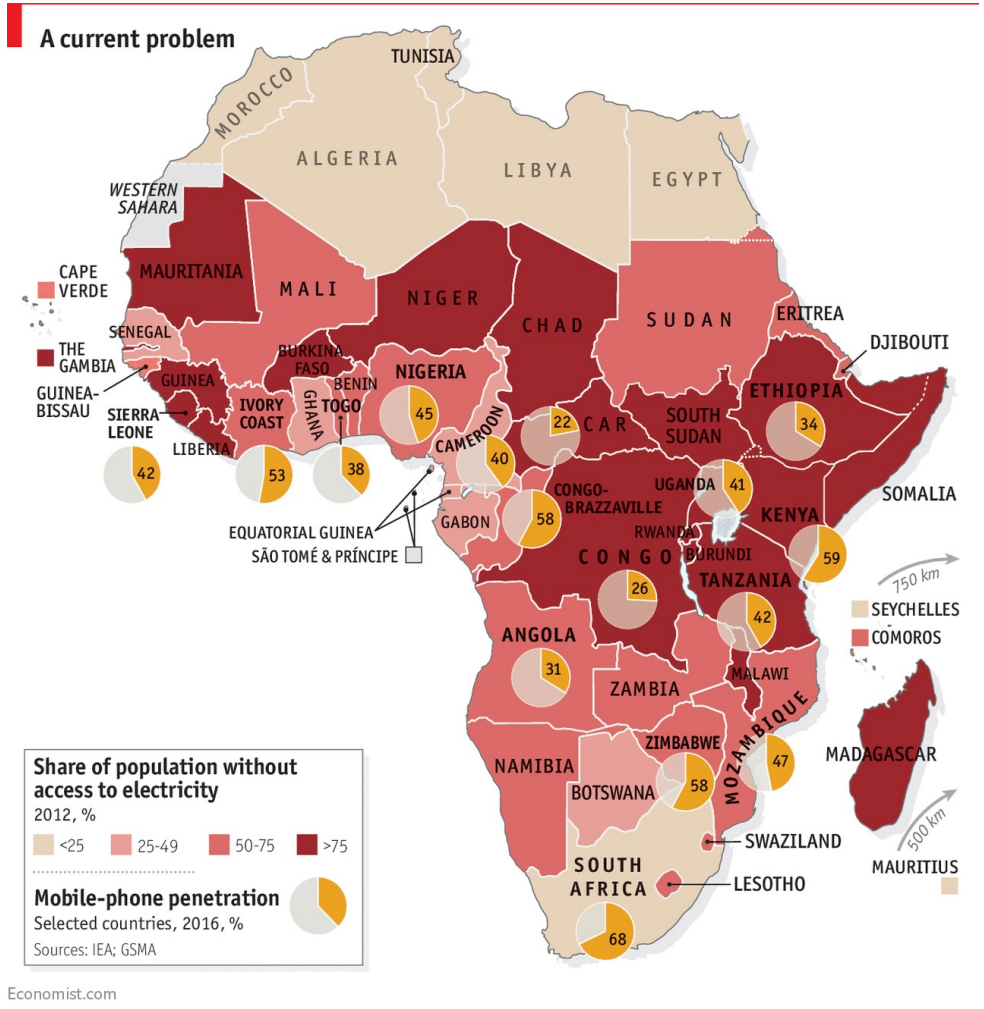
mHealth Impact on Demand-Capacity Mismatch in Accessing Health Services in Africa

Gilbert N. Nyaga, PhD
Associate Professor & Group Chair
Supply Chain & Information Management Group
D'Amore-Mckim School of Business
Northeastern University
g.nyaga@northeastern.edu

Overview

- ✓ The healthcare burden in Africa
- ✓ Demand-capacity mismatch and access to health care services
- ✓ Impact of mHealth on access and cost of healthcare services
- ✓ Suggestions for policy and theory



Source: https://www.economist.com/graphic-detail/2017/11/08/in-much-of-sub-saharan-africa-mobile-phones-are-more-common-than-access-to-electricity

Healthcare burden and supply chain challenges in Africa

- Accessing health care services is a major challenge in many African countries in part because of supply chain related issues:
- Logistics challenges
  - Poor roads and limited connectivity limits access and is costly
  - Inefficient distribution systems and inadequate distribution facilities
  - Limited number of healthcare facilities – patient travel long distances
- Procurement challenges
  - Cumbersome and often uncoordinated procurement processes
  - Counterfeit medicine and medical supplies – informal /illegal channels
  - Procurement decisions not done by professionals

