Exploring pathways for building trust in vaccination and strengthening health systems resilience

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7th Vaccine Acceptance Meeting

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Global Health Economics for Pharmacy

UNC ESHELMAN SCHOOL OF PHARMACY

Rising to the challenge

GAVI Alliance Partners' Forum

5-7 December 2012, Dar es Salaam, Tanzania

DOI: 10.1377/hlthaff.2015.1086
HEALTH AFFAIRS 35,
NO. 2 (2016): 199–207

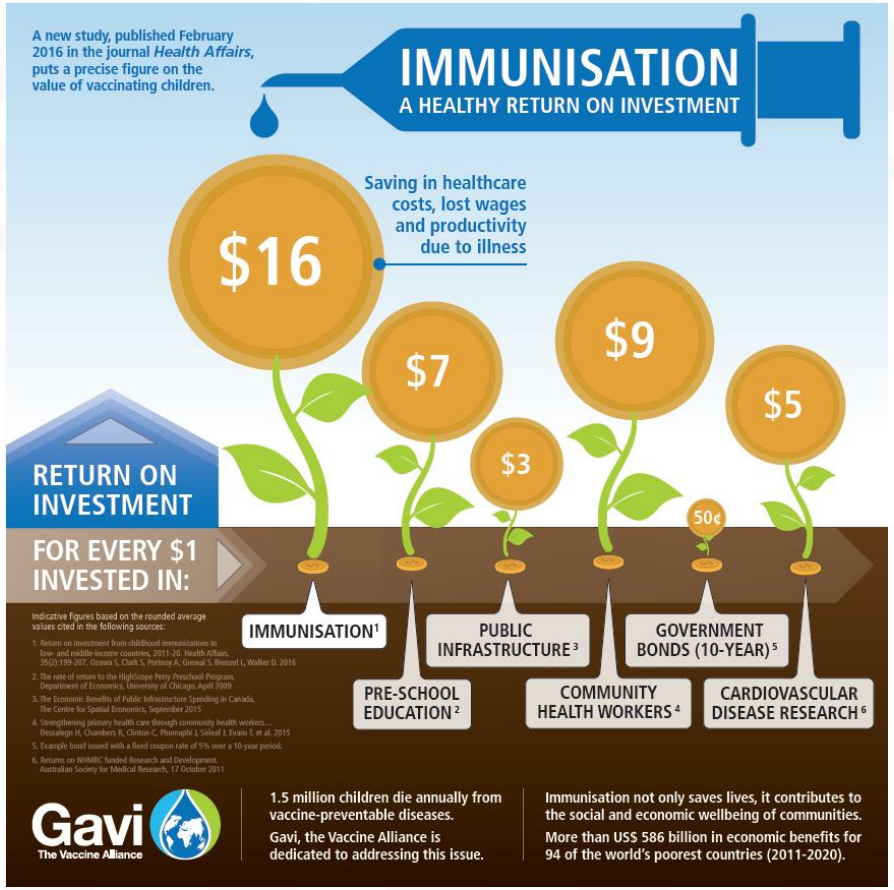
By Sachiko Ozawa, Samantha Clark, Allison Portnoy, Simrun Grewal, Logan Brenzel, and Damian G. Walker

Return On Investment From Childhood Immunization In Low- And Middle-Income Countries, 2011–20

Every $1 invested childhood immunization during 2011-2020 across 94 countries can yield a net return of $16-$44.

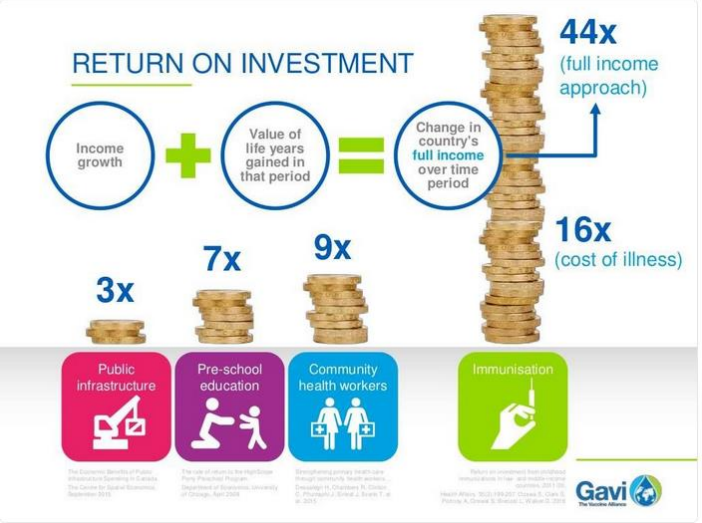
ABSTRACT An analysis of return on investment can help policy makers support, optimize, and advocate for the expansion of immunization programs in the world's poorest countries. We assessed the return on investment associated with achieving projected coverage levels for vaccinations to prevent diseases related to ten antigens in ninety-four low- and middle-income countries during 2011–20, the Decade of Vaccines. We derived these estimates by using costs of vaccines, supply chains, and service delivery and their associated economic benefits. Based on the costs of illnesses averted, we estimated that projected immunizations will yield a net return about 16 times greater than costs over the decade (uncertainty range: 10–25). Using a full-income approach, which quantifies the value that people place on living longer and healthier lives, we found that net returns amounted to 44 times the costs (uncertainty range: 27–67). Across all antigens, net returns were greater than costs. But to realize the substantial positive return on investment from immunization programs, it is essential that governments and donors provide the requisite investments.

http://dx.doi.org/10.1377/hlthaff.2015.1086



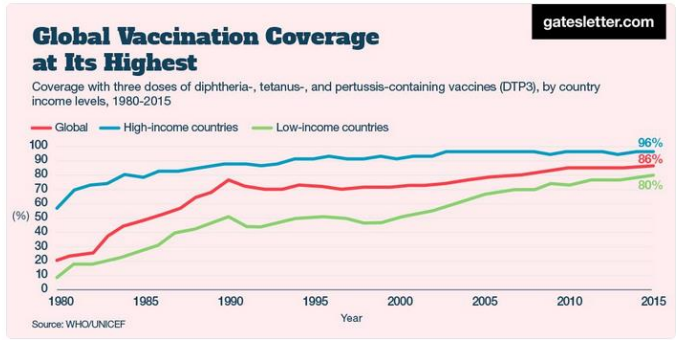
Seth Berkley
@GaviSeth
Following

Investing $1 in vaccines can get a return of up to $44. Here's the @Health_Affairs research behind it: ow.ly/5MSO309hDHL #vaccineswork



