What if hardship causes drug resistance?

A development studies research agenda to inspire innovative global health policy solutions

Dr Marco J Haenssgen | University of Warwick | 02 June 2020
Background
Personal background

- Development studies and management
- Interdisciplinary and mixed-methods research
- Interest in health behaviour and contextual change
- Geographical focus on Southeast Asia

https://warwick.ac.uk/fac/arts/schoolforcross-facultystudies/gsd/aboutus/people/new/marcohaenssgen
Motivation for this seminar

• AMR as globally recognised health priority
• Policy response shaped by focus on intuitive solutions with potentially harmful overemphasis of individual knowledge deficits
• Starting point: AMR policy is development policy

“We need to:

1. Undertake a **massive global public awareness campaign**”

(The Review on Antimicrobial Resistance, 2016, p. 17)
Motivation for this seminar

- Extensive funding pledges
- Behavioural science and non-medical approaches
- Improved measurement of disease burden
- Subscription-based financing models
- Pharmaceutical companies pulling out of development


## Interdisciplinary issues consistently obscured by the primacy of biomedicine

### Governance
- Individualistic and knowledge deficit biases
- What counts as actionable data
- Securitisation of health
- Inter-sectorial cooperation beyond One Health
- North-South relationships
- Hegemonic medical discourses and practices

### Economic
- Economic frameworks for drug development
- Assessing costs and benefits of drug resistance
- Economic contexts shaping medicine use and behaviour
- Production and marketing systems for agri- and aquaculture

### Social
- Relationships of “experts” vs. “lay people”
- Social purposes and political appropriation of health technologies
- Non-health solutions for health problems
- Ethical dilemmas in medicine prescription and use
- Unintended social consequences of medical intervention

### Environmental
- Human-animal co-existence
- Drug disposal behaviour
- Role of climate change, biodiversity loss, pollution
- Impact of development processes on environmental factors of AMR
Conceptual issues
Some basic premises

1. The landscape of healthcare providers is fragmented and obscure.
2. Preferences and means to access healthcare vary within the population.
3. When navigating these obscure health systems, people share a social space within which they collaborate and compete.
4. New healthcare solutions at the patient – health system interface will always have to compete with existing solutions.
5. Social, economic, and technological change can affect treatment-seeking behaviours in unforeseen ways.
6. Solutions for “problematic behaviour” need not be confined to the health sector, but they can plausibly have similarly (or more effective) substitutes in other sectors.
Behaviour as: Decision making

Behaviour as: Response to adversity

"The goal is not to move people from the bottom of the coin to the top, because both positions are unfair. Rather, the goal is to **dismantle the systems** (i.e., coins) causing these inequities." (Nixon, 2019:3)
### Hardship: poverty, marginalisation, precarity, stress?

<table>
<thead>
<tr>
<th>Poverty</th>
<th>Marginality / Marginalisation</th>
<th>Precarity</th>
<th>Stress</th>
</tr>
</thead>
</table>
| • Relative concept  
• “Being deprived”  
• Typically considered in one-dimensional terms as monetary poverty  
• Represents barriers to healthcare access | • Relative concept (static / dynamic)  
• “Being situated at the social / economic / political / ecological / geographic margins of society”  
• Intrinsically multi-dimensional | • Absolute concept  
• “Pernicious self-dependence, undermining control over life & ability to flexibly respond to crises”  
• Focused on work, but also applies to livelihoods in high-/ middle-/ low-income countries | • Absolute concept  
• Evidenced to be linked to sub-optimal decision-making processes  
• Argued to be one main mechanisms underlying precarity (owing to work focus), but similarly applies to experience of poverty |
Study data
Overview of related projects

• **Antibiotics and Activity Spaces**
• The social role of biomarker testing
• Supply-induced demand for antibiotics among marginalised populations
• What if precarity causes drug resistance?
• (Mobile phone diffusion and rural healthcare access in India & China)
Relevance of Southeast Asia for AMR

