MOZAMBIQUE WORKFORCE ALLOCATION

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PURPOSE

Develop a **decision-support tool** (DST) that aids in the **allocation of healthcare workers to provinces**, using needs and employee preferences as key factors in allocation

PARTNERS

- Public Health Informatics (PHII) Institute at the Task Force for Global Health
- Centers for Disease Control and Prevention (CDC)
- Georgia Tech
- Mozambique Ministry of Health

CONTEXT

- Assignment of healthcare workers in Mozambique, Africa, is not optimized
- There are approximately 3 doctors and 21 nurses per 100,000 people.[1]
- For over half the population, the nearest health facility is at least an hour walk away.[2]
- Healthcare workers are in high demand, and their distribution throughout Mozambique is critical to the success of the healthcare system.

1. Source: *Mozambique Overview*. [cited 2013 9 September]; Available from: http://healthqual.org/mozambique.
2. Source: USAID. Global Health. *Where We Work 8679*; Available from: http://www.usaid.gov/mozambique/global-health.
3. Source: Organization, W.H., *WISN: Workload Indicators of Staffing Need, User-s Manual*. 2010: Switzerland. p. 52.

OPTIMIZATION FRAMEWORK

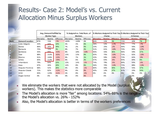
Optimization Model

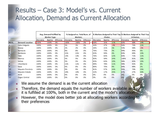
Maximize (i.e., choosing the best among feasible choices of assignments):

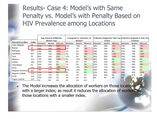
- the rewards (preference scores) from assigning workers to their preferences,
- minus the penalties that result from not fulfilling a percentage of demand

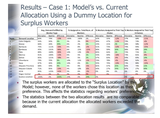
Subject to constraints:

- Each worker can be assigned to at most one location
- Cannot assign more workers than the demanded by the location
- Cannot violate budget constraints (if any)
- Fixed workers must be assigned to their fixed location
- Some workers may only be assigned to one of their choices (or not be assigned at all)









Decision Variables

x_{ij} Employee x_i placed in location j

α_{tj} Percentage of employee type t demand met in location j

Objective Function

Maximize reward of placing employee x_i in one of his/her preferred locations less the sum of all penalties for not meeting each province's employee demand

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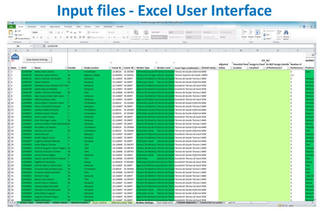
Input files - Excel User Interface



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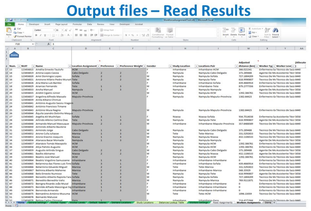
Output files – Read Results



Input to Workforce Allocation Tool

- **Cadres** (List of cadres, subtypes/levels of cadres (for salaries), default salaries for each combination
- **Demand locations** (list of demand locations & coordinates, budget , demand by cadre type (number of workers))
- **Workers** (NUIT/name, location, cadre type/subtype/level, salary, worker fixed location, worker location preference by rank)

DST OVERVIEW

The decision-support tool:

- Includes an optimization model with a user interface and basic analysis capability
- Recommends the optimal location to place each healthcare employee.
- Maximizes employee satisfaction as represented by their preferred locations subject to limitations defined by demand and other facility-specific information needed for successful operation
- Inputs include information about each employee, the demand in each province, and the available budget in each province.

IMPLEMENTATION

- Pilot testing of the tool in early 2015
- Deployment in June 2015, during the allocation period for HCWs
- HCW shortages will continue to be an issue in the scale-up of HIV services in Mozambique, the deployment of the workforce allocation tool helps close some gaps in services

This project has continued in collaborate on with government health agencies and non-governmental organizations. A decision support tool was built by Dr. Monica Villarreal that incorporates mathematical models and allows users to see the impact of various changes in the system. The tool has been deployed for assisting in making human resource decisions. This media article documents the collaboration with the Task Force for Global Health, the Centers for Disease Control and Prevention, and Mozambique.

Rosenberg, Mark, MD, MPP. "Development of Healthcare Workforce Allocation Tool Demonstrates Real Collaboration Among Atlanta-based Global Health Organizations," *Thought Leaders: Global Health*.
The Saporta Report, 8 January 2015. Web. 11 November 2015.

Georgia Tech