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Supplementary appendix 1

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

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High-quality health systems in the Sustainable Development Goals era: time for a revolution

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Section 2: What quality of care are people receiving in LMICs today?

1. Country income groups

The Commission's scope is all low- and middle-income countries as classified by the World Bank, listed below. Data presented in Section 2 used the country's income group specific to the survey year based on World Bank classification, which may differ from the current classification (as of January 2018) below.

Country	Income Group
Afghanistan	Low income
Albania	Upper middle income
Algeria	Upper middle income
American Samoa	Upper middle income
Angola	Lower middle income
Argentina	Upper middle income
Armenia	Lower middle income
Azerbaijan	Upper middle income
Bangladesh	Lower middle income
Belarus	Upper middle income
Belize	Upper middle income
Benin	Low income
Bhutan	Lower middle income
Bolivia	Lower middle income
Bosnia and Herzegovina	Upper middle income
Botswana	Upper middle income
Brazil	Upper middle income
Bulgaria	Upper middle income
Burkina Faso	Low income
Burundi	Low income
Cabo Verde	Lower middle income
Cambodia	Lower middle income
Cameroon	Lower middle income
Central African Republic	Low income
Chad	Low income
China	Upper middle income
Colombia	Upper middle income
Comoros	Low income
Congo	Lower middle income
Costa Rica	Upper middle income
Côte d'Ivoire	Lower middle income
Croatia	Upper middle income
Cuba	Upper middle income
Dem. Rep. Congo	Low income
Djibouti	Lower middle income
Dominica	Upper middle income
Dominican Republic	Upper middle income
Ecuador	Upper middle income
Egypt	Lower middle income
El Salvador	Lower middle income

Equatorial Guinea	Upper middle income
Eritrea	Low income
Ethiopia	Low income
Fiji	Upper middle income
Gabon	Upper middle income
The Gambia	Low income
Georgia	Lower middle income
Ghana	Lower middle income
Grenada	Upper middle income
Guatemala	Lower middle income
Guinea	Low income
Guinea-Bissau	Low income
Guyana	Upper middle income
Haiti	Low income
Honduras	Lower middle income
India	Lower middle income
Indonesia	Lower middle income
Iran	Upper middle income
Iraq	Upper middle income
Jamaica	Upper middle income
Jordan	Lower middle income
Kazakhstan	Upper middle income
Kenya	Lower middle income
Kiribati	Lower middle income
Dem. People's Rep. Korea	Low income
Kosovo	Lower middle income
Kyrgyzstan	Lower middle income
Laos	Lower middle income
Lebanon	Upper middle income
Lesotho	Lower middle income
Liberia	Low income
Libya	Upper middle income
Macedonia	Upper middle income
Madagascar	Low income
Malawi	Low income
Malaysia	Upper middle income
Maldives	Upper middle income
Mali	Low income
Marshall Islands	Upper middle income
Mauritania	Lower middle income
Mauritius	Upper middle income
Mexico	Upper middle income
Micronesia	Lower middle income
Moldova	Lower middle income
Mongolia	Lower middle income
Montenegro	Upper middle income
Morocco	Lower middle income
Mozambique	Low income
Myanmar	Lower middle income
Namibia	Upper middle income
Nauru	Upper middle income
Nepal	Low income
Nicaragua	Lower middle income

Niger	Low income
Nigeria	Lower middle income
Pakistan	Lower middle income
Palestine	Lower middle income
Panama	Upper middle income
Papua New Guinea	Lower middle income
Paraguay	Upper middle income
Peru	Upper middle income
Philippines	Lower middle income
Romania	Upper middle income
Russia	Upper middle income
Rwanda	Low income
Samoa	Upper middle income
São Tomé and Principe	Lower middle income
Senegal	Low income
Serbia	Upper middle income
Sierra Leone	Low income
Solomon Islands	Lower middle income
Somalia	Low income
South Africa	Upper middle income
South Sudan	Low income
Sri Lanka	Lower middle income
St. Lucia	Upper middle income
St. Vincent and the Grenadines	Upper middle income
Sudan	Lower middle income
Suriname	Upper middle income
Swaziland	Lower middle income
Syria	Lower middle income
Tajikistan	Lower middle income
Tanzania	Low income
Thailand	Upper middle income
Timor-Leste	Lower middle income
Togo	Low income
Tonga	Upper middle income
Tunisia	Lower middle income
Turkey	Upper middle income
Turkmenistan	Upper middle income
Tuvalu	Upper middle income
Uganda	Low income
Ukraine	Lower middle income
Uzbekistan	Lower middle income
Vanuatu	Lower middle income
Venezuela	Upper middle income
Vietnam	Lower middle income
Yemen	Lower middle income
Zambia	Lower middle income
Zimbabwe	Low income