Healthcare burden and supply chain challenges in Africa

- Government bureaucracy and corruption
  - Slow response by government institutions – many decision layers
  - Rampant corruption – e.g., medicines and supplies diverted from public health facilities to private clinics and stores, etc.
- Shortage of health care personnel and supply chain professionals
  - Procurement and related supply chain decisions often handled by clinical staff taking away time from patient care – leading to a "fighting fires" approach
- Demand-Capacity mismatch
  - Very high and growing demand for healthcare services but very limited facilities and clinical personnel.
- Etc.

Research question and methodology

- What is the impact of increased use of mobile technology in alleviating demand-capacity mismatch in healthcare sector in Africa?
  - How can mobile technology facilitate better matching of demand and capacity?
  - What are the main challenges in adopting/deploying mobile technology?

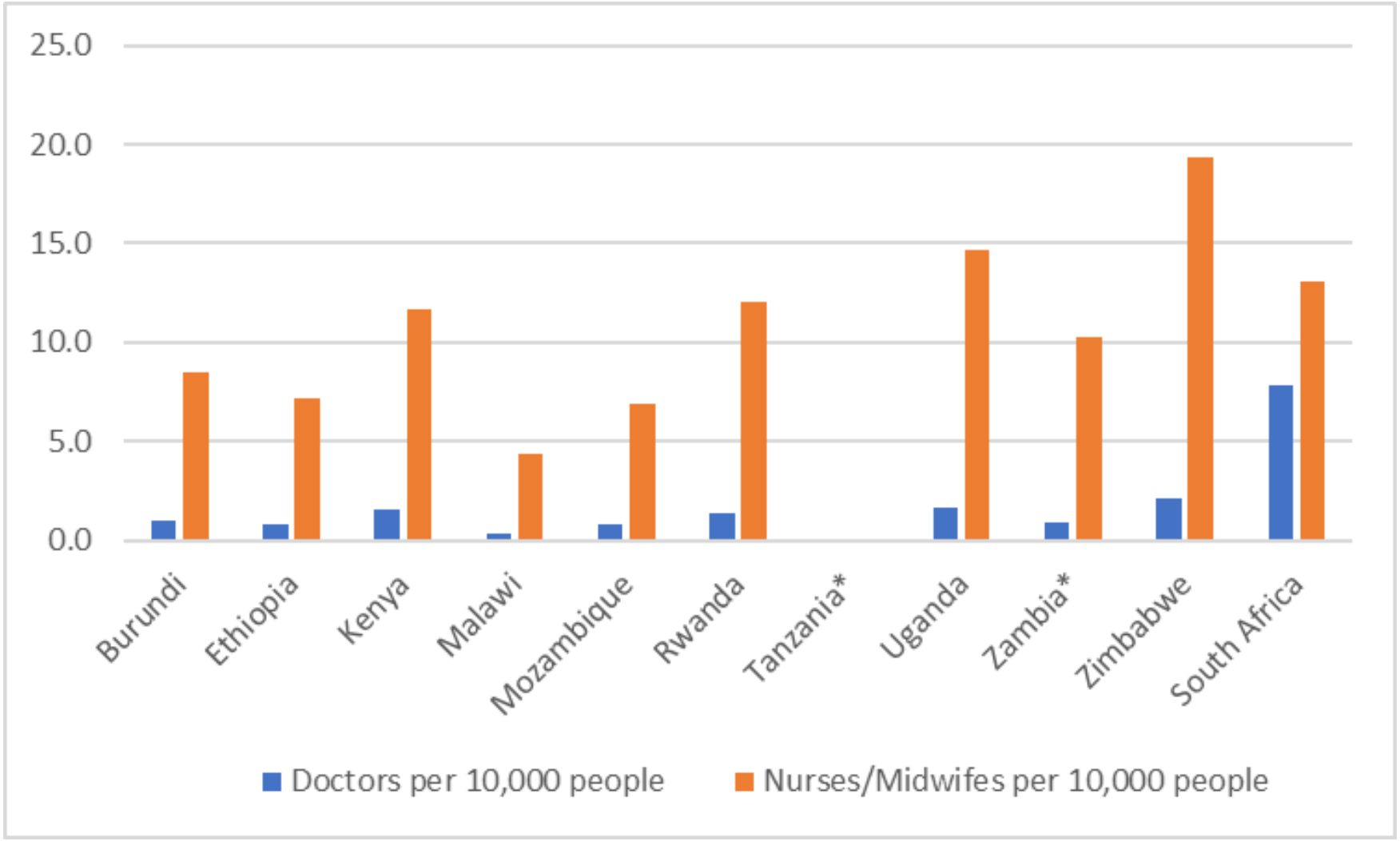
- This is an on-going study. Review of extant literature and preliminary analysis of secondary data offers insights about the opportunities and challenges for mHealth in Africa including enhancing access to healthcare services.