Bill Gates
@BillGates
Following

For every $1 spent on childhood vaccines, you get $44 in benefits. You can't beat that deal: b-gat.es/2ltQaJ7



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"For every dollar spent on childhood immunizations, you get $44 in economic benefits." gatesnotes.com/2017-annual-le … via @billgates

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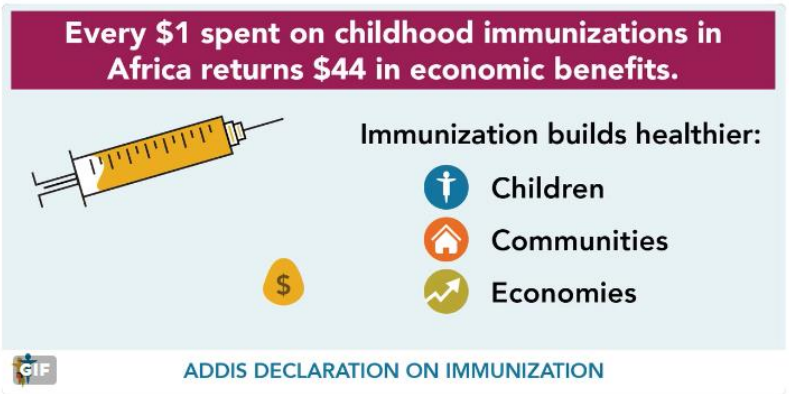
#AddisVxDec endorsement shows #Africa's leaders are ready 2 deliver on promise of #immunization 4 all. bit.ly/ADI_ #28thAUsummit



DOI: 10.1377/hlthaff.2016.0462
HEALTH AFFAIRS 35,
NO. 11 (2016): –

WEB FIRST

By Sachiko Ozawa, Allison Portnoy, Hiwote Getaneh, Samantha Clark, Maria Knoll, David Bishai, H. Keri Yang, and Pallavi D. Patwardhan

Modeling The Economic Burden Of Adult Vaccine-Preventable Diseases In The United States

ABSTRACT Vaccines save thousands of lives in the United States every year, but many adults remain unvaccinated. Low rates of vaccine uptake lead to costs to individuals and society in terms of deaths and disabilities, which are avoidable, and they create economic losses from doctor visits, hospitalizations, and lost income. To identify the magnitude of this problem, we calculated the current economic burden that is attributable to vaccine-preventable diseases among US adults. We estimated the total remaining economic burden at approximately $9 billion (plausibility range: $4.7–$15.2 billion) in a single year, 2015, from vaccine-preventable diseases related to ten vaccines recommended for adults ages nineteen and older. Unvaccinated individuals are responsible for almost 80 percent, or $7.1 billion, of the financial burden. These results not only indicate the potential economic benefit of increasing adult immunization uptake but also highlight the value of vaccines. Policies should focus on minimizing the negative externalities or spillover effects from the choice not to be vaccinated, while preserving patient autonomy.

http://dx.doi.org/10.1377/hlthaff.2016.0462

The Washington Post
Democracy Dies in Darkness

Economic Policy

The $5.8 billion argument for getting your flu shot

https://www.washingtonpost.com/news/wonk/wp/2016/10/13/the-5-8-billion-argument-for-getting-your-flu-shot/

Forbes Billionaires Innovation Leadership Money

46,900 views | Oct 12, 2016, 04:14pm

Adults Not Getting Vaccinated Cost The U.S. $7.1B In 2015

http://www.forbes.com/sites/brucelee/2016/10/12/adults-not-getting-vaccinated-cost-u-s-7-1-billion-in-2015/#ae8841e6c961

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Anti-vaxxers are costing Americans billions each year

https://finance.yahoo.com/news/antivaxxers-costing-americans-billions-each-year- 191839191.html

Estimated economic impact of vaccinations in 73 low- and middle-income countries, 2001–2020

Sachiko Ozawa,[a] Samantha Clark,[b] Allison Portnoy,[c] Simrun Grewal,[d] Meghan L Stack,[e] Anushua Sinha,[f] Andrew Mirelman,[g] Heather Franklin,[f] Ingrid K Friberg,[h] Yvonne Tam,[b] Neff Walker,[b] Andrew Clark,[i] Matthew Ferrari,[j] Chutima Suraratdecha,[k] Steven Sweet,[l] Sue J Goldie,[l] Tini Garske,[m] Michelle Li,[n] Peter M Hansen,[o] Hope L Johnson[n] & Damian Walker[p]

Objective To estimate the economic impact likely to be achieved by efforts to vaccinate against 10 vaccine-preventable diseases between 2001 and 2020 in 73 low- and middle-income countries largely supported by Gavi, the Vaccine Alliance.

Methods We used health impact models to estimate the economic impact of achieving forecasted coverages for vaccination against *Haemophilus influenzae* type b, hepatitis B, human papillomavirus, Japanese encephalitis, measles, *Neisseria meningitidis* serogroup A, rotavirus, rubella, *Streptococcus pneumoniae* and yellow fever. In comparison with no vaccination, we modelled the costs – expressed in 2010 United States dollars (US$) – of averted treatment, transportation costs, productivity losses of caregivers and productivity losses due to disability and death. We used the value-of-a-life-year method to estimate the broader economic and social value of living longer, in better health, as a result of immunization.

Findings We estimated that, in the 73 countries, vaccinations given between 2001 and 2020 will avert over 20 million deaths and save US$ 350 billion in cost of illness. The deaths and disability prevented by vaccinations given during the two decades will result in estimated lifelong productivity gains totalling US$ 330 billion and US$ 9 billion, respectively. Over the lifetimes of the vaccinated cohorts, the same vaccinations will save an estimated US$ 5 billion in treatment costs. The broader economic and social value of these vaccinations is estimated at US$ 820 billion.

Conclusion By preventing significant costs and potentially increasing economic productivity among some of the world's poorest countries, the impact of immunization goes well beyond health.

Abstracts in عربي, 中文, Français, Русский and Español at the end of each article.

Bull World Health Organ 2017;95:629–638

Vaccinations given between 2001-2020 in 73 countries will avert over 20 million deaths and save $350 billion in cost of illness; broader economic and social value is estimated at $820 billion.

