vector Control to Fight Malaria

Background

- About 69% of the total population in Ethiopia is at risk of malaria infection and transmission is highly seasonal.
- Historically, the primary vector of malaria in Ethiopia has been *An. arabiensis*.
- The invasive malaria vector *Anopheles stephensi* was reported for the first time in Ethiopia in 2016.
  - To date, it has been found in 52 urban and peri-urban sites.

PMI-Supported LSM Implementation and Entomological Monitoring Sites

- To help curb the spread of *An. stephensi*, PMI VectorLink/Evolve collaborated with the Ministry of Health to implement LSM in 8 urban towns starting in August 2022.
- Entomological monitoring was conducted to understand the impact of LSM on larval density, larval habitat indices and adult resting density.



Entomology Monitoring Overview and Timeline

July 2022 ----------December 2023

Entomology Data Collection

- Baseline conducted for 2-4 weeks from Jul 25-Aug 20, 2022 prior to start of LSM
- Weekly larval/pupal sampling from tracked permanent & random larval habitats
- Adult sampling in houses near tracked larval habitats and animal shelters using Prokopack
- Transport larvae/pupae to insectary for rearing to adult and identification to species

LSM Implementation Overview and Timeline

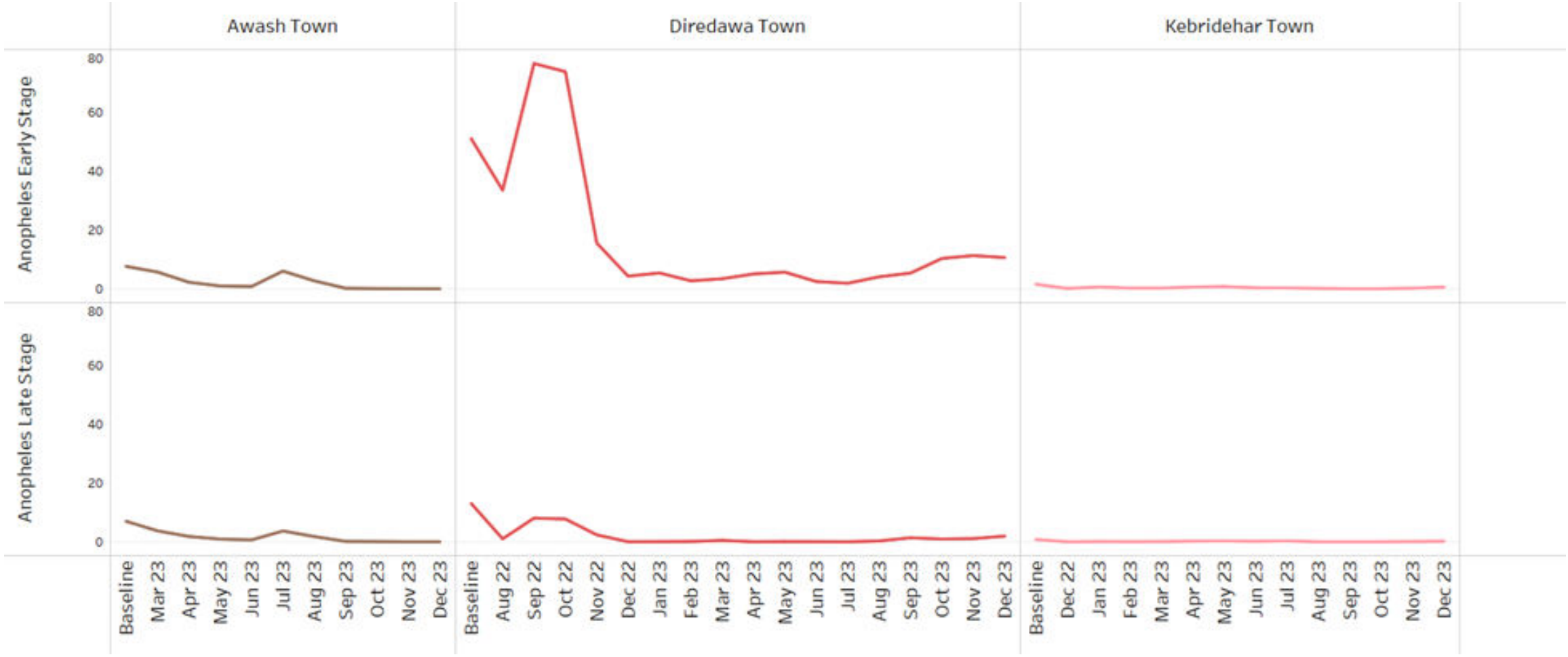
August 2022 ---------- December 2023

- Methods: Direct application and spraying of VectoBac WG, source reduction (protocol was developed with the manufacturers and LSM experts)
- Larval habitats visited and appropriate LSM method administered biweekly
- mHealth tool guided larvicide dosage

Results: Properties and larval habitats accessed per cycle across the eight towns

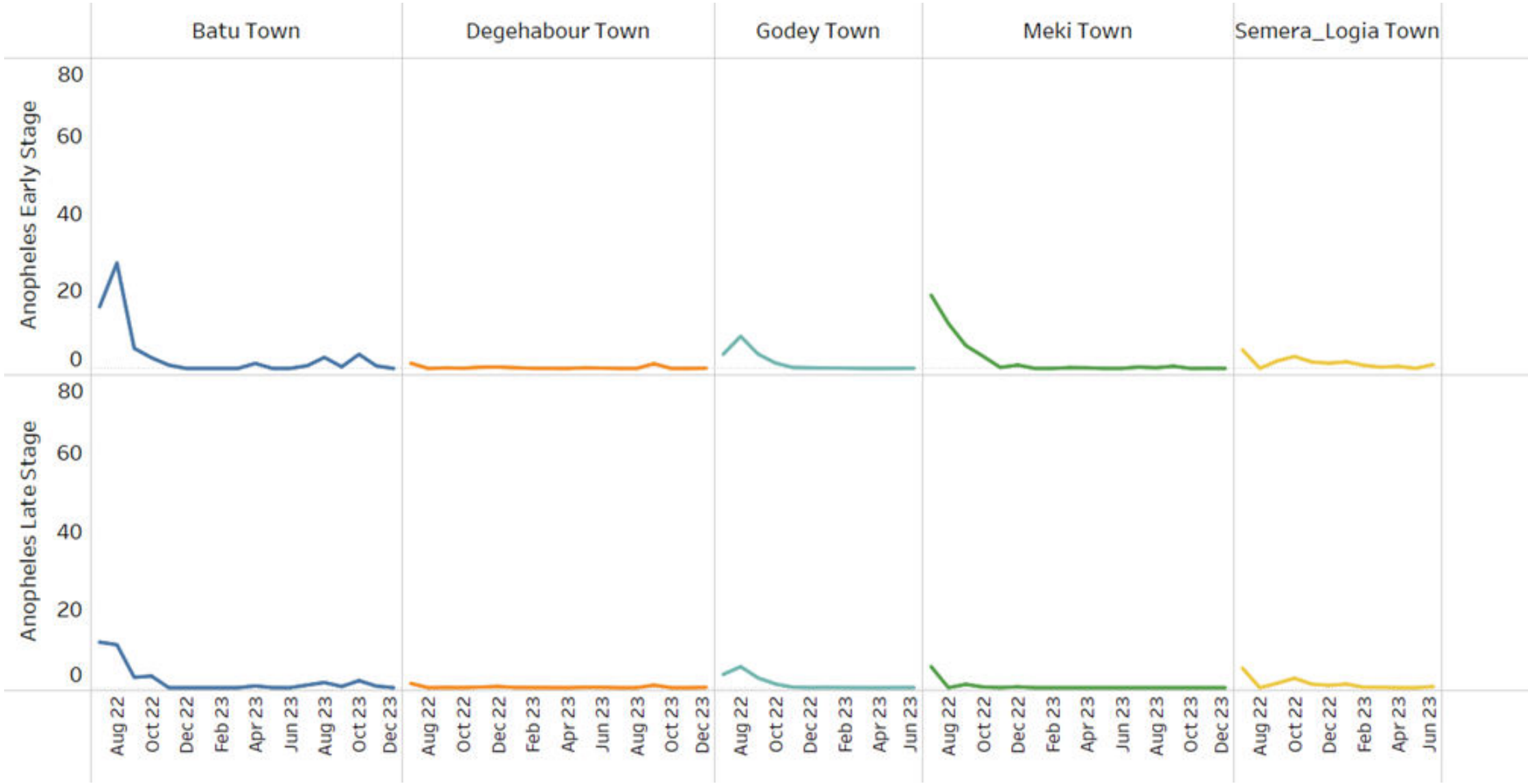
Dates and frequency of LSM implementation	Every two weeks from Aug. 2022-Dec. 2023
# of towns covered by PMI-supported LSM	8 towns
Average # of properties visited per cycle	87,996
Average # of larval habitats treated by direct application	30,046 (44%)
Average # of larval habitats treated by spraying	1,741 (3%)
Average # of larval habitats source reduced	36,191 (53%)
Population protected	611,360
Larvicide (VectoBac in Kg)	2,015