Demand-Capacity mismatch: Limited capacity; very high demand

Country	Population	Clinic/ Dispensary/ Health center	Hospitals	Total health facilities	Population/# of health facilities
Burundi	11,216,450	616	49	665	16,867
Ethiopia	107,534,882	5,054	161	5,215	20,620
Kenya	50,950,879	5,744	402	6,146	8,290
Malawi	19,164,728	568	80	648	29,575
Mozambique	30,528,673	1,518	61	1,579	19,334
Rwanda	12,501,156	525	47	572	21,855
Tanzania	59,091,392	6,081	223	6,304	9,374
Uganda	44,270,563	3,671	121	3,792	11,675
Zambia	17,609,178	1,172	97	1,269	13,876
Zimbabwe	16,913,261	1,067	163	1,230	13,751

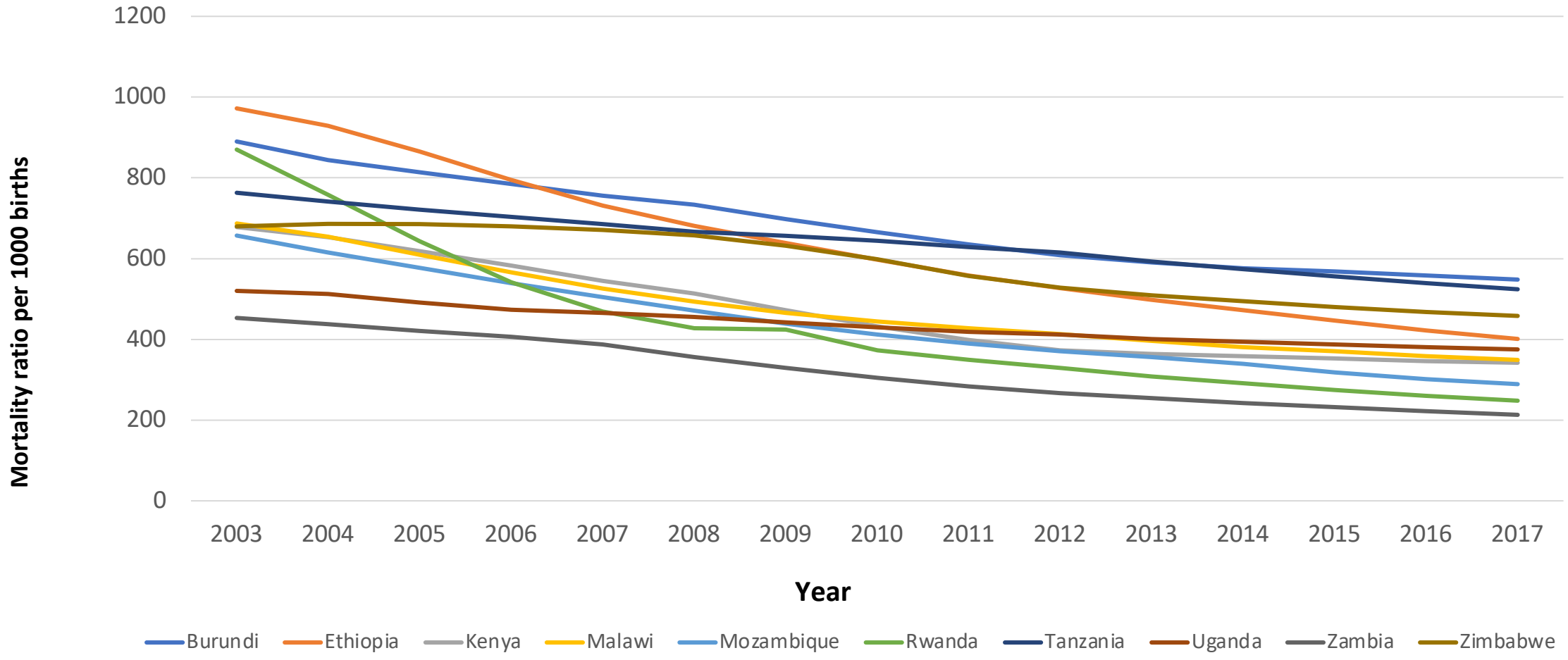
***Data Source**: World Health Organization & Data.World (Health Facilities in sub-Saharan Africa - dataset by hdx | data.world)*