Global and regional immunization profile

Data received as of 2019-Jul-01

Global

Number of reported cases	2018	2017	2016	2015	2014
Diphtheria	16'648	8'819	7'101	4'535	7'774
Japanese encephalitis	4'402	4'668	5'399	4'086	4'810
Measles	353'236	173'457	132'413	214'816	282'078
Mumps	499'037	560'622	591'684	385'736	311'599
Pertussis	151'074	162'938	174'177	149'089	177'083
Polio	104	96	42	106	415
Rubella	26'006	16'393	23'418	23'760	33'514
Rubella (CRS)	449	835	369	282	142
Tetanus (neonatal)	1'803	2'266	1'997	3'580	2'238
Tetanus (total)	15'103	12'509	13'813	10'337	12'531
Yellow fever	2'064	876	1'154	72	54

Percentage of target population vaccinated, by antigen

based on WHO-UNICEF estimates
TT2plus is based on reported coverage

BCG	89	89	89	88	88
DTP1	90	91	91	90	89
DTP3	86	86	86	85	84
HepB_BD	42	41	37	37	35
HepB3	84	84	85	83	81
Hib3	72	72	71	63	55
IPV1	72	58	47	23	-
MCV1	86	86	86	85	84
MCV2	69	68	67	63	59
PCV3	47	45	43	38	32
Pol3	85	86	85	85	85
RCV1	69	52	48	47	45
rotac	35	28	25	23	19
TT2plus	72	73	72	70	67
YFV	49	48	46	42	43

Is there economies of scale in immunization?

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Systematic review of the incremental costs of interventions that increase immunization coverage

Sachiko Ozawa [a,b,*], Tatenda T. Yemeke [a], Kimberly M. Thompson [c]

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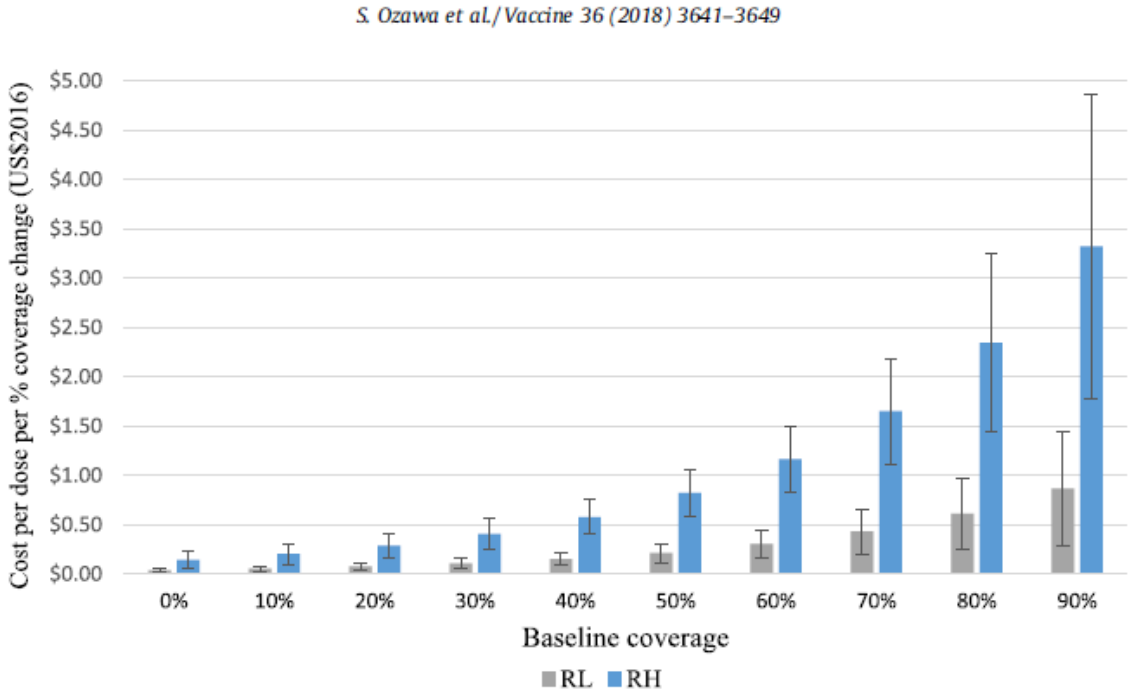
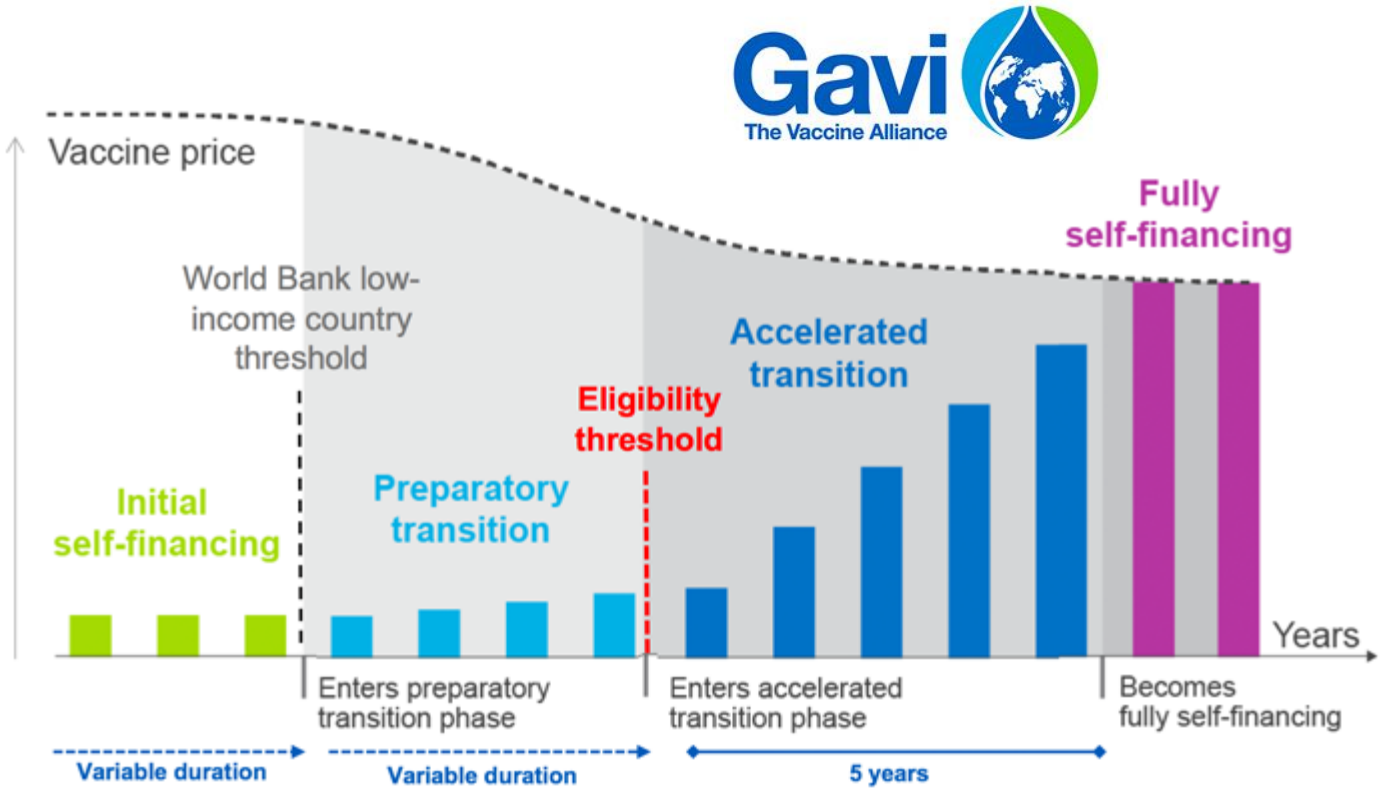
[b] Department of Maternal and Child Health, UNC Gillings School of Global Public Health, University of North Carolina, Chapel H
[c] Kid Risk, Inc., Columbus, OH, USA

