

## Notes from the Millennium Villages Project:

### Breaking the Disease-Driven Poverty Trap

Matt Bonds<sup>1</sup>



### Expanding Access to Healthcare in Rwanda

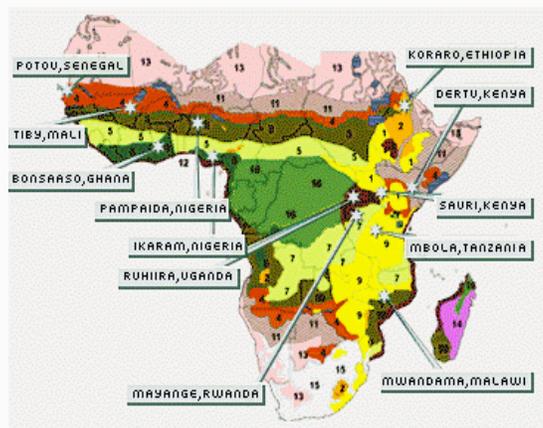
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## Introduction to the Millennium Villages:

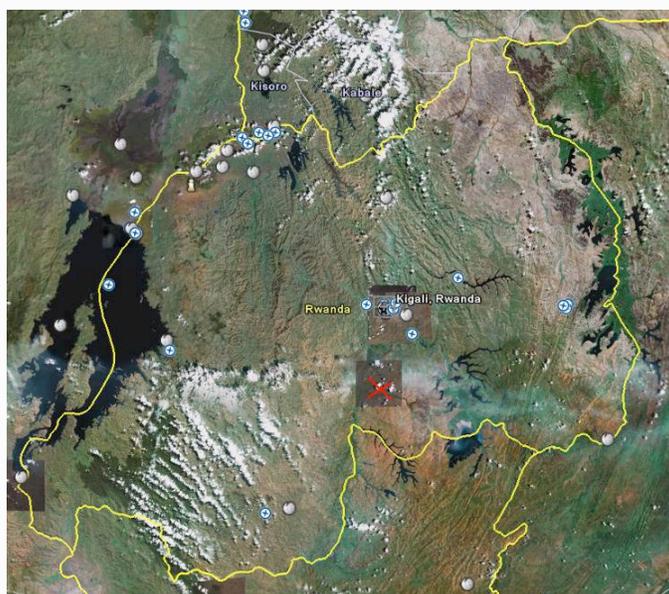


*Millennium Villages sites across Sub-Saharan Africa.*

The Millennium Villages Project aims to achieve the eight Millennium Development Goals. These goals outline a global partnership to reduce extreme poverty with a specific focus on hunger, education, gender equality, health, and environmental sustainability.

Mayange Sector, one of the poorest regions in Rwanda (with an average annual income of under 150 US dollars), is home to 4,600 households and approximately 25,000 people. The Government of Rwanda (GoR) selected Mayange in 2005 as a Millennium Village, making it the third such site in Africa.

Unlike most of rural Rwanda where individual homesteads are scattered across the hilly landscape, Mayange has several *umudugudus* – also known as settlements – of closely spaced dwellings. The government built these settlements after the 1994 genocide in order to house returnees. Within the sector are five primary schools, one secondary school, one health center, and over 2,300 hectares of farmland cultivated during the 2007 long rains.



*Aerial map of Rwanda: The red X indicates the Rwandan Millennium Village.*

## Breaking the Disease-Driven Poverty Trap

By Matt Bonds

One out of six people in the world today suffers from extreme poverty (UN Millennium Project, 2005). This kind of poverty means barely enough economic productivity to survive, leaving little or nothing to invest for the future. Such a dearth of savings and investment has translated to one of the most puzzling realizations of our time: significant portions of the globe have never experienced meaningful economic growth and are roughly as poor today as they were tens of thousands of years ago.