Demand-Capacity mismatch: Healthcare Personnel per 10,000 people



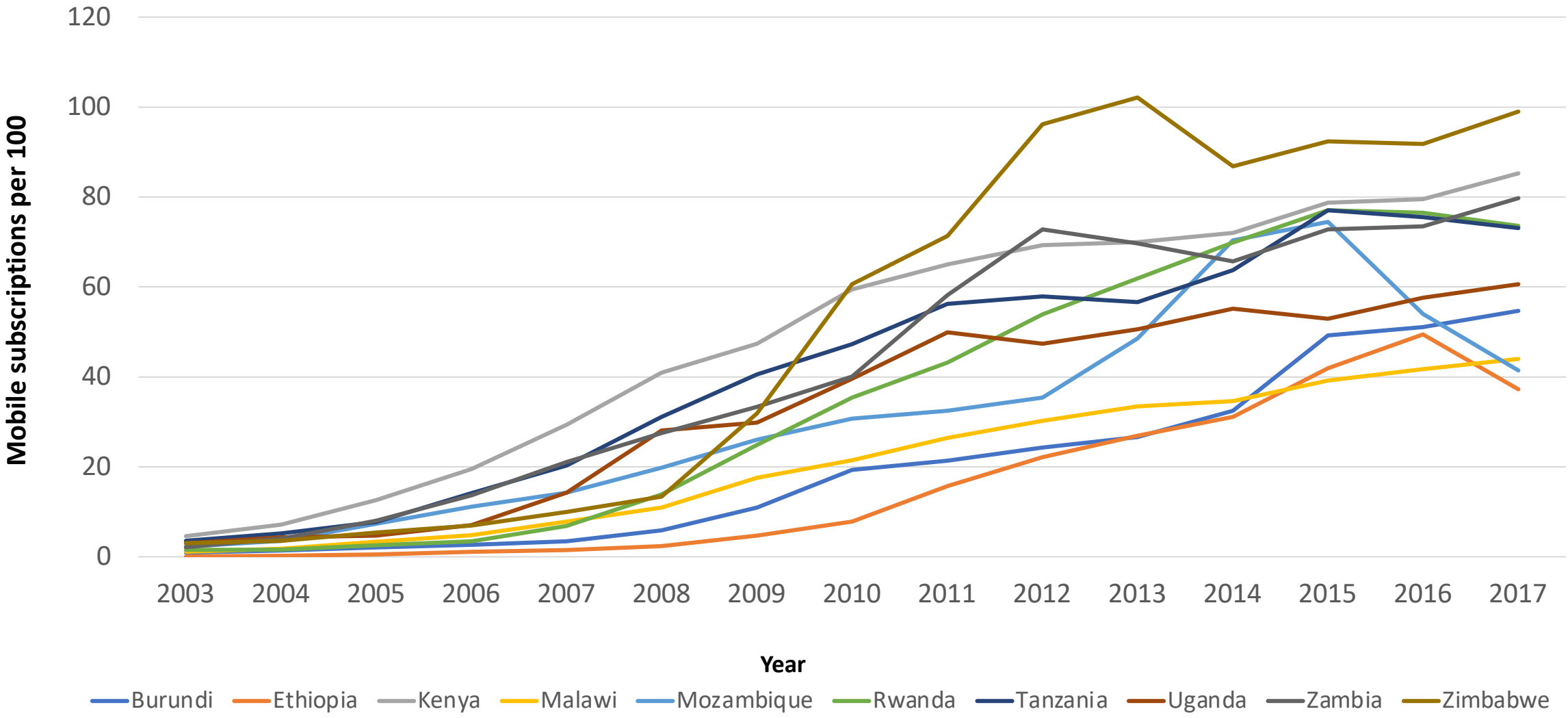
***Data Source**: World Bank (Databank - World Bank Open Data | Data)*