• Geographic origin of antimalarial resistance
• Thailand “posterchild” in tackling AMR, but region (incl. TH) persistently labelled hotspot and at “high risk” of AMR
• 110m int’l tourist arrivals, 9% of global int’l air passengers in 2016 – risk of cross-border spread (e.g. multi-drug-resistant *Neisseria gonorrhoeae*)
**Thailand and Lao PDR**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Thailand</th>
<th>Lao PDR</th>
<th>LMIC average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poverty rate (US$1.90/day, in purchasing power parity)</strong></td>
<td>0% (2017)</td>
<td>23% (2012)</td>
<td>12% (2015)</td>
</tr>
<tr>
<td><strong>Poverty rate (US$5.50/day, in purchasing power parity)</strong></td>
<td>8% (2017)</td>
<td>85% (2012)</td>
<td>55% (2015)</td>
</tr>
<tr>
<td><strong>Literacy rate (% of adult population)</strong></td>
<td>93% (2015)</td>
<td>85% (2015)</td>
<td>84% (2016)</td>
</tr>
<tr>
<td><strong>Under-5 mortality rate (per 1,000 live births)</strong></td>
<td>10 (2017)</td>
<td>63 (2017)</td>
<td>43 (2017)</td>
</tr>
</tbody>
</table>


Survey research methods

Rural Chiang Rai & Salavan

Representative satellite-aided multi-stage sampling

5,885 survey participants

50 cognitive interviews

Single-/multi-level regression
Difference-in-difference analysis

Social network analysis

Qualitative triangulation

Public engagement activities
Flow diagram created using SankeyMATIC: http://sankeymatic.com/build/
Antibiotic knowledge, attitudes and practices: new insights from cross-sectional rural health behaviour surveys in low-income and middle-income South-East Asia

Marco J Haenssgen,^1,2,3,4^ Nutcha Charoenboon,^5^ Giacomo Zanello,^6,7^ Mayfong Mayxay,^8,9,10^ Felix Reed-Tsochas,^3,4,11^ Yoel Lubell,^1,5^ Heiman Wertheim,^12,13^ Jeffrey Lienert,^3,4,14^ Tripphaphone Xayavong,^15,16^ Yuzana Khine Zaw,^17^ Amphayvone Thepkhamkong,^8^ Nicksan Sithongdeng,^8^ Nid Khamsoukthavong,^9^ Chanthasone Phanthavong,^8^ Somsanith Boualaiseng,^8^ Souksakhone Vongsavang,^8^ Kanokporn Wibunjak,^5^ Poowodon Chai-in,^5^ Patthanavan Thavethanuththanawin,^5^ Thomas Atthaus,^1,5^ Rachel Claire Greer,^5,18^ Supalert Nedsuwan,^19^ Tri Wangrangsimakul,^13,20^ Direk Limmathurotsakul,^20^ Elizabeth Elliott,^21,22^ Proochista Ariana^1^
Fragmented notions of antibiotics & drug resistance complicate awareness raising

---

### a) Commonly mentioned names for antibiotics

<table>
<thead>
<tr>
<th>Chiang Rai</th>
<th>Salavan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-inflammatory medicine</td>
<td>“Amp” (Amoxicillin)</td>
</tr>
<tr>
<td>Germ killer</td>
<td>Antibiotic (official term)</td>
</tr>
<tr>
<td>Antibiotic (official term)</td>
<td>“Amp” / “Mox” (Amoxicillin)</td>
</tr>
<tr>
<td>“Hero” (Heromycin) / TC-Mycin</td>
<td>“Tetra” (Tetracycline)</td>
</tr>
<tr>
<td>“Corlam” (Chloramphenicol)</td>
<td>“Gulalam” (Chloramphenicol)</td>
</tr>
<tr>
<td>Capsule medicine</td>
<td>“Sepalim” (Cephalexin)</td>
</tr>
<tr>
<td>Pain reliever</td>
<td>“Pen” (Pencillin)</td>
</tr>
<tr>
<td>“Amox” / “Mox” (Amoxicillin)</td>
<td>“Par” (Paracetamol) / Veracold</td>
</tr>
<tr>
<td>“Amp” (Amoxicillin)</td>
<td>Pain reliever</td>
</tr>
<tr>
<td>“Pen” (Pencillin)</td>
<td></td>
</tr>
<tr>
<td>“Tetra” (Tetracycline)</td>
<td>“Her” (Heromycin)</td>
</tr>
<tr>
<td>“Para” (Paracetamol) / Sar / Nify</td>
<td>Anti-inflammatory medicine</td>
</tr>
<tr>
<td>Other names</td>
<td>Capsule medicine</td>
</tr>
<tr>
<td>“Don’t know”</td>
<td>Other names</td>
</tr>
</tbody>
</table>