2. Datasets analyzed

Quality estimates in Section 2 draw on cross-national data from health facility, household, telephone and internet surveys collected between 2007 and 2017. This table presents all surveys for which microdata was analyzed in this Commission. Unless indicated below, we used survey sampling weights. Aggregation across countries are unweighted means, so that each country weighs equally.

Dataset	Available from	Countries and years	Type of data used	Sampling and notes
Service Provision Assessment Survey (SPA)	https://dhsprogram.com/	Ethiopia 2014, Haiti 2013, Kenya 2010, Malawi 2013-14, Namibia 2009, Nepal 2015, Rwanda 2007, Senegal 2015-16, Tanzania 2014-15, Uganda 2007	Direct observations and exit interviews	Nationally representative samples of health facilities, censuses or near-censuses.
Results Based Financing impact evaluations baseline health facility surveys (RBF)	http://microdata.worldbank.org/	Burkina Faso 2013, Central African Republic 2012, Cameroon 2011, Republic of the Congo 2014, Democratic Republic of the Congo 2015, Kyrgyzstan 2012-13, Nigeria 2013, Tajikistan 2014-15	Direct observations	RBF health facility assessment sampling varied by country but generally included all hospitals and a random sample of primary health care facilities in the districts selected for the RBF evaluation. Estimates from the RBF datasets are unweighted.
World Bank Service Delivery Indicators (SDI)	https://data.worldbank.org/data-catalog/service-delivery-indicators	Kenya 2012, Nigeria 2013, Tanzania 2013-14, Togo 2013, Uganda 2013	Clinical vignettes	
Demographic and Health Surveys (DHS)	https://dhsprogram.com/	Afghanistan 2015, Albania 2008-2009, Armenia 2010, Bangladesh 2014, Benin 2011-2012, Bolivia 2008, Burkina Faso 2010, Burundi 2010, Cambodia 2014, Cameroon 2011, Chad 2014-2015, Colombia 2015, Comoros 2012, Republic of Congo 2011-2012, Cote D'Ivoire 2012, Dominican Republic 2013, Democratic Republic of the Congo 2014, Egypt 2014, Ethiopia 2016, Gabon 2012, Ghana 2014, Guatemala 2014-2015, Guinea 2012, Guyana 2009, Haiti 2012, Honduras 2011-2012, Indonesia 2012, Jordan 2012, Kenya 2014, Kyrgyzstan 2012, Lesotho 2014, Liberia 2013, Madagascar 2009, Malawi 2015-2016, Maldives 2009, Mali 2013, Mozambique 2011, Namibia 2013, Nepal 2011, Niger 2012, Nigeria 2013, Pakistan 2012-2013,	Population survey	We used the most recent DHS or MICS survey available if a country had both within the last ten years.

