Redesigning health systems to promote maternal and newborn survival

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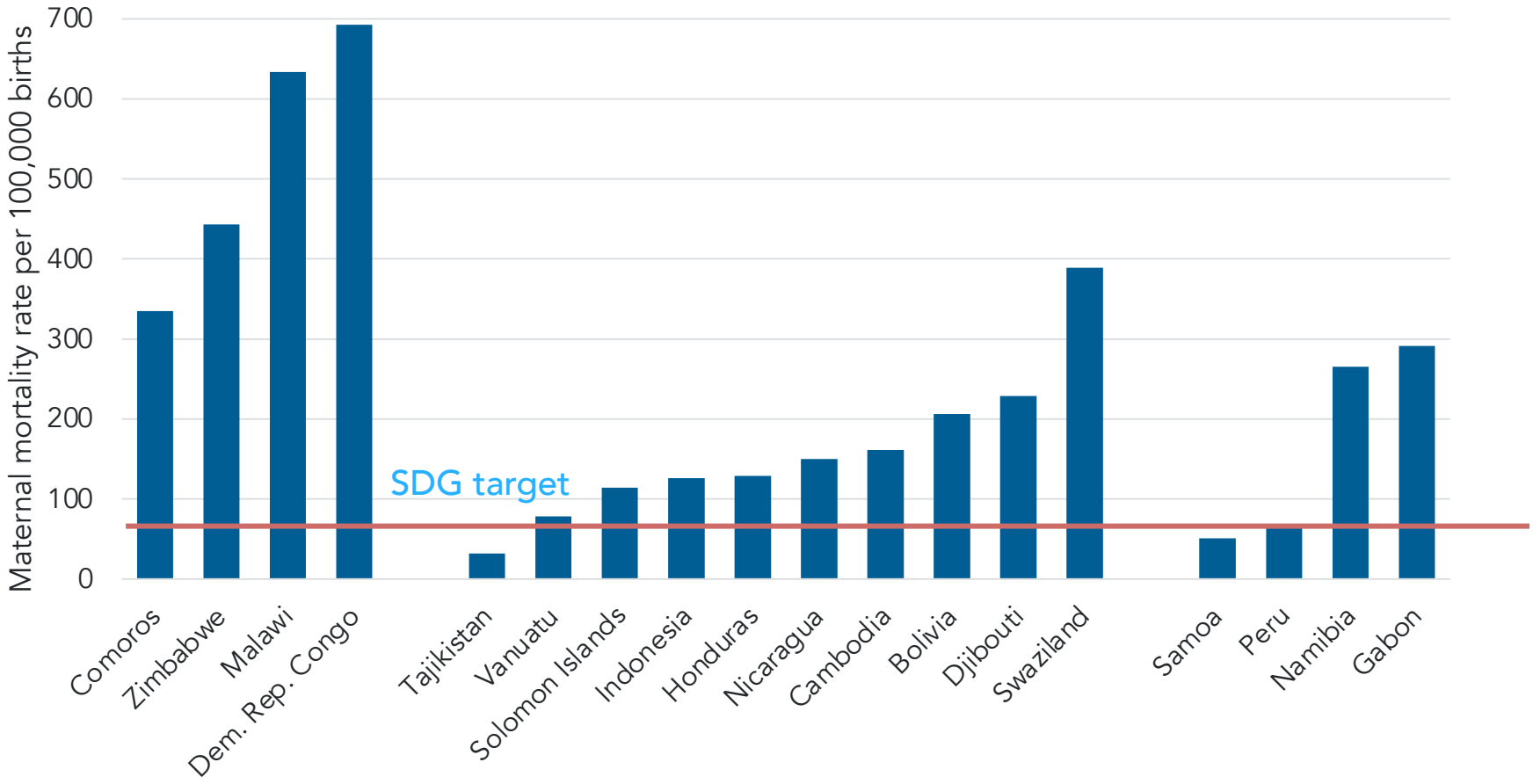
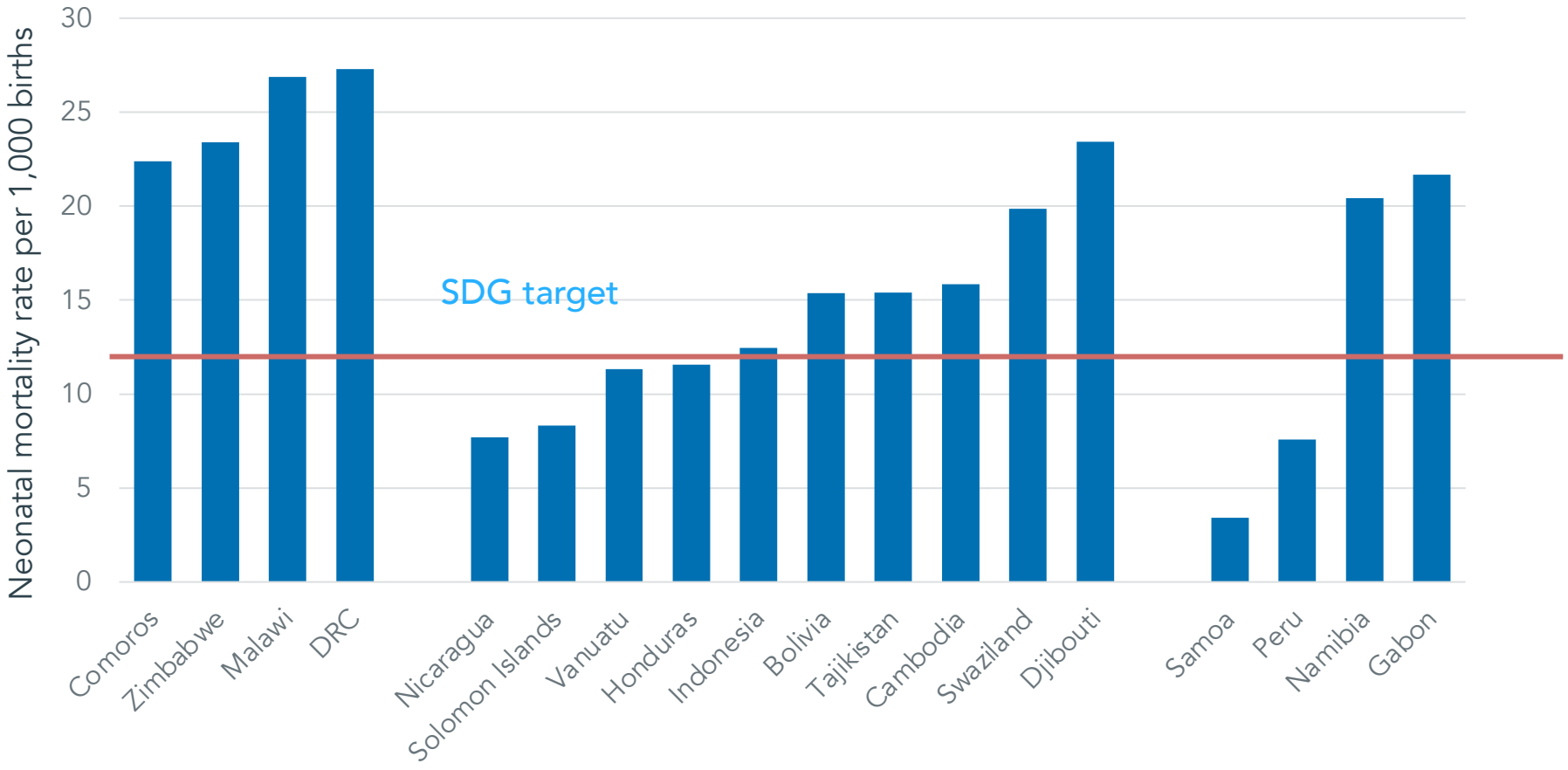
90% facility delivery ≠ maternal survival



Maternal mortality

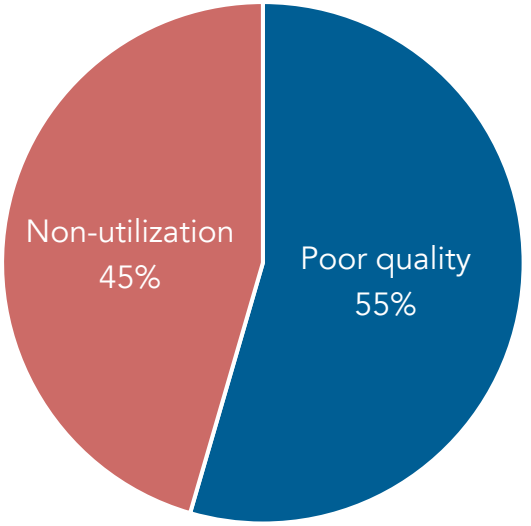
or newborn survival



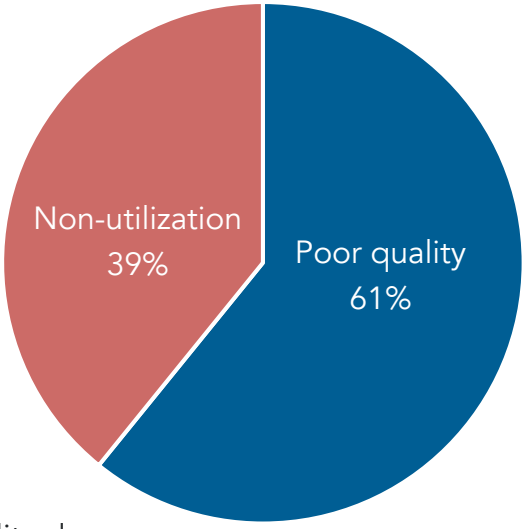
Newborn mortality

Poor quality is major factor in deaths amenable to health care

103,908 amenable
maternal deaths

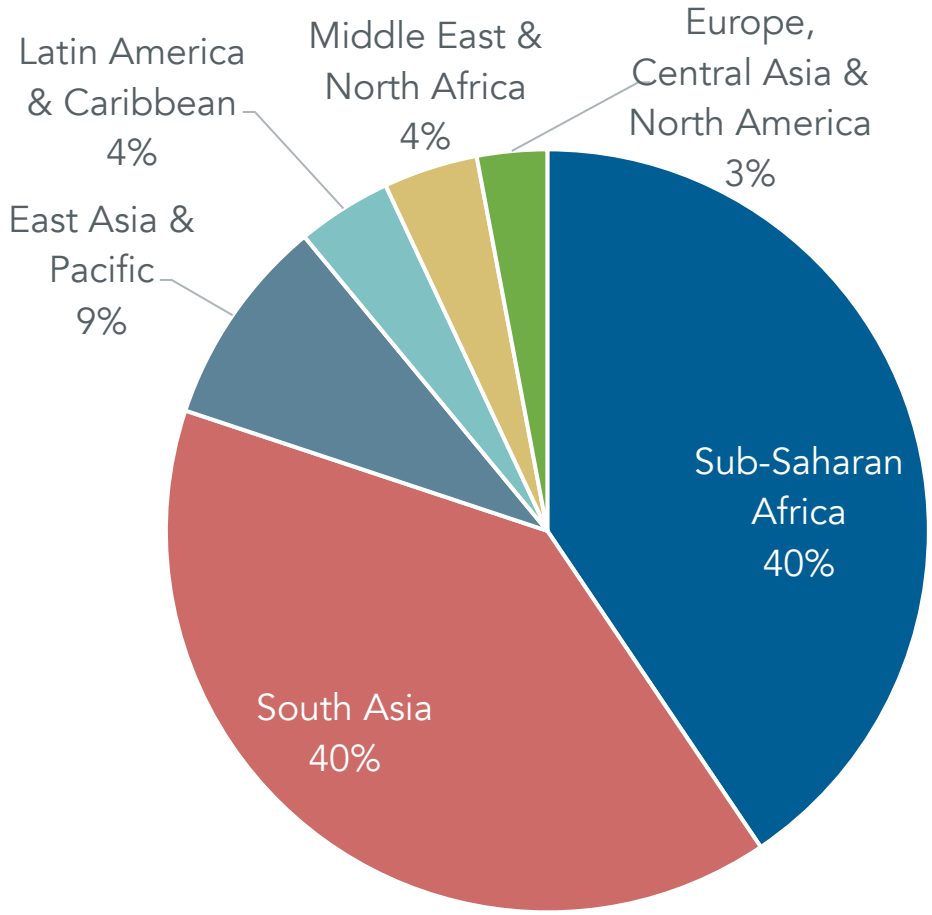


1,080,817 amenable
newborn deaths



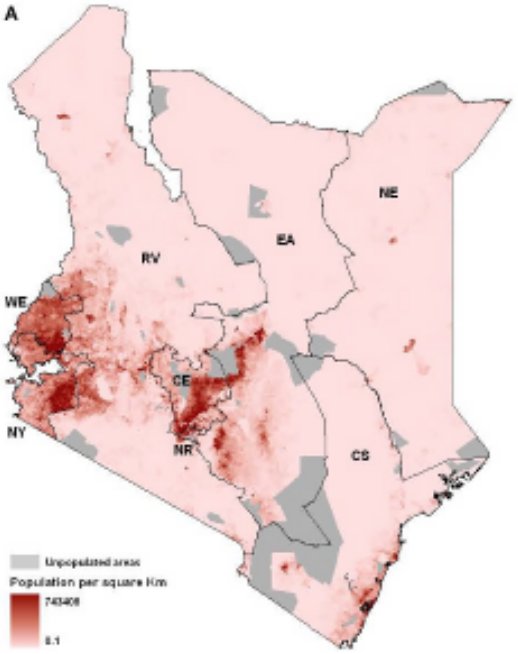
Kruk ME, Gage AD, Joseph NT, Danaei G, García-Saisó S, Salomon JA. Mortality due to low-quality health systems in the universal health coverage era: a systematic analysis of amenable deaths in 137 countries. The Lancet. 2018 Sep 5.

Two regions contribute majority of global newborn deaths

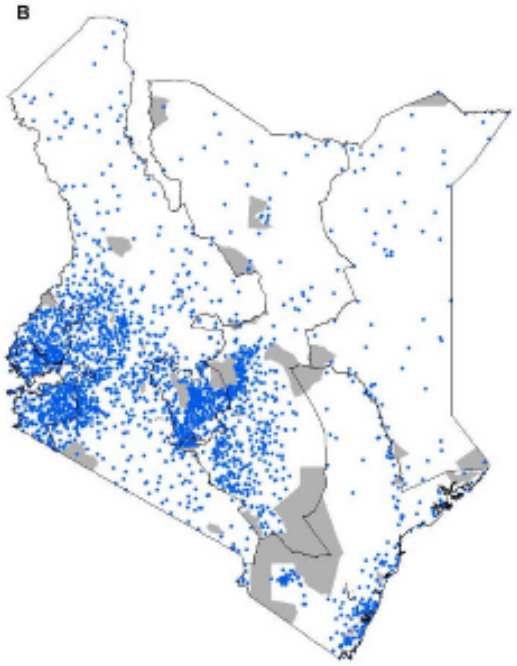


Global Burden of Disease Study 2017. Global Burden of Disease Study 2017 (GBD 2017) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2017.