Results: Mean Larval Density of *Anopheles* from Tracked Habitats in Awash, Dire Dawa, and Kebridehar



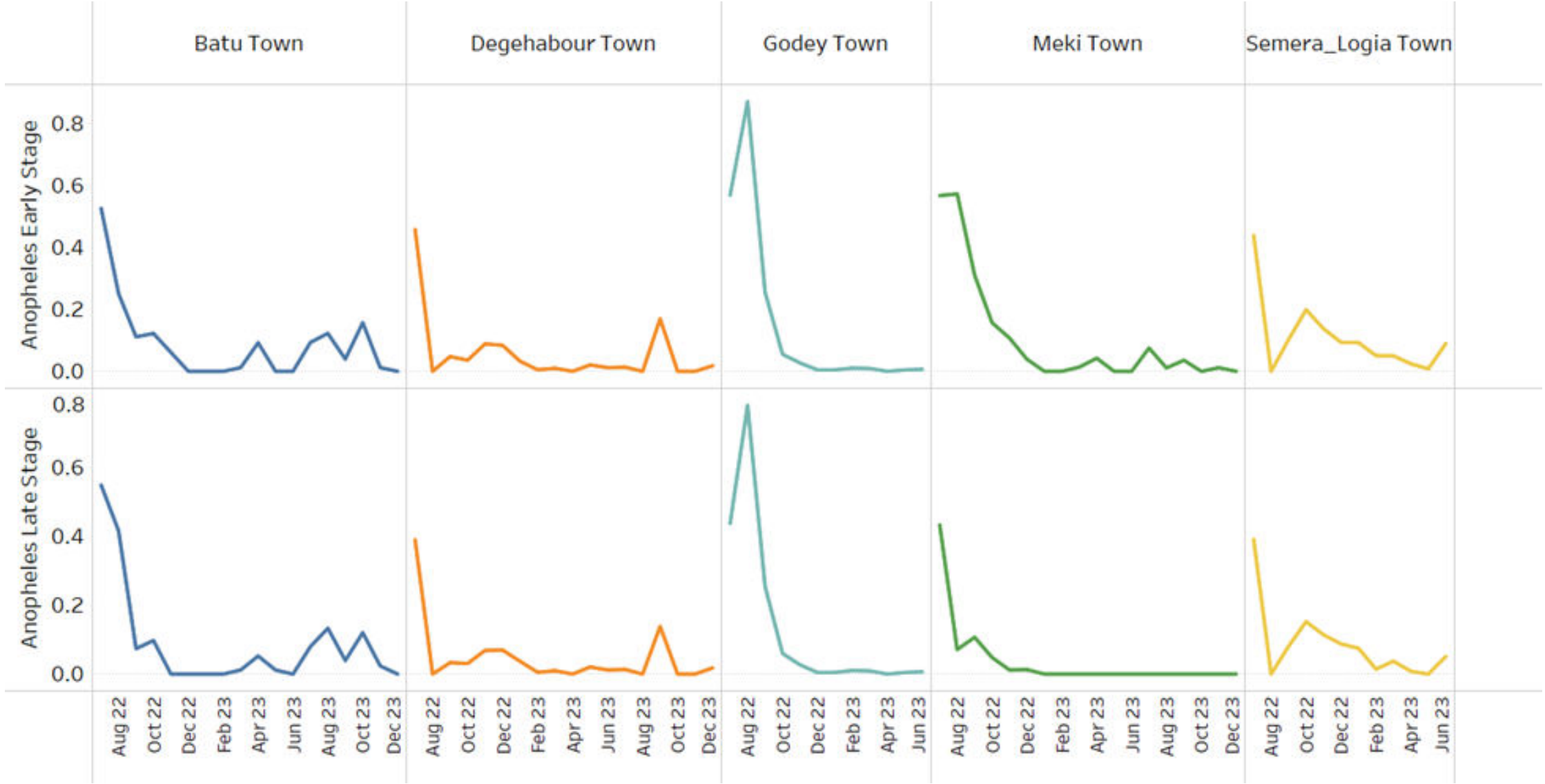
LSM resulted in decline of the mean larval density of *Anopheles*