That the developed world has largely ignored these problems should put a blemish on our collective conscience. Perhaps the issues have been too abstract and confusing to seem real or soluble. But the ever-growing rift between the rich and poor is something that more and more people of the rich world are finding unacceptable. The Millennium Villages Project (MVP) serves to provide something of a remedy to this. Through a suite of basic interventions in agriculture and land management, health, education, infrastructure, family planning, and business development, the MVP works with local communities and national governments to offer a comprehensive economic development package which strives to eliminate extreme poverty in rural Africa. It also offers an opportunity for people of the rich world to work in solidarity with those of the poor world, helping to dismantle not just the economic issues at play, but also a sense of social disconnection between the two worlds. As an economist and disease ecologist trained in the U.S., my introduction to the practical side of international development has come formally through my position as an Earth Institute Postdoctoral Fellow working with the MVP in Rwanda, and informally through my friendships with Rwandans on the MVP staff and from the villages themselves.

If there is a single lesson I've learned from working on the ground with the MVP, it is that the problems addressed by the sustainable development community (disease, conflict, population growth, land and water scarcity, etc.) take a lot of intellectual work to comprehend in the West, but are often devastatingly obvious in much of the poor world. Certain debates (like those over trade-offs between economic growth and environmental conservation that pit economists against ecologists in the U.S., for example, or those over whether population growth is economically good or bad) can be highly misguided and often falsely dichotomous when applied to underdeveloped countries. In areas of extreme poverty, like parts of Rwanda, where nearly the entire population subsists directly off of its finite land holdings, economics is clearly *driven* by the relationships between people and their environment. People rely on fertile soils and reliable sources of water, while human population growth necessarily increases per capita consumption of resources. Aside from resource conservation and management, a critical part of the solution is a more diverse set of inputs (facilitated by free markets and trade), which is a paradigm too often decried as neo-liberal ideology. The most fundamentally important resource of all that social, political, and natural scientists of many stripes can agree on is healthy labor. This makes basic healthcare a particularly high priority for sustainable economic development.

In describing my experience with the Rwanda MVP, I want to emphasize two points: 1) the leading killer in Rwanda is not violence, it is disease; and 2) violence and disease are both products of the same problem: poverty. A small landlocked country of approximately 9 million people, Rwanda is the most densely-populated country in Africa, and over 50 percent of its population suffers from extreme

poverty. Most people now know of Rwanda from the genocide of 1994, when approximately 800,000 Tutsis and Tutsi-sympathizers were systematically massacred by the Rwandan army and the civilian Hutu population over the course of three and a half months. The signature of the genocide remains everywhere in the country, as in the weekly local tribunals for genocide or the many genocide resettlement communities. It is especially significant in the Nyamata and Mayange sectors where the MVP operates; each sector lost 60 percent of its population in 1994. When the project began in December of 2005, the life-expectancy at birth in Nyamata was 39 years, and the under-five mortality rate was 23.3 percent. Many people are especially concerned by the effects on the community of the genocide as well as its underlying causes, along with how that concern affects our work.

When I first arrived in Nyamata in February of 2007, a year after the project was off the ground, I began working with Max Fraden on determining health insurance subsidies for every household in Nyamata. Of all the MVP interventions, basic universal healthcare is the most fundamental and least expensive, and therefore has the greatest “return on investment.” The leading cause of death for Rwandans, and indeed throughout Africa, is not conflict, but highly preventable and treatable infectious diseases. Therefore, the MVP specifically focuses on healthcare access. For example, the MVP improved quality of healthcare in a clinic by increasing the nursing staff, building an inventory of drugs, and expanding health services.

Before the MVP arrived in Mayange, the area health clinic was often out of service due to the circular problems of a lack of resources for treating illness and a lack of faith in the hypothetical service itself; the staff was indeed often known to “work from home” because residents rarely used the clinic, while the residents rarely used the clinic because it was often closed. Increasing healthcare access therefore requires a process of building faith in the health system in addition to adequately efficient health services. Given that early treatment of disease is critical not only for preventing the development of complications, but also for preventing further transmission, the community and the country have an interest in ensuring that each individual is treated quickly when symptoms arise. The government of Rwanda has accordingly required Rwandans to buy into the health insurance program called Mutuelle. To encourage participation in the health system, and to complement the positive impacts of greater food production, the MVP requires residents to purchase Mutuelle in order to qualify for seed and fertilizer loans. Mutuelle is priced at about 2 U.S. dollars per person per year, which can be prohibitively expensive in an area where subsistence farmers with little or no cash income comprise 90 percent of the population. Therefore, the MVP subsidizes the program based on need.