- Limited literature (n=42), few from LMICs
- Many studies report effectiveness without costs
- **Increasing incremental costs required to reach higher coverage**



Country financing of immunizations



19 countries to transition out of Gavi by 2020

Countries need evidence to finance immunization

Reaching the hard to reach for vaccination

- Nearly every country has populations that are difficult to reach to vaccinate.
- Source of disease outbreaks
- Link for infectious diseases to spread between populations

Why are some people hard to reach?

How can we build trust & resilience?

Why are some people hard-to-reach?

Vaccine 37 (2019) 5525–5534

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Review

Defining hard-to-reach populations for vaccination

Sachiko Ozawa [a,b,*], Tatenda T. Yemeke [a], Daniel R. Evans [c], Sarah E. Pallas [d], Aaron S. Wallace [d], Bruce Y Lee [e,f,g]

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[b] Department of Maternal and Child Health, UNC Gillings School of Global Public Health, University of North Carolina, Chapel Hill, NC, USA
[c] Duke University School of Medicine, Durham, NC, USA
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[e] Public Health Computational and Operations Research (PHICOR), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
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[g] Global Obesity Prevention Center (GOPC), Johns Hopkins University, Baltimore, MD, USA

Hard-to-reach populations for vaccination (those that have never been vaccinated or have not consistently received all recommended doses of vaccines) **cannot be defined based on vaccination outcome.**

Rationale:

- Understanding what makes populations hard-to-reach can help estimate the size of target groups, identify strategies, and allocate adequate resources.

How are hard-to-reach populations defined?

Conducted a literature search

- 5 databases (PubMed, Embase, Web of Science, Scopus, Google Scholar)
- Vaccination/immunization AND “hard to reach” (distant, isolated, remote, inaccessible, disadvantaged, deprived, hidden, vulnerable, mobile, displaced, unsettled, high-risk populations)
- Published since 2000

Identified literature gaps

Comprehensive definitions of hard-to-reach populations not found	Population groups were classified as hard to reach rather than their mechanisms
Supply-side and demand-side barriers were not separated	Few tools or scales were identified to measure how hard individuals are to reach

Conceptual framework

Mechanisms that make people hard-to-reach are different from those that make people hard-to-vaccinate

Multiple mechanisms may be at play

S. Ozawa et al./Vaccine 37 (2019) 5525–5534

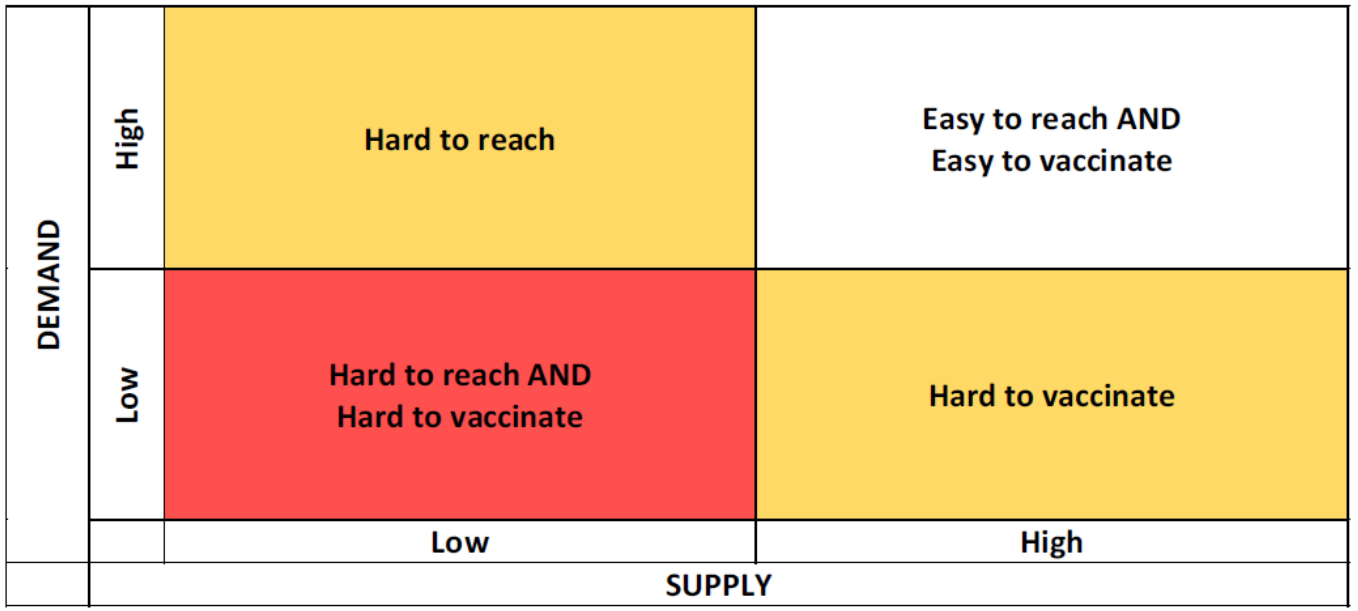


Fig. 1. Conceptual framework of hard-to-reach and hard-to-vaccinate populations.