### b) Commonly mentioned purposes for antibiotics

<table>
<thead>
<tr>
<th>Chiang Rai</th>
<th>Salavan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sore throat</td>
<td>External wounds</td>
</tr>
<tr>
<td>External wounds</td>
<td>Cough</td>
</tr>
<tr>
<td>Inflammation</td>
<td>Fever</td>
</tr>
<tr>
<td>Muscle pain, body aches</td>
<td>Sore throat</td>
</tr>
<tr>
<td>Cough</td>
<td>Stomach conditions</td>
</tr>
<tr>
<td>Whatever the doctor suggests</td>
<td>Cold, flu, runny nose</td>
</tr>
<tr>
<td>Fever</td>
<td>Inflammation</td>
</tr>
<tr>
<td>Cold, flu, runny nose</td>
<td>Headaches, migraine</td>
</tr>
<tr>
<td>Stomach conditions</td>
<td>Muscle pain, body aches</td>
</tr>
<tr>
<td>Fighting infections / germs</td>
<td>Skin conditions</td>
</tr>
<tr>
<td>Non-human use (plants, animals)</td>
<td>Diarrhoea</td>
</tr>
<tr>
<td>Skin conditions</td>
<td>“Don’t know”</td>
</tr>
<tr>
<td>Headaches, migraine</td>
<td>“Don’t know”</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>“Don’t know”</td>
</tr>
<tr>
<td>Other</td>
<td>“Don’t know”</td>
</tr>
</tbody>
</table>

---

**N = 1851.** including respondents who indicated that they had seen the presented medicine (i.e. common antibiotics) before. Population-weighted statistics. Multiple response permitted. Error bars indicate 95% confidence interval.
Chiang Rai

a) Commonly mentioned names for antibiotics

- Anti-inflammatory medicine
- Germ killer
- Antibiotic (official term)
- "Hero" (Heromycin) / TC-Mycin
- "Corlam" (Chloramphenicol)
- Capsule medicine
- Pain reliever
- "Amoxi" / "Moxi" (Amoxicillin)
- "Ampi" (Ampicillin)
- "Peni" (Penicillin)
- "Tetra" (Tetracycline)
- "Para" (Paracetamol) / Sara / Tiffy
- Other names
- "Don't know"

Salavan

- "Ampi" (Ampicillin)
- Antibiotic (official term)
- "Amok" / "Moxi" (Amoxicillin)
- "Tetra" (Tetracycline)
- "Gulolam" (Chloramphenicol)
- "Sepasin" (Cephalexin)
- "Peni" (Penicillin)
- "Para" (Paracetamol) / Veracold
- Pain reliever
- "Hero" (Heromycin)
- Anti-inflammatory medicine
- Capsule medicine
- Other names
- "Don't know"

Chiang Rai

b) Commonly mentioned purposes for antibiotics

- Sore throat
- External wounds
- Inflammation
- Muscle pain, body aches
- Cough
- Whatever the doctor suggests
- Fever
- Stomach conditions
- Cold, flu, runny nose
- Headaches, migraine
- Muscle pain, body aches
- Skin conditions
- Diarrhoea
- Other
- "Don't know"

Salavan

- External wounds
- Cough
- Fever
- Sore throat
- Stomach conditions
- Cold, flu, runny nose
- Inflammation
- Headaches, migraine
- Muscle pain, body aches
- Skin conditions
- Diarrhoea
- Whatever the doctor suggests
- Fighting infections / germs
- Non-human use (plants, animals)
- Other
- "Don't know"

