

FONEASTRA MILK PASTEURIZATION MONITOR: BUILDING CAPACITY OF SMALL-SCALE HUMAN MILK BANKS

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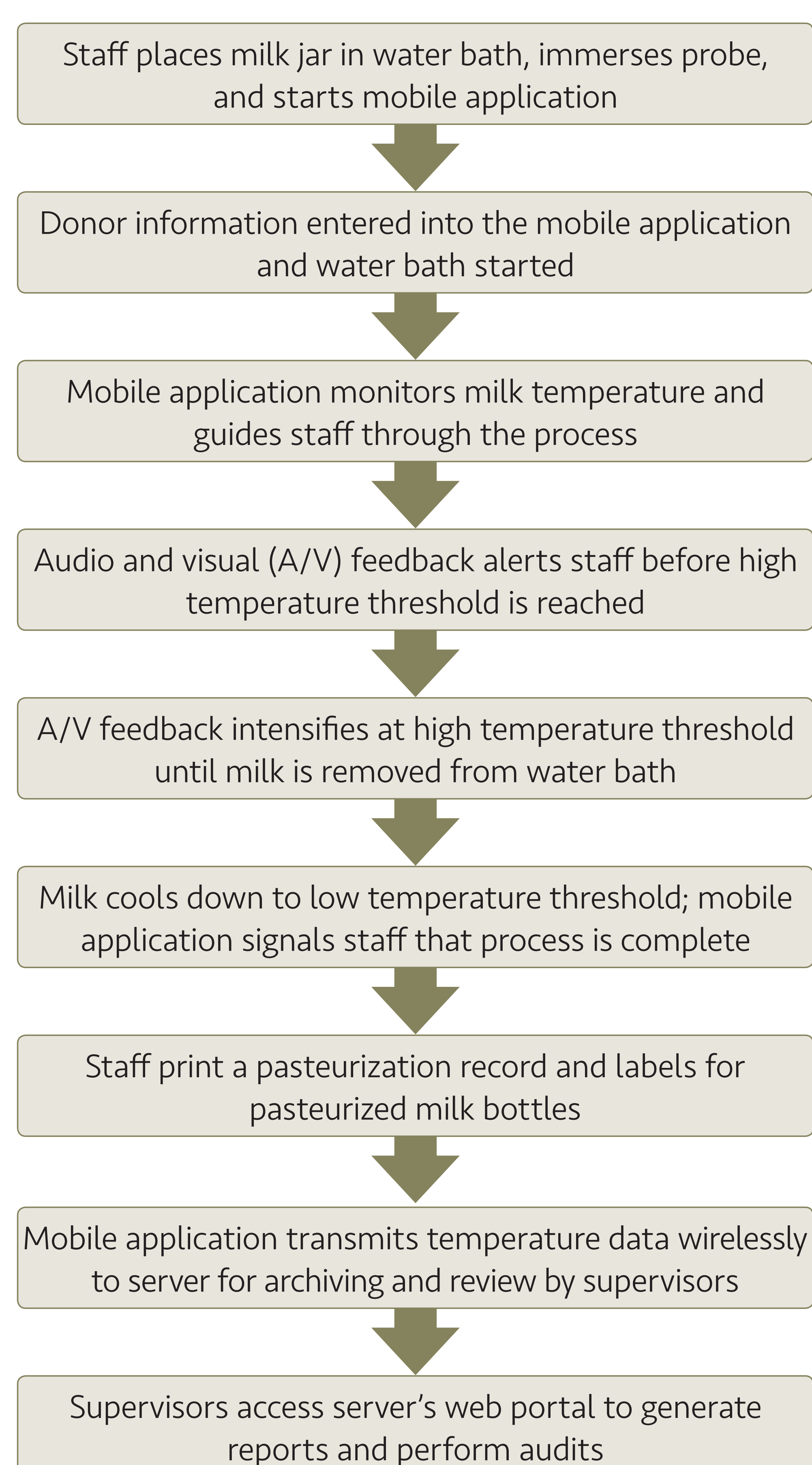
Background