Our task was to determine appropriate Mutuelle subsidies based on a socioeconomic index of the population by creating a cheap, easy, and scalable method. In practice, this meant that we needed to determine key household indicators of economic status that were measurable with a quick survey and that we could analyze with packaged statistical techniques to which others in Rwanda would have access. After preliminary research, we began with a series of informal household interviews with residents from across income strata to inform our survey design. Our translator was Delphin Muhizi, an MVP community mobilizer and now a good friend of mine. Like many of our staff, Delphin is around 30 years old and spent his early years outside of the country. He went to primary and secondary school in the Democratic

Republic of the Congo before returning to Rwanda after the war in 1994. He recently completed his bachelor's degree on demography and land policy, and has a particular passion for improving food production. English is his fourth language, and he has a gift for approaching community members, putting them at ease, and asking questions respectfully.

Delphin first took us to a “typical” representative of the poorest residents. She was a 50 year old woman sitting barefoot and topless behind her one-room, mud-brick, thatched-roof house that sat upon a small hill that overlooked a breathtaking mountainous landscape. We sat on a bench outside her home in the mid afternoon and conversed as her family and many grandchildren soon convened around us, very curious about the white visitors, “umuzungus.” Our questions focused on how they survived, how they generated income, what their priorities were, what they owned, and what they felt they lacked. They owned almost nothing, and even rented land for cultivation. An increase in income to them, they said, would mean owning land, and obtaining goats, a cow, a mattress, and improved mortar for the frame of their door, which wouldn't close. I remember being struck by how relaxed, pleasant, and positive this encounter was, given that we were there to explore understand the needs of the poorest of the poor.

Delphin then took us to a “middle income” home. On MVP motorcycles, we drove to a small village neighborhood, “umudugudu,” via a short main street lined with a row of houses, and approached a young woman in her mid-twenties. Her home was mud-brick with a concrete façade that from the outside, looked to be a clear improvement from the previous house. The song of a solo female vocalist emanated from a radio in her dark living room, as we all sat on a single bench, observing the bare walls and dirt floor of the bare room. She explained that she was orphaned during the genocide, that she inherited two hectares (five acres) of land that were more than she could manage alone, that she had two children, and that her relatively nice home was provided by an NGO that worked for genocide survivors. In contrast to the first interviewee, who was older, vital, and warm, this second woman was much more subdued. We then talked to a nearby couple, who appeared to be a bit wealthier, as indicated by the cow in their front yard. They were an older pair who had lost their children during the genocide and adopted an orphan since. They were extremely warm and gentle and seemed happy to talk. They explained that the cow was actually owned by their adopted child. They wanted bank credit, so they could buy some more land to farm and another cow for milk.

Over time, our informal conversations led to a short household survey on ownership of a collection of household assets (i.e., table, bench, mattress, radio, etc.) that we used to determine eligibility for health insurance. Through help from MVP staff and the community, we eventually surveyed all households (~4500) in Nyamata. We analyzed the data with a pattern recognition technique called principle components analysis, and correlated the results with previous ownership of health insurance. We then were able to determine how these assets indicated ability to pay for coverage, and determined subsidies designed to achieve universal coverage based on our index.

Other major health research questions focused on the impact of MVP policies, such as expanding Mutuelle coverage, distributing malaria bed nets, removing clinic fees, expanding health satellite posts, and hiring community health workers. The necessary data is collected through other surveys or through health clinic records, and we are currently synthesizing these analyses for further publication.

