THE HEALTH CARE WORKER SUPPLY CHAIN:

ALLOCATING HUMAN RESOURCES FOR HEALTH IN SUB-SAHARAN AFRICA

SHEEREEN BROWN, MS
JULY 19, 2018

THE TASK FORCE FOR GLOBAL HEALTH

Public Health Informatics Institute

Task Force for Global Health

130
DEDICATED EMPLOYEES

157
COUNTRIES

2ⁿᵈ
LARGEST U.S. NON-PROFIT

$1.6
BILLION USD

2016
HILTON HUMANITARIAN PRIZE WINNER

3
SECTORS

Context

Supply Chain Context

1. **Scare resources:** Shortage of health care workers in sub-Saharan Africa

2. **Inefficient processes:** Current allocation processes are manual and not data driven

3. **Autonomous resources:** Current allocation processes do not take into account location preferences from health care workers

Physicians per 1,000 People
- 7-8
- 6-7
- 5-6
- 4-5
- 3-4
- 2-3
- 1-2
- 0-1
- No Data
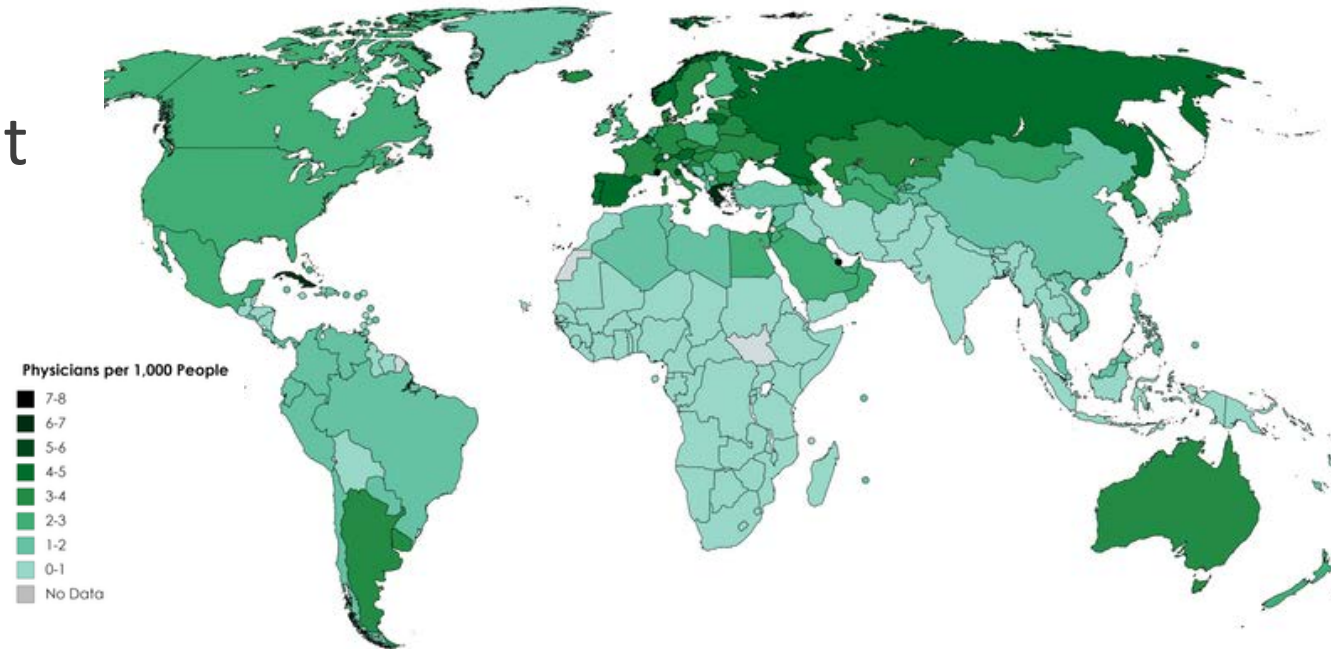
Workforce Allocation Optimization Tool

1. **Allocate scarce resource** of health care workers across the country

2. **Optimize the allocation** processes and health care worker supply chain via a data

3. **Include worker preferences in the allocation model** to improve worker satisfaction, retention, and decrease bureaucratic tasks

Workforce Allocation Optimization (WAO) Tool

WAO Tool Optimization Model

MAXIMIZE

Total rewards (preference scores or weights) coming from assigning workers to their preferred location

MINIMIZE

minus the penalties that result from not fulfilling a percentage of the locations' demand, for each worker type.