Hard-to-reach vs. Hard-to-vaccinate

Hard-to-reach (Supply-side)	Hard-to-vaccinate (Demand-side)
Geography by distance	Distrust
Geography by terrain	Religious beliefs
Transient/nomadic movement	Lack of awareness
Healthcare provider discrimination	Poverty and low socioeconomic status
Lack of healthcare provider recommendations	Lack of time
Inadequate vaccination systems	Gender-based discrimination
War and conflict	
Home births / other home-bound mobility limitations	
Legal restrictions	

Gaps in the Hard-to-Reach Literature

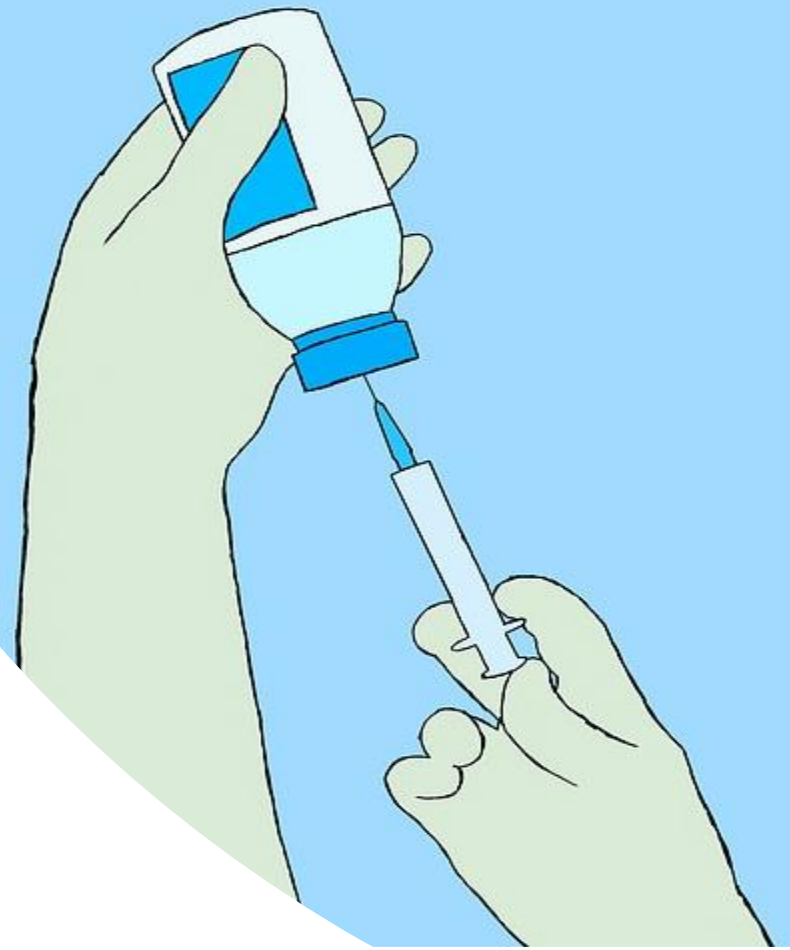
Geography by distance	Geography by terrain	Transient/nomadic movement	Healthcare provider discrimination
• Most studies did not specify a precise distance threshold • 2 studies used 5km from a health center as a threshold	• No studies mentioned how long populations were not accessible for vaccination • No studies described how much extra effort it may have taken to reach populations faced with terrain barriers • One study described hard-to-reach areas as having only one way to move, by boat or on foot	• No studies described the frequency of movement or duration per location to define when populations became hard to reach • Few studies noted lack of coordination of immunization information systems resulted in missed opportunities to complete doses when people relocated	• No studies were identified that measured the level of healthcare provider discrimination • No studies quantified the number of individuals who are hard to reach due to provider discrimination

Gaps in the Hard-to-Reach Literature

Lack of healthcare provider recommendations	Inadequate vaccination systems	War and conflict	Home births / other home-bound mobility limitations	Legal restrictions
• No studies measured or quantified the number of individuals who are hard to reach due to lack of healthcare provider recommendations	• Supply chain disruptions have been recorded but the number of people affected are poorly characterized • Measures or thresholds for the degree of political commitment for immunizations are not available	• no vaccination studies estimated the number of individuals who are hard to reach due to war and conflict	• No vaccination studies quantified individuals who are hard to reach due to mobility limitations	• No vaccination studies focused on individuals who are hard to reach due to legal restrictions

Key Takeaways

- Hard-to-reach populations should not be defined based on vaccination outcome
- Mechanisms that make populations hard-to-reach should be distinguished from those that make people hard-to-vaccinate
- A clear definition is needed to assess target population size and interventions
- The literature poorly defines them without criteria or thresholds for classification



Trust is critical to generate and maintain demand for vaccines in low and middle income countries.

Rationale:

- There is little documentation on how health system insufficiencies affect trust in vaccination and the process of re-building trust once it has been compromised.

How can we build trust & resilience?

The Author(s) *BMC Health Services Research* 2016, **16**(Suppl 7):639
DOI 10.1186/s12913-016-1867-7

BMC Health Services Research

RESEARCH Open Access

Exploring pathways for building trust in vaccination and strengthening health system resilience

Sachiko Ozawa[1*], Ligia Paina[2] and Mary Qiu[2]

Trust in health systems & vaccination

Conducted a literature search

- 4 databases (PubMed, Health & Psychosocial Instruments, PsycINFO, Embase)
- Trust AND Health System; Trust AND Vaccine/immunization; Trust AND Systems Dynamics; Vaccine AND hesitancy
- Also explored grey literature