		Peru 2009-2012, Philippines 2013, Rwanda 2014-2015, Senegal 2013-2016, Sierra Leone 2013, Swaziland 2006-2007, Tajikistan 2012, Tanzania 2015-2016, Timor Leste 2010, Togo 2013-2014, Uganda 2011, Ukraine 2007, Yemen 2013, Zambia 2013-2014, Zimbabwe 2015		
UNICEF Multiple Indicator Cluster Surveys (MICS)	http://mics.unicef.org/	Algeria 2012-13, Argentina 2012-13, Belarus 2012, Belize 2011, Bhutan 2010, Bosnia and Herzegovina 2011-12, Central African Republic 2010, Costa Rica 2011, Cuba 2014, El Salvador 2014, Guinea Bissau 2014, Iraq 2011, Jamaica 2011, Kazakhstan 2015, Kosovo 2013-14, Laos 2011-12, Macedonia 2011, Mauritania 2011, Mexico 2015, Moldova 2012, Mongolia 2013-14, Montenegro 2013, Palestine 2014, Panama 2013, Saint Lucia 2012, Sao Tome and Principe 2014, Serbia 2014, South Sudan 2010, Sudan 2014, Suriname 2010, Thailand 2012-13, Tunisia 2011-12, Turkmenistan 2015-16, Vietnam 2013-14	Population survey	We used the most recent DHS or MICS survey available if a country had both within the last ten years.
WHO Study on global AGEing and adult health (SAGE)	http://www.who.int/healthinfo/sage/en/	China 2007-2010, Ghana 2007-2008, India 2007-08, Mexico 2009-10, Russia 2007-2010, South Africa 2007-08	Population survey	
Commonwealth Fund International Health Policy Survey (CWF)	http://www.commonwealthfund.org/interactives-and-data	Australia, Canada, New Zealand, United Kingdom, United States, Germany, Netherlands, France, Norway, Sweden, Switzerland 2013 for all countries	Population survey	Used as high-income comparison only.
Inter-American Development Bank primary care survey (IDB)	N/A	Brazil, Colombia, El Salvador, Jamaica, Mexico, Panama 2013 for all countries	Population survey	
HQSS Commission-led internet survey (HQSS)	N/A	Argentina, China, Ghana, India, Indonesia, Kenya, Lebanon, Mexico, Morocco, Nigeria, Senegal, South Africa 2017 for all countries	Population survey	Internet survey of user experience in 12 LMICs conducted for the Commission by Riwi Corporation. See below for further detail.
Mexican Institute of Social Security	N/A	Mexico 2016	Electronic health records	The Mexican Institute of Social Security (IMSS) is the largest Health

(IMSS)				system in Mexico; it provides healthcare for 62 million affiliates from the formal labor market (51% of the population). Figures based on databases of IMSS performance indicators, which originated from electronic health records at primary care services and hospital-based registries.
Afrobarometer surveys (AFRO)	http://www.afrobarometer.org/data	Algeria, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Cote d'Ivoire, Egypt, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe (All countries surveyed between 2011-2013)	Population survey	
District Level Household and Facility Survey (DLHS)	http://rchiips.org/	India, 21 states 2012-2014	Population survey	
WHO Stepwise Approach to Surveillance (STEPS)	http://www.who.int/ncds/surveillance/steps/en/	Bhutan 2014, Burkina Faso 2013, Guyana 2016, Kenya 2015, Saint Vincent & The Grenadines 2013, Swaziland 2014, Uganda 2014	Population survey	

3. HQSS Commission-led Survey of User Experience in 12 LMICs

Study aims
We commissioned an internet survey of user experience in 12 LMICs from the RIWI Corporation. The survey included questions about demographics, healthcare utilization, the respondent's last healthcare experience, their perceptions of the health system and the healthcare vignettes designed to elicit thoughts about expectations of care.

Study design and sample
We used random domain intercept technology (RDIT^{tm}) to collect survey data through the internet. The methodology is patented by the Riwi Corporation and randomly exposes internet users to an online survey instrument. "RDIT™ delivers anonymous opt-in surveys to random web users who are surfing online by typing directly into the URL bar. When these users make data input errors by typing in websites that no longer exist, or by mistypes on non-trademarked, secure websites that RIWI owns or controls at any given time, RIWI invites these random web users, filtered through a series of proprietary algorithms."

We used RDIT^{tm} to randomly sample web users aged 18 or older in 12 LMIC countries in August and September of 2017. The survey closed when at least 1,000 surveys were completed per country. Countries were purposefully chosen to represent LMICs from all world regions. In order to optimize population representativeness, only countries with internet penetration rates over 20% were selected. Included countries were Senegal, Ghana, Kenya, India, Nigeria, Morocco, Indonesia, South Africa, Lebanon, China, Mexico, and Argentina. The survey instrument was translated to country-appropriate languages and back-translated by native speakers to check for accuracy. Each respondent received a maximum of 23 questions (exact number was dependent on response content and skip-logic).