CONSTRAINTS

1. Each worker can be assigned to at most one location

2. Cannot assign more workers than the demanded by the location

3. Fixed workers must be assigned to their fixed location

4. Workers may only be assigned to one of their choices or not be assigned at all

5. Cannot violate budget constraints
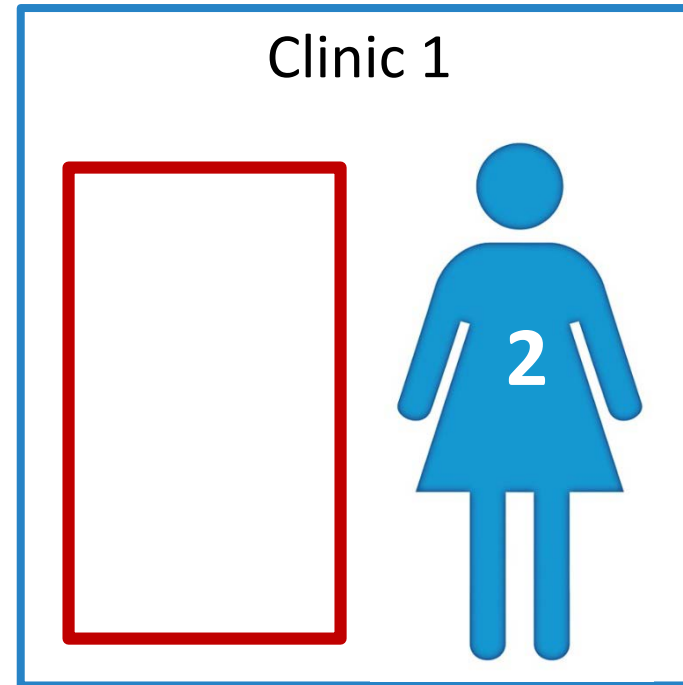
WAO Tool Optimization Logic Example

| Worker 1, Type: Blue	
Location Preference	Opt. Reward
Location 2	3
Location 1	2
Location 4	1
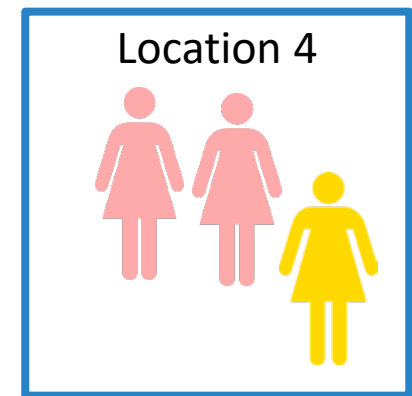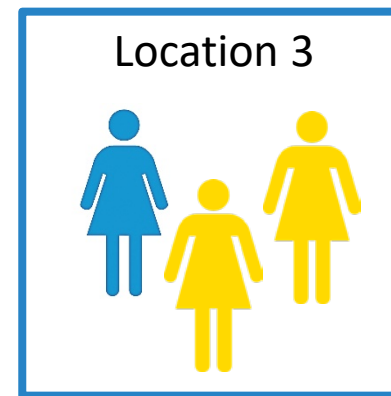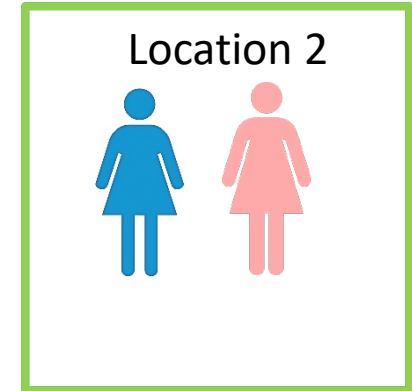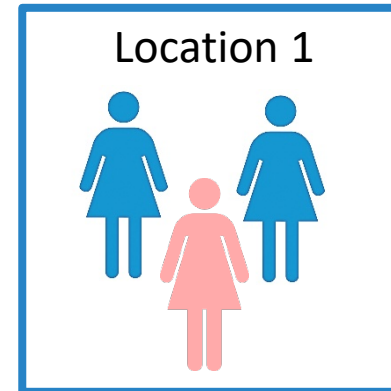
WAO Tool Optimization Logic Example