N = 1851. including respondents who indicated that they had seen the presented medicine (i.e. common antibiotics) before. Population-weighted statistics. Multiple response permitted. Error bars indicate 95% confidence interval.
N = 1851, including respondents who indicated that they had seen the presented medicine (i.e. common antibiotics) before. Population-weighted statistics. Multiple response permitted. Error bars indicate 95% confidence interval.
a) Commonly mentioned names for antibiotics

- Anti-inflammatory medicine
- Germ killer
- Antibiotic (official term)
- "Hero" (Heromycin) / TC-Mycin
- "Corlam" (Chloramphenicol)
- "Gulabs" (Chloramphenicol)
- "Sepalin" (Cephalexin)
- Capsule medicine
- Pain reliever
- "Amoxi" / "Moxi" (Amoxicillin)
- "Ampi" (Ampicillin)
- "Para" (Paracetamol) / Veracold
- Capsule medicine
- Other names
- "Don't know"

b) Commonly mentioned purposes for antibiotics

- Sore throat
- External wounds
- Inflammation
- Muscle pain, body aches
- Cough
- Whatever the doctor suggests
- Fever
- Cold, flu, runny nose
- Stomach conditions
- Fighting infections / germs
- Non-human use (plants, animals)
- Skin conditions
- Headaches, migraine
- Diarrhoea
- Other
- "Don't know"

N = 1851. Including respondents who indicated that they had seen the presented medicine (i.e. common antibiotics) before. Population-weighted statistics. Multiple response permitted. Error bars indicate 95% confidence interval.
**Chiang Rai**

**a) Commonly mentioned names for antibiotics**

- Anti-inflammatory medicine
- Germ killer
- Antibiotic (official term)
- "Hero" (Heromycin) / TC-Mycin
- "Corlam" (Chloramphenicol)
- Capsule medicine
- Pain reliever
- "Amoxi" / "Moxi" (Amoxicillin)
- "Ampi" (Ampicillin)
- "Tetra" (Tetracycline)
- "Sepasin" (Cephalexin)
- "Para" (Paracetamol) / Sara / Tiffy
- Other names
- "Don't know"

**Salavan**

- "Ampi" (Ampicillin)
- Antibiotic (official term)
- "Amok" / "Moxi" (Amoxicillin)
- "Tetra" (Tetracycline)
- "Gulolam" (Chloramphenicol)
- Capsule medicine
- Pain reliever
- "Para" (Paracetamol) / Veracold
- Pain reliever
- "Hero" (Heromycin)
- Anti-inflammatory medicine
- Capsule medicine
- Other names
- "Don't know"

**b) Commonly mentioned purposes for antibiotics**

- Sore throat
- External wounds
- Inflammation
- Muscle pain, body aches
- Cough
- Whatever the doctor suggests
- Fever
- Stomach conditions
- Cold, flu, runny nose
- Fighting infections / germs
- Non-human use (plants, animals)
- Skin conditions
- Headaches, migraine
- Muscle pain, body aches
- Other
- "Don't know"

**Percent of rural population who recognised antibiotics**

*N = 1851*. Including respondents who indicated that they had seen the presented medicine (i.e. common antibiotics) before. Population-weighted statistics. Multiple response permitted. Error bars indicate 95% confidence interval.
Antibiotic use episodes across field sites and channels of antibiotics access, by attitude towards buying over-the-counter antibiotics

**Education**

Fragmented notions of antibiotics & drug resistance complicate awareness raising

Ambiguous links between antibiotic use and education / attitudes undermine campaign logic

\[ N = 964. \text{ Population-weighted statistics. Group comparison using Wilcoxon rank-sum tests. Arrows illustrate differences and do not imply a causal relationship. OTC=over-the-counter.} \]
Marginalisation

You’ve Got a Friend in Me: How Social Networks and Mobile Phones Facilitate Healthcare Access Among Marginalised Groups in Rural Thailand and Lao PDR

Marco J HAENSSGEN a, b, f, *
Nutcha CHAROENBOON c, g
Giacomo ZANELLO d, e, h

“disproportionate uptake of public healthcare among marginalised groups with social and mobile phone support”
Marginalisation
(using a 5-dimensional index)