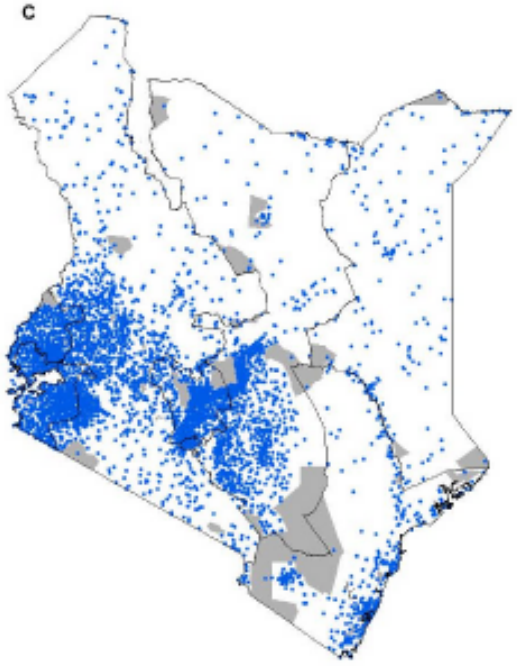
But not because of shortage of clinics: Kenya built 1800 facilities in 5 years



Population density 2007



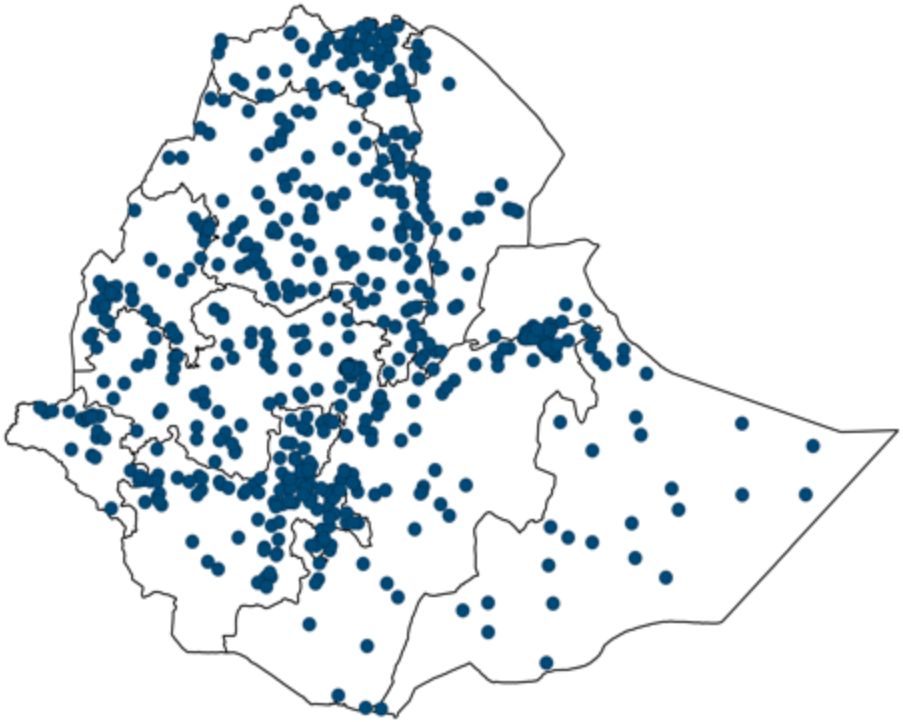
Health facilities 2003



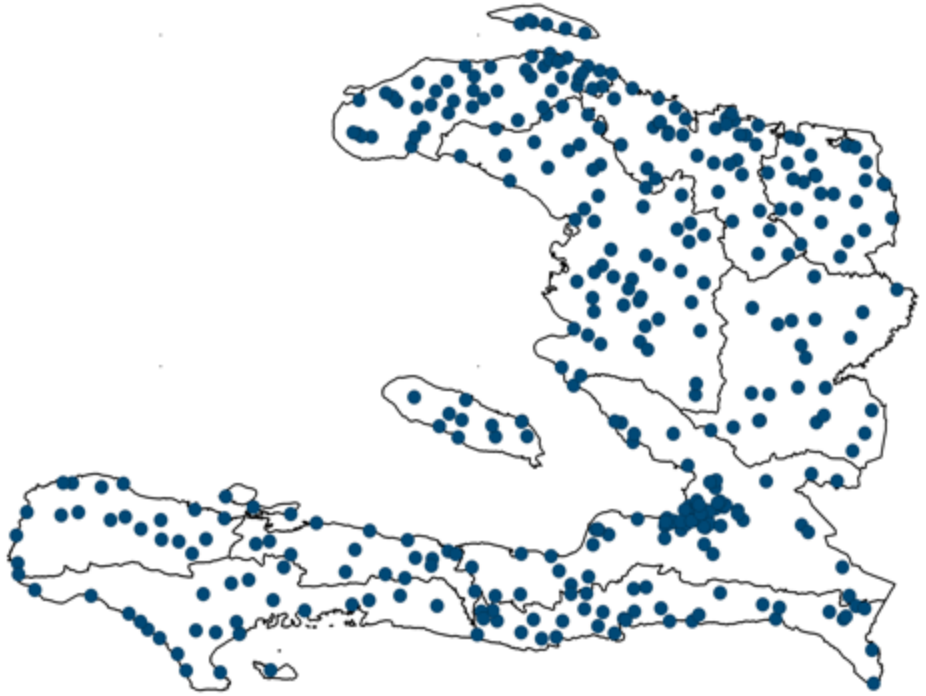
Health facilities 2008

Noor A, Alegana V, Gething P, Snow R. A spatial national health facility database for public health sector planning in Kenya in 2008. International Journal of Health Geographics. 2009;8(1):13.

