



MAMASnet

Space Technologies for Mother Earth

Maternal-Child Telemedicine in Most Vulnerable Communities **A Prototype Project for American Telemedicine Association (ATA) and UN WHO**

The Purpose:

MAMASnet will demonstrate the transformational benefits of converging new technologies with strategic partnerships for delivery of maternal-child health services in post conflict, remote and high risk environments. Demonstrations will yield practical telemedicine infrastructure with inter-operability, scalability, and capacity for rapid ramp-up to maximize local health resources.

The Project:

MAMAS team proposes two testbeds (Sierra Leone-Liberia, and Natal, South Africa) with key technology and program partners, and with four systems support and training tracks:

- **Biomedical informatics:** Design of systems for data upload, mapping, monitoring and regular deliver to stakeholders for health infrastructure planning and policy
- **Clinical refresher trainings** for physicians, nurses and nurse midwives: standardized trainings and inclusion of telemedicine for remote diagnostics including access to reference libraries, ultrasound and communications for upgraded triage and transport logistics
- **Administrative services** (supply chain, cold chain, emergency transport, billing)
- **Community engagement** featuring: rural “Let’s Talk MAMAS” radio utilizing mobile phones (schools, hospitals, markets) for call-in to 1-800 number with dialogue moderated and post produced for local radio and internet on key health topics and best strategies.

The Partnerships:

- MAMASNet is under the auspices of [American Telemedicine Association \(ATA\)](#) and in affiliation with [MITAC](#), Virginia Commonwealth University, as a key center for testing of space medicine, and MedITAC, for application of same advanced systems to global health needs. Hybrid systems will be tracked, analyzed and reported in real time. Lead university centers will be identified in relation to task, during initial planning phases.
- TATRC is proposed as a key working partner and funding source, with design of MAMASnet for maternal-child health in US disaster preparedness and also with future potential for both Afghanistan and Iraq to accelerate development of health infrastructure..
- Global University System (GUS) is an existing organizational partner for MAMASnet and will assess regional e-health prototype networks for inclusion in GUS university exchanges, with eligibility for Japan ODA funding to support broadband in the same testbed regions.

- International affiliation is with [World Health Organization's "Making Pregnancy Safer" Department](#) in Geneva.
- Field partnerships for telemedicine development and trainings in target countries are proposed with key INGO collaborators, Mercy Ships, International Medical Corp and International Red Cross-Red Crescent.

The Big Picture—Obstetrics and Neonatal Health as First Focus:

A woman dies every minute due to pregnancy-related complications. As part of the Millennium Development Goals, the United Nations is striving to reduce the maternal mortality ratio (MMR), the number of maternal deaths per 100,000 live births, by 75% from 1990 to 2015. Leading medical causes of maternal mortality could be prevented with more efficient triage, transfer and expert clinician response appropriate to pre-eclampsia, hemorrhage, obstructed labor and infection. Early recognition and rapid response with telemedicine infrastructure and clinician support is a critical and specific task for survival and recovery of communities.

Three Delays --Contributing Factors for Maternal Mortality, and Basis for Telemedicine Inputs:

1. Delay in recognizing maternal risk
2. Delay in reaching medical facility and appropriate response
3. Delay in clinicians responding to need with appropriate treatment.

Goals:

- Reduce maternal and infant mortality in target districts in advance of the United Nations Millennium Development Goals ([MDG](#)) for 2015 by increasing local medical capacity
- Advance collaboration and leveraging for partners' telemedicine and information systems,
- Demonstrate US goodwill and strategic assistance to countries in crises and armed conflict
- Open and/or strengthen US technology market opportunities and collegial relationships for meeting critical needs as identified by UN MDG 2015 for maternal-child health
- Contribute to efficiency and affordability of health service delivery in target countries
- Support applied research in relation to all of the above.

Outputs

In sequenced testbeds, selected for challenges unique to target site, we will prove value of:

- Improved data collection capacity that increases health analysis and planning capabilities;
- Effective use of remote medical education, diagnostics, monitoring and evaluation, uses of telesurgery for obstetrics (expanded later), infrastructure administration (logistics)
- Appropriate inclusion of end-users in design, embedding of systems and training of clinicians for acceptance of technologies by both health workers and patient groups.

ATA-MAMASnet regional testbeds to include:

#1: Sierra Leone and Liberia, West Africa: (post conflict, national/community recovery scenario) Sierra Leone is only now beginning to heal from a decade of rebel wars and near destruction of its health infrastructure. Maternal and newborn health is impacted by lack of access to health services and inability to pay for what little is there.