Results: Mean Larval Density of *Anopheles* from Tracked Habitats in Batu, Degehabour, Godey, Meki, and Semera-Logia



Results: Mean Larval Habitat Indices (Larval Habitat Positivity) of *Anopheles* Mosquitoes from Tracked Habitats in Awash, Dire Dawa, and Kebridehar

Results: Mean Larval Habitat Positivity of *Anopheles* from Tracked Habitats in Batu, Degehabour, Godey, Meki, and Semera-Logia



Key Findings and Lessons Learned (1)

1. Enumeration of households (properties) and larval habitats prior to LSM enabled good coverage and high-quality implementation
   - Facilitated estimation of HR, larvicide, and equipment needs
   - Each property received an ID number which was used to assign LSM personnel.

   **It is worth noting that enumeration is dynamic; at no point in time will it be the same.*

2. Most larval habitats were artificial water containers, which were limited in number and accessible and easily identified by CVCTs.
   - Implementing LSM in these habitats may help control the spread of *An. stephensi*.


Cistern


Water tanks


Barrels

Key Findings and Lessons Learned (2)

3. Larval surveillance on the edge of slow-flowing rivers indicated that these water bodies could be breeding habitats for both *An. stephensi* and *An. arabiensis.*
   - Residual life of VectoBac®WG in such habitats was very short and thus would require more frequent application (weekly instead of every two weeks).

4. Implementation of high quality LSM resulted in a decline in larval density, pupal density, and habitat indices compared to baseline.
   - Further investigation of epidemiological data is needed, however, to understand if this has translated into a decline in malaria incidence.