◦ 2 clinics with different demands:

  ◦ Clinic 1 needs 2 workers

  ◦ Clinic 2 needs 1 worker

◦ 2 Workers with same preferences

  ◦ Workers prefer Clinic 1 with preference weight 2

  ◦ Workers prefer Clinic 2 with preference weight 3
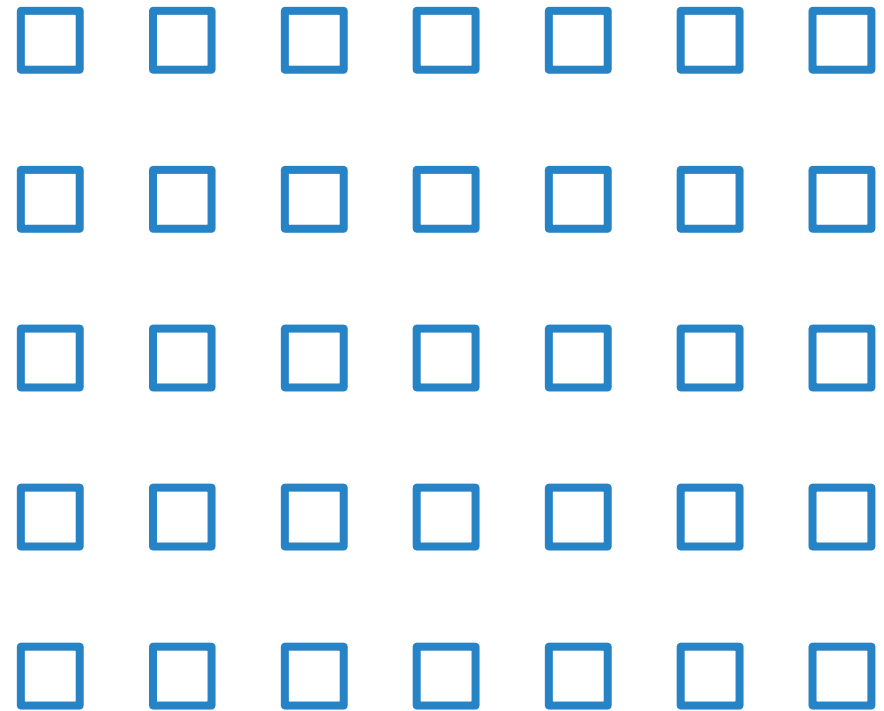
◦ Penalty for unfulfilled demand percentage = 40