Extensive facility networks in even the poorest countries

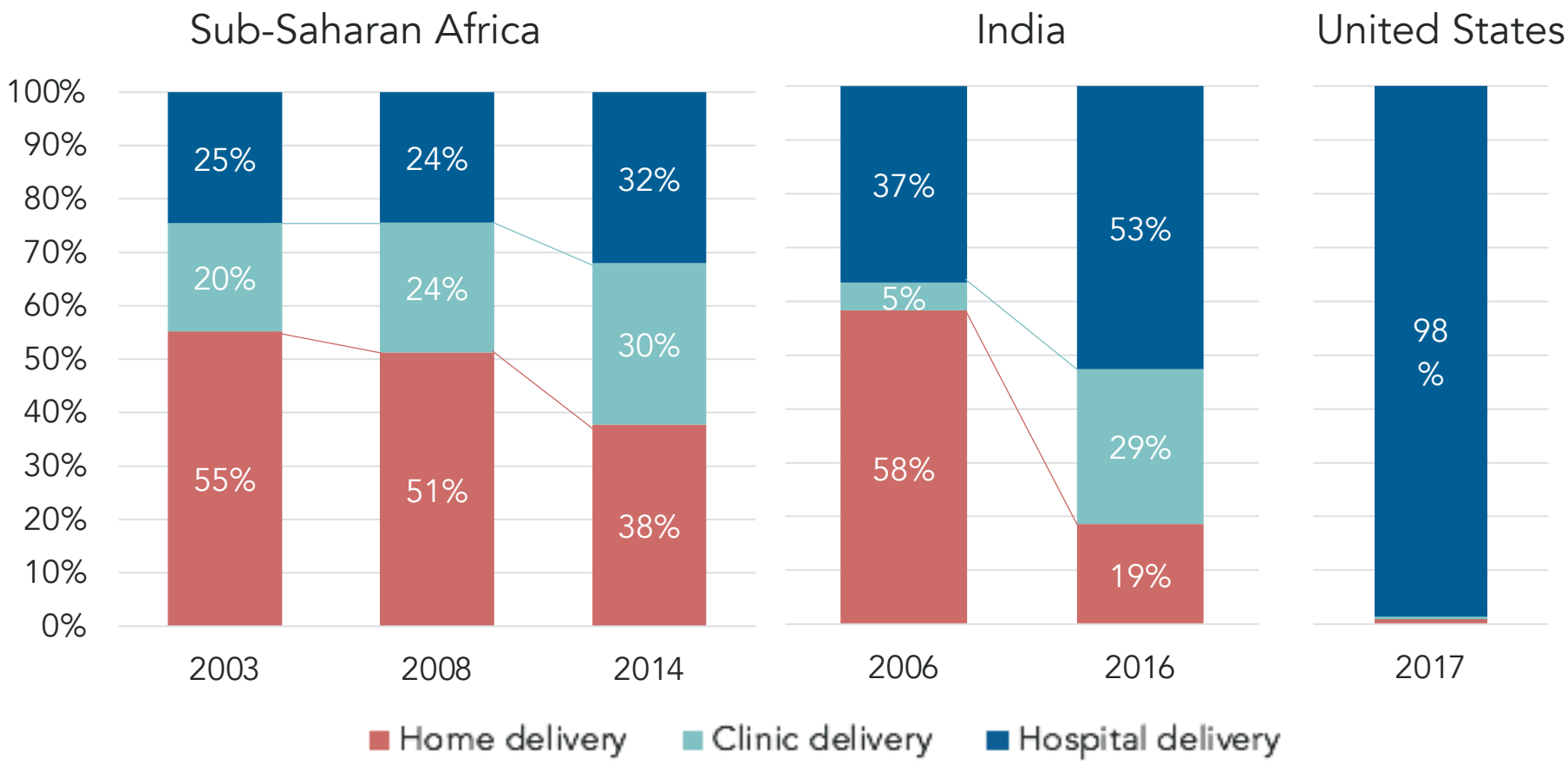


Ethiopia

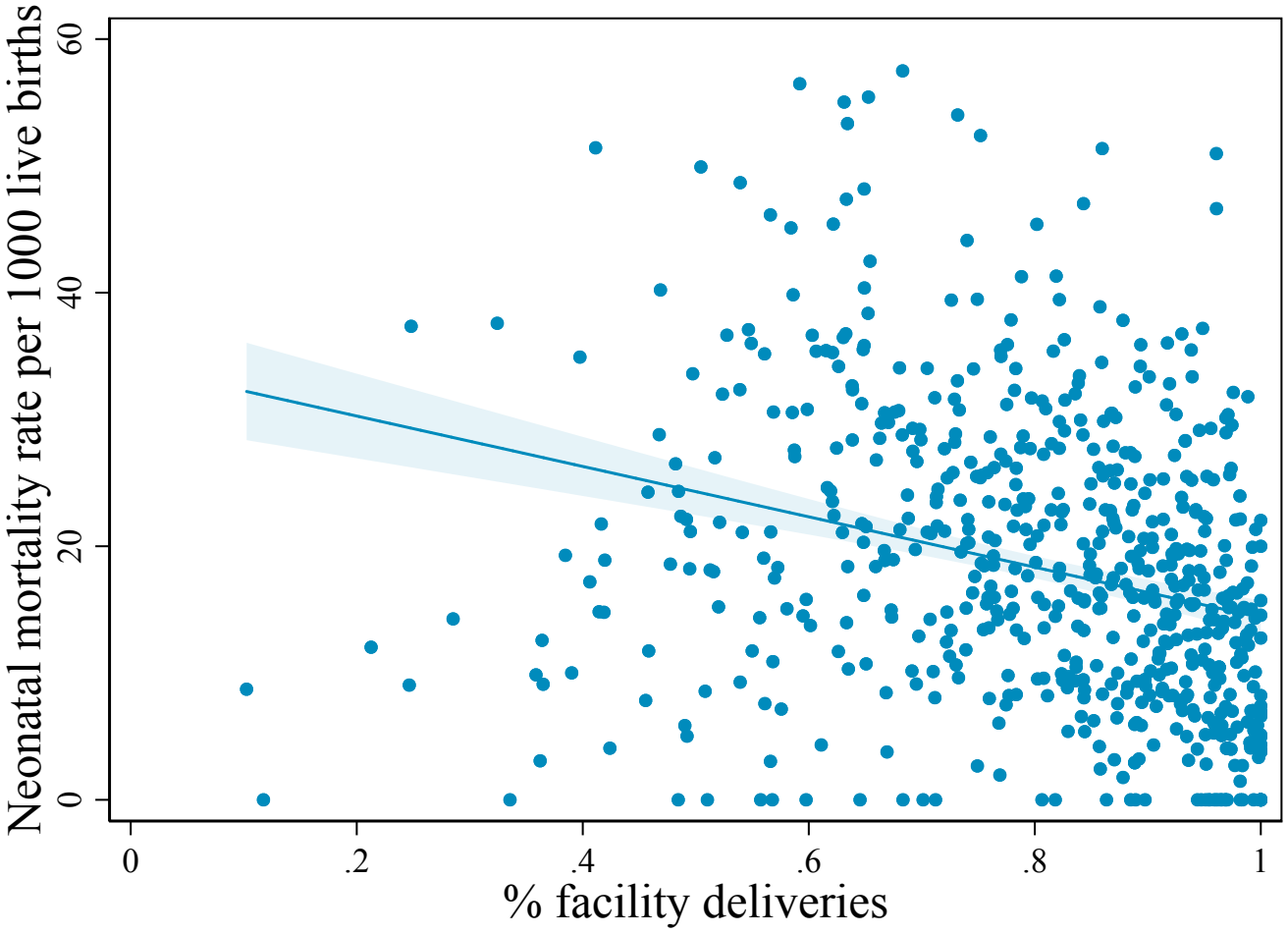


Haiti

1 in 3 babies born in primary care clinics in highest mortality regions

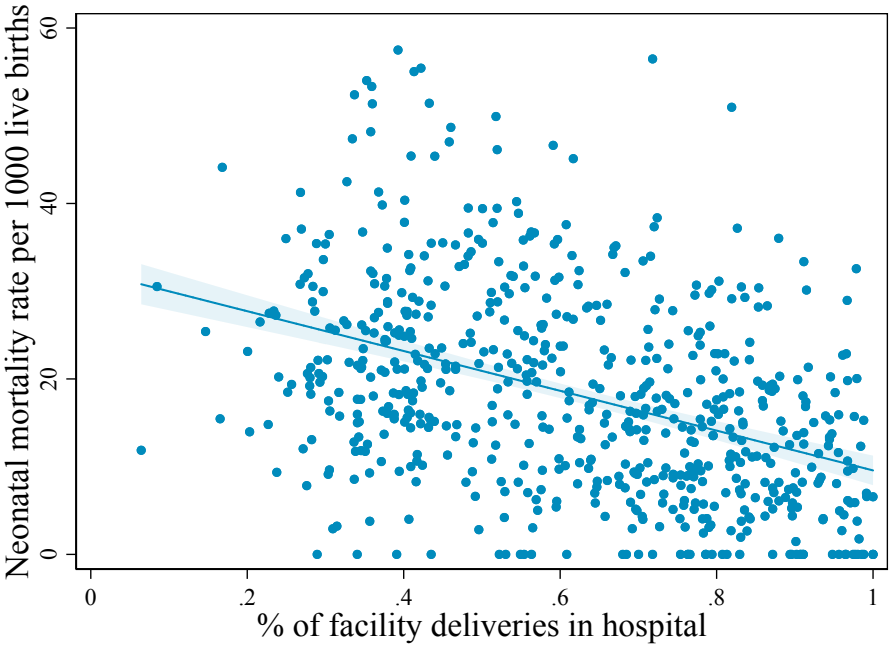


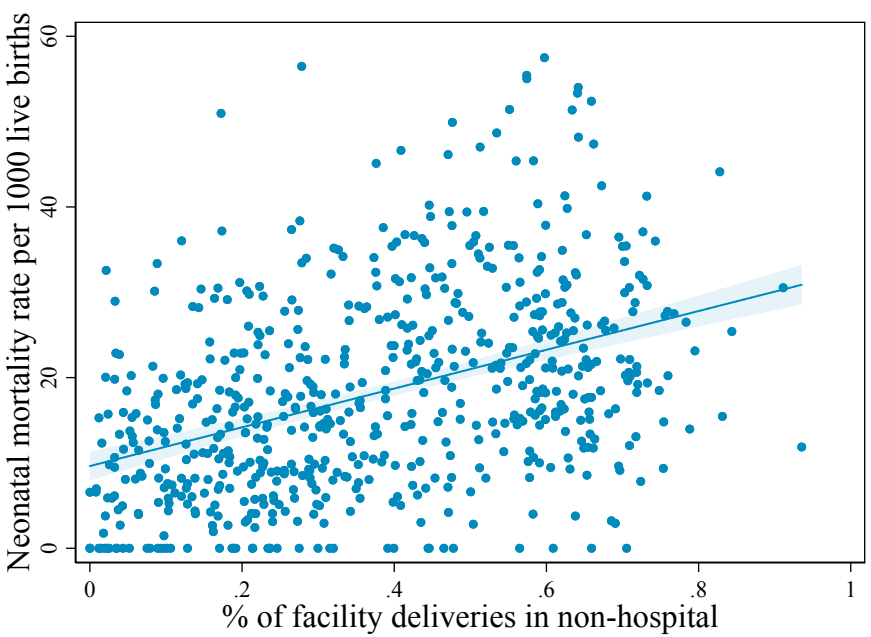
On aggregate, facility delivery in India associated with lower newborn mortality



2015-2016 India NFHS data for 640 districts

But system models matters



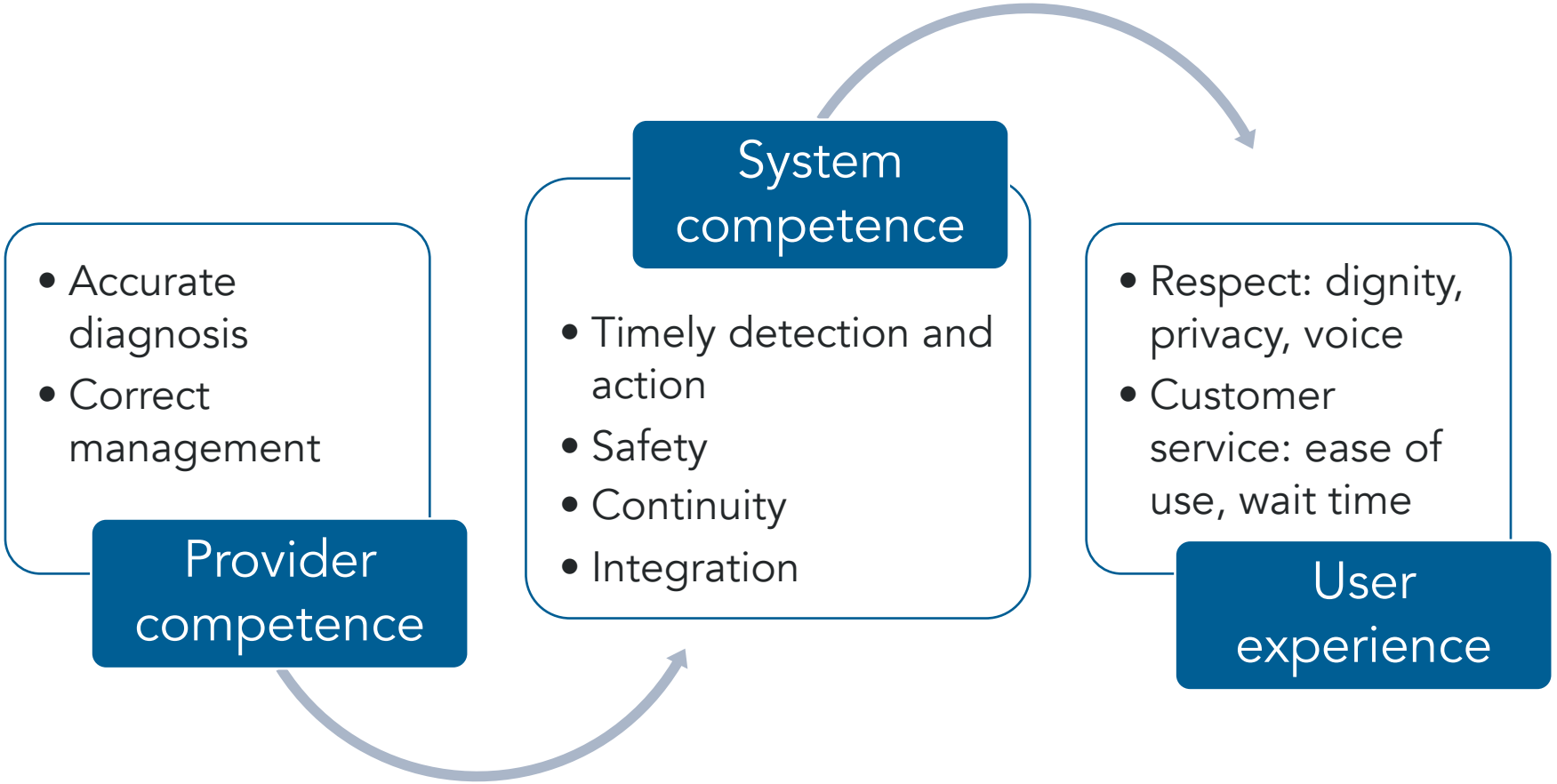


2015-2016 India NFHS data for 640 districts

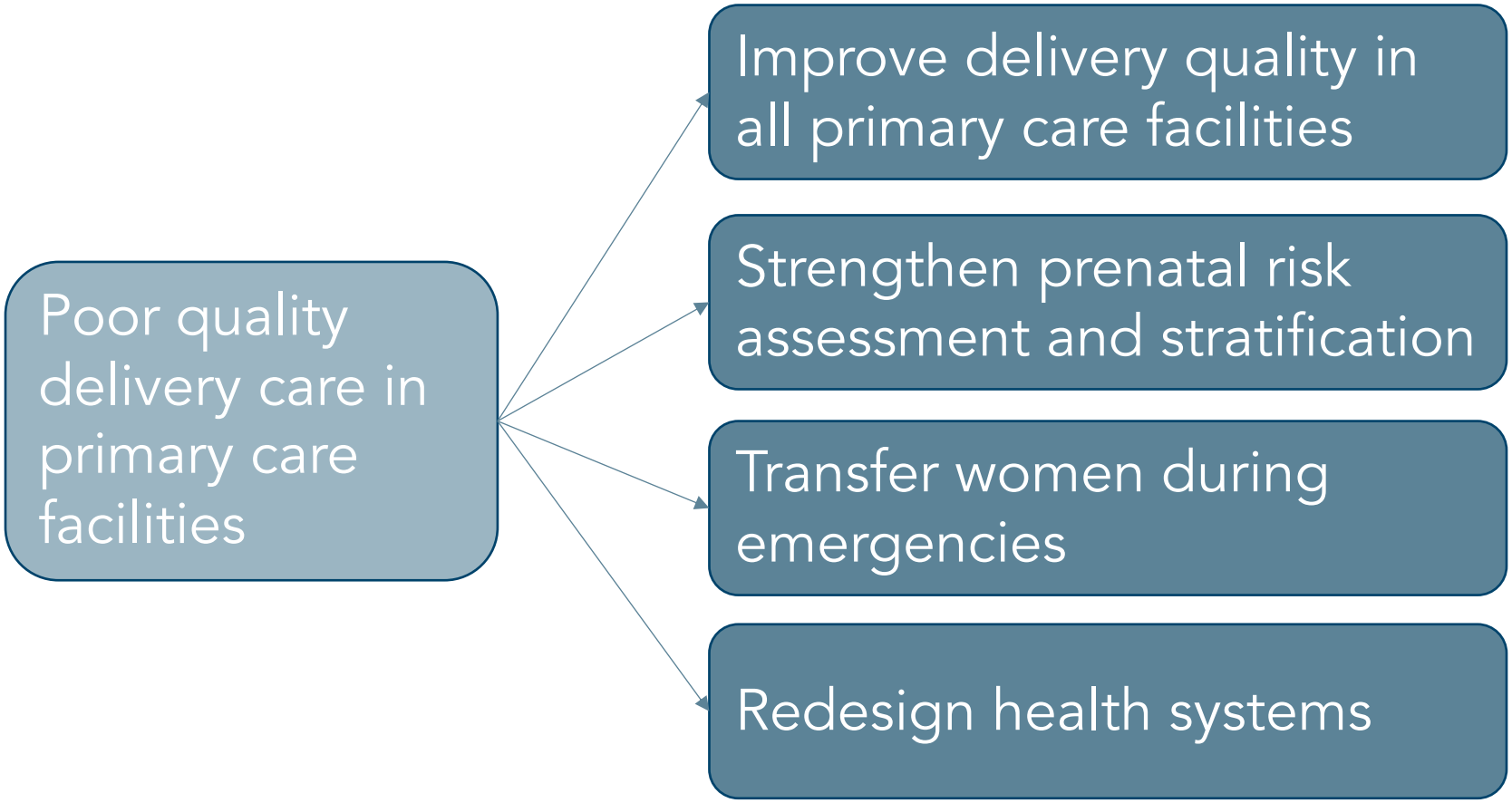
Irrespective of volume, hospitals have much better basic maternal care quality

Kruk, M.E., Leslie, H.H., Verguet, S., Mbaruku, G.M., Adanu, R.M. and Langer, A., 2016. Quality of basic maternal care functions in health facilities of five African countries: an analysis of national health system surveys. *The Lancet Global Health*, *4*(11), pp.e845-e855.

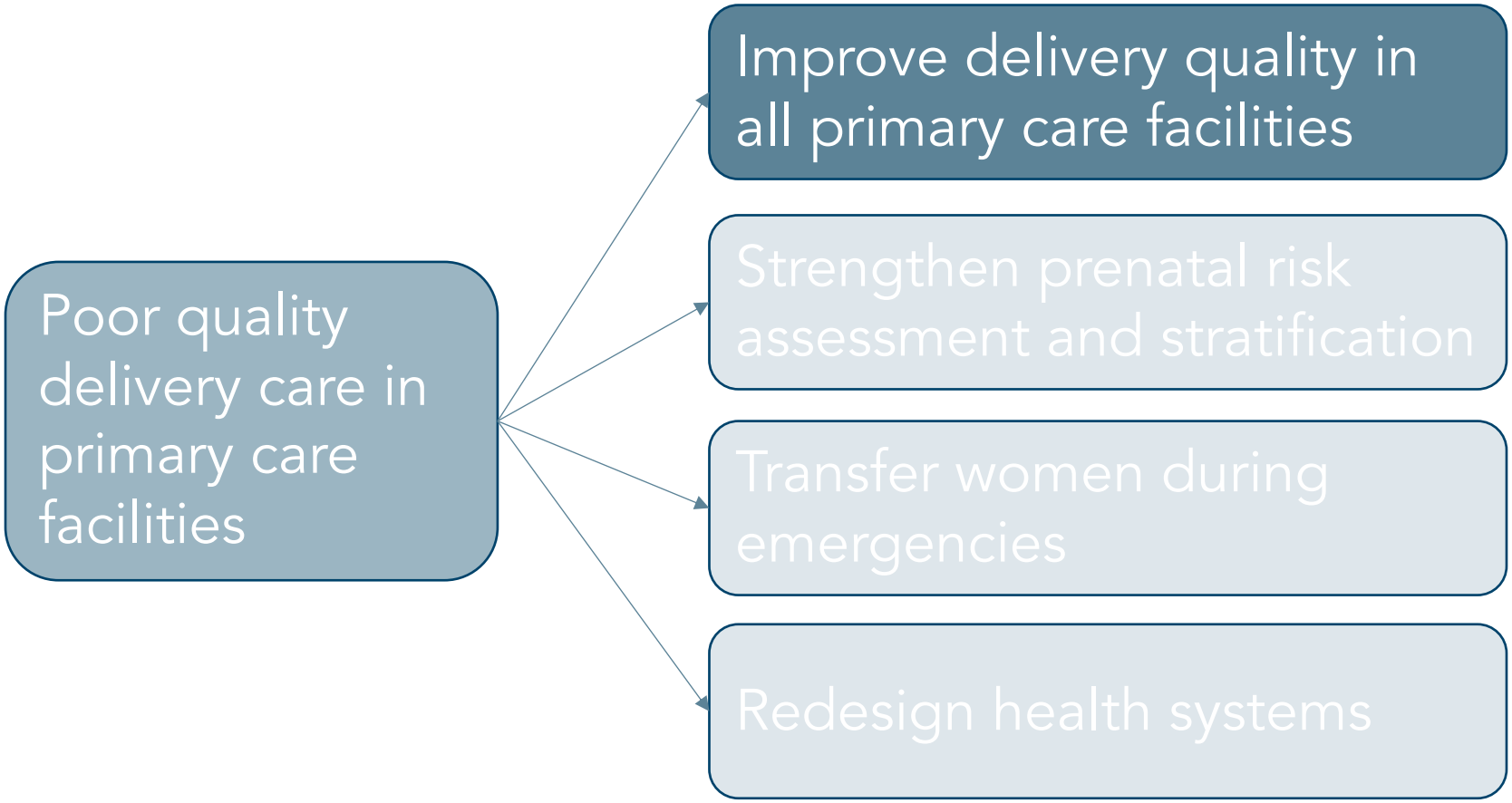
What do we mean by quality?