MAMAS has completed seven years of preparatory field analyses and relationship-building in Sierra Leone, Guinea and Liberia in cooperation with health sector, rural women's cooperatives, university medical faculty. Maternal mortality in these countries is highest in the world; coordinated health sector, physicians and nurse midwifery trainings are of central importance.

#2: Zululand (Natal Province, South Africa) and Swaziland: (represent a microcosm of the problems in Africa,). A survey published in March 2004 found that South Africans spend more time at funerals than they do having their hair cut, shopping, or having Braais (Bar-B-Qs). The survey found that more than twice as many people had been to a funeral in the past month than

had been to a wedding. It has been estimated that a minimum of 600 people in South Africa die of HIV-related illnesses each day. As of 1999, more than four million people were infected in this region. Maternal-child HIV/AIDS transmission is a key factor in all thoughtful interventions. Based on a 2006 USAID report, KwaZulu bears the brunt of the Africa HIV/AIDS pandemic.

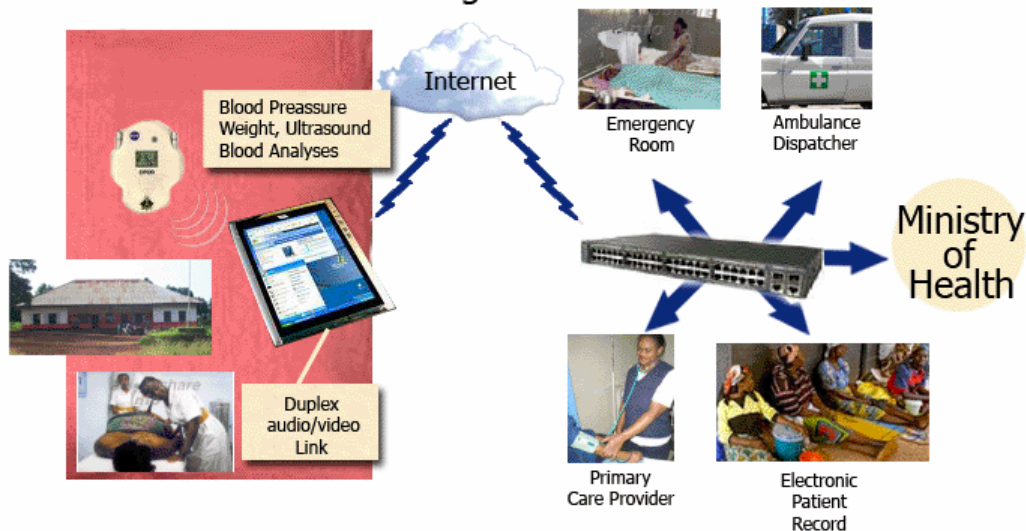
MAMAS will cooperate with Nelson R. Mandela School of Medicine, University of KwaZulu, Natal in maximizing existing teleconferencing infrastructure and inter-hospital university relationships to expand workforce education and (proposed) rural talk radio for community engagement, education, logistics support in regard to HIV/AIDS and mother-child transmission.

Clinical Collaboration and Appropriate Technologies

MAMASnet includes international “best practice” trainings for review and adaptation in testbed districts. These include Alaska’s Community Health Aide Program (CHAP) for rural health worker trainings and American College of Nurse Midwives. Objectives include to:

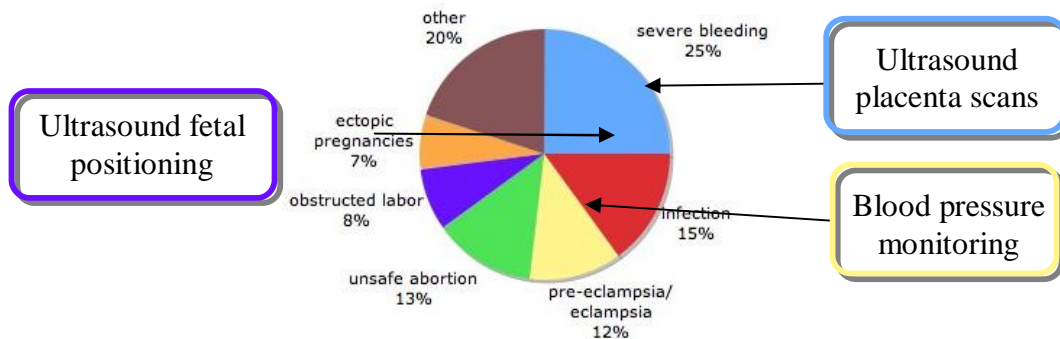
- adapt the e-medicine platform, enabling managing and sharing of personal health data.
- develop communication networking tools and interfaces with input by local population.