For the MVP in Rwanda, my role has been unique in that I am one of the only people whose primary role has been to observe policy rather than execute it. How strange and relieving it was to arrive in Rwanda, after being saturated with scientific literature, sensing that, at the outset, just about *everybody* knew more about the issues than I did. The single most important economic variable on the minds of our staff and of the residents of Nyamata and Mayange was something one did not need a Ph.D. to understand. It was whether the rains would be generous that season. Every week after I returned to the U.S. last spring, Max or Delphin would send notice on the status of the rains, which failed. Poor rains combined with a virus that thrives under drought conditions meant wide-scale crop failure in Mayange. Consequently, the MVP had to forgive many of the seed and fertilizer loans, a frustrating reminder of the difficulties of working in these environments. Fortunately, through improved seed, fertilizer and training in planting techniques, the previous season witnessed a quadrupling of typical harvests, which offered some buffer against future crop failure. Further, because of near-universal healthcare access and bed net coverage, there were no funerals in Mayange that season.

To the typical (Western) lay-reader, Rwanda's conflict, poverty, and disease may seem like a depressing version of a familiar African story. In the midst of an unpredictable and unforgiving environment, where the stakes of failed policy are so high, one would expect the working environment of the MVP to be correspondingly unforgiving. In a sense, it is. But what I found is that such destitution and utterly serious humanitarian challenges are in the context of a very rich and vibrant social network. As one who has explored these problems indoors through academic lenses an ocean away, what I have felt from these experiences is a kind of moral or visceral release. Working on these kinds of problems in collaboration with the community, the Rwandan staff, our director, Josh Ruxin, and others like Max and our health coordinator, Ranu Dhillon, feels like a privilege even under the worst circumstances. Seeing such work and sacrifice not for each other, but for a common critically important purpose, is inspiring. It is also a privilege to understand extreme poverty outside of the contexts of sympathy and guilt. I admire those like Delphin and the community at large for their focused orientation towards progress.

Last July, I returned with Delphin to one of the first houses we visited, that of the 20-something who had been orphaned, to drop off a photograph. The woman remembered us immediately and greeted us warmly. Delphin did not hesitate to question her about the progress of her kitchen garden. Afterwards, he looked at me with a bit of frustration, but with a truly inspiring sense of determination, and said, "This is my goal Matt. Every Rwandan must have a productive kitchen garden."

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UN Millennium Project. (2005). *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*. UN Millennium Project, New York, NY,

## Expanding Access to Healthcare in Rwanda

By Max Fraden

It was on a flight home from Iran in the summer of 1998 that I was first introduced to the field of sustainable international development. At the time, I was an eighth grade student doing my best to learn Zulu before an upcoming trip to southern Africa. I noticed the South African passport of the woman seated next to me on the plane, and struck up a conversation in Zulu. Although my vocabulary ran dry almost immediately, I soon realized that I had stumbled across a person with whom I would never exhaust conversation. Our exchange continued for the next year while she lived in my home in Boston pursuing a Masters degree in Sustainable International Development. Our talks in the late afternoons became my first introduction to concepts of microfinance, public health, and gender equity.

Since our first encounter, I've visited Mapule at her home in Naledi, Soweto several times. During my last stay, she invited me to her workplace, a micro credit bank called the Women's Development Bank. After the fall of Apartheid she began to work there with the bank's founder, First Lady Mbeki, who had befriended Mapule during their two decades together in exile. Walking through the bank's Johannesburg headquarters and seeing the dozen or so employees struggling to create an economy that could accommodate the millions of uneducated poor, I was presented with the vision that Soweto, given decades, could be transformed.