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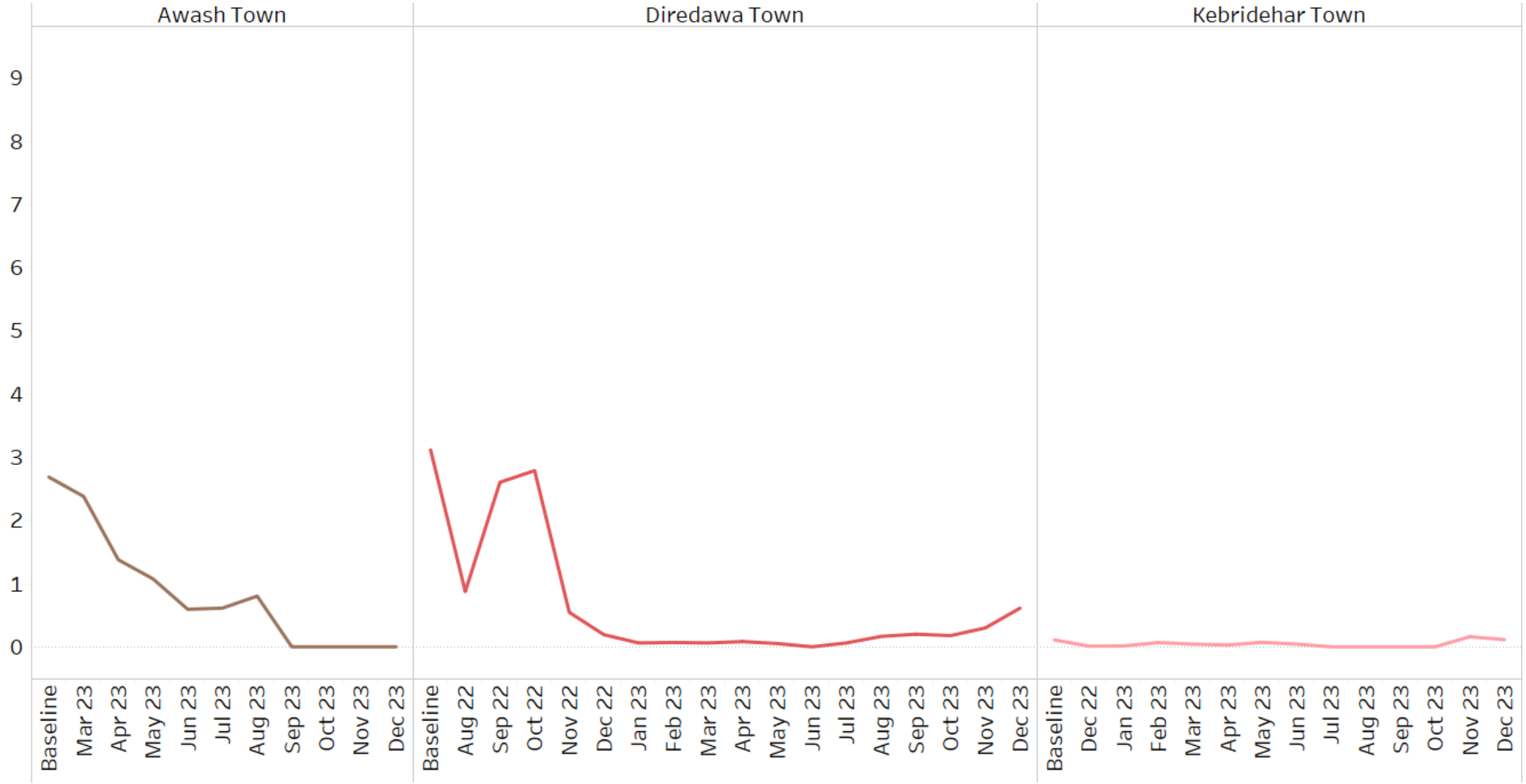
