Cost and Effectiveness Analysis of “Strategically Packaging” Malaria Interventions - Evidence from a Retrospective Analysis in Senegal

Sophie Faye; Alteya Cico; Alioune Badara Gueye; Elaione Baruwa; Benjamin Johns; Martin Allilo

1Abt Associates, USA; 2Senegal National Malaria Control Program (PNL); 3U.S. President’s Malaria Initiative, U.S. Agency for International Development, USA

**Background**
- Resources for malaria control and elimination interventions are limited.
- Cost-effectiveness data is necessary for decision-making and planning.
- Lack of cost-effectiveness data for intervention combinations or “packages”
- Senegal Malaria control packages:
  1. SUFI (Scale Up For Impact): only LLI, RS, R+I, R+S+I, R+SPC, S+PEC
  2. S+I, S+SMC, S+SMC + PEC
  3. SUFI + Indoor Residual Spraying (IRS)
  4. SUFI + S+SMC + IRS
  5. SUFI + Reactive Case Investigation (Focal Screen and Treat and Mass Screen and Treat)

(Source: National Malaria Control Strategic Plan 2018-2024)

**Objectives**
- Estimate cost-effectiveness ratios (CER) for different packages of malaria interventions in Senegal using routine data, as opposed to modelling.
- Utilize results to identify potential efficiency gains and to draw lessons as malaria epidemiology evolves in Senegal

**Data**
- Retrospective analysis of 2013-2014: first two years that all packages were occurring.
- District level data for 76 districts (incidence, mortality, intervention coverage, outputs and costs).
- Costing analysis: direct financial implementation costs.
- Coverage and output cost data for interventions obtained from NMCP or implementing partners

**Methods**
- Total annual costs estimated using bottom up and top down approaches.
- Intervention costs aggregated to obtain package costs.
- Package effectiveness measured in disability-adjusted life years (DALYs) averted for the study period.
- CER: Cumulative costs of a package in its area of implementation divided by cumulative DALYs averted.

**Results**
- **Total Costs of Interventions/Packages**
  - SUFI only had the highest total cost; LLI accounted for almost 80 percent of total cost.
  - SUFI (LLI, RS, R+I, case management, PEC) accounted for the largest component of all other packages, except those with IRS.
  - Seasonal malaria chemoprevention (SMC) accounts for almost half of total cost of SUFI+SMC package.

- **Unit Costs of Interventions/Packages**
  - Lower unit costs of prevention-related interventions, vs. treatment-related.
  - Indoor residual spraying (IRS) had highest unit cost of preventive interventions, reactive case investigation (RCI) highest among treatment interventions.

- **Package Effectiveness**
  - Decrease in malaria incidence and mortality over the study period.
  - Packages with SMC had largest decrease in incidence.
  - Packages with IRS had largest decrease in mortality.

- **Package Cost Effectiveness**
  - Per WHO guidelines, all packages were “very cost effective,” meaning CER was less than country GDP per capita of $1,067 in 2014.
  - Exception: SUFI+RCI package is “cost effective,” meaning CER less than 3 times the GDP per capita.
  - Relative to other packages, SUFI+SMC is most cost effective, SUFI+RCI is least cost effective.

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