Sampling weights
Sampling weights were created post-stratification using a ranking algorithm to approximate a nationally representative sample based on the respondent's age, gender, urban/rural and education. The age and gender weight targets were created based on the Census Bureau's 2017 Population Estimates of the country's population. The urban and rural targets were created based on the Central Intelligence Agency database. The education targets for most countries were created based on educational attainment data from the UNESCO Institute for Statistics. Education targets for Nigeria were created based on data from the Demographic and Health Survey conducted by the National Population Commission of Nigeria and education targets for Morocco were based on educational enrolment data from the High Commission for the Plan of Morocco.

Ethical approval
This study (protocol number IRB17-0907) was reviewed by the Harvard University Human Research Protection Program and deemed exempt from full review.

4. Definitions of quality measures included in section 2

Definitions for all the quality measures calculated by the Commission are included below according to the order they are presented in Section 2.

Figure 2A in the report presents composite measures of quality based on adherence to evidence-based guidelines for maternal and child health services. Using guidelines from the WHO, we identified essential elements of care for family planning, antenatal care and sick child care consultations.[1-4] We matched these to indicators available in the Service Provision Assessment Surveys and the baseline surveys of Results Based Financing impact evaluations. Labor and delivery care quality was assessed using a previously validated index.[3] The quality indices were calculated as the percentage of items fulfilled per visit, to provide a continuous quality score scaled from 0 to 100. The table below describes the individual items included in the composite quality indices.

Service	Index components: Recommended care items
Family planning	Asked: age, current breastfeeding, # living children, chronic illness history, reproductive intentions, last delivery, last period, menstruation regularity, smoking history, STI symptoms, desired timing Exam: blood pressure, pelvic exam, weight Prescribed at least one family planning method Counseling: explained how to use method, possible side effects and what to do if have problems, discussed partner status and attitude, risk of STI/HIV, condoms, dual method use, asked about concerns, discussed follow-up visit Privacy: ensured visual and auditory privacy, assured client confidentiality Communication: Used visual aids, checked and wrote on card
Antenatal care	Asked: danger signs, pregnancy history, last period, previous complications[a] Exam: weight, fundal height, oedema, vaginal exam, blood pressure, ultrasound, fetal heart rate[a] Test: syphilis, HIV, anemia, blood group, urine Prevention: tetanus toxoid injection, iron/folic acid, IPTp against malaria[a] Counseling: nutrition, sleeping under ITN, birth plan, supplies for home delivery, breastfeeding[a], postpartum/postnatal care[a], pregnancy spacing[a], wrote on card
Labor and delivery care	Assessment and exam: HIV status, headaches or blurred vision, vaginal bleeding, blood pressure, pulse, washes hands, wears gloves First stage of labor: explains what will happen during labor, prepares uterotonic drug, uses partograph, prepares bags for neonatal resuscitation Second and third stages of labor: correctly administers uterotonic, assess completeness of placenta and membranes, perineal and vaginal lacerations Immediate newborn and postpartum care: dries baby, skin-to-skin, ties or clamps cord, takes mother's vital signs, palpates uterus, initiate breastfeeding
Sick child care	Asked: ability to drink, normal and sick feeding pattern[b], cough or difficulty breathing, diarrhea, fever, vomiting, convulsions, maternal HIV status, ear problems Exam: weight, plots weight on chart, temperature, pallor, oedema, MUAC, jaundice, count respirations, check mouth[b] Gives or checks card for: immunizations, vitamin A, deworming Counseling: how to administer meds if prescribed, gives directions for feeding, danger signs, scheduled or discussed return visit, gave diagnosis, keeping infant warm[b]

[a] Follow-up antenatal care visits only
[b] For children under 2 months old only

All other quality indicators presented in section 2 are defined here.