Since arriving at Columbia, I have been lucky enough to get involved in two development projects with vastly different aims. The first project, originally a small start-up venture composed of a molecular biologist, a business student, a doctor, and another undergraduate and myself, is now months away from delivering a prototype low cost, highly sensitive Multi-Drug Resistant Tuberculosis Diagnostic. The second, the Millennium Villages Project, works to eliminate extreme poverty in Rwanda's Bugesera District. Both projects hold several core beliefs. First, access to health, education, and infrastructure are human rights not to be denied. The economic costs of treatable disease, when aggregated, amounts to hundreds of billions of U.S. dollars annually. Second, these services should be decentralized wherever possible and efficient. Decentralization increases and facilitates local solutions for local problems and access to these solutions. Third, social safety nets are necessary for promoting equity. Safety nets in the form of universal health insurance or business development for the landless poor ensure that growth is not divisive and does not leave marginalized groups behind. Social services, such as housing for victims of domestic violence or broken families plagued by rural alcoholism, protect individuals from estrangement. Lastly, achieving best practice is possible even in resource constrained settings.

Beyond interventions, social attitudes must evolve as well. I've found that in certain situations communities mired in deep poverty expect less and the mediocre is accepted as a *status quo*. I distinctly remember one incident when a battered woman came to the health center for treatment. After wound care, nurses were prepared to send her home because no other alternatives were available; abuse of women is not considered a major problem in Rwanda. Ranu Dhillon, our health coordinator, made sure she was not simply consulted but also given proper social support. Working alongside the nursing team, he found her a job at the health center and a place to stay. I realized that strong community led networks can form and ingrained attitudes towards domestic violence can be transformed.

At the national level, policy makers sometimes argue that the impoverished are ignorant and unprepared for advancement. In Ministries of Health in Delhi or Kigali, I've heard officials claim that free, high quality services will be over-utilized. These leaders are legitimately concerned about their populations' expectations and reliance on historically fickle foreign aid. However, this concern is unfounded and only applies to a small portion of the population. At the two Millennium Village sites where I've worked, our health facilities see roughly 1.5 patient visits per year (on average four times more than neighboring clinics). Still, this is below ideal utilization given the population's disease burden. Furthermore, I have heard people say that extreme poverty persists because people are either unwilling to support themselves or too uneducated to manage complex systems. I remember being profoundly discouraged after a meeting with a group of doctors at India's Ministry of Health during which they wrote off the use of rapid, molecular tests as too complicated for the developing world. The next day I arrived in Bangalore with my advisor, Dr. Yanis Ben Amor, to meet Dr. Kumar, a creative engineer interested in the manufacture of a new TB diagnostic. A few months later we formed a partnership to develop a low cost, rapid test. Dr. Ben Amor's group has since demonstrated that in Rwanda – where technicians had never worked with PCR<sup>3</sup> technology – 95 percent homology can be achieved with blinded samples run at the prestigious Institute of Tropical Medicine in Antwerp, Belgium (Ben Amor et al). Now, encouraged by the results of many doctors who have not sacrificed best practice for lower standards, the policy environment is changing. The World Health Organization and Foundation for Innovative New Diagnostics have partnered with biotech companies looking to develop a test that can replace an ineffective 130 year old method.

**Millennium Project:**

My work with the Millennium Project has taken several unexpected turns. Freshman year I was hired by Professor Josh Ruxin to help edit grants for a potential new site in Rwanda. By junior year I had lived in Rwanda for a year during which a national scale-up was announced by the President's office. I have learned to think of development holistically and to believe that a comprehensive development agenda is entirely feasible. I also, however, remain skeptical and concerned that the field is losing focus. Top-end hotels from Kigali to Accra are filled with "Summits on Gender Equity" and "Sessions on Community Mobilization." It seems that more money is spent on supporting expensive U.S. consultants than on actual in-country work.

For funds on the order of 100 billion dollars per year to be allocated properly, they must be apportioned to people on the ground, *implementers* and *practitioners*. Development must be infused with realism. Development projects alone will not end poverty in a five-year window. True working relationships with communities, governments, and other donors must be forged over years. Remote villages will not be able to export surplus crops if the government does not pave roads. Project staff will not learn the inner-workings of a community overnight. It takes time to understand which local leaders are supportive of change, which leaders to approach when dealing with issues of broken homes, and which to approach when trying to distribute improved seeds.