Human milk banks (HMBs) are a crucial system for treating and providing safe donor milk to vulnerable infants. Flash-heat pasteurization, a low-cost,



simple method originally designed for women to use in the home, has recently been used to treat donor milk in a neonatal intensive care unit in Durban, South Africa, but its lack of temperature monitoring has prevented scale-up.¹ FoneAstra, a smart phone-based monitoring device, has been adapted to guide the user through the pasteurization process and record and transmit pasteurization temperatures.² The goal of this project is to evaluate the FoneAstra system as a human milk pasteurization monitor (MPM) for a resource-limited milk bank. Objectives include: (1) finalize the FoneAstra MPM prototype to meet user and HMB requirements; (2) field test implementation of MPM system in collaboration with the Human Milk Banking Association of South Africa in Durban, South Africa; (3) evaluate the safety of the MPM process; and (4) assess the acceptability of community-based HMB.

Figure 1. Feedbackloop for the FoneAstra milk pasteurization monitor system



Methods

- Baseline data collected:
 - Current limitations of flash-heat pasteurization system.
 - Assessment of the new MPM process.
 - Assessment of current data management systems.
 - Evaluation and validation of MPM processes.
- Feedback incorporated into the MPM design.
- Bacteriology assays conducted for safety.
 - Pre-pasteurized samples.
 - Post-pasteurized samples comparing conventional flash-heat and enhanced flash-heat with MPM.
- Interviews regarding perceptions of community human milk banks conducted with women before and after participating in a breastfeeding counselor training program

Results

- Flash-heat pasteurization process adapted through enhancements to the MPM system:
 - Temperature monitoring provided with MPM.
 - Tripled donor milk volumes.
 - Decreased contamination risk by establishing a water control.
 - Reduced time required with an induction stove and rapid cooling.
- Data management and tracking capability integrated into MPM:
 - Temperature data uploaded and archived.
 - Donor tracking and capability to print pasteurization reports and bottle labels via a Bluetooth-enabled printer.
- MPM successfully launched at study HMB site and used in routine process.

Post-pasteurization bacterial assays demonstrate safety of FoneAstra MPM

- 0% with growth post-flash-heat with MPM (n=100).
- 86% with growth pre-pasteurization (n=100).
- 1% with growth post flash-heat pasteurization without use of MPM (n=100).

- 39/50 women enrolled into acceptability study and provided baseline feedback:
 - 40% felt that heating donor milk would render it safe.
 - 57% felt that it would be acceptable for a mother in a community to set up a small breast milk bank to feed orphans.
 - Follow-up interviews will be conducted after three months of breastfeeding counselor training in order to determine if training and education improves acceptability of donor breast milk in the community.
- MPM use expanded to three neonate intensive care units; additional expansion is underway.



Adapting original flash-heat process to MPM system.

Conclusion

- MPM provides safe pasteurization through monitoring and data tracking capability while significantly reducing staff time requirements.
- MPM could be used as a quality assurance tool for establishing new HMBs and for standardizing the flash-heat process.
- The safety of MPM has been verified through microbial testing of post-pasteurization samples.
- This simple and low-cost technology could make wide-scale implementation of human milk banks feasible in low-resource settings.



FoneAstra milk pasteurization monitor being used to treat donor milk at neonatal intensive care unit in South Africa.

References

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- 2 Chaudhri R, Vlachos D, Borriello G, et al. Decentralized Human Milk Banking with ODK Sensors. Presented at ACM DEV 2013, January 11-12, 2013; Bangalore, India.

Acknowledgements

Funding provided from a grant from the Bill & Melinda Gates Foundation through the Grand Challenges Explorations initiative, the University of Washington Computer Science Engineering, by donations from private foundations and individuals to the PATH Health Innovation Portfolio, and National Science Foundation Research Grant No. IIS-1111433.