Figure number or report section	Variable name	Data source	Data type	Numerator	Denominator
Patient assessments	Postpartum checkup for mothers in a health facility after delivery and before discharge	DHS, MICS	Self-report	Women who were examined or asked questions about their health	Women who delivered in a health facility
Patient assessments	Blood pressure, urine and blood samples taken during ANC with skilled provider	DHS, MICS	Self-report	Women who received all of the following at any point during their last pregnancy: blood pressure checked, urine and blood samples taken	Women who had at least one antenatal care visit with a skilled provider during their last pregnancy (doctor, nurse or midwife or country-specific skilled provider)
Figure 2B	Diagnostic accuracy, Malaria with anemia	SDI	Provider test	Correctly identified diagnosis as malaria with anemia from vignette	All providers
Figure 2B	Diagnostic accuracy, Neonatal asphyxia	SDI	Provider test	Correctly identified diagnosis as neonatal asphyxia from vignette	All providers
Figure 2B	Diagnostic accuracy, Diarrhea	SDI	Provider test	Correctly identified diagnosis as diarrhea from vignette	All providers
Figure 2B	Diagnostic accuracy, Pneumonia	SDI	Provider test	Correctly identified diagnosis as pneumonia from vignette	All providers
Figure 2B	Diagnostic accuracy, Diabetes	SDI	Provider test	Correctly identified diagnosis as diabetes from vignette	All providers
Figure 2B	Diagnostic accuracy, Postpartum hemorrhage	SDI	Provider test	Correctly identified diagnosis as postpartum hemorrhage from vignette	All providers
Figure 2B	Diagnostic accuracy, Tuberculosis	SDI	Provider test	Correctly identified diagnosis as TB from vignette	All providers
Figure 3 and figure 11A and B	Received appropriate number of tetanus vaccinations and iron supplements among women who attended ANC	DHS, MICS	Self-report	Women who received an appropriate number of tetanus injections (defined as either 2 during current pregnancy or 1 during current pregnancy and 1 in the past 3 years) and were given or bought iron supplements.	Women who had at least one antenatal care visit with a skilled provider during their last pregnancy (doctor, nurse or midwife or country-specific skilled provider)
Figure 3 and figure 11A and B	Received antibiotics when seeking care at a facility for symptoms of pneumonia	DHS, MICS	Self-report	Children who received antibiotic pills, syrup or injections	Children under 5 who, in the past 2 weeks, have suffered from symptoms consistent with pneumonia (a cough accompanied

					by short, rapid breathing and difficulty breathing as a result of a problem in the chest) and were taken to a medical facility for treatment (including public sector and medical private sector facilities, except for pharmacies)
Figure 3 and figure 11A and B	Received oral rehydration therapy when seeking care at a facility for diarrhea	DHS, MICS	Self-report	Children who received oral rehydration therapy (from oral rehydration salts (ORS), pre-packaged ORS liquid or other homemade fluids)	Children under 5 who had diarrhea in past 2 weeks and were taken to a medical facility for treatment (including public sector and medical private sector facilities, except for pharmacies)
Figure 3	Percent of people aware of their HIV status who are on ART	UNAIDs	Global estimate	People on ART	People living with HIV who know their status
Figure 3	Received minimally adequate treatment among those diagnosed with MDD	World Mental Health Survey[5]	Self-report	Received minimally adequate treatment: either pharmacotherapy (at least 1 month of a medication, plus at least 4 visits to any type of medical doctor) or psychotherapy (at least 8 visits with any professional including religious or spiritual advisor, social worker or counsellor)	Diagnosed with major depressive disorder in the last 12 months
Counseling	Told about potential side effects when first prescribed contraceptives	DHS, MICS	Self-report	Women told about side effects or problems the respondent might have when first obtained the method she is currently using.	Women who were prescribed a family planning method from a health facility
Counseling	Told about danger signs or where to go in case of complications during ANC with skilled provider	DHS, MICS	Self-report	Women told about potential danger signs to look for during pregnancy or where to go in case of complications	Women who had at least one antenatal care visit with a skilled provider during their last pregnancy (doctor, nurse or midwife or country-specific skilled provider)
Counseling	Counseled on HIV (transmission, prevention, getting tested) during ANC with skilled provider	DHS, MICS	Self-report	Women told about AIDS transmitted from mother to child or things to do to prevent AIDS or getting tested for AIDS virus.	Women who had at least one antenatal care visit with a skilled provider during their last pregnancy (doctor, nurse or midwife or country-specific skilled provider)