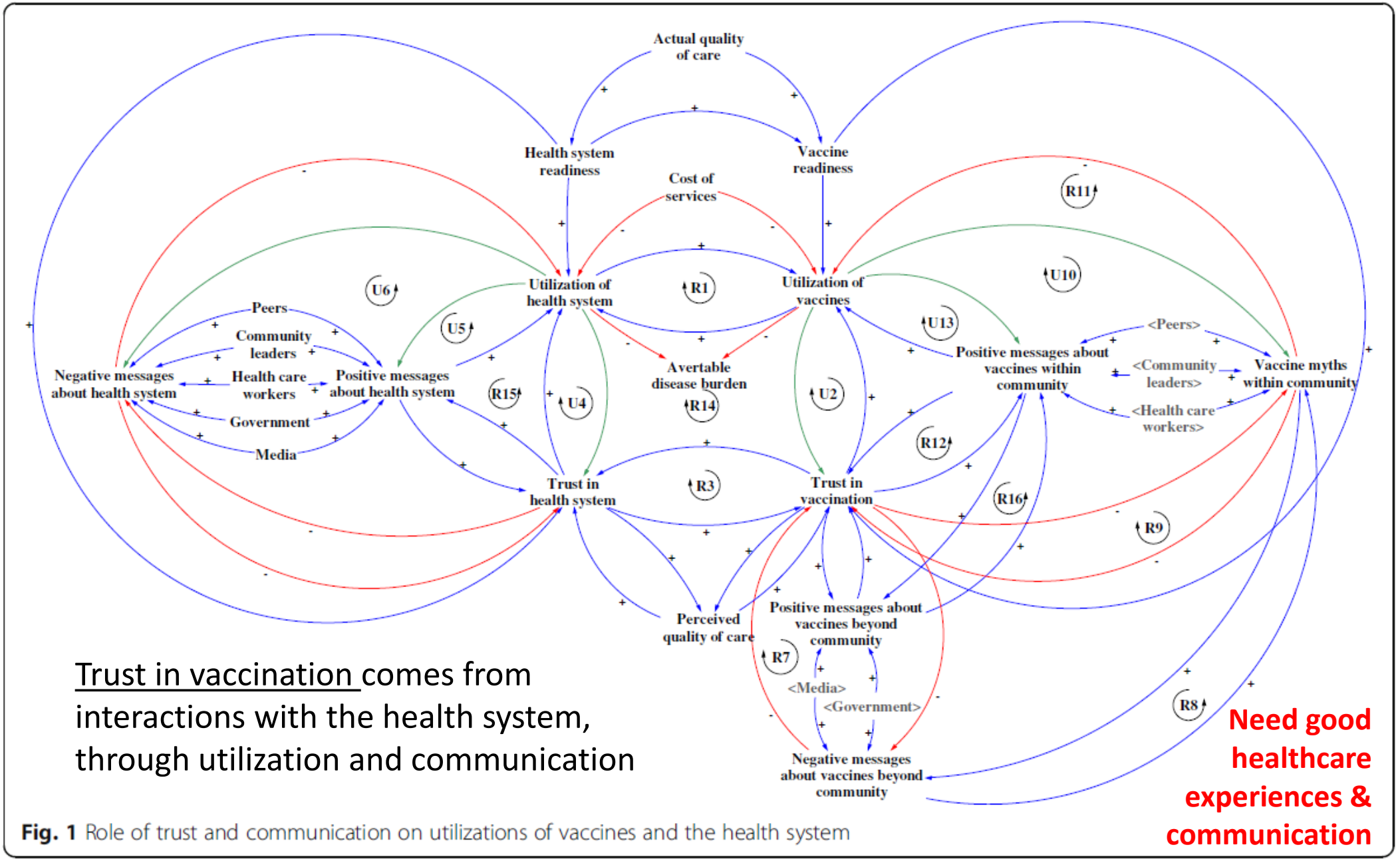
Identified literature gaps; Developed causal loop diagram

Trust in vaccination comes from interactions with the health system, through utilization and communication

Health system shocks not only influence trust in the health system, but spillover into trust in vaccination

Distrust reinforces feedback between vaccination and health systems and spills over in the broader health system