Solutions


Poor quality delivery care in primary care facilities
Improve delivery quality in all primary care facilities
Strengthen prenatal risk assessment and stratification
Transfer women during emergencies
Redesign health systems

Solutions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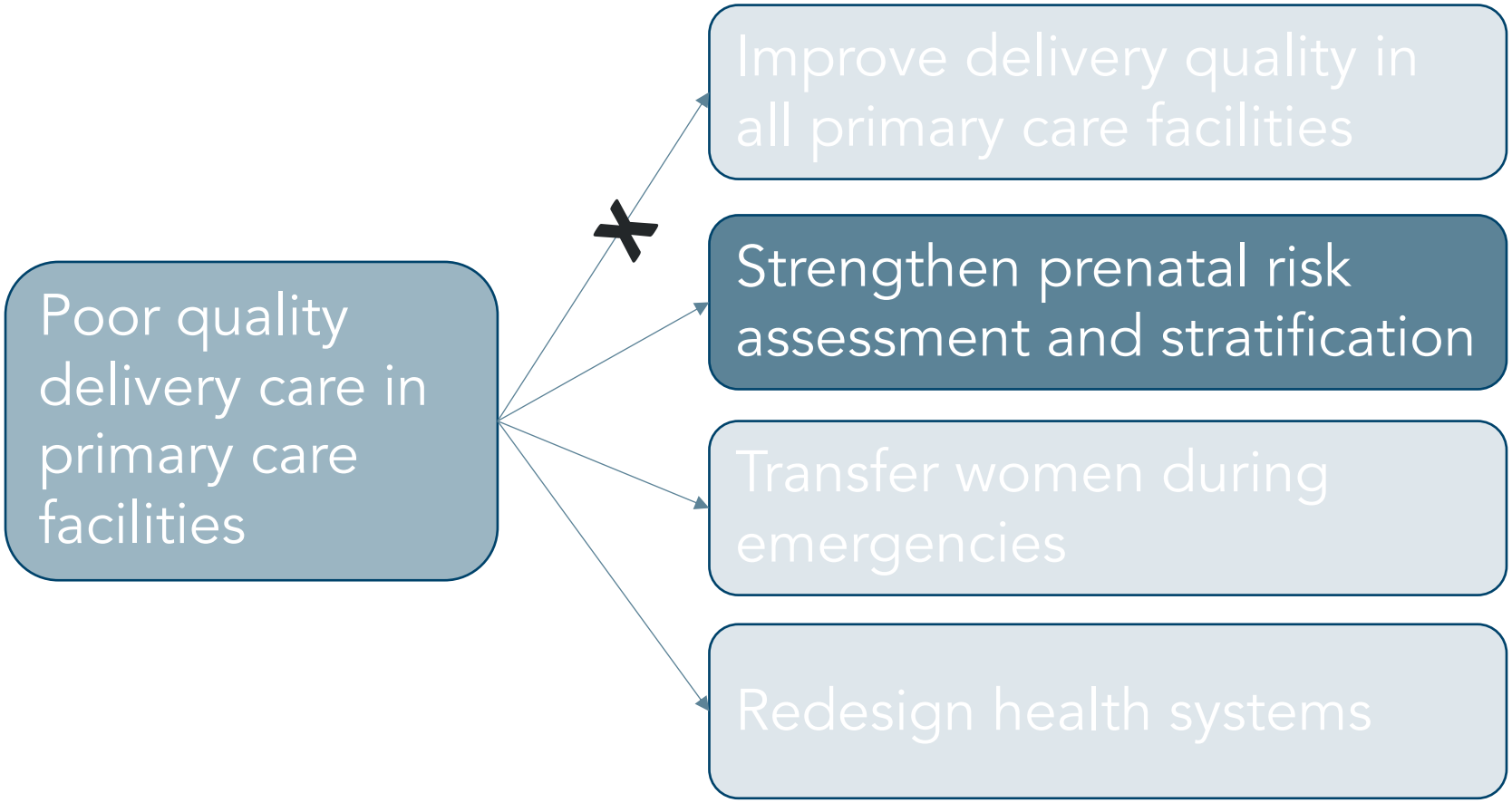
Redesign health systems

Better Birth Study in India tried improving care in primary care clinics but found no difference in survival

"There was no significant difference in the composite primary outcome or in secondary maternal or perinatal adverse outcomes"

Semrau, K. E., Hirschhorn, L. R., Marx Delaney, M., Singh, V. P., Saurastri, R., Sharma, N., ... & Kodkany, B. S. (2017). Outcomes of a Coaching-Based WHO Safe Childbirth Checklist Program in India. *New England Journal of Medicine*, *377*(24), 2313-2324.

Solutions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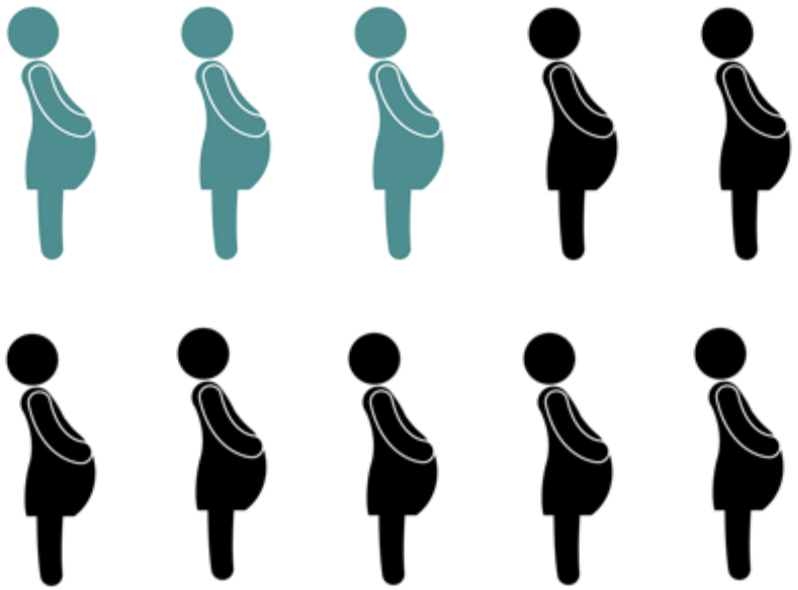
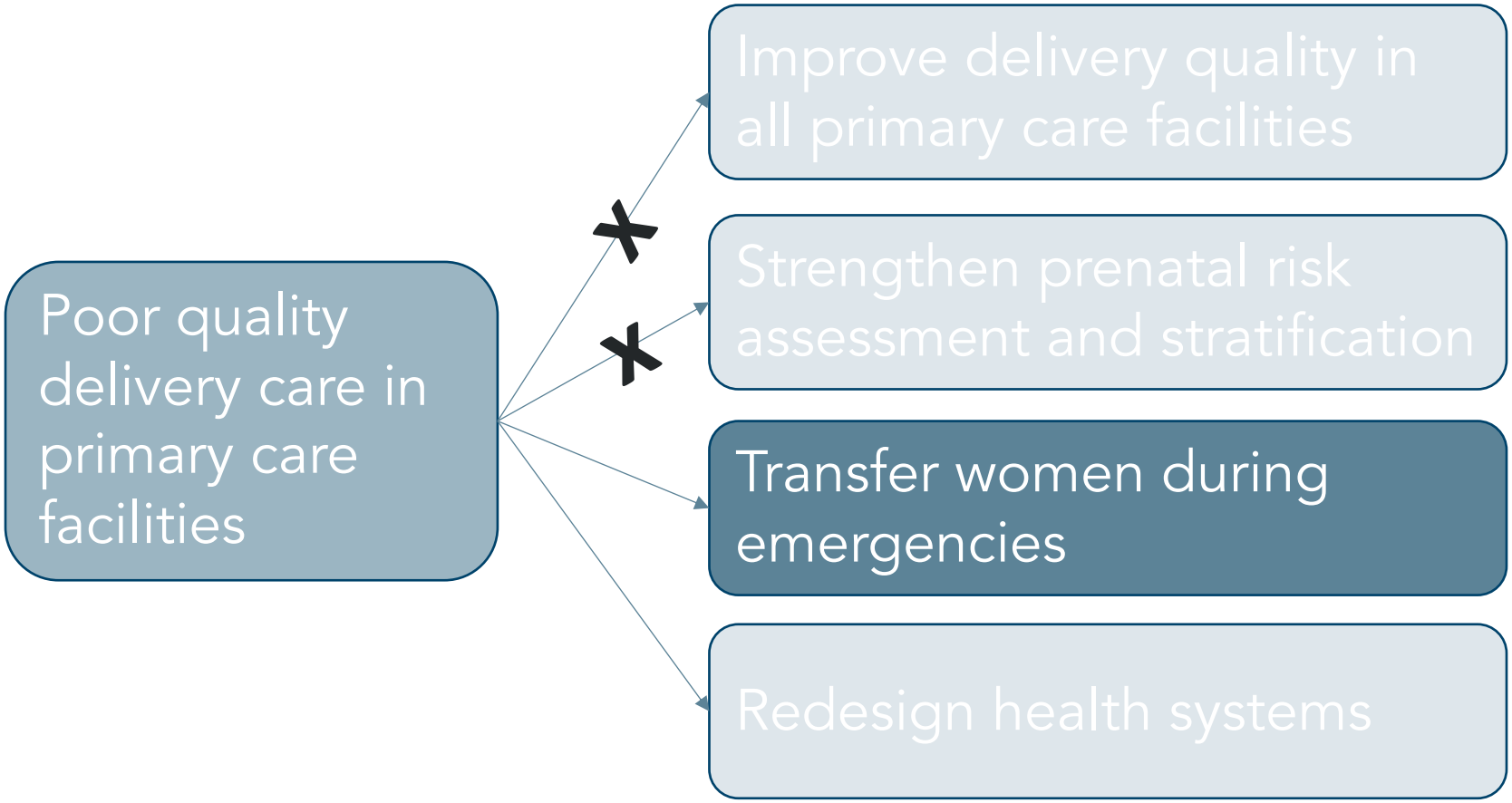
In US, 38% of women are judged to be low risk; of these 29% developed unexpected complications



Danilack VA, Nunes AP, Phipps MG. Unexpected complications of low-risk pregnancies in the United States. Am J Obstet Gynecol. 2015;212(6):809 e1–6

Solutions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Transfer women during emergencies
Redesign health systems

Referral is neither feasible nor clinically recommended

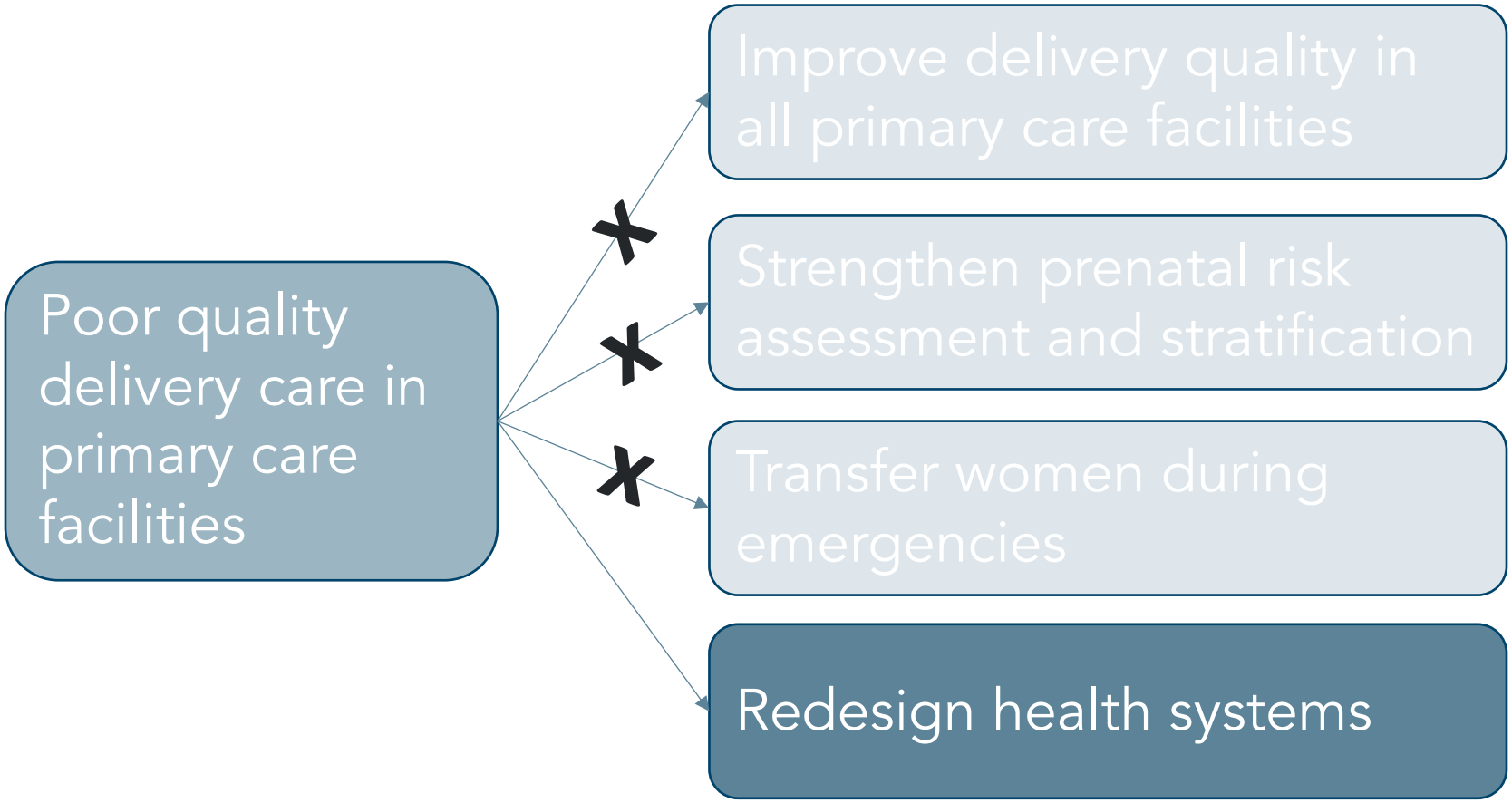
Across 5,627 primary care facilities providing deliveries in 10 LMICs…