Counseling	Stated the child diagnosis during sick child consultation	SPA, RBF	Observations	Observed stating the diagnosis during the consultation	Sick child care observations
Counseling	Was told to quit smoking or not start by a healthcare provider among those diagnosed with chronic condition in past 12 months	STEPS	Self-report	Healthcare provider told quit or not start smoking	People diagnosed by a physician or other health care provider with high blood glucose, high blood pressure, or high blood cholesterol in the past 12 months
Counseling	Was told to maintain healthy body weight or lose weight by a healthcare provider among those diagnosed with chronic condition in past 12 months	STEPS	Self-report	Healthcare provider told to maintain health body weight or lose weight	People diagnosed by a physician or other health care provider with high blood glucose, high blood pressure, or high blood cholesterol in the past 12 months
Counseling	Was told to start or do more physical activity by a healthcare provider among those diagnosed with chronic condition in past 12 months	STEPS	Self-report	Healthcare provider told to start or do more physical activity	People diagnosed by a physician or other health care provider with high blood glucose, high blood pressure, or high blood cholesterol in the past 12 months
Counseling	Was told about dietary change by a healthcare provider among those diagnosed with chronic condition in past 12 months	STEPS	Self-report	Healthcare provider told to reduce salt, eat ≥5 servings of fruit and vegetables a day, or reduce fat in diet.	People diagnosed by a physician or other health care provider with high blood glucose, high blood pressure, or high blood cholesterol in the past 12 months
Counseling	Doctor gave advice on diet and exercise	IDB	Self-report	Doctor gave advice on exercise, diet and stress	Has at least one chronic condition
Prevention, detection	Proportion up-to-date with preventive exams	IDB	Self-report	Had blood pressure checked in last year and cholesterol measured in last 5 years	All adults over 18 years old
Prevention, detection	Women aged 50-69 who had a mammogram in past 3 years	SAGE	Self-report	Had a mammogram in the past three years	Women age 50-69 years old
Prevention, detection	Tested for HIV during ANC	DHS, MICS	Self-report	Women tested for HIV	Women who had at least one antenatal care visit
Continuity, Figure 11A and B	Retained in ANC until the 4th visit among women who had at least 1 visit	DHS, MICS	Self-report	Women who had at least 4 antenatal care visits during their last pregnancy	Women who had at least one antenatal care visit during their last pregnancy
Continuity, Figure 11A and B	Received the third dose for DTP by one year of age, among those who had received the 1st dose	DHS, MICS	Self-report	Children who had all three doses of the diphtheria, tetanus, pertussis vaccine by one year of age	Children who received at least one dose of the DTP vaccine
Continuity	Percentage of people living with HIV known to be on ART 12 months after starting	DHS, MICS	Global estimate	On ART 12 months after beginning ART	People living with HIV on ART

Timely care	Woman was checked within 1 hour of delivery after giving birth in a facility	DHS, MICS	Self-report	Women who were examined or asked questions about their health within one hour of delivery	Women who delivered in a health facility
Timely care	Timely breast cancer diagnosis	IMSS	Electronic health records	Number of women with opportunity for timely breast cancer diagnosis, defined as women with time between mammography and histopathological diagnosis less than 30 calendar days	Number of women ≥25years with breast cancer diagnosis who had mammography and histopathological confirmation in 2016
Timely care	Timely cervical cancer diagnosis	IMSS	Electronic health records	Number of women with opportunity for timely cervical and uterus cancer diagnosis, defined as women with time between Papanicolaou and histopathological diagnosis less than 30 calendar days	Number of women ≥25years with cervical and uterus cancer diagnosis who had Papanicolaou and histopathological confirmation in 2016
Timely care	Timely breast cancer treatment	IMSS	Electronic health records	Number of women with opportunity for timely breast cancer treatment, defined as women with time between histopathological confirmation of Breast Cancer diagnosis and the beginning of therapy less than 21 days	Number of women ≥25years with breast cancer diagnosis who had mammography and histopathological confirmation in 2016
Timely care	Timely cervical cancer treatment	IMSS	Electronic health records	Number of women with opportunity for timely cervical and uterus cancer treatment, defined as women with time between histopathological confirmation of cervical and uterus cancer diagnosis and the beginning of therapy less than 21 days	Number of women ≥25years with cervical and uterus cancer diagnosis who had Papanicolaou and histopathological confirmation in 2016
Figure 4	Never experienced lack of attention or respect from public facility staff	AFRO	Self-report	Never experience problem with lack of attention or respect from staff at local public clinic or hospital in the last 12 months	Visited public health facility in past 12 months
Figure 4	Rated respect at last outpatient visit as good or better	HQSS	Self-report	Rates quality of respect the provider showed at their last visit as "Good", "Very good" or "Excellent"	Visited any health facility in past 12 months
Figure 4	Regular GP explains things in a way that is easy to understand	IDB, CWF	Self-report	Regular doctor explains things in a way that is easy to understand always or often	Has a regular doctor
Figure 4	Rated how the provider listened at	HQSS	Self-report	Rates how well the provider listened	Visited any health facility in past