MAMASnet: Tools for Decentralized Diagnostics and Medical Logistics



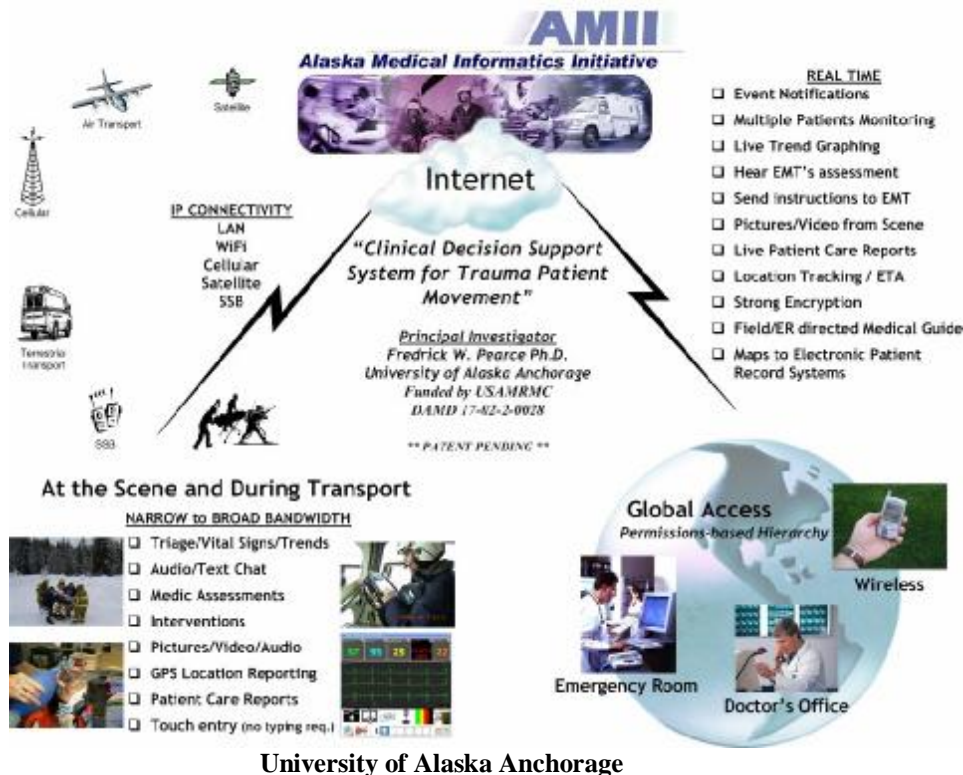
Examples of screening protocols on major causes of maternal death:

Ultrasound for remote diagnostics and informed triage. Multiple uses (across specialties) for ultrasound have potential for cost-effective use in district and provincial hospitals. New technologies include a handheld ultrasound machine and stationary systems for district centers.



Connectivity

Infrastructure should allow for current medical metrics including images to be securely transmitted and received. In addition, we will also adapt the existing e-medicine platform for supporting the network and human interfaces for both the local and the global clinician support. Mobile telephony infrastructure has exploded in its use, even in rural Africa. Based on our experience and partners' capacity, we will utilize cell phone and/or other communications infrastructure to develop a flexible and scalable network for MAMASnet.



University of Alaska Anchorage

MAMASnet test beds will provide opportunities for further analyses and development of system technologies like Alaska's AMII (Alaska Medical Informatics Initiative) with the unique capability to transmit in narrow bandwidth environment. Dr. Fred Pearce, UAA, has designed this system for USAMRMC, building on his experience as architect of the Alaska Telemedicine Testbed Project. AMII supports real-time clinical collaboration. It provides real-time monitoring of blood pressure, SPO2, twelve-lead ECG, temperature, heart and lung sounds, and respiration rate (depending on sensors used). Its flexible architecture allows for additional digital clinical data (ultrasound).

