

ICT Platforms for Regional & Global Human Resources Development

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ICT-Platforms for Regional Human Resource Development

- **Developing economies require a skilled labor pool:**
 - High quality education
 - High quality health care, nutrition, clean water, etc.
 - Large trained technology savvy workforce
 - Effective utilization of women in the workforce
- **Need strong partnerships that bring skills from many different sectors (scientific, policy, geographic) together.**

- **Barriers to the achievement of these goals**
 - Reliable data is not available at the micro-level.
 - Need to set up Africa-focused, innovative data surveillance paradigms.
 - Good decisions (where to invest, how much to invest, what to invest) cannot be made without good data.



Selected Platforms

- **WISE (World-Wide Information System for Education) – but really tracks 4700+ variables for over 200 countries including most countries in the East Africa region.**
 - Joint work with John Dickerson, Damon Earp, Romain Murenzi.
- **GIDSTAR (Global Infectious Disease Surveillance, Tracking, and Repository) – will show a sample for health surveillance in Kenya. Funded by the US National Institutes of Health.**
 - Joint work with D. Reforgiato
- **Mobile phone based data collection schemes for surveillance of ICT, health, nutrition, ICT impact and more. Currently planned as a cooperative effort with the Government of Rwanda.**
 - Joint work with Rwanda MINAGRI, MINICT and Romain Murenzi.



What Is WISE?

WISE is a software platform developed by John Dickerson, Damon Earp, Romain Murenzi and V.S. Subrahmanian that

- Gathers education/health/economic/political data for all countries from authoritative sources (World Bank, UNESCO) in one huge database – over 4700 variables;
- Uses sophisticated data mining software to learn models relating outcomes (in health/education) with the context in which those outcomes occurred. **All rules we show have been extracted automatically by WISE.**
- Model are expressed as stochastic rules.
- Soon to come:
 - Forecasting algorithms (already designed and tested in other applications, but not in WISE)
 - TOSCA policy engine (already designed and tested in other applications, but not WISE) to help planners.
- **DISCLAIMERS:**
 - WISE is intended to help policy makers consider options they may not have thought out.
 - WISE started generating rules just last week and will complete extraction of rules for all countries by Christmas 2010. **So all findings are preliminary and still need to be fully vetted.**



Primary Drop-out Rates Correlated With Education Expenditure

Burundi: When educational expenditure is 3.67% of the GNI:

- Total dropout rate (primary) is 37.55%.
- Male dropout rate (primary) is 38.82 to 41.35%.
- Female dropout rate (primary) is 35.94%.

DRC: When educational expenditure is 0.95% of GNI:

- Total dropout rate (primary) is 20.5%.
- Male dropout rate (primary) is 18.23%.
- Female dropout rate (primary) is 23.58%.

Uganda: When educational expenditure is 1.94% of GNI

- Female dropout rate (primary) is 60.11 to 61.59%.

CAUTION: Results are preliminary and need to be fully vetted.



WISE

WISE

- Search
- Accounts
- Models
- Countries
- Periods
- Institutes
- Settings
- Logout

Rule Filter

Countries: At least 1 Region or Country must be selected.

Regions:

Countries: The selected countries will be added to the set of countries found in the regions above.

Rwanda × Croatia × Democratic Republic of the Congo ×
Burundi × Uganda ×

Variables:

Outcome Variables: At least 1 Outcome must be selected.

Drop-out rate (%), primary ×
Drop-out rate (%), primary, female ×
Drop-out rate (%), primary, male ×

Environment Variables: At least 1 Environment must be selected.