Positive social capital builds trust in vaccination

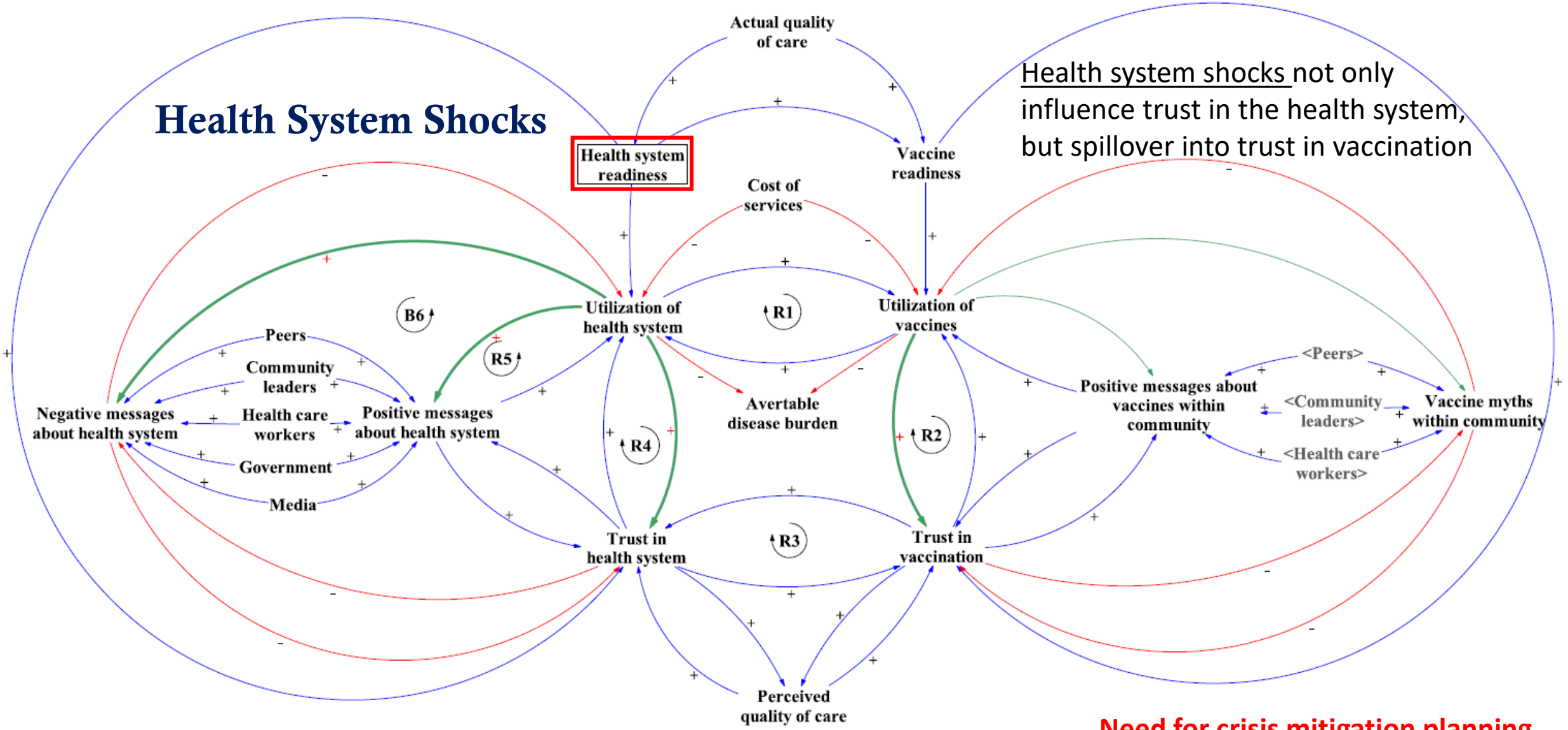


Trust in vaccination comes from interactions with the health system, through utilization and communication

Fig. 1 Role of trust and communication on utilizations of vaccines and the health system

Need good healthcare experiences & communication

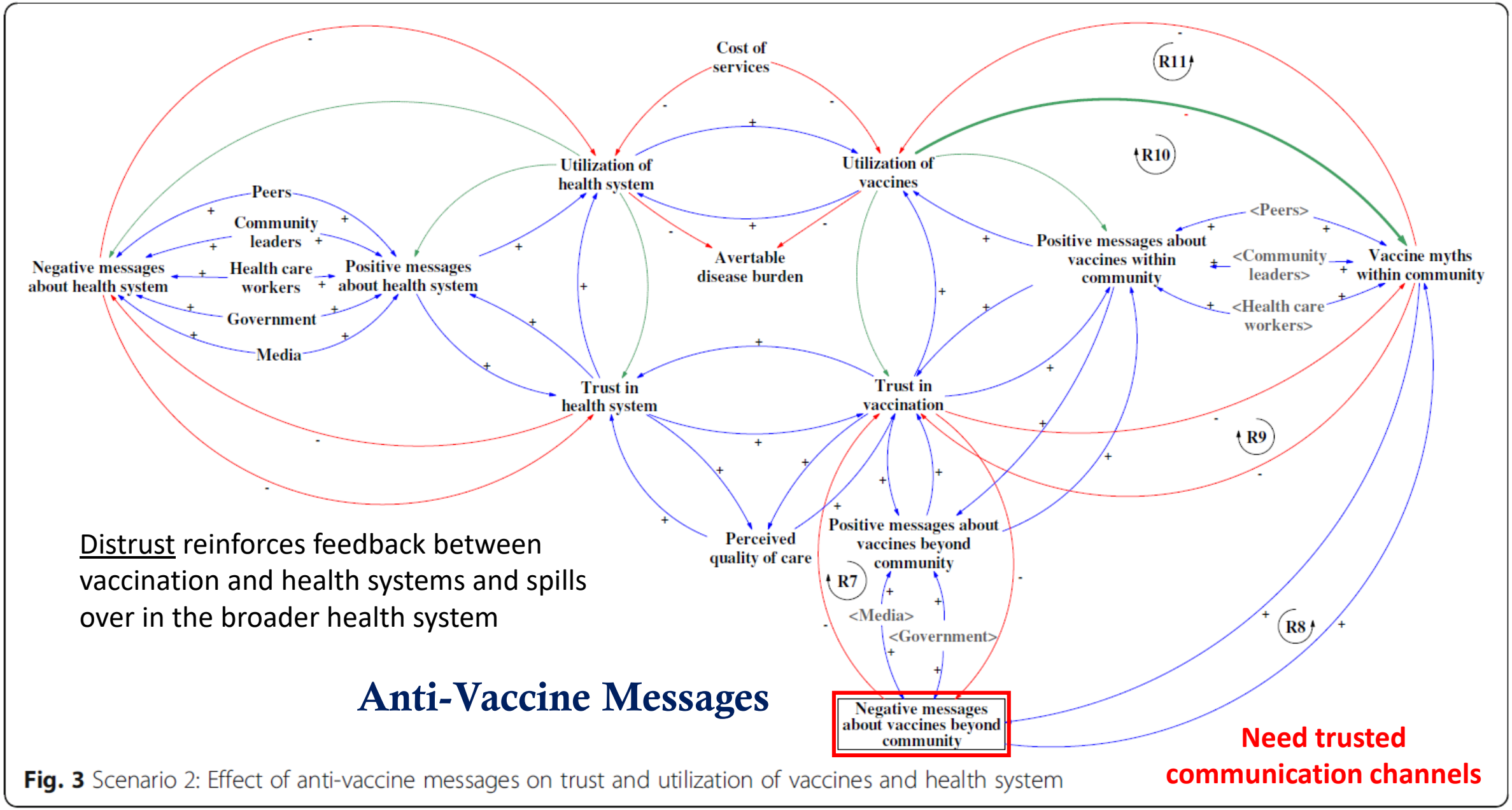
Health System Shocks



Health system shocks not only influence trust in the health system, but spillover into trust in vaccination

Need for crisis mitigation planning

Fig. 2 Scenario 1: Effect of poor health systems readiness on trust, communication and utilization