	last outpatient visit as good or better			during their last visit as "Good", "Very good" or "Excellent"	12 months
Figure 4	Regular GP spends enough time with you	IDB, CWF	Self-report	Regular doctor spends enough time with you always or often	Has a regular doctor
Figure 4	Rated how much time the provider spent with patient at last outpatient visit as good or better	HQSS	Self-report	Rates the time the provider spent with him/her in the past visit as "Good", "Very Good" or "Excellent"	Visited any health facility in past 12 months
Figure 4	Rated wait time at last outpatient visit as good or better	HQSS	Self-report	Rated the wait time at their last facility visit as "Good", "Very good" or "Excellent"	Visited any health facility in past 12 months
Figure 4	Did not have a problem with the wait time at this visit	SPA	Self-report	Does not have a problem with the amount of time s/he waited before being seen at the visit today	All exit interview respondents
Figure 4	Did not have a problem with the amount of explanation received during this visit	SPA	Self-report	Does not have a problem with the amount of explanation received during this visit	All exit interview respondents
Morbidity	Number of women who reported ever experiencing symptoms of a fistula among those whose last birth was attended by a skilled provider per 1,000	DHS	Self-report	Ever experienced a constant leakage of urine or stool, occurred after a delivery or some other event.	Most recent delivery was with a skilled birth attendant
Morbidity	Percent of people on ART who achieve viral suppression	UNAIDs	Global estimate	Achieve viral suppression (less than 1000 copies per ml)	People living with HIV on ART
Morbidity	Percent of people receiving treatments for chronic lung disease who report no symptoms from the disease in the past 2 weeks	SAGE	Self-report	Experienced no symptoms (shortness of breath at rest, coughing or wheezing for 10 minutes or more or coughing up sputum or phlegm for most days of the month) in the last two weeks	Taken any medications or other treatment (like oxygen) for diagnosed chronic lung disease in the past 12 months
Morbidity	Percent of people receiving treatments for depression who report no symptoms from the disease in the past 2 weeks	SAGE	Self-report	Experienced no symptoms in past twelve months, following definition of Arokiasamy et al, shown below*.	Taken any medication or other treatment (including attending therapy or counseling sessions) for diagnosed depression in the past 12 months
Figure 7	Believes the system works pretty well and only minor changes are needed	HQSS, IDB, CWF	Self-report	Agrees with statement: On the whole, the system works pretty well and only minor changes are necessary to make it work better.	All respondents
Figure 7	Thinks government handles	AFRO	Self-report	Says government is doing very well	All respondents

	improving basic health services well			at improving basic health services.	
Figure 7	Confident that if sick will receive the most effective treatment	IDB	Self-report	Confident that if sick will receive the most effective treatment	All respondents
Figure 7	Confident that if got sick tomorrow, could get the care s/he needed	HQSS	Self-report	"Somewhat confident" or "Very confident" would be able to receive effective treatment from the health system if s/he becomes very sick tomorrow	All respondents
Utilization and bypassing, Figure 8	Bypass public facilities	DLHS	Self-report	Usual source of treatment when household member gets sick is private facility, NGO, home treatment, chemist, or non-medical shop	All respondents
Utilization and bypassing, Figure8	Bypassers cited at least one quality concern	DLHS	Self-report	Selected any of the following options for not attending a government facility: poor quality of care, doctor not available, health personnel often absent, no adequate infrastructure, drugs not available, distrust for government facilities, waiting time too long, or facility timing not convenient.	Households that do not use government facilities for their main source of treatment when a member gets sick
Panel 3	Very satisfied with family planning visit	SPA	Self-report	Reported "very satisfied" with today's visit	Family planning clients
Panel 3	Very satisfied with ANC visit	SPA	Self-report	Reported "very satisfied" with today's visit	ANC clients
Panel 3	Very satisfied with sick child visit	SPA	Self-report	Reported "very satisfied" with today's visit	Sick child caregivers
Panel 3	Rated hypertension patient vignette as good, very good or excellent quality	HQSS	Self-report	Reported vignette quality was "good", "very good" or "excellent". Vignette: [Anthony] is a 45-year old man with high blood pressure who needs a regular check up. As the health facility, the nurse does greet him, introduce herself and change his medications. She does not ask about his symptoms or check his blood pressure.	All respondents who completed the survey through question 20.
Figure 9	Reports assistance from PCP in	IDB	Self-report	Regular doctor helps to coordinate	Has a regular doctor