Marginalisation is common

Marginalisation

Marginalisation is common
M linked to lower private and higher public healthcare

(Salavan)

\[ N = 964. \] Predicted results. Error bars indicating 95% confidence interval.
Marginalisation

Marginalisation is common M linked to lower private and higher public healthcare

Tech and social support linked to higher public healthcare access for M’ed groups

N = 964. Predicted results. Error bars indicating 95% confidence interval.
Marginalisation is common
M linked to lower private and higher public healthcare
Tech and social support linked to higher public healthcare access for M’ed groups
But: inequitable phone uptake

N = 964. Population-weighted statistics. Hypothesis tests using Pearson $\chi^2$ tests for binary variables and two-sided t-tests for total marginalisation index. *p < 0.1, **p < 0.05, ***p < 0.01.
Precarity and clinical determinants of health behaviour and antibiotic use in Southeast Asia

Marco J HAENSSGEN a, b, f, *
Nutcha CHAROENBOON c, g
Thomas ALTHAUS d, e, h

“patients experiencing precarity were significantly more likely to engage in clinically sub-optimal forms of antibiotic use in the presence of situational facilitators”
Precarity
(using a 6-dimensional index)

Precarity among clinical factors, marginalisation, facilitators

Outcomes
- Healthcare access
- Informal healthcare
- Antibiotic use
- Clinically inadvisable access
- Clinically inadvisable antibiotic use

Clinical presentation
- Infection
- Respiratory symptoms
- Common cold
- Fever
- Neurological symptom
- Digestive presentation
- Uro-gynaecological symptom
- Traumatism

Precarity
- Insecure income
- Inflexible work
- No adults in HH
- No health social network
- No HH mobile phone
- No advanced motor transport

Marginalisation
- No formal education
- Minority ethnicity
- Bottom 20% wealth

Facilitation (during illness)
- Social support
- Any phone use
- Advanced motor transport

Other controls
- Illness severity/duration
- Illness of child/adult
- Sex of respondent
- Distance to formal care

Other controls
- Distance to formal care
Precarity

Precarity among clinical factors, marginalisation, facilitators

Antibiotics linked to infections and respiratory symptoms

Any formal or informal healthcare access during illness episode

At least one antibiotic use episode during illness

_N = 1421. Adjusted odds ratio with 95% confidence intervals, controlling for marginalisation, facilitation, field site, and other control variables._
Precarity among clinical factors, marginalisation, facilitators

Antibiotics linked to infections and respiratory symptoms

Clinically inappropriate AB use driven by situational facilitators in presence of precarity

N = 1421. Predicted and interpolated results, controlling for marginalisation, clinical determinants, field site, and other control variables. Shaded areas indicate 95% confidence intervals.
Contextual change

“the process of digital inclusion delivers tools that intensify the competition for scarce healthcare resource among deprived populations”

The struggle for digital inclusion: Phones, healthcare, and marginalisation in rural India

Marco J. Haessgen a, b, c, d, *

What Global Health Policy can Learn From Strategic Management to Tackle Antimicrobial Resistance

Marco J HAENSSGEN a, b, c, *

97 villages
6683 observations
3056 illness episodes

Rural India wide
2005 – 2012
24,006 observations

Work in progress
Contextual change

Tech diffusion raises healthcare barriers for excluded segments.

\( N = 24,006. \) Predicted relationship between district-level phone diffusion, household phone ownership, and private healthcare access.
Contextual change

Tech diffusion raises healthcare barriers for excluded segments.

Widespread phone use links to lower public healthcare access.

\( N = 97 \). Trendline indicating linear fit with 95% confidence interval in grey. Data aggregated from 3056 illness episodes across all field sites.
Contextual change

Tech diffusion raises healthcare barriers for excluded segments.

Widespread phone use links to lower public healthcare access.

Job loss raises demand for healthcare but pushes people away from hospitals, towards primary & informal providers.

N = 876. Period change compared across people who lost and gained employment.
Policy implications
Summary

“Massive awareness campaigns” speak to a fraction of health behaviours

Ungoverned **contextual change** entails unforeseeable & potentially problematic health behaviour

Health policy alone is **unable to solve contextual drivers of AMR**
So what?

Understand the drivers of human behaviour before trying to alter them.