14% have a functional ambulance with fuel

48% have a facility phone or short-wave radio available at all times

SPA data from Bangladesh, DRC, Haiti, Malawi, Nambia, Nepal, Rwanda, Senegal, Tanzania, Uganda

Solutions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Transfer women during emergencies
Redesign health systems

Redesign health systems to maximize survival

Conditions that demand advanced clinical expertise

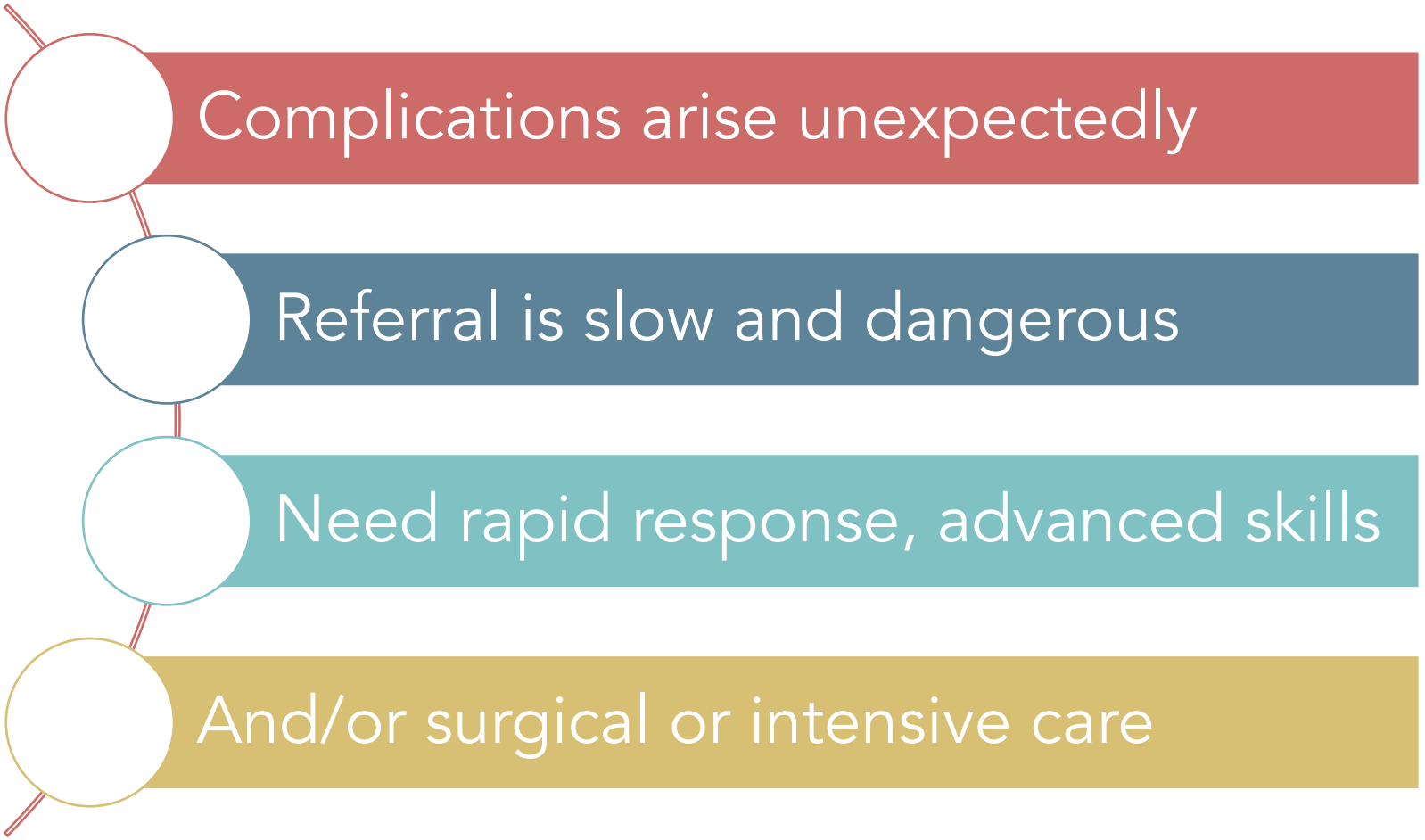
Tertiary

Secondary

Primary

Low-acuity conditions requiring coordinated, continuous care

System redesign is needed because



Essential to connect services and tackle quality along continuum of care

Antenatal care

Delivery care

Postnatal care of women and newborn

Well-child care

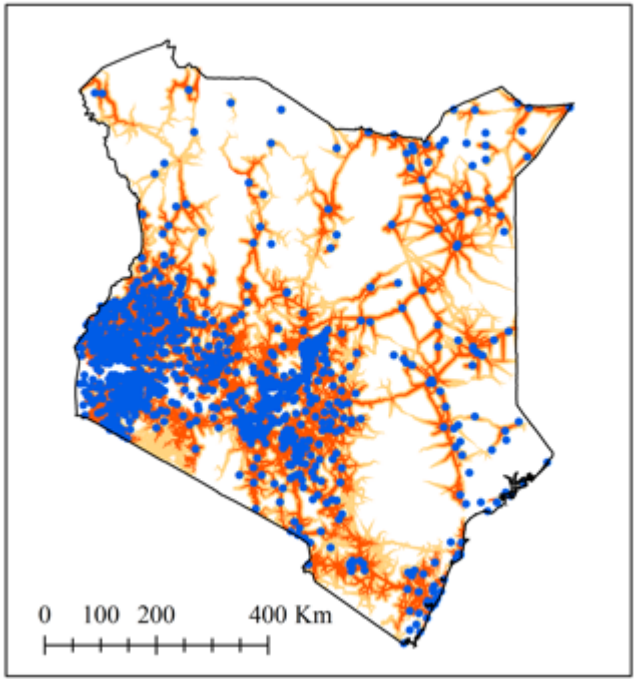
Health centers and clinics

Hospitals or surgical facilities

Health centers and health clinics

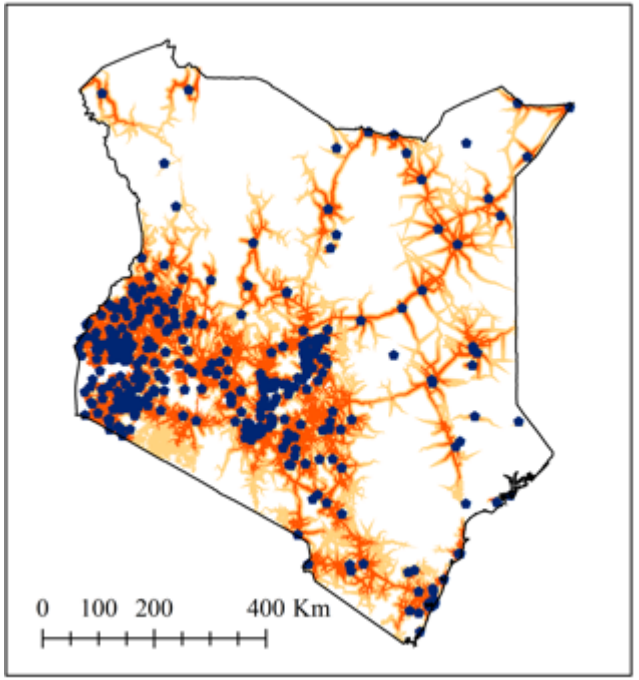
Is system redesign geographically feasible? Kenya

Current scenario: all delivery facilities



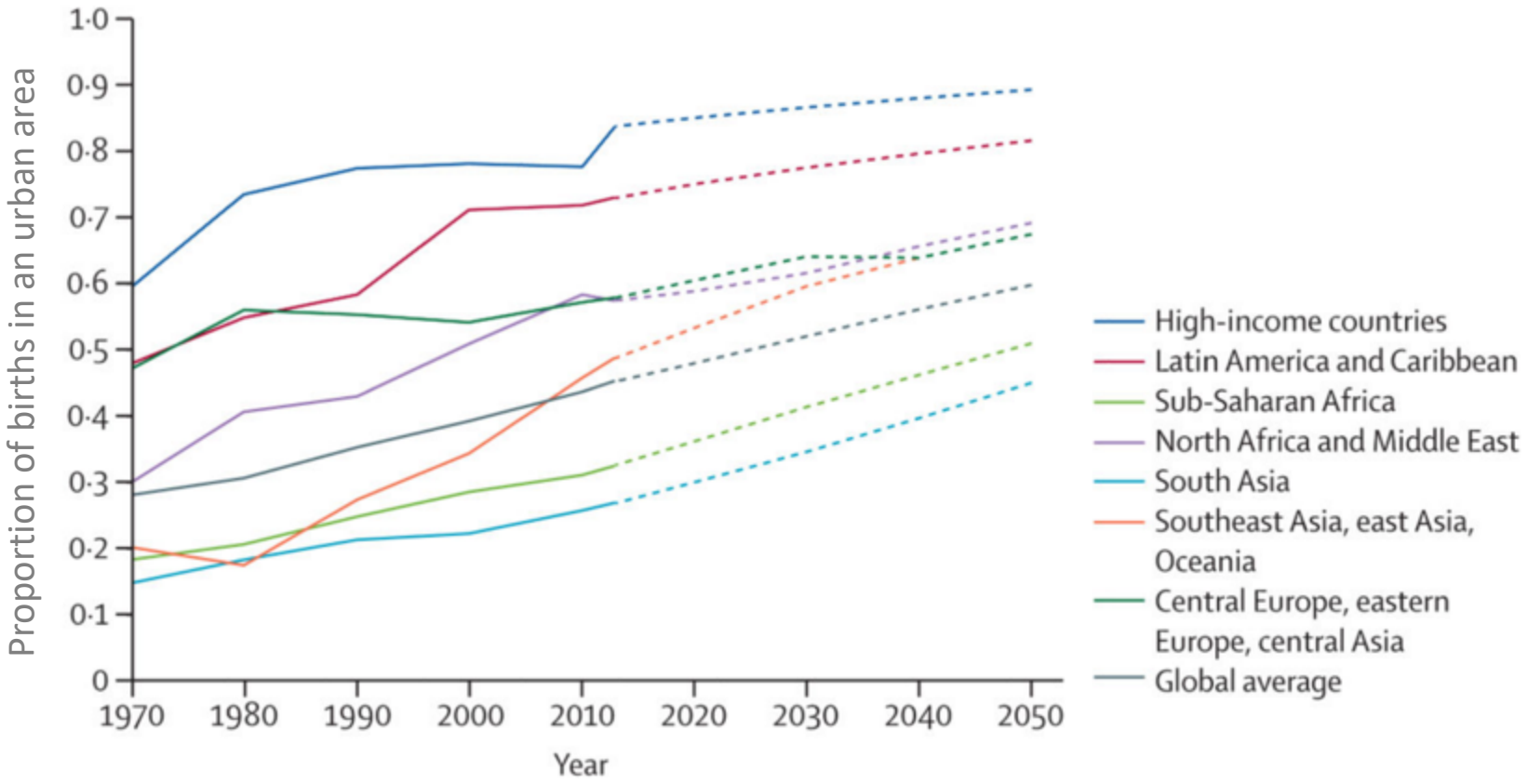
Average quality: 0.42
2 hour access: 92%

Future scenario: Hospitals



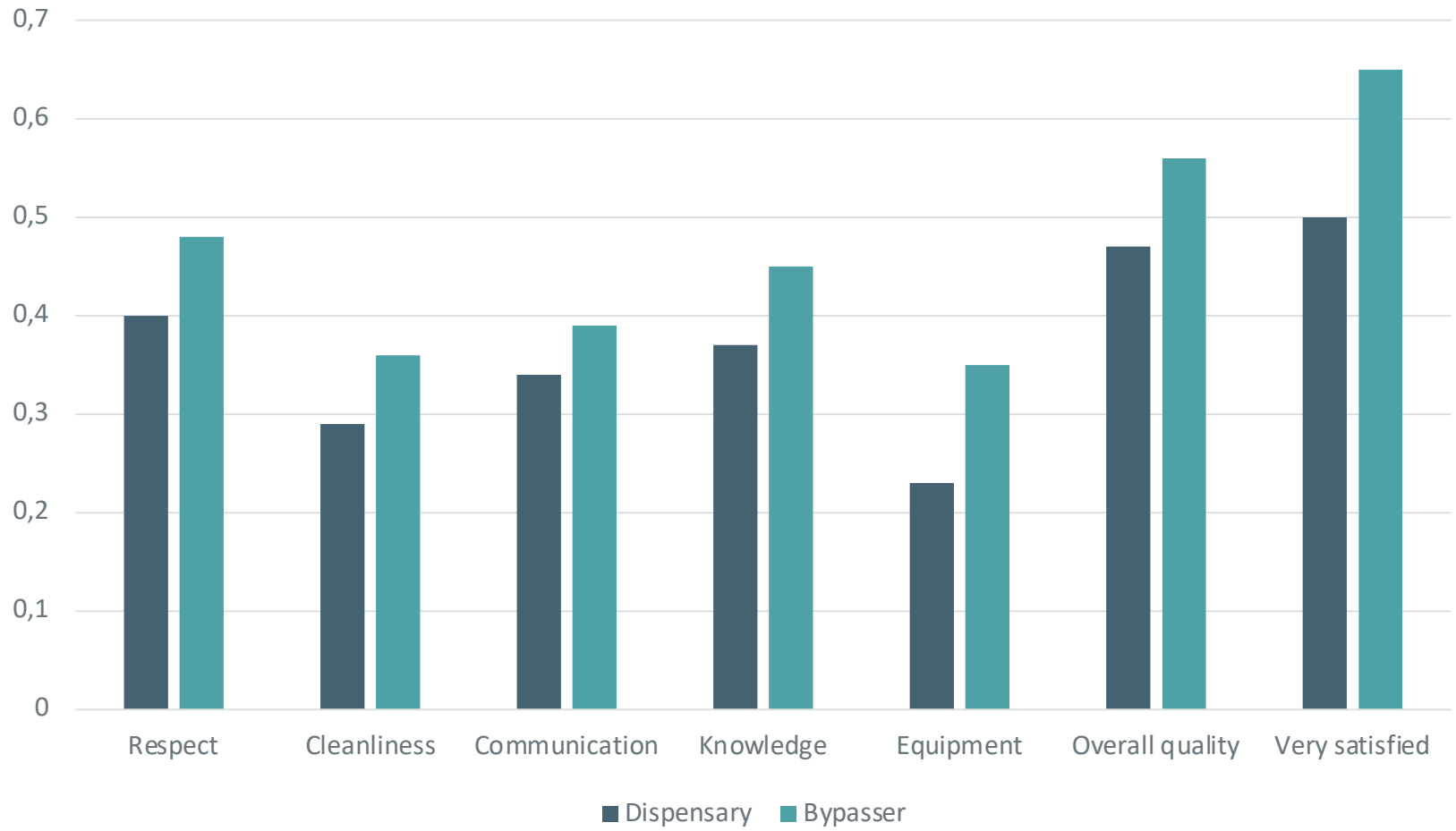
Average quality: 0.72
2 hour access: 90%