Demand-Capacity mismatch: Maternal mortality ratio *(per 1,000 live births)*



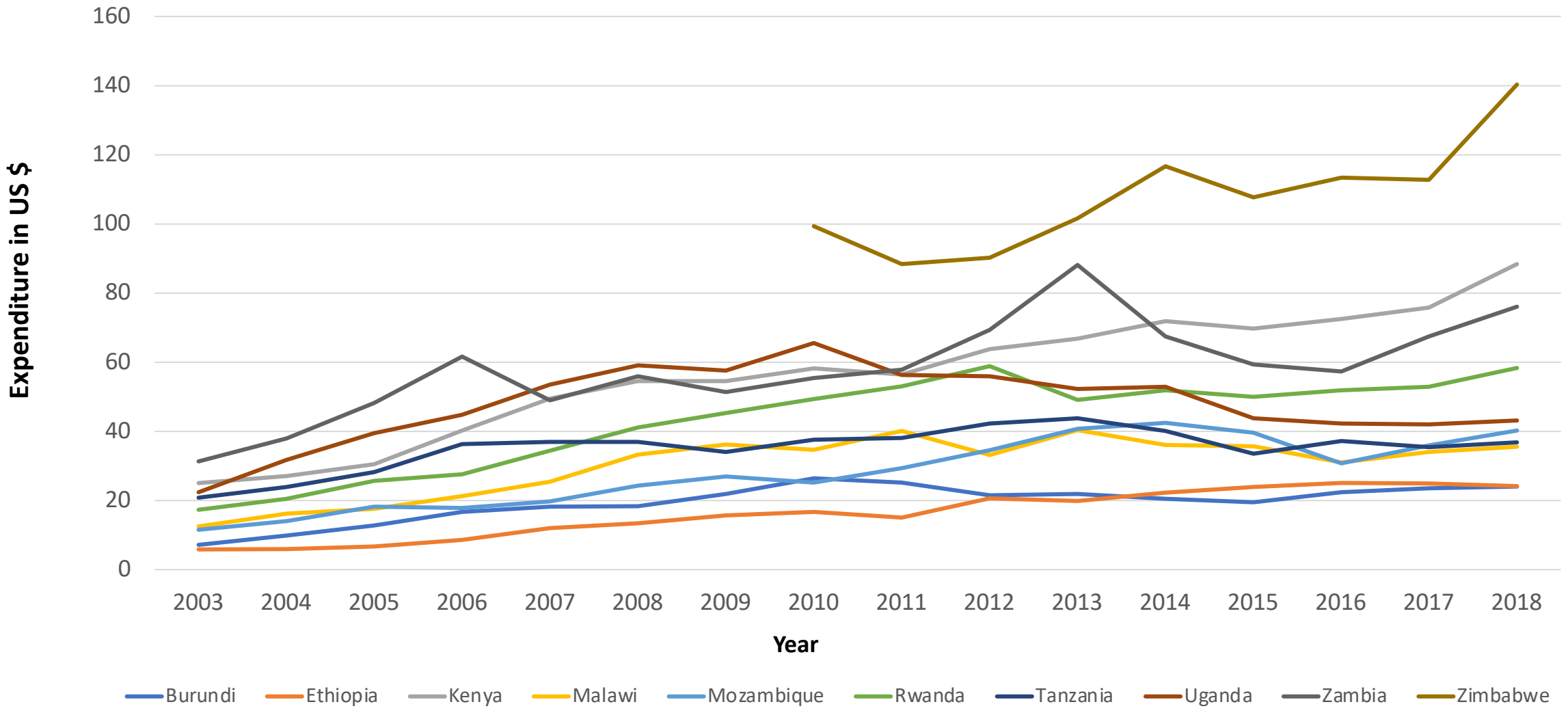
***Data Source**: World Bank (Databank - World Bank Open Data | Data)*