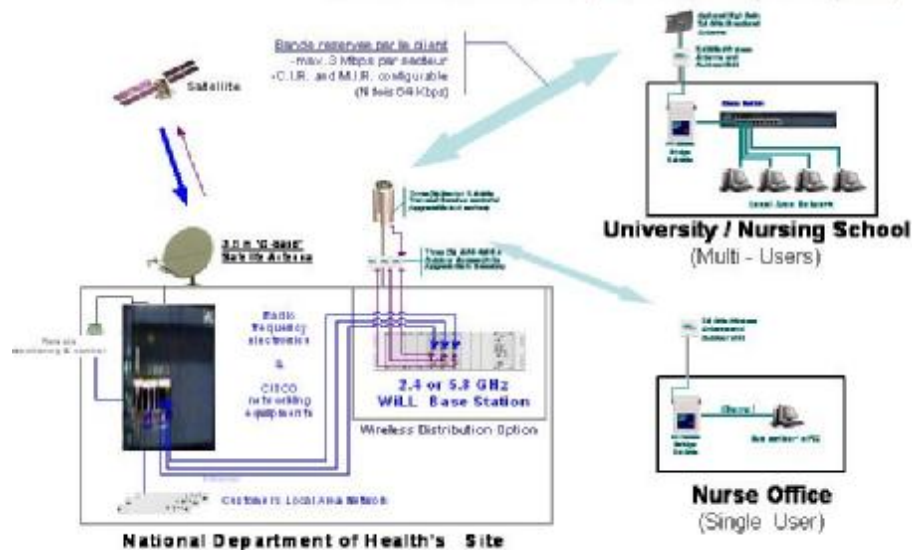
The AMII communications module will seek and find the "best" available IP connection from a satellite modem (default communications protocol for air evacuation), cell phone modem, 802.xx wireless IP, and/or Ethernet. The database structure records every aspect of each event for trend analysis and utilization review with up to six simultaneous interventions per field-unit.

Coordination among national stakeholders:

Integrated data systems for both clinical support and development of informed policy and planning are central to sustainability. MAMASnet related systems are described in "Technical Description" document, separate cover.

Local Network Plan for National Hub

Wireless Multimedia (internet, data, voice, etc)



Project Phases:

The Project will include four initial phases with reports to funders and budgets for the next phase submitted at the end of each phase. We are considering parallel program deployment in Sierra Leone and West Bank-Gaza, with ongoing analyses and reporting onto a common website.

Phase I (months 1-3): Establishment of American Telemedicine Association (ATA) partners and administration with MITAC and MedITAC Program, Virginia Commonwealth University; Plan for strategy, proposal writing, and timelines for submission which yields funding to support both initial field cooperative design and preliminary demonstration testbed in target sites, with mechanism for deliverable at ATA conference, May, 08., Seattle.

Phase II (months 4-6): Based on the trip analysis, we will finalize agreements both for regional and international partnerships, and for bioengineering support in US, and install and test the technical system in a U.S. lab as a permanent counterpart to the systems installed in testbeds. This will allow complementary troubleshooting and remote system development as needed once the systems are installed in the testbeds; We will design workforce and community trainings and set up monitoring and evaluation systems;

Phase III (months 7-16): We will install and run identical technical systems in the two testbed districts. These will include development of (D2H2) clinical applications with appropriate connectivity. We will troubleshoot as needed.

Phase IV (months 17-18): Following review of testbed results (as per UN indicators) we will develop a plan for scaled systems, trainings, and operations in our final 18 months.

Evaluation and Scalability

Structure for evaluation and planning for scalability will be in accordance with established UN indicators for related obstetrical interventions, and the World Bank InfoDev Framework for health information. The monitoring system will be built into the overall project plan and will be participatory, involving participants directly in the continual collection of data, which will be forwarded to the project director. At the end of year one, an internal evaluation of performance will be conducted in accordance with the indicators chosen. Assuming funds are made available for this purpose, an external evaluation of the full 18-month activity will be conducted.

Leadership, Management, Collaborators:

MAMASnet administration will be designed during Phase I by MAMAS International in cooperation with MedITAC, ATA (industry, university), TATRC and INGO partners. This will include preparations for Phase II partnership agreements for roles and responsibilities.

Summary

With operational leadership at MedITAC, Virginia Commonwealth University, and in cooperation with MAMASnet consortium (as established during preliminary phase 2000-2007) Project will demonstrate, evaluate, continually report and course-correct rapid ramp-up systems for maternal-child health.

Testbed projects will be designed to increase capacity of local partners, advance research and field operations for US TATRC and NASA, highlight and expand the uses of American innovative technologies to prevent maternal and infant mortality.

Testbeds will yield planning for scalability, establishing solid governmental, university, INGO relationships and technical capacity for expanded uses of innovative telemedicine to meet broader medical and surgical needs, education and logistical support in low resource, high risk and emergency scenarios.

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