Urbanization will further reduce distance barriers



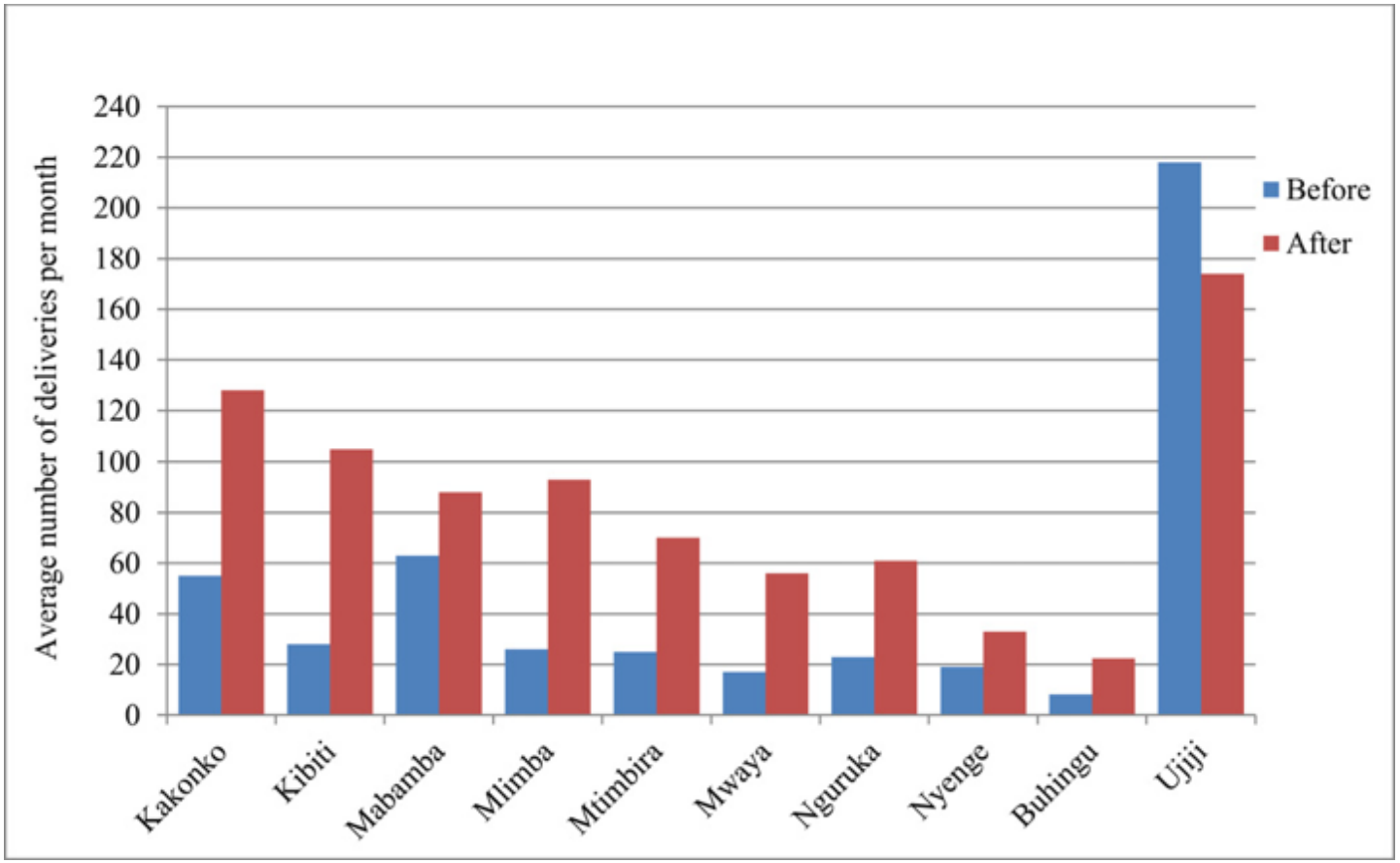
Kruk, M.E., Kujawski, S., Moyer, C.A., Adanu, R.M., Afsana, K., Cohen, J., Glassman, A., Labrique, A., Reddy, K.S. and Yamey, G., 2016. Next generation maternal health: external shocks and health-system innovations. *The Lancet*, *388*(10057), pp.2296-2306.

Will women travel to hospital? 4 in 10 bypassed nearby dispensary in Tanzania; reported better experience



Kruk ME, Hermosilla S, Larson E, Mbaruku GM. Bypassing primary care clinics for childbirth: a cross-sectional study in the Pwani region, United Republic of Tanzania. Bull World Health Organ. 2014;92(4):246-53.

Women want to deliver in advanced facilities: adding Caesarian section more than doubled delivery volumes in health centers



Mean monthly deliveries before and after C/S

Nyamtema AS, Mwakatundu N, Dominico S, Mohamed H, Pemba S, Rumanyika R, et al. Enhancing Maternal and Perinatal Health in Under-Served Remote Areas in Sub-Saharan Africa: A Tanzanian Model. PLoS One. 2016;11(3):e0151419. Epub 2016/03/18.

Intentional health system redesign: context specific, user centered

Improve hospitals

Expand capacity and improve quality

- Upgrade existing or add new facilities
- Targeted hospital quality improvement: hire advanced staff

Boost primary care

Strengthen services they are suited to perform

- Enhance continuity and coordination of care
- Establish referral/counter referral

Enable access

Support people in getting to the right level care

- Vouchers, ambulances and public private partnerships
- Improve key roads and bridges

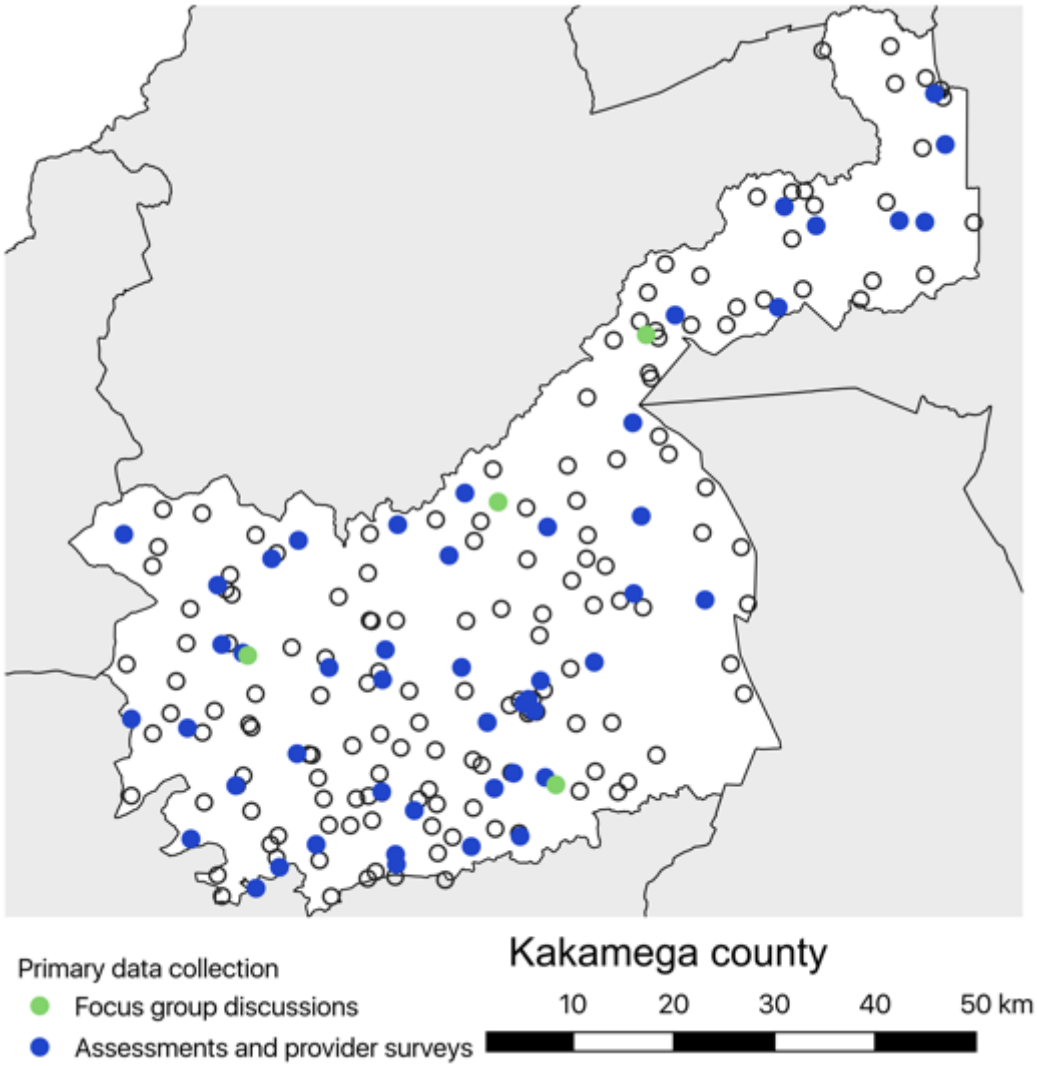
Build demand

Generate demand for redesign

- Educate communities: campaigns, social media; influencers
- Provide incentives if needed
- Share success stories

Change policy

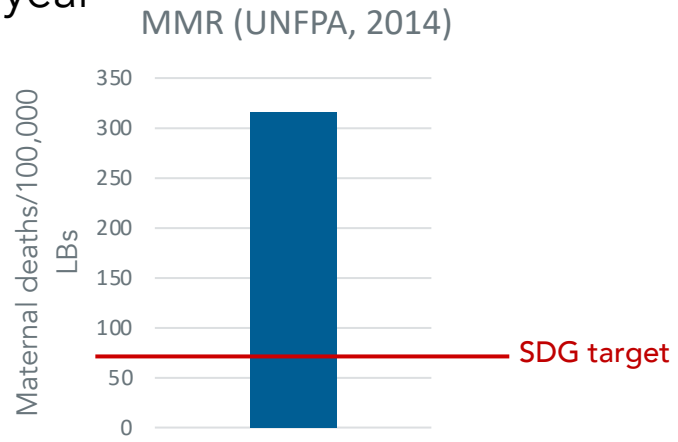
Kenya example: Kakamega county

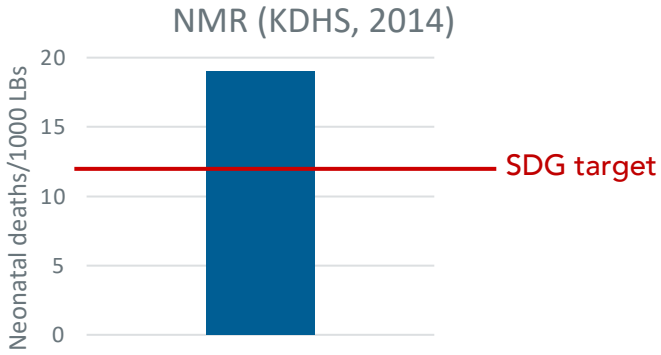


County stats

~2M people population

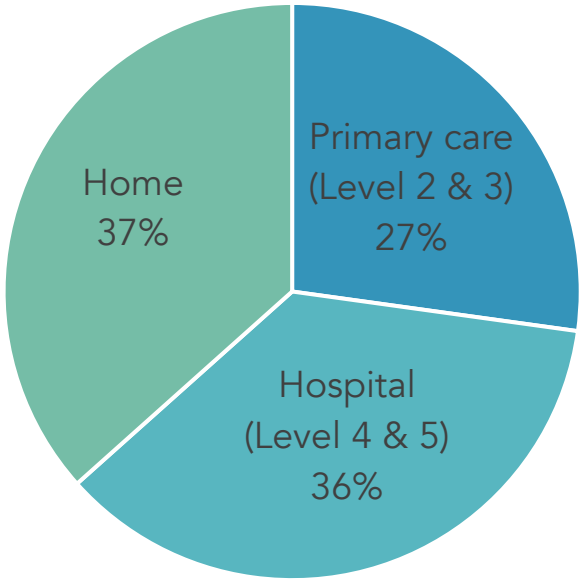
~72000 deliveries per year





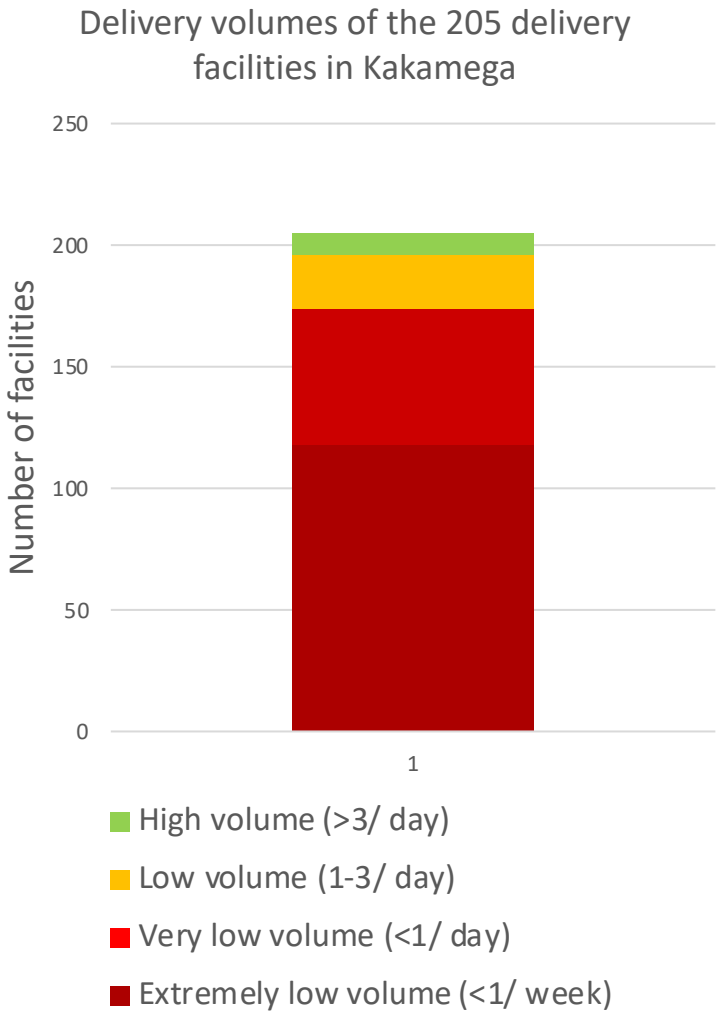
Current model of care: nearly 1 in 3 women deliver in level 2&3 facilities