Demand-Capacity mismatch: Mobile subscriptions per 100 people



***Data Source**: World Bank (Databank - World Bank Open Data | Data)*

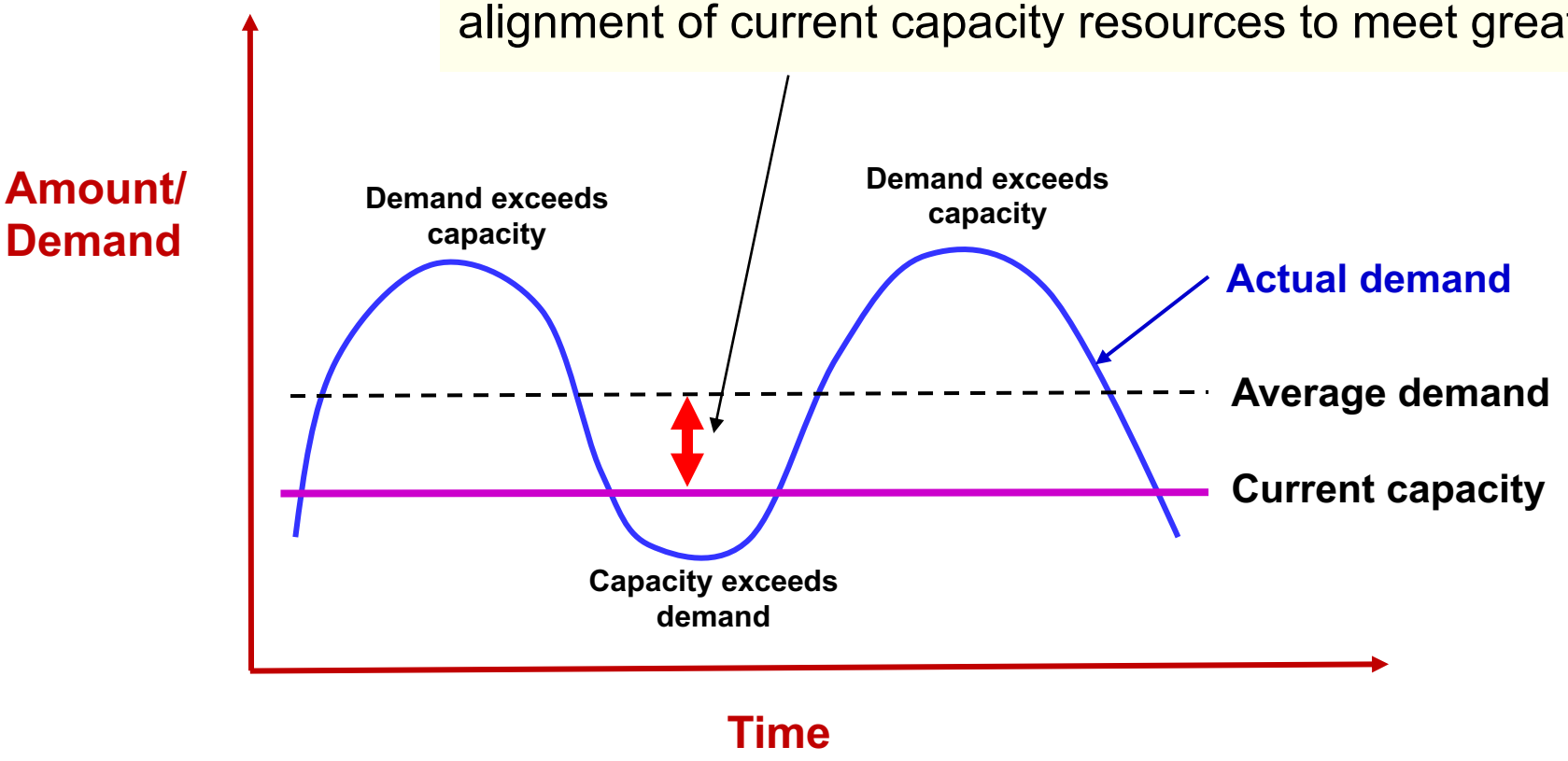
Demand-Capacity mismatch: Current health expenditure per capita *(current US$)*



***Data Source**: World Bank (Databank - World Bank Open Data | Data)*

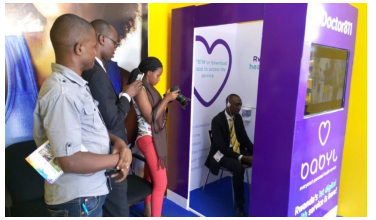
Demand-capacity mismatch and access to health care services

Building capacity is slow and costly – but mHealth can enable re-alignment of current capacity resources to meet greater demand



mHealth and its impact on the healthcare supply chain

- **mHealth** – is the use of mobile phone and wireless technology for health-related purposes (Betjeman, Soghoian & Foran, 2013)
  - Rapid growth in mobile phone use and technology disrupting provision of many services in Africa.