- Steer away from neo-colonial and elitist interventions by checking your privilege and taking local populations serious
- Involve local social scientists and development workers to understand health behaviours
- Consciously avoid biased interventions (urban bias, modernisation bias, knowledge deficit assumptions)

Explore the role of AMR-sensitive interventions as health policy alternative.

- Social and labour protection schemes (e.g. sick leave) could alleviate pressure to depend on “quick fix” pharmaceuticals
- Access to finance (e.g. cash transfer programmes) could help overcome healthcare access constraints
- Community outreach through development organisations could help to ground interventions in local context
Opportunities for future research
Opportunities for future research

**Ethnography**
- Conceptual development of “precarity” across contexts
- Gradual transformation of livelihoods
- Lived experiences of various dimensions of precarity, both on the side of patients and healthcare providers

**Longitudinal secondary data analyses**
- Macro-level relationship between contextual change that mitigates/reinforces precarious livelihoods and aggregate health behaviours / outcomes
- E.g. event study of sub-national labour law impacts on aggregate antibiotic consumption

**Observational mixed-method research**
- Documenting (on the micro level) the complex treatment-seeking behaviours; gradual and seasonal fluctuations in social structure, livelihoods, community interactions, and their relationship to behaviours; evolving patient – provider interactions

**Experimental / intervention research**
- Micro-level relationship between (health) policy and behavioural outcomes
- Community-level development interventions and their impact on precarity and behaviour, even if this impact is not originally intended

**Evaluation research**
- Broaden knowledge base on limitations and unintended consequences of knowledge-deficit approaches
- Use balanced and transparent evaluation criteria: from effectiveness and efficiency towards broader impact, relevance, coherence, and sustainability of health action
Thank you.

Questions?
Email: marco.haenssgen@warwick.ac.uk
Twitter: @HaenssgenJ
Web: http://warwick.ac.uk/mjhaenssgen

Dr Marco J Haenssgen | University of Warwick | 02 June 2020
Backup: Survey data overview

<table>
<thead>
<tr>
<th>Country</th>
<th>Survey design</th>
<th>Villages</th>
<th>Respondents</th>
<th>Illness episodes</th>
<th>Degree of representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. China</td>
<td>3-stage cluster random sample (09-10/14)</td>
<td>16</td>
<td>400</td>
<td>356</td>
<td>Rural Gansu province, 2 districts (2,700,000 adults)</td>
</tr>
<tr>
<td>2. India</td>
<td>3-stage cluster random sample (08-09/14)</td>
<td>16</td>
<td>398</td>
<td>315</td>
<td>Rural Rajasthan state, 2 districts (1,900,000 adults)</td>
</tr>
<tr>
<td>3. Lao PDR</td>
<td>3-stage cluster random sample (02-05/18)</td>
<td>30</td>
<td>983</td>
<td>356</td>
<td>Rural Salavan province (190,000 adults)</td>
</tr>
<tr>
<td>4. Thailand</td>
<td>3-stage cluster random sample (12/17-03/18)</td>
<td>30</td>
<td>1,158</td>
<td>608</td>
<td>Rural Chiang Rai province (522,000 adults)</td>
</tr>
<tr>
<td>5. Lao PDR</td>
<td>2-round census survey (12/17-02/18 &amp; 03-05/18)</td>
<td>2</td>
<td>2,480</td>
<td>796</td>
<td>All adult members of 2 villages (1,342 adults)</td>
</tr>
<tr>
<td>6. Thailand</td>
<td>2-round census survey (11-12/17 &amp; 03-04/18)</td>
<td>3</td>
<td>1,264</td>
<td>625</td>
<td>All adult members of 2 villages (694 adults)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>97</strong></td>
<td><strong>6,683</strong></td>
<td><strong>3,056</strong></td>
<td></td>
</tr>
</tbody>
</table>
Whereas public healthcare access and village-level mobile phone diffusion were linked negatively in most field sites, private healthcare access had a mildly positive association with phone diffusion.

\( N = 97. \) Trendline indicating linear fit with 95% confidence interval in grey. Data aggregated from 3056 illness episodes across all field sites.