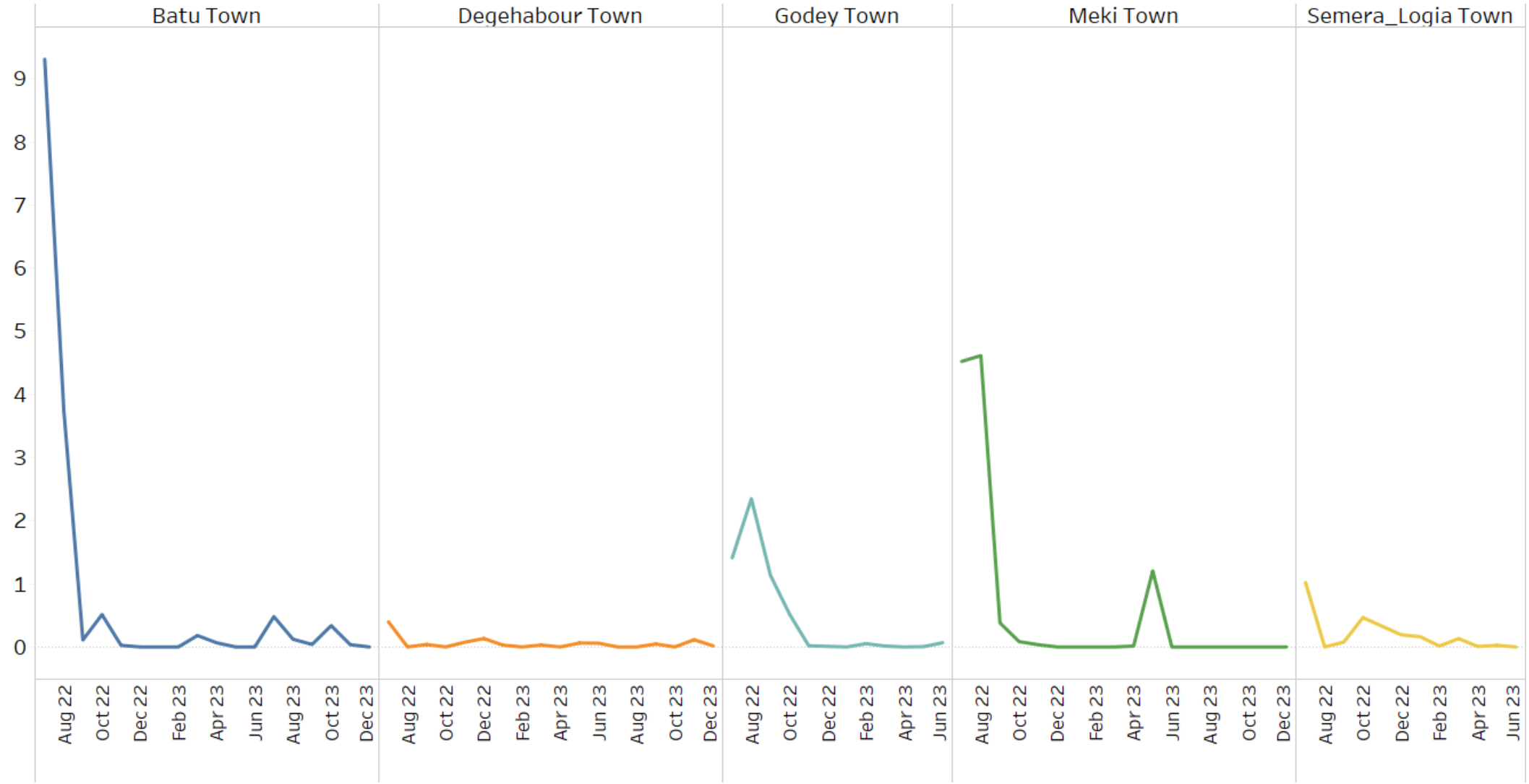
EXTRA SLIDES