Adjusted savings: education expenditure (% of GNI) ×

Previous | 1 of 1 | Next | Rule Count: 20 |

Done



Outcome:
Drop-out rate (%), primary, male
[38.82, 41.35]

Environment:
Adjusted savings: education expenditure (% of GNI)
[3.67, 3.7]

	Probability	Inverse Probability
Burundi	1.0	0.0

Outcome:
Drop-out rate (%), primary, female
[35.94, 35.94]

Environment:
Adjusted savings: education expenditure (% of GNI)
[3.67, 3.67]

	Probability	Inverse Probability
Burundi	1.0	0.0

Outcome:
Drop-out rate (%), primary, male
[18.23, 18.23]

Environment:
Adjusted savings: education expenditure (% of GNI)
[0.95, 0.95]

	Probability	Inverse Probability
Democratic Republic of the Congo	1.0	0.0

Primary enrolment vs. % of education expenses spent on primary education (EEP)

Rwanda: When EEP is 45.6-46.27%:

- Total primary enrolment: 97%
- Male primary enrolment: 96.43%
- Female primary enrolment: 97.04 to 98.88%

Uganda: When EEP is 55.4%

- Total primary enrolment: 95.86 to 97.67%
- Male primary enrolment: 96%
- Female primary enrolment: 99%

Burundi:

- When EEP is 40.1 to 51.6%, Total primary enrolment: 52 to 63%
- When EEP is 37.5-37.8%, total primary enrolment is 36-43%.
- When EEP is 51.8%, total primary enrolment is 99%.

CAUTION: Results are preliminary and need to be fully vetted.



Female tertiary graduates in science vs. educational expenditure in tertiary (EET)

Kenya:

- When EET is 11.7%, female graduates from tertiary institutions is 30%.
- When EET is 13%, this number dropped to 27%, suggesting other factors influenced this.

Uganda: Experience very similar to Kenya.

- When EET is 11.9%, female graduates from tertiary institutions is 27%.

Burundi:

- When EET is 18.3%, female graduates from tertiary institutions is 16%.

CAUTION: Results are preliminary and need to be fully vetted.



Female tertiary grads in Eng/Mgt/Construction (EMC) vs. Educ. Expenditure in Tertiary (EET)

Kenya:

- When EET is 11.7%, female EMC graduates from tertiary institutions is 13%.
- When EET is 13.1 %, it is 12%.

Uganda: Experience very similar to Kenya.

- When EET is 11.9%, female EMC graduates from tertiary institutions is 19%.

Burundi:

- When EET is 18.3%, female EMC graduates from tertiary institutions is 7%.

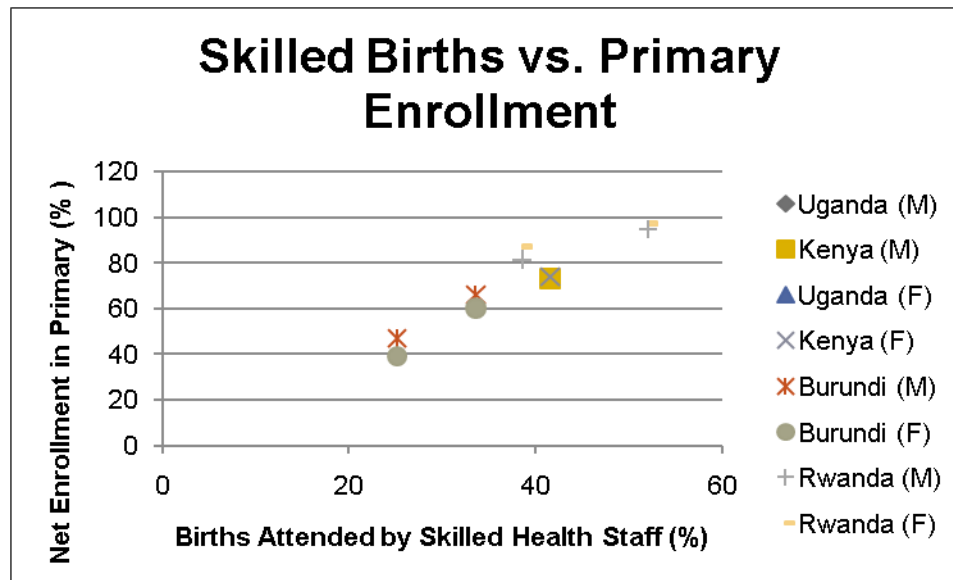
CAUTION: Results are preliminary and need to be fully vetted.