Clinic 1

Clinic 2

2

1

$-40(0.5) + 2$
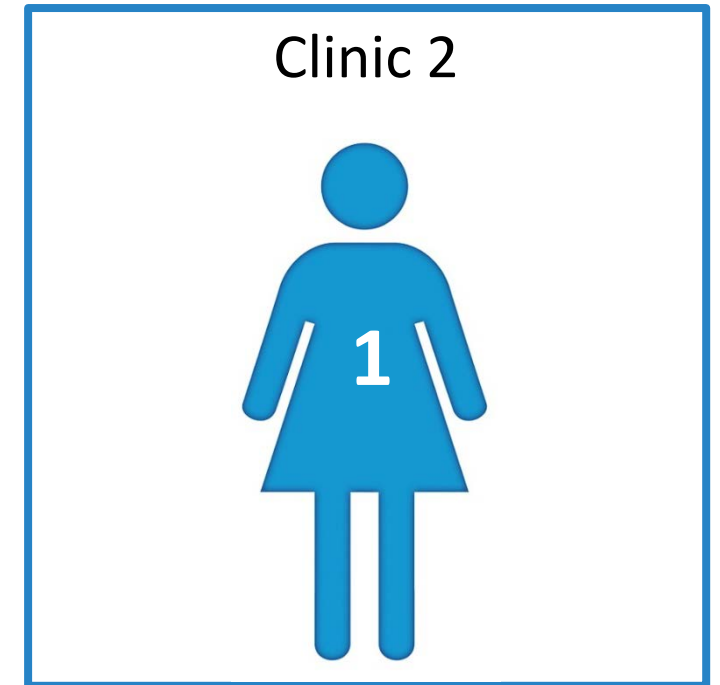
$-40(0) + 3$

WAO Tool Optimization Logic Example

Feasible Solution	W_1	W_2	Objective Function (OF) Calculation	OF Value
1	X	X	-40(2)	-80
2	L_1	X	-40(.50) − 40(1) + 3	-57
3	L_2	X	-40(1) + 2	-38
4	X	L_1	-40(.50) − 40(1) + 3	-57
5	X	L_2	-40(1) + 0	-40
6	L_1	L_1	-40(1) + 3 + 3	-34
7	L_1	L_2	-40(.50) + 3 + 0	-17
8	L_2	L_1	-40(.50) + 2 + 3	-15

Increased Complexity
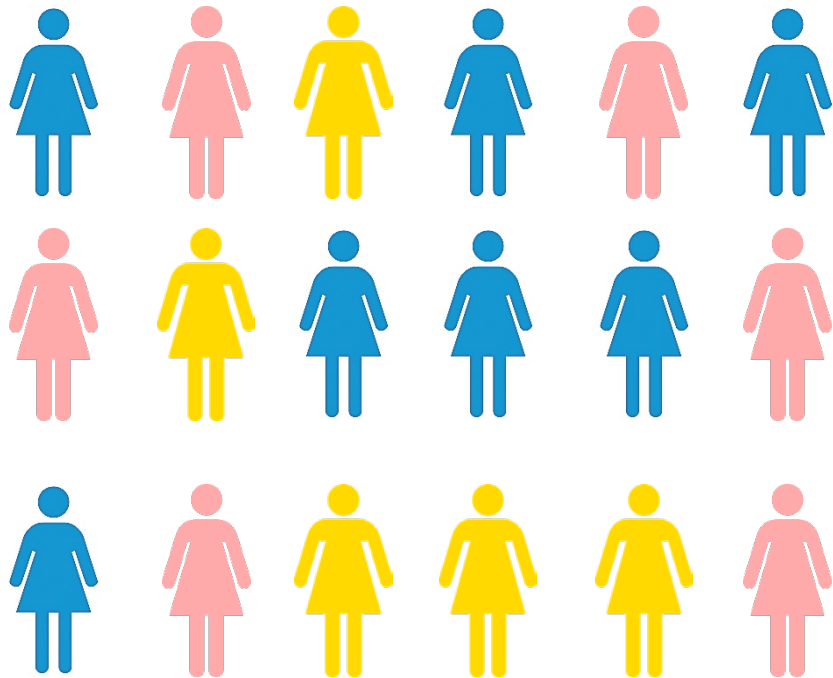
Workforce Allocation Optimization (WAO) Tool

Low cost + user friendly + easily implemented
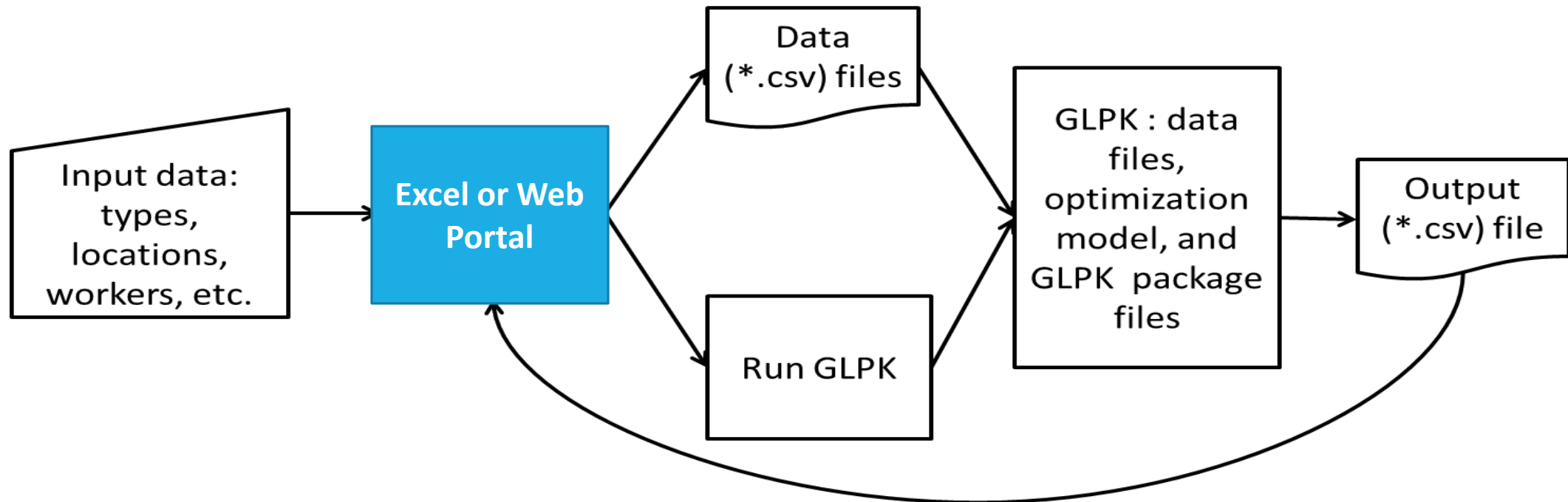
Successes