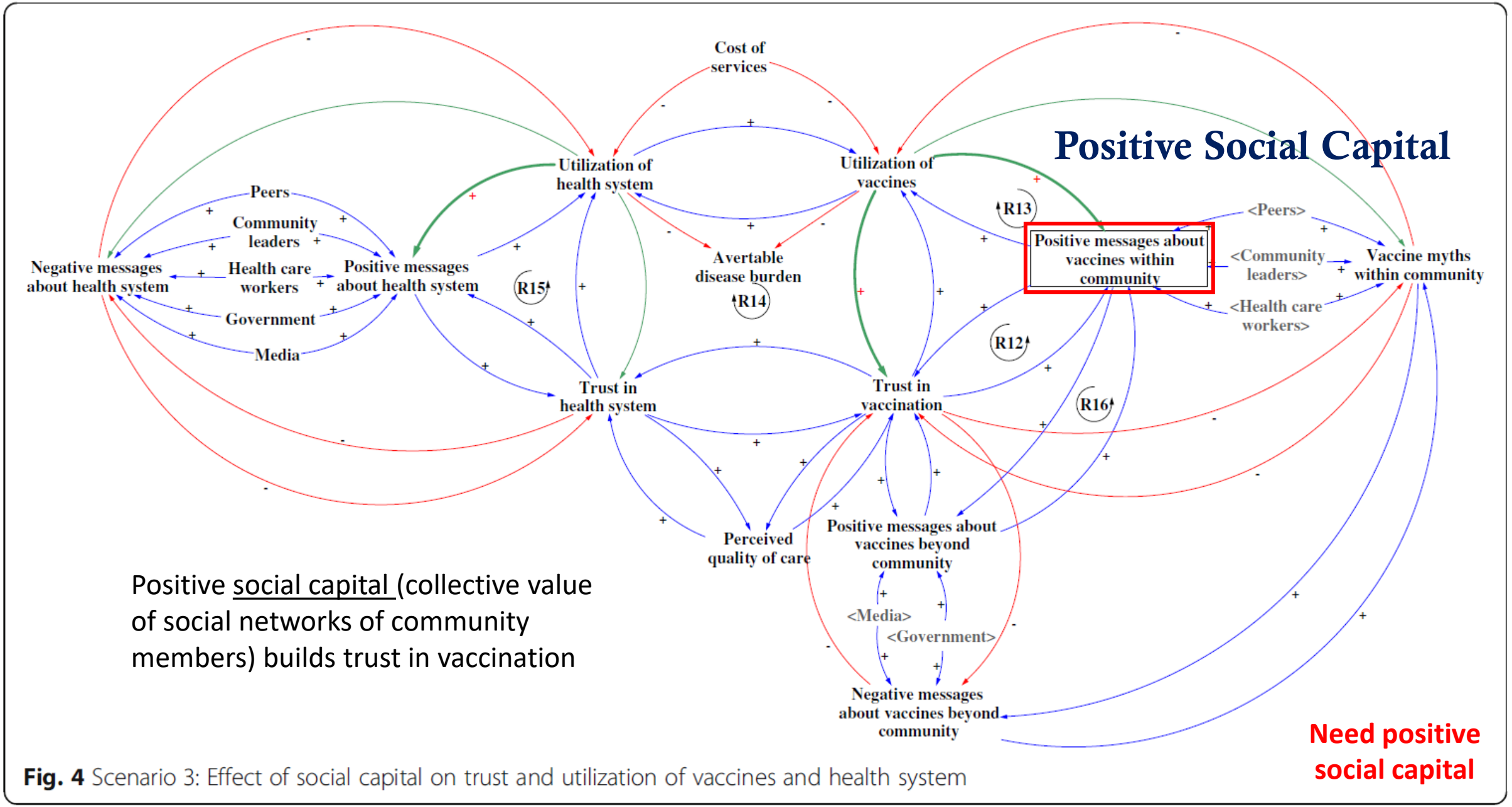


Distrust reinforces feedback between vaccination and health systems and spills over in the broader health system

Anti-Vaccine Messages

Fig. 3 Scenario 2: Effect of anti-vaccine messages on trust and utilization of vaccines and health system

Need trusted communication channels



Positive social capital (collective value of social networks of community members) builds trust in vaccination

Need positive social capital

Fig. 4 Scenario 3: Effect of social capital on trust and utilization of vaccines and health system

Measuring trust in vaccination

Social Science & Medicine 91 (2013) 10–14

Contents lists available at SciVerse ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Review

How do you measure trust in the health system? A systematic review of the literature

Sachiko Ozawa*, Pooja Sripad

Department of International Health, Johns Hopkins Bloomberg School of Public Health, 615 N. Wolfe St., Baltimore, MD 21205, United States

Vaccine 33 (2015) 4165–4175

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Measuring vaccine hesitancy: The development of a survey tool

Heidi J. Larson[a,*,1], Caitlin Jarrett[a], William S. Schulz[a], Mohuya Chaudhuri[b,1], Yuqing Zhou[c,1], Eve Dube[d,1], Melanie Schuster[e], Noni E. MacDonald[f,1], Rose Wilson[a], the SAGE Working Group on Vaccine Hesitancy[2]

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[b] *Independent Journalist and Documentary Filmmaker, India*
[c] *Chinese Center for Disease Control, China*
[d] *Institut National de Santé Publique du Québec, Canada*
[e] *World Health Organization, Switzerland*
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Vaccine 37 (2019) 6008–6015

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Trust in vaccines and medicines in Uganda

Daniel R. Evans[a], Tatenda T. Yemeke[b], Elizabeth E. Kiracho[c], Aloysius Mutebi[c], Rebecca R. Apolot[c], Anthony Ssebagereka[c], Sachiko Ozawa[b,d,*]

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[d] *Department of Maternal and Child Health, UNC Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA*

- Overall trust in vaccines and medicines was high compared to traditional medicines
- Trust was associated with previous experiences and source of health information
- Respondents were most concerned about ease of access to and safety of vaccines & medicines

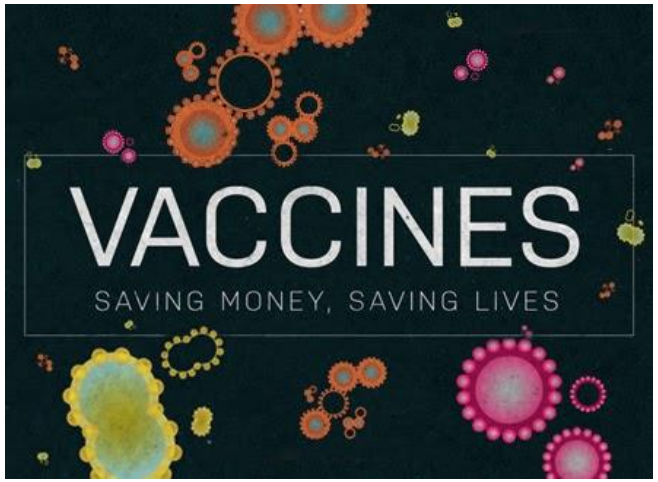
Summary

1. Please publish costs alongside effectiveness of vaccination interventions – Economic evidence matters!

2. Let's use a consistent definition of hard-to-reach populations based on reasons why they are hard-to-reach

3. Building trust & resilience in vaccination requires good healthcare experiences, trusted communication channels, positive social capital, and crisis mitigation planning.

Thank You!



Ozawa et al. Vaccines Work Infographic (2012).
https://www.trendhunter.com/trends/vaccines-work-infographic

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Global Health Economics for Pharmacy

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