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<sup>3</sup> Polymerase Chain Reaction, a molecular tool for DNA amplification used by a wide array of diagnostics.

Many have proposed algorithms, flow charts, and methods for development. At the end of the day, however, we need to focus more on the intricacies of implementation and on making policy a reality. Clearing 23,000 bednets through customs and off-loading them at night with no electricity is a challenge. Getting these same bed nets to three districts 40 kilometers apart takes time to plan. Mobilizing communities to use the nets and access healthcare requires more than effort. It takes deep, long lasting local connections.

**Access:**

This all takes me back to freshman year at Columbia. I learned that tuberculosis - a perfectly curable bacterial infection - kills 2 million people a year. In regions of the world with high HIV burdens, the prevalence of tuberculosis is only increasing. Why are patients not getting treated, especially when a six-month regimen costs only 10 U.S. dollars? The answer is complex; bottlenecks occur long before a patient presents for consultation.

User fees and health insurance are prohibitive to many. In September, as I was preparing to leave Rwanda for school, I realized that a friend suspected that her child was infected with active TB. She could not afford the two U.S. dollar health insurance package to treat her baby. She was denied a basic human right because the primary health care system failed. It operates on a meager budget (12 U.S. dollars per capita), too small to support the population's disease burden. More funding is desperately needed.

Dr. Ruxin's team has brought some solutions to the ground. Dr. Joseph Nkurunziza, Theo Ndebereye, Ranu Dhillon, Matt Bonds and I attempted to understand where the health system was failing. Working in the community every day for over a year, we learned through both informal conversations and formal statistical analysis who could pay for health insurance and how much they could afford. We evaluated the cost of all necessary interventions from bed sheets to incubators and aspirators, from penicillin to ceftriaxone. We proposed financing mechanisms to get all the nation's health centers on board. Along with structural and financial reform, came another critical component, increased staffing. About half of our 17 U.S. dollars per capita recurrent annual costs go to pay for nurses' salaries. People must be paid decently to do good work to achieve best practice.

Matt Bonds then returned four months later and we began to carry out regression analysis. The results were striking. Removal of co-payments and universal coverage (provided through subsidized health insurance connected to fertilizer loans) led to an additional 36,000 outpatient visits per year (at a health center serving 25,000 people). An expanded pharmacy, increased staffing, electrification, improved equipment, an ambulance, and the opening of satellite health centers did even more.

Unfortunately, my friend lived outside the project's 25,000-person catchments area. Even if this overhaul of the health system reached her home, would her child be diagnosed properly? Pediatric TB is often smear-negative, which means that the 130 year old sputum test would not detect the bacteria. Access must come with trained implementers, equipped with modern tools to provide best practice and adequate diagnosis.

Extreme poverty keeps the poor poor. The poverty trap will persist as long as we continue to treat this crisis with ambivalence, denying its massive human toll. There are no silver bullets and there have and

always will be failures. This, of course, is no excuse. It is up to our generation to solve the greatest problem of today's world.



*Loans for fertilizer were connected to loans for subsidized health insurance. Through this scheme over 12,000 individuals were insured. Credit L. Margulies.*



*Kibirizi, Mayange during health insurance registration and fertilizer distribution.*



*Community Meeting in Kibenga, Mayange. Credit: J. Mukabalisa.*



*Household Visits to Discuss Health Insurance in Kanazi, Nyamata.*



*The Millennium Project staff outside our office in Nyamata, Rwanda.*



*Crop estimates in Nyamata. Richard Mundere, center. Aloys Hakizimana, left. Max Fraden, right.*

**References:**

Ben Amor, Yanis. *Implementation Validation Performed in Rwanda to Determine Whether the INNO-LiPA Rif. TB Line Probe Assay Can be Used for Detection of Multi Drug Resistant Mycobacterium tuberculosis in Low Resource Countries*. Journal of Clinical Microbiology (Sept. 2007).