MOZAMBIQUE

- Used semi-annually in Mozambique since Dec. 2015

- 85% of workers allocated to one their top three preferences, 62% to first preference

- Significant decrease in transfer requests

- Improved morale and retention

TANZANIA, ZAMBIA

- Development of Web Portal

- Building capacity in HITRAC, informatics organization in Harare, Zimbabwe

- Tool training and hand off in Q2 2018 for integration with existing information systems

Questions?
Thank you!

Enter Key Words

Configure System   User: administrator   Log Out

- Home
- Allocation Results
- Workers Assignments
- Demand Met by Location
- Assignments by Location
- Assignments by Worker Types
- Preferences by Location
- Fixed Assignments
- Allocation Inputs

Home / Allocation Results / / Workers Assignments

Workers Assignments

Print | Column visibility

Search:

Num	UID	Name	Assigned Location	Assignment Preference	Gender	Study Location	Adjusted Distance (km)	Worker Type	Worker Level	Salary (Allocated)
1	123456789	PATIENCE Chikerema	Dar es Salaam	1	F	Kigoma	0	Dental Officer	2	0
2	123456790	PATIENCE CHENAI	Mwanza	0	F	Kigoma	0	Dental Officer	2	0
3	123456791	PATIENCE SAIKO	Kigoma	0	F	Kigoma	0	Dental Officer	2	0
4	123456792	NTANDOYETHU MABASA	Arusha	2	M	Geita	0	Assistant Environmental Health Officer	2	0
5	123456793	PATIENCE EDITH	Dar es Salaam	1	F	Kigoma	0	Assistant Environmental Health Officer	2	0
6	123456794	FARAI EDITH	Dar es Salaam	2	F	Dar es Salaam	0	Assistant Environmental Health Officer	2	0
7	123456795	ZENASE TSISTSI	Arusha	2	M	Kigoma	0	Assistant Environmental Health Officer	2	0
8	123456796	ZANELE PORTIA	Dar es Salaam	1	M	Kigoma	0	Assistant Environmental Health Officer	2	0
9	123456797	ZANELE SLOBODAN	Geita	1	M	Dar es Salaam	0	Assistant Environmental Health Officer	2	0
10	123456798	ZANELE TAPIWA	Dar es Salaam	1	M	Kigoma	0	Assistant Environmental Health Officer	2	0

Showing 1 to 10 of 220 entries

zhrisproject.hitrac.co.zw:81/allocationtool/index.php/home

Previous | 1 | 2 | 3 | 4 | 5 | ... | 22 | Next

🏠 Home

📑 Worker Settings

📍 Demand Locations

🖥 Allocation Results

Home

Allocation Input

Worker Settings

Enter the workers information: study location (to compute distances),type, level, adjusted salary and fixed location (if any), and preferences.

Demand Location

Enter the demand locations, budget, and demand (number of workers per type per location).

Allocation Status

Last Allocation Run	2016-07-12
Total Number of Graduates	221
Total Number of Graduates Allocated	220
Total Number of Graduates Not Allocated	1