Primary enrolment vs. Births attended by skilled medical staff

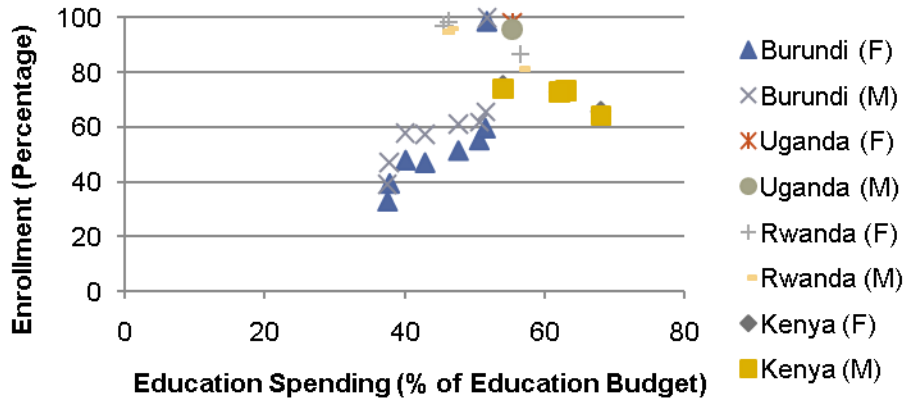
•Rwanda:

- when 52.1% of births were attended by skilled health staff, the adjusted net enrolment rate by males in primary education is 94.66%.

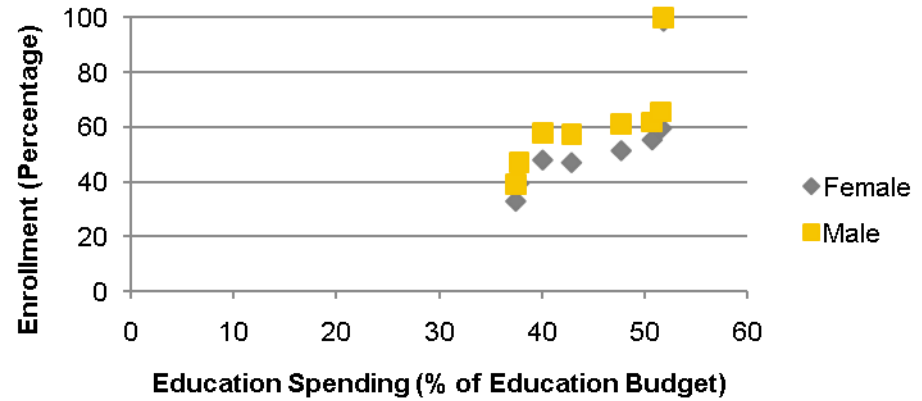


Education expenditure on primary education vs. Primary enrollment rate.

Education Spending vs. Enrollment



Burundi: Education Spending vs. Enrollment



Micro-WISE

- **WISE is currently being tested in-house. Will be ready for testing with 2-3 selected partners in March/April.**
- **WISE's final report will be released by mid-2011.**
- **WISE Partnerships**
 - CDIG is looking for organizations/governments seeking to partner with us.
 - Governments will be able register to access the system *for free* so that they can better serve their population.
- **But WISE operates at a *macro-level (country-level)*. Need to drill down to achieve better targeting of resources.**
- **Rwanda is the world-leader in this.**



Rwanda as an ICT Leader

• If all goes well, Rwanda will be the first country in the world to have:

- A world class micro-level *real-time* country-wide surveillance scheme to ensure the well-being of its population.
- Will use mobile phones together with incentives for self-reporting in order to track variables relating to
 - Agricultural output (e.g. One Cow per Family Program) with mobile phones to collect data – with Hon. Minister Dr. Agnes Kalibata.
 - Impact of ICT investment on socio-economic-health-education development in Rwanda with Hon. Minister Dr. Ignace Gatare.
- Plus the automated rule learning engine and the policy analytics engine of WISE to help policymakers craft policies grounded in real data and the best science.