Distribution of 72,000 deliveries in Kakamega in 2018 (DHIS-2)



The goal of redesign would be to have all women give birth in hospitals, as occurs in most middle and all high-income countries

Today in Kakemega 86% of facility deliveries are in low volume clinics

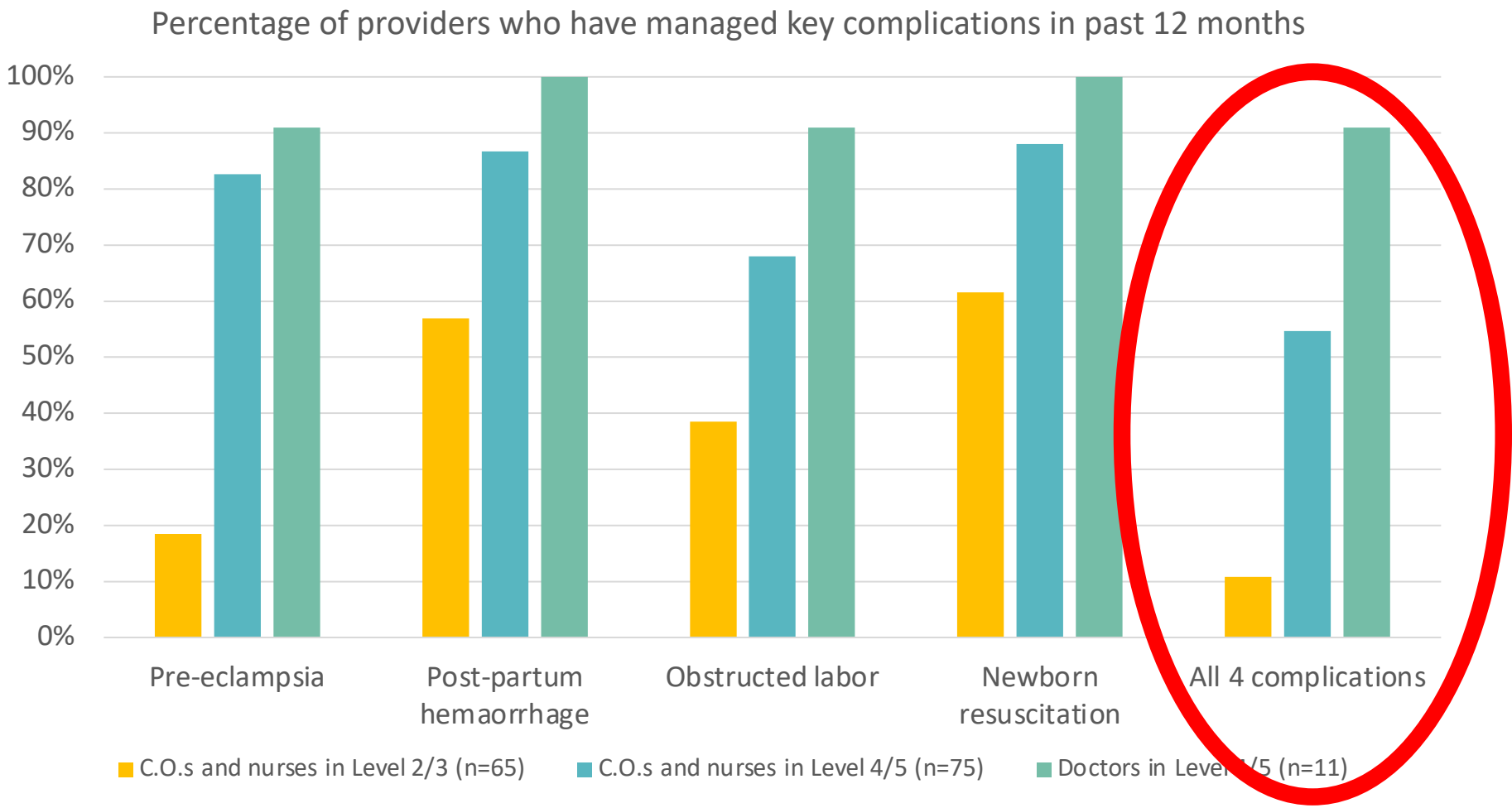


This is a problem because:

1. Staff and equipment are thinly distributed across many facilities- nearly 9 in 10 delivery facilities conduct less than 1 delivery per day
2. Staff in low volume clinics cannot retain emergency skills

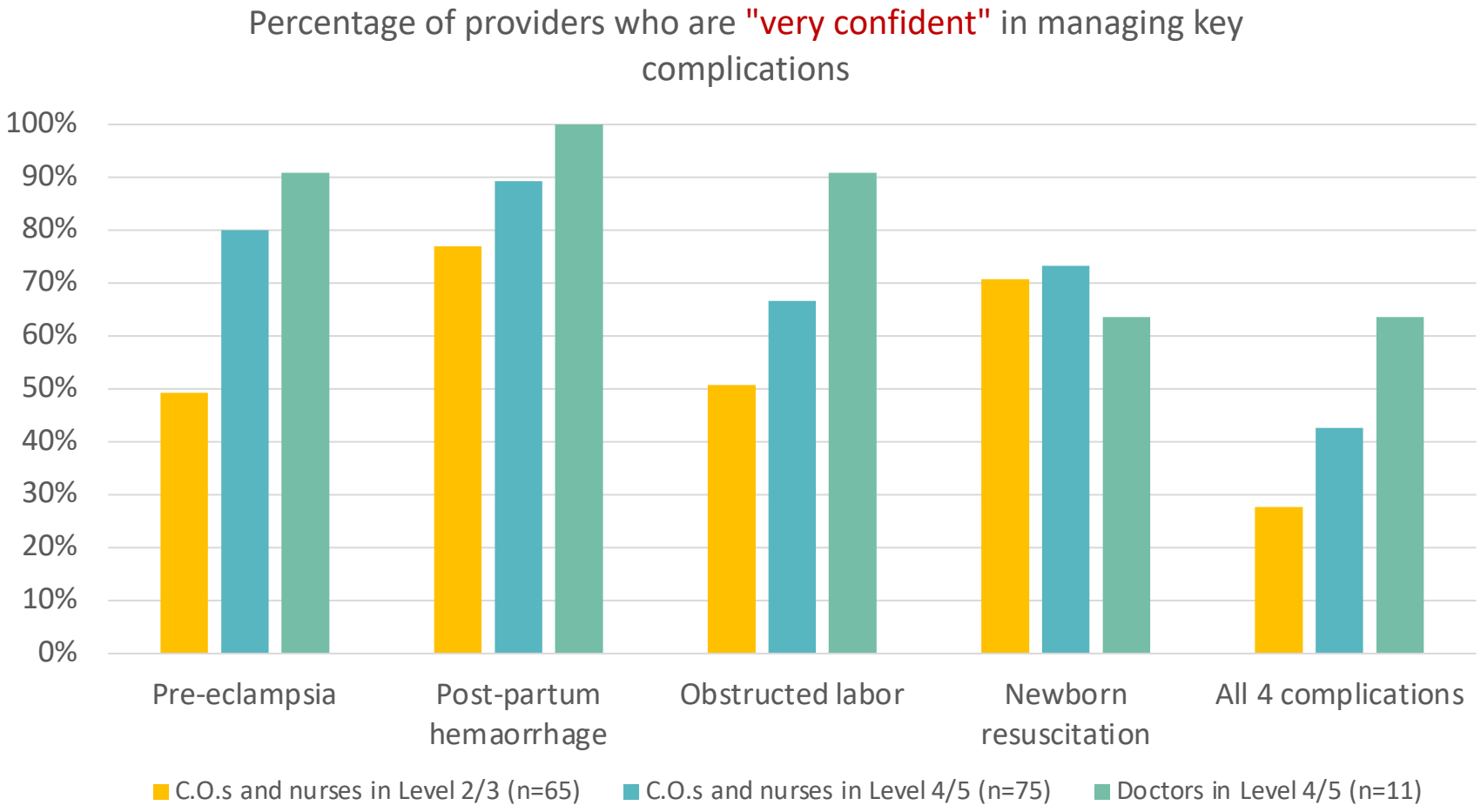
Data from DHIS-2, 2018

Providers in level 2/3 facilities lack experience in managing complications



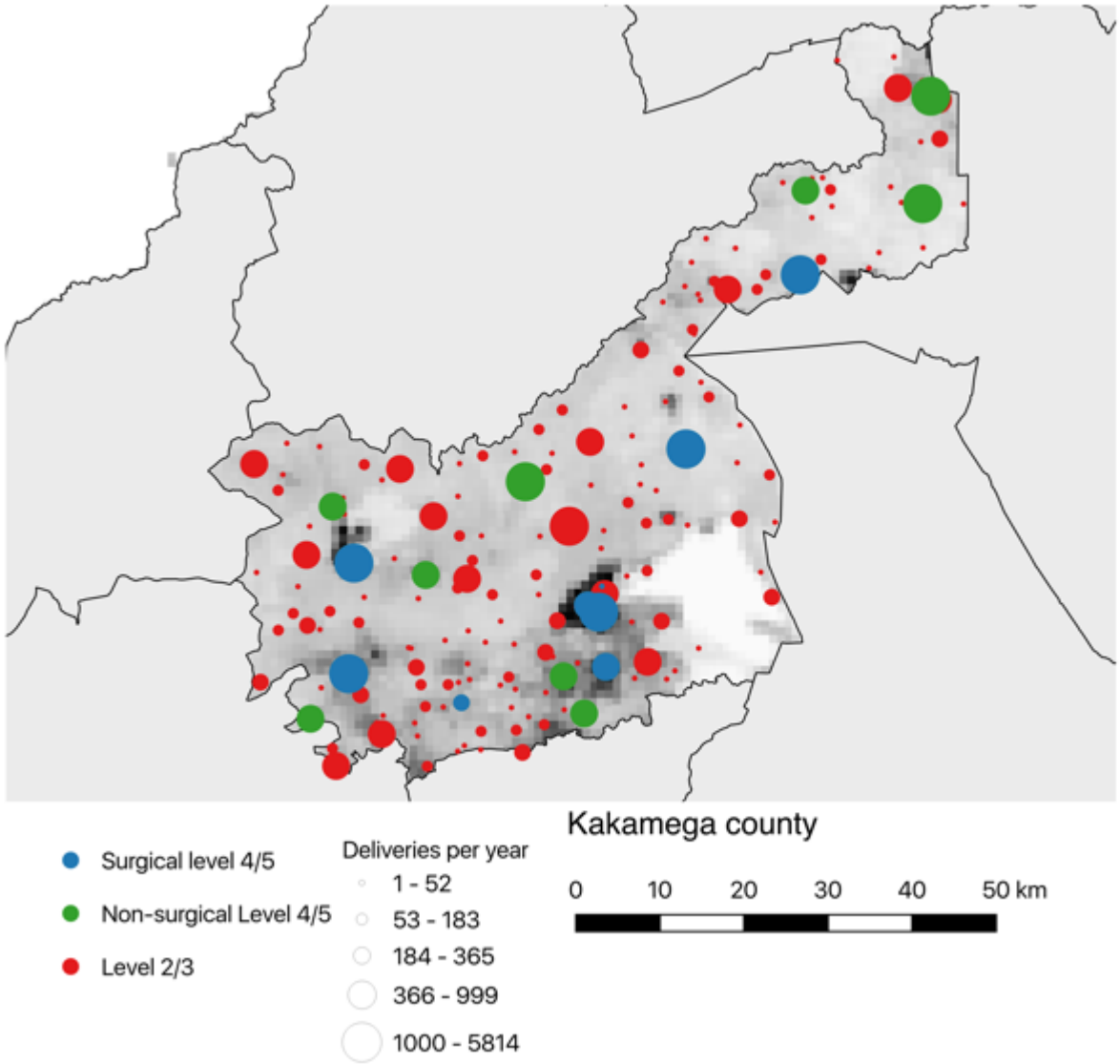
Data source: From primary data collection, Oct-Nov 2019

…and have lower confidence in their skills



Data source: From primary data collection, Oct-Nov 2019

Level 4/5 facilities are well distributed across the county



Nearly all women in Kakamega currently live within 1-hour of a Level 4/5 facility

