Children’s Health in the Solomon Islands

a systems approach

Claire Brereton
UN ‘Least Developed Country’

700,000 people

75% rural

Subsistence fishing and farming

Minimal road infrastructure
Population

High birth rates

Average age 24

Median age 19

More than 40% under 15 years old
Peri-urban

40% of urban population in informal settlements

Overcrowding

No sanitation

River pollution
Rural water and sanitation

Basic water can mean up to 30 minutes round trip to the source

80% open defecation

WASH – food vs soap
Rural electricity

Household solar provides lighting only

Minimal 2G phone network
## Children’s Health in Solomon Islands – local primary data and global estimates

<table>
<thead>
<tr>
<th>Children aged under 5</th>
<th>Children aged 5-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality cause ranking</td>
<td>Morbidity Years lived with disability ranking</td>
</tr>
<tr>
<td>1 neonatal</td>
<td>nutritional</td>
</tr>
<tr>
<td>2 other communicable diseases</td>
<td>enteric disease</td>
</tr>
<tr>
<td>3 enteric disease</td>
<td>malaria and NTDs including dengue</td>
</tr>
<tr>
<td>4 nutritional deficiency related disease</td>
<td>chronic respiratory disease</td>
</tr>
<tr>
<td>5 malaria and NTDs including dengue</td>
<td>skin diseases</td>
</tr>
<tr>
<td>6 acute respiratory infection</td>
<td></td>
</tr>
</tbody>
</table>
Children’s Health System in Solomon Islands

Interactions between health, environment, economic and social domains

Qualitative modelling – Causal Loop Diagram

From literature and expert opinion. Gives system structure.

Quantitative modelling – Dynamic model

Mathematical relationships of behaviour over time

Uncertainty and data gaps

Gaps and inconsistencies highlighted

Testing and simulation

Requires quantitative data

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Air Pollution Causal Loops – Children’s Health in Solomon Islands

- Vehicles
- Poverty
- Clean fuel
- Cooking with biomass fuel
- Internal air pollution
- Respiratory disease
- Child morbidity
- Child mortality
- Adult morbidity/premature mortality

- Natural resource depletion/pollution
- Climate change
- Ambient air pollution
- Outdoor waste burning
- Vehicles pollution

- B1
- R9

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**System Dynamics Approach**

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Children’s Health in Solomon Islands - Dynamic (quantitative) modelling

Top level modular view

Mathematical relationships between causes and effects

Simulation over a time period – 1990 to 2030
Under 5 mortality simulation

REDUCING INFLUENCERS

Increased health expenditure 2003-2010 and progress on immunization

INCREASING INFLUENCERS

Reduction of basic water and sanitation services

Reducing subsistence food supplies

Climate change related mortality

Reducing per capita health expenditure
Population
Growing faster than United Nations Population Division estimates
Confirmed by model and by 2019 Solomon Islands demographic survey
Growth ‘baked in’ due to lead times
Can reduce with increased family planning access
Surveys indicate demand present
Under 5 mortality simulation

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Most important data gaps?

- Birth/death registration completeness, estimated 88% today
- Mortality coding, limited by remoteness
- Nutrition and poverty data
- Health access data
- WASH investment data
- Family planning data, supply and demand-side
- Air quality data, urban and rural, ambient and internal
A systems approach

Moving up the knowledge ladder

Support for priorities and policies

Known knowns

Uncertainty

Estimates

Projections with caveats

Assumptions

Unknown unknowns

Inconsistencies

Data understanding

Clarity on uncertainty ranges

Better projections

Known unknowns

Clarity on uncertainty ranges

Better projections
Questions
ACKNOWLEDGEMENTS

Prof Paul Jagals  CHEP
Prof Peter Sly  CHEP
Dr Matteo Pedercini  Millennium Institute, Geneva
Mr Leonard Olivera  Solomon Islands Ministry of Health
Climate Change

Rising sea levels

Rising water table

Increasing frequency / magnitude of tropical storms
The dangers to children from coconut tree trauma, in KiraKira, Solomon Islands: a retrospective clinical audit

Rajan Rehan, Peter D. Jones, Hashim Abdeen, Heddi Rowas and Jasryn Dhaliwal

Abstract

**Background:** Kirakira is small community of 3,000 people and is the capital of Makira-Ulawa province in Solomon Islands. Kirakira is an impoverished community with a small 30 bed hospital with limited resources. This audit was conducted by final year students from Bond University as part of a selective clinical placement.

**Methods:** The audit included admissions to the hospital from 2011 to 2014. Trauma-related admissions were identified and classified according to the patient’s age, sex, description of injury, mechanism of injury and whether they were transferred to the National Referral Hospital (NRH) in Honiara for further treatment. Injuries due to Coconut tree trauma were classified as being due to falls from the tree, or trauma from either falling branches or falling coconut fruit.

**Results:** There were 3455 admissions and 23 (0.7 %) non-neonatal deaths over the 3 year period. 126 (3.6 %) admissions were referred on to the NRH for further treatment. 277 (8.02 %) admissions were trauma-related with 57 (21 %) of these referred on to the NRH. 142 (55 %) of the trauma admissions involved children. Coconut Tree trauma was the
Solomon Islands WASH causal loops

Household poverty

Lack of soap
Lack of improved water access
Lack of hygiene
Lack of clean water
Lack of sanitation
Open defecation
WASH related disease
Malnutrition/stunting
Chronic child morbidity/mortality

Child educational attainment
Adult educational attainment

Family size

Adult morbidity/premature mortality

R2

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Dynamic (Quantitative) model example
Cooking

‘Solomons kitchen’
Wood or coconut shell
Malnutrition and stunting common
Health and education access
Average adult education 5 years

Rural clinics and first aid posts
No water or fridge
Rural children’s health issues
diarrhoea
malaria
worms
ARI
Injury
Urban life

Electricity

Water

Metered

Rainwater

River

Open rubbish burning
Children’s Environmental Health in Solomon Islands

Measures

Broader than traditional environmental health scope

- General demographics
  - Population
  - Poverty
  - Health access
  - Fertility / family planning availability /
  - Education

- Specific causes
  - Access to water and sanitation
  - Vectors
  - Air pollution ambient and internal
  - Climate change

- Health Outcomes
  - Child mortality by cause, morbidity
  - Links to adult mortality / morbidity
  - Malnutrition / maternal malnutrition