GIDSTAR System

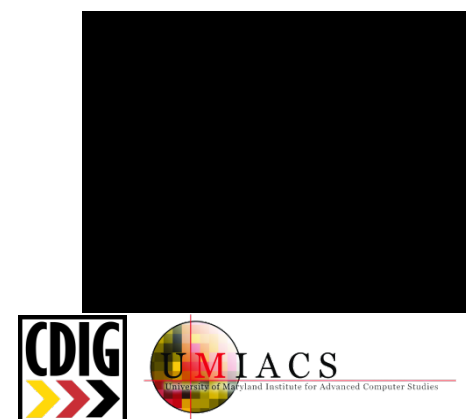
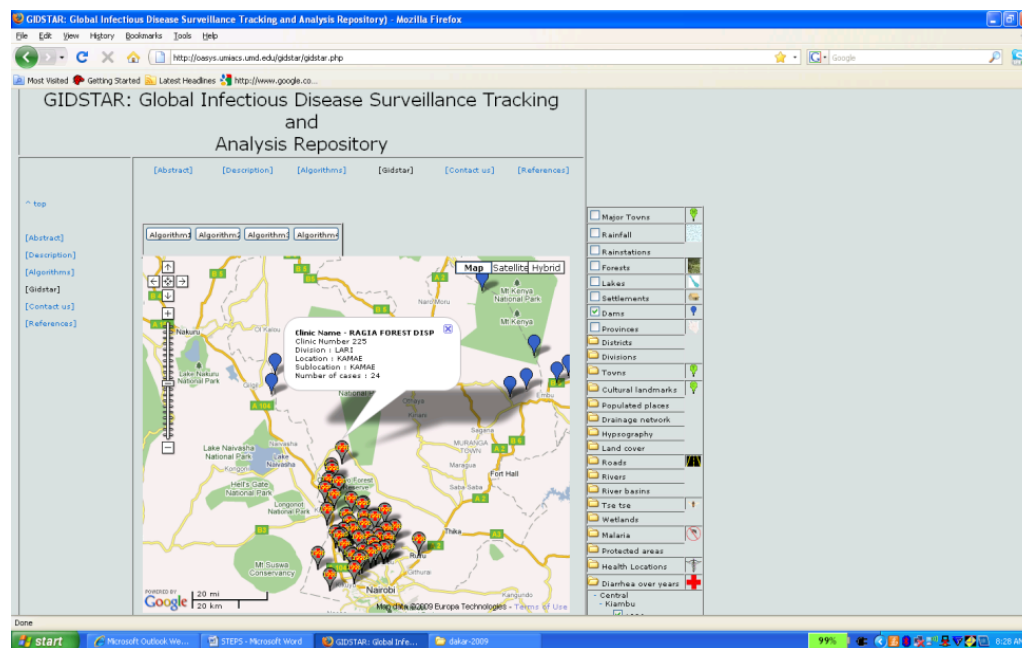
Work by D. Reforgiato
and V.S. Subrahmanian.

NIH funded work tracks
diarrheal diseases in
Kenya.

Developed methods to
collect data online,
overlay them on a DBMS.

In process of adding data
mining algorithms on top
to understand the
relationships between
environmental/demographic/socio-cultural
variables and diarrheal
disease outbreak.

GIDSTAR can be applied to any
disease and any part of the world.