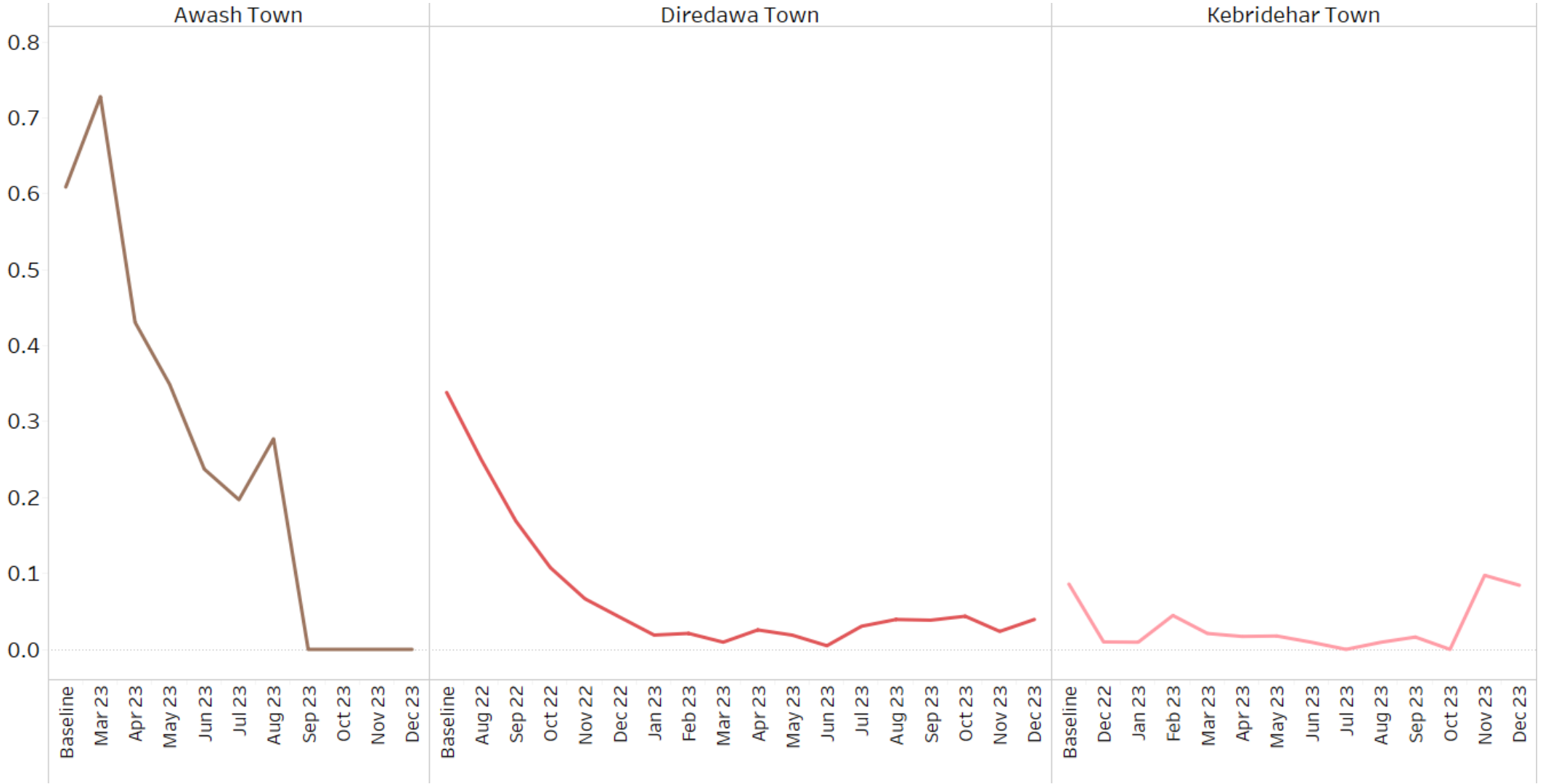
Pupal Density of Tracked Habitats in Awash, Dire Dawa, and Kebridehar



Pupal Density of Tracked Habitats in Batu, Degehabour, Godey, Meki, and Semera-Logia



Pupal Index of Tracked Habitats in Awash, Dire Dawa, and Kebridehar



Pupal Index of Tracked Habitats in Batu, Degehabour, Godey, Meki, and Semera-Logia