- Mobile technology application in health care includes:
  - Medication adherence – e.g., patient reminders via text messages
  - Emergency notification and alert system
  - Health surveillance and data collection
  - Access to and dissemination of health information, etc.

  - *Examples of healthcare apps use: registration of infants, vaccine alerts, appointment reminders, physician consultations, prescription reminders, etc.*

Impact of mHealth on access and cost of healthcare services

- Faster information sharing and coordination
- More timely and accurate data
- Faster transactions and payments
- Reduced cost – *better coordination, faster payments, reduced wastage, etc.*
- Greater access to health facilities and clinical staff
- Increased transparency with mobile automation – *this can reduce corruption*
- More effective distribution – e.g., *mosquito nets after mapping prevalence areas.*
- Timely reporting of counterfeits and removal from distribution system
- Training clinical staff on basic supply chain skills
- Etc.

mHealth implementation challenges

- Scalability – many mHealth programs don't go beyond the pilot phase
- Cost effectiveness of mHealth programs
- Limitations and reliability of telecommunication network/infrastructure
- Sustainability – most programs are dependent on donor funding
- Data privacy and security
- Lack of formalized use of mHealth
- Lack of standardization
- Limited literacy on mHealth use by a segment of population
- Limited buy-in on mHealth use by clinical personnel, patients, etc.
- Etc.

Suggestions for policy and theory

There are several issues that call for more research. These include:

- **Impact of mHealth programs** on patient care and other health outcomes at different intervention levels (*e.g., patient, local, national/regional*).
- **Factors that moderate or mediate mHealth adoption** in different contexts (e.g., to *develop more effective intervention and governance mechanisms*).
- **Disruptive effect of mobile technology** on supply chains – *e.g., potential for mHealth to flip established supply chain models.*
- **Cost-effectiveness of mHealth programs** and **scalability** of such programs.
- **e-procurement models** that leverage mobile technology.
- **Policy changes at macro- and micro-level** that can facilitate more effective mHealth adoption in different situations.
- Etc.

Questions?

References

- Betjeman, T.J., Soghoian, S.E., Foran, M.P., 2013. mHealth in Sub-Saharan Africa. International Journal of Telemedicine and Applications. http://dx.doi.org/10.1155/2013/482324.
- Kiberu, V.M., Mars, M., Scott, R.E., 2017. Barriers and opportunities to implementation of sustainable e-Health programmes in Uganda: A literature review. *African Journal of Primary Health Care & Family Medicine* (phcfm.org).
- Njoroge, M., Zurovac, D., Ogara, E.A.A., Chuma, J., Kirigia, D., 2017. Assessing the feasibility of eHealth and mHealth: a systematic review and analysis of initiatives implemented in Kenya. *BMC Research Notes* (DOI 10.1186/s13104-017-2416-0).
- Patel et al., 2017. Economic evaluation of mobile phone text message interventions to improve adherence to HIV therapy in Kenya. Medicine (2017) 96:7. http://dx.doi.org/10.1097/MD.0000000000006078.
- Wexler, et al., 2018. Implementing eHealth Technology to Address Gaps in Early Infant Diagnosis Services: Qualitative Assessment of Kenyan Provider Experiences, *JMIR MHEALTH AND UHEALTH*, 6(8), 1-10.
- Medhanyie, A.A ; Little, A ; Yebyo, H ; Spigt, M ; Tadesse, K ; Blanco, R ; Dinant, G.J., 2015. Health workers' experiences, barriers, preferences and motivating factors in using mHealth forms in Ethiopia. *Human Resources for Health*, 13(1), p.1-10 (http://www.human-resources-health.com/content/13/1/2)
- Hall, C.S., Fottrell, E., Wilkinson, S., Byass, P., 2014. Assessing the impact of mHealth interventions in low- and middle-income countries what has been shown to work? Global Health Action 2014, 7: 25606 - http://dx.doi.org/10.3402/gha.v7.25606.
- Etc.