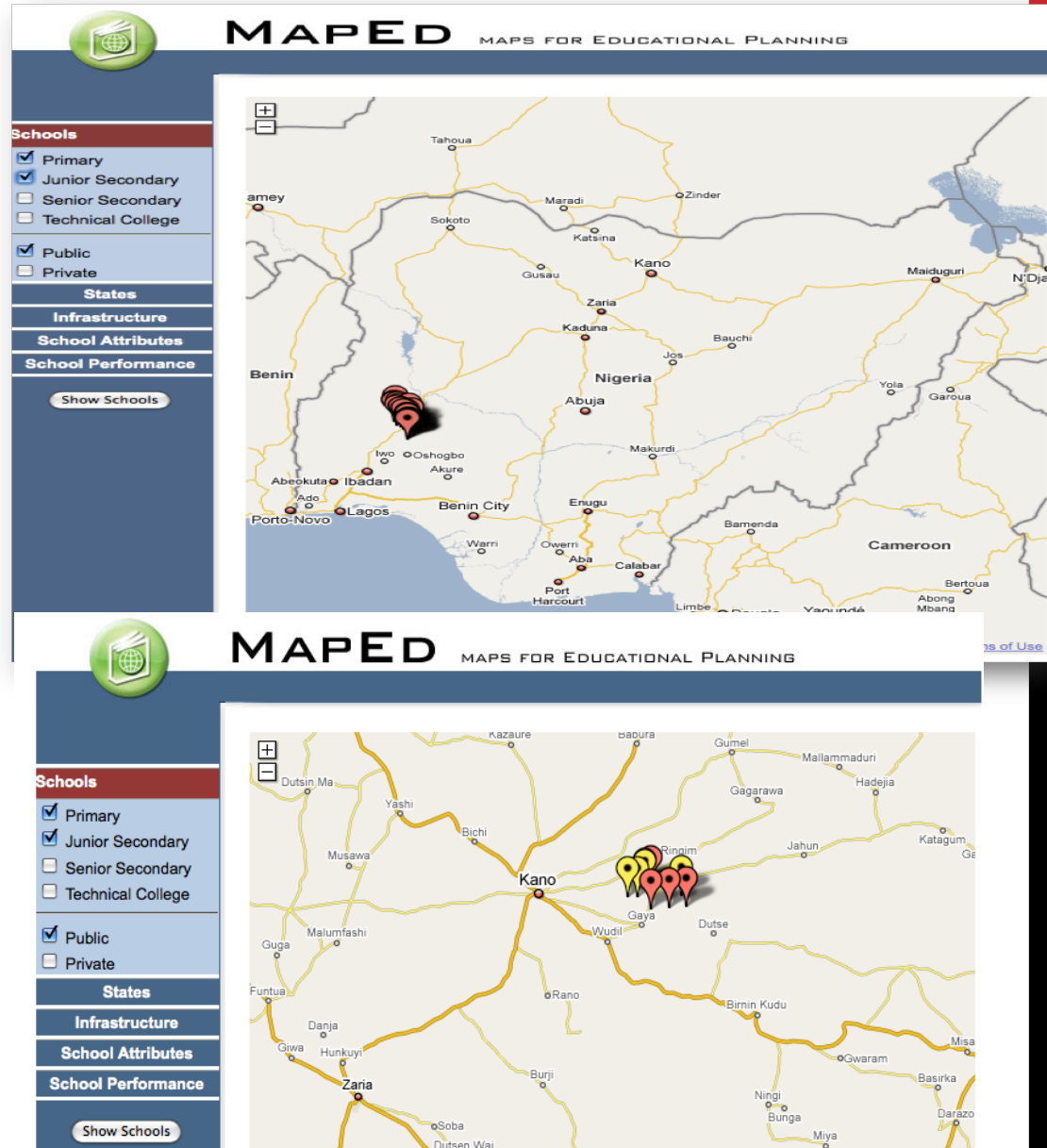
Education tracking in Nigeria

Joint work with Amy Sliva and Marito Garcia (World Bank).

Developed method to track progress in Nigerian schools.

Information goes into a central database that can be

- Visualized in a GIS
- Analyzed with data mining algorithms.



Conclusion

- High quality education at all levels is key for development.
- Big unanswered questions for all countries:
 - Where should we make investments in education, i.e. how much should be invested in a given geography?
 - Should additional educational investment focus on specific groups (e.g. women) ? How much?
- To answer these questions, we need a systematic micro-surveillance scheme that tracks relevant educational variables.
- Combined with sophisticated data mining and policy generation software, this has the potential (as yet unproven) to help policymakers.
- WISE is a start at a macroscopic level, but micro-level surveillance schemes such as Rwanda's are currently leading the way.

