The role of intervention complexity for the feasibility of scaling-up health interventions in low and middle-income countries

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Why develop a framework for intervention complexity?

- The conceptual framework

- Application of the framework: Solar water disinfection

- Potential usefulness of the framework

- Conclusions
WHY DEVELOP A FRAMEWORK FOR INTERVENTION COMPLEXITY?

To understand the role of intervention design in expanding access

– Is intervention complexity a useful criterion to complement burden of disease, cost-effectiveness, and affordability considerations?

To indicate R&D priorities for simplifying interventions

– Are there particular interventions that are easy to scale up?

– How can existing interventions be simplified to relax constraints?

To guide decisions on how to implement interventions in a specific setting

– Which characteristics of an intervention can we change to implement it here?
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CONCEPTUAL FRAMEWORK FOR CATEGORIZING INTERVENTIONS BY THEIR DEGREE OF COMPLEXITY

- **Intervention characteristics**
  - Basic product design
  - Supplies
  - Equipment

- **Delivery characteristics**
  - Facilities
  - Human resources
  - Communication & transport

- **Government capacity requirements**
  - Regulation/legislation
  - Management systems
  - Collaborative action

- **Usage characteristics**
  - Ease of usage
  - Pre-existing demand
  - Black market risk

- **Features**
  - Comprehensive enough to capture important constraints
  - General enough to apply to different types of interventions
  - Policy-relevant in identifying constraints and opportunities
CONCEPTUAL FRAMEWORK: THIRD LEVEL CRITERIA

Intervention characteristics

Basic product design
- Stability
- Standardisability
- Safety profile
- Ease of storage
- Ease of transport

Supplies
- Need for regular supplies

Equipment
- High-tech equipment & infrastructure needed
- Different types of equipment needed
- Maintenance needed
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DIARRHOEA IS STILL ONE OF THE THREE TOP KILLERS OF CHILDREN

- Epidemiology
  - 1.1 billion people still depend on rivers, streams, and other unsafe surface water sources for drinking water
  - Contaminated drinking water is main route of transmission of diarrhoeal diseases
  - 2.2 million people die from diarrhoea annually, mostly children

- Household water treatment and storage
  - Boiling water for 10 min, simple chlorination systems (tablets, drops)

- Solar water disinfection
  - Water filtration through charcoal and subsequent exposure to sunlight practised in India 2000 B.C.
  - Simplest application today: Storing water in transparent containers that are placed in direct sunlight
  - Two synergetic effects: UV radiation & temperature rise
Health impact in Kenyan children < 6 years
• Reduction of diarrhoea episodes by 34% (adjusted OR 0.66, 95%CI 0.5 to 0.87)
• Reduction of severe diarrhoea episodes by 35% (adjusted OR 0.65, 95%CI 0.5 to 0.86)
• Risk of contracting cholera during epidemic reduced by 88% (OR 0.12, 95%CI 0.05 to 0.26)

1. INTERVENTION CHARACTERISTICS: SODIS

**Basic Product Design**
- Transparent PET plastic bottles
- Process is highly standardisable. Many container types proved effective
- Excellent safety profile. Leak of chemicals has been excluded
- Water treatment & storage in same container minimises recontamination

**Supplies**
- No need for regular supplies

**Equipment**
- Plastic bottles
- Black paint
2. DELIVERY CHARACTERISTICS: SODIS

**Facilities**
- Plastic bottles from domestic refuse

**Human Resources**
- No medical knowledge needed
- Initial training, monitoring & evaluation by community development volunteers with training by development agency or NGO

**Communications & Transport**
- No dependency of delivery on strong communication & transport infrastructure
- In very remote rural areas, purchase & transport of used bottles from the city has to be organised
3. GOVERNMENT CAPACITY REQUIREMENTS: SODIS

- **Regulation/Legislation**: No need for regulation
- **Management Systems**: No need for sophisticated management systems
- **Collaborative Action**: Eventually some partnership requirements in promotion and information/education/communication campaigns e.g., public sector, NGOs, media
4. USAGE CHARACTERISTICS: SODIS

Ease of Usage
- Basic information/education on how to use SODIS needed.
- Best results if integrated in wider sanitation & hygiene strategy
- Some need to monitor practice and correct mistakes during first months of use

Pre-existing Demand
- Pre-existing demand is low, therefore substantial need for initial promotion.
- However, once introduced practice is sustained over years

Black Market Risk
- None.
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INTERVENTION COMPLEXITY CAN COMPLEMENT OTHER CRITERIA FOR PRIORITY SETTING

![Diagram showing the relationship between burden of disease, cost-effectiveness, affordability, and intervention complexity, with categories for highly feasible interventions like ORT, SODIS, New antibiotics, HAART, and Trachoma surgery.]

Highly feasible interventions: ORT, SODIS

Low cost: ORT, SODIS

High cost: HAART, Trachoma surgery

Low intervention complexity: New antibiotics, SODIS

High intervention complexity: HAART, Trachoma surgery
NON-CONVENTIONAL WAYS TO SCALE-UP INTERVENTIONS IDENTIFIED IN LITERATURE REVIEW

► Simplified technology

– Medical abortion replacing surgical abortion
– Long-lasting insecticide treated nets

► Different delivery/distribution channels

– Social marketing for condoms or insecticide-treated nets
– Use of NGOs where government capacity is weak

► Pushing down human resources requirements

– Midwifery training of traditional birth attendants
– Sticking-plaster treatment replacing trachoma surgery

► Simplified usage

– Solar water disinfection at point of consumption

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CONCLUSIONS

– Intervention complexity is a useful way to think about feasibility

– It complements burden of disease, cost-effectiveness, and affordability considerations

– It can help to identify R&D priorities to simplify interventions

– It can guide decisions on how to implement interventions in specific settings

Intervention complexity is a useful additional criterion for decision making on scaling-up health interventions