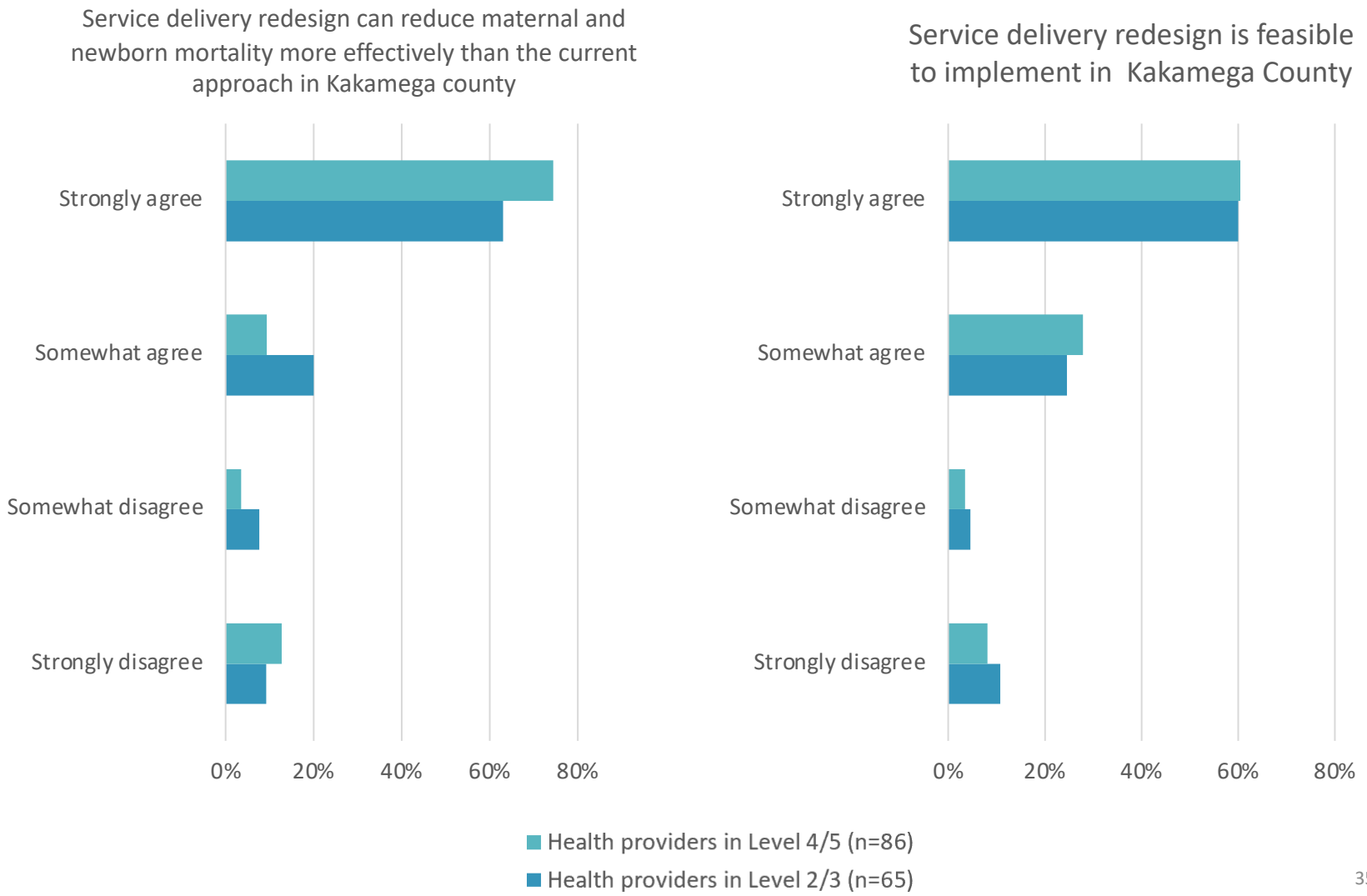
% of women living within 1-hour of the 10 surgical facilities in Kakamega

92%

% of women living within 1-hour of the 19 Level 4/5 facilities in Kakamega

99%

Strong support for redesign among health workers in both hospitals and primary care



Data source: From primary data collection, Oct-Nov 2019

The population is predisposed to facility deliveries…

"When you deliver in the hospital you are more digital; you are not analogue. You are seen to be of high status, and people therefore want to deliver in the facility" ***36-year-old with recent home delivery***

"In a facility, if an operation is necessary it can be easily done… Also, women with HIV can be given medication to prevent [mother to child] transmission of the virus, which cannot be done at home." ***41-year-old grandmother***

…and are welcoming of service delivery redesign

"You would have saved us; it would be very good. If this hospital is set up for delivery, then there would be no delays in accessing care" ***37-year-old with a recent home delivery***

"If that hospital has everything, then you know that you will not be referred to another facility. Every problem will be managed there." ***57-year-old TBA***

Data source: From primary data collection, Oct-Nov 2019

Challenges: transportation availability and cost is a barrier to getting to hospital

"I had my first born [in a facility] and I was treated very well. I had my next delivery at home because I went into labor in the night and the boda-boda [motorbike] I called could not come, so I delivered at home." ***20-year-old with recent home delivery***

"I saw a woman dying with a TBA because we could not get a vehicle to transport her to Navakholo [a level 4 facility]. She had a placenta problem." ***49-year-old male community member***

"If women think they will have a normal delivery, they would prefer to deliver at home because they would save on transportation." ***60-year-old male community member***

"I may not be able to afford transportation if the place if far."
21-year-old nulliparous woman

Challenges: person-centered and respectful care and overcrowding

"I was mistreated during one delivery, so I decided to deliver at home subsequently, where the TBA takes good care of us" ***32-year-old with recent home delivery***

"All of us understand the benefits of hospital delivery, but some of us fear going to the hospital because we would be abused and beaten." ***39-year-old with recent home delivery***

"Health workers may be a challenge. The health provider may be careless due to overworking."
39-year-old with recent home delivery

Data source: From primary data collection, Oct-Nov 2019

Challenges: knowledge gaps among health workers, including doctors and nurses in level 4/5

Average scores on a 60-item maternal and newborn care knowledge test (pass score: 80%)

54%

Clinical officers and nurses in Level 2/3 facilities

55%

Clinical officers and nurses in Level 4/5 facilities

68%

Doctors in Level 4/5 facilities

Data source: From primary data collection, Oct-Nov 2019

Redesign should be led locally, backed by research, and updated through learning

Engage

- Assess interest and motivation for structural reform from local leaders

Analyze

- Facility distribution, coverage, quality, management
- Utilization patterns and people's preference
- Road network and transportation options

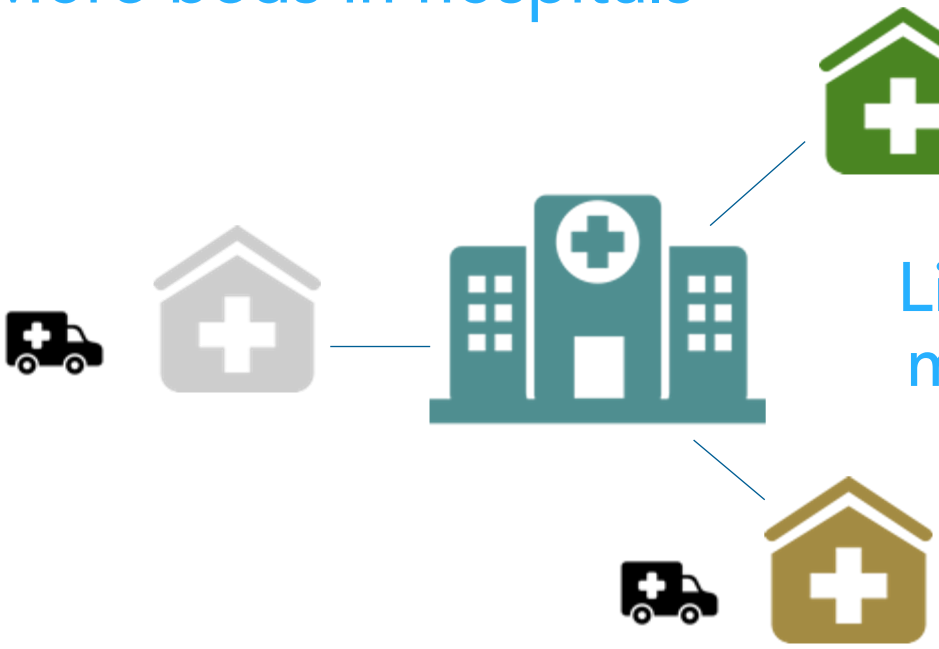
Design, implement, evaluate, adapt, scale

- Local leaders and users design relevant system model
- Evaluate impact on health, confidence, costs (selected settings)
- Build feedback and accountability channels; measure
- Adjust model through learning health system
- Adapt for other settings

Context specific delivery site options

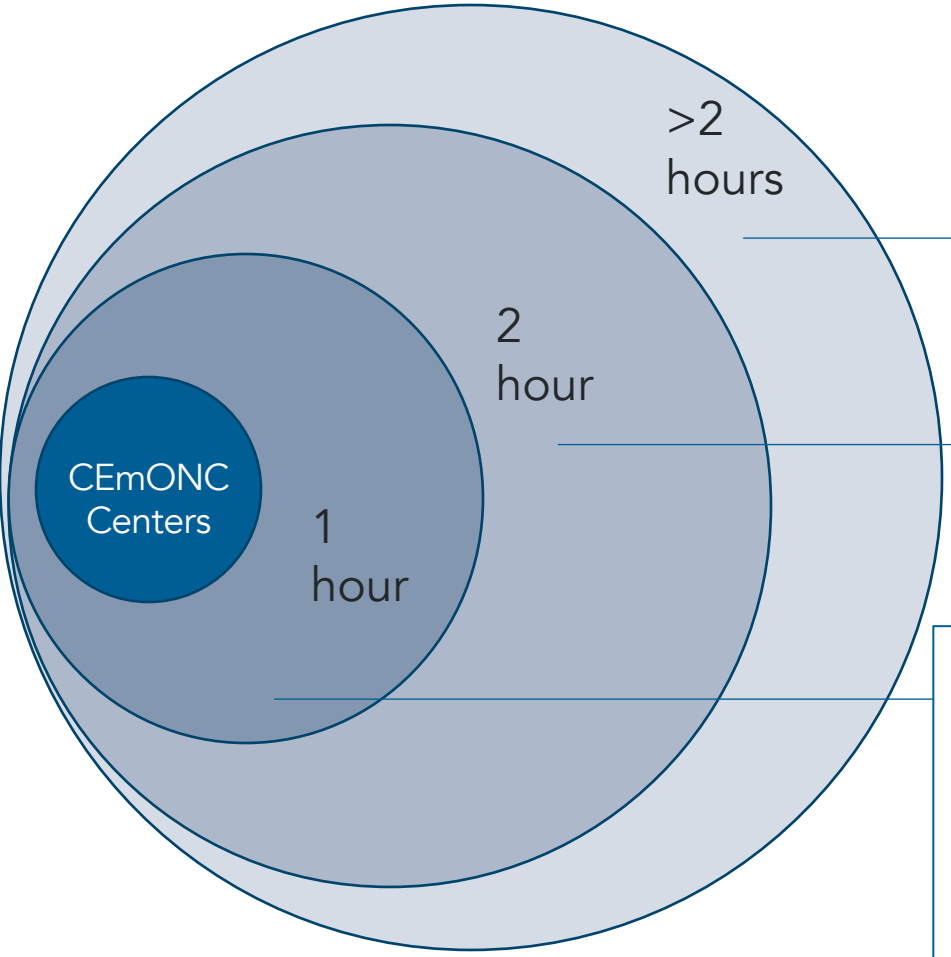
More beds in hospitals

Adjacent birthing units



Linked network of maternity centers

Context specific access options



Strategic maternity centers

Emergency transport

Maternity waiting options for all women

Taxis/ride share in early labor

Emergency transport

Maternity waiting options

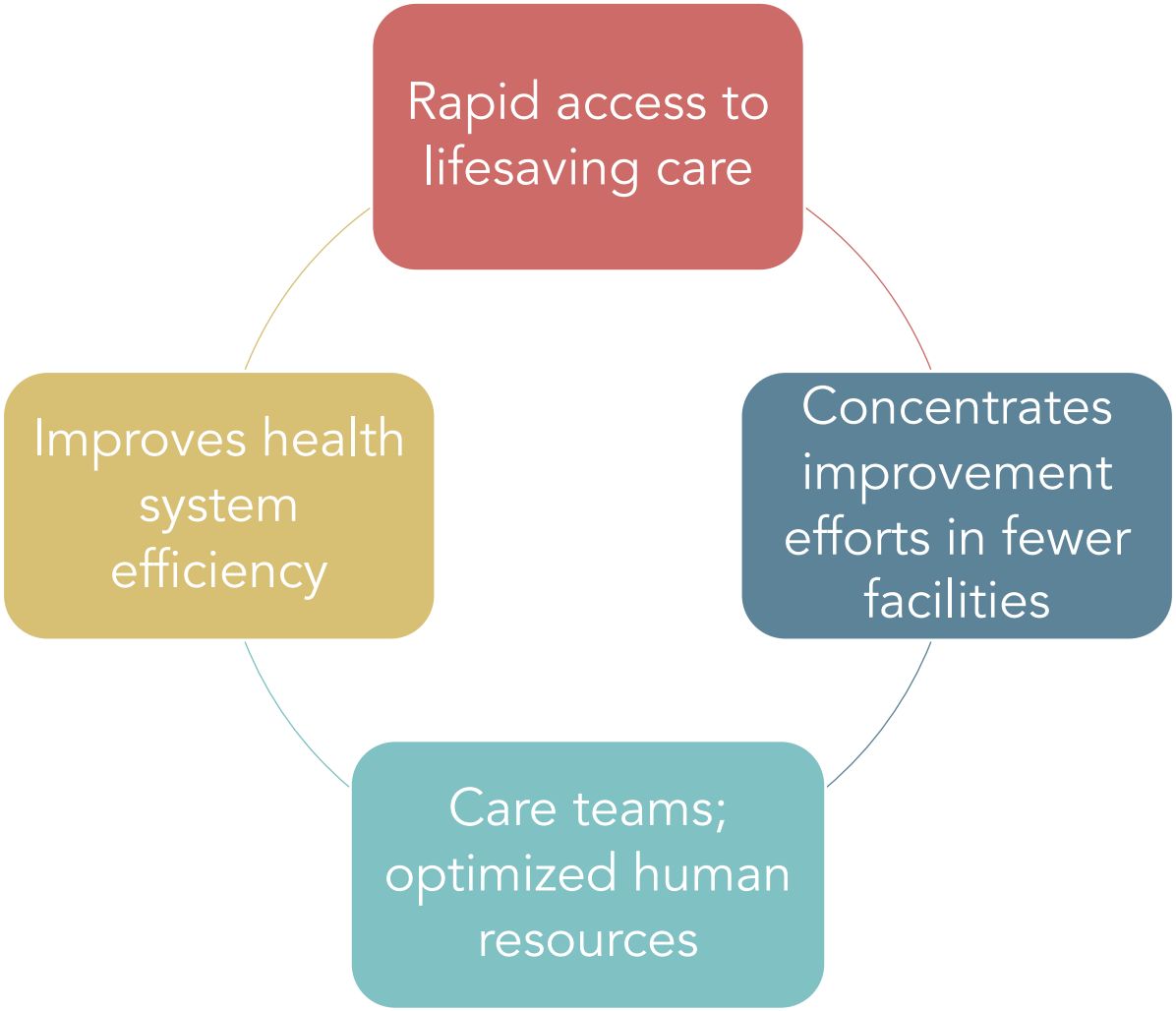
Taxis/ride share in early labor

Emergency transport

Mitigating negative unintended consequences

- Overcrowding: planning and gradual shifts, using adjacent facilities
- Overmedicalization, excess C-sections, disrespect: midwifery led care, monitoring, supervision, quality reviews
- Inequities in access to hospital, financial hardship: targeted roads/bridges, focused subsidies, transport on-call
- Other: build emergent effects into evaluation and adjust as model evolves

Health and system benefits of redesign



Discussion