	coordinating care among those who have a regular PCP			care	
Figure 9	Primary care provider (PCP) knows medical history among those who have a PCP	IDB	Self-report	Regular provider knows medical history	Currently has a regular doctor
Figure 9	Used emergency room for a condition that could have been treated at the primary care level	IDB	Self-report	Used emergency room for a primary health care treatable case	At least one emergency room visit in the past 2 years
Figure 9	Has a national universal access phone number for pre-hospital care (yes/no)	WHO Global Health Observatory	Global estimate	Existence of a universal access telephone number for pre-hospital care	Low and middle income countries
Figure 9	Is able to transport at least 50% of patients seriously injured by ambulance following road traffic crashes (yes/no)	WHO Global Health Observatory	Global estimate	Reported % of seriously injured patients transported by ambulance	Low and middle income countries
Figure 9	Specialist had basic medical information about the patient from the GP	IDB	Self-report	Specialist had basic information from regular doctor	Seen any specialist doctors in the past 2 years
Figure 9	GP subsequently had the results after the specialist visit	IDB	Self-report	Regular doctor had up-to-date information after specialist visit	Seen any specialist doctors in the past 2 years
Figure 11C	Rated overall quality of visit as good or better	HQSS	Self-report	Rates the overall quality of the past visit as "Good", "Very Good" or "Excellent"	Visited any health facility in past 12 months
Figure 11C	Rated the provider's knowledge at visit as good or better	HQSS	Self-report	Rates the time the provider's knowledge during past visit as "Good", "Very Good" or "Excellent"	Visited any health facility in past 12 months
Section 2 – Who receives worse quality care?	Treated poorly by health staff because of identity	HQSS	Self-report	Reported health staff had ever treated them poorly for one of the following reasons: poverty, religion, ethnicity or language, immigration or migrant status, education, romantic or sexual attraction to someone of the same sex, type of illness, gender, other	All respondents

* The numerator for the indicator *Percent of people receiving treatments for depression who report no symptoms from the disease in the past 2 weeks* calculated using SAGE data is based on the definition of depression by Arokiasamy et al[6], copied below.

Question No	Question text and algorithm to ascertain disease
1	During the last 12 months, have you had a period lasting several days when you felt sad, empty or depressed?
2	During the last 12 months, have you had a period lasting several days when you lost interest in most things you usually enjoy such as personal relationships, work or hobbies/recreation?
3	During the last 12 months, have you had a period lasting several days when you have been feeling your energy decreased or that you are tired all the time?
	If any of the above three questions are yes then following set of questions were asked
4	Was this period [of sadness/loss of interest/low energy] for more than 2 weeks?
5	Was this period [of sadness/loss of interest/low energy] most of the day, nearly every day?
6	During this period, did you lose your appetite?
7	Did you notice any slowing down in your thinking?
8	Did you notice any problems falling asleep?
9	Did you notice any problems waking up too early?
10	During this period, did you have any difficulties concentrating; for example, listening to others, working, watching TV, listening to the radio?
11	Did you notice any slowing down in your moving around?
12	During this period, did you feel anxious and worried most days?
13	During this period, were you so restless or jittery nearly every day that you paced up and down and couldn't sit still?
14	During this period, did you feel negative about yourself or like you had lost confidence?
15	Did you frequently feel hopeless - that there was no way to improve things?
16	During this period, did your interest in sex decrease?
17	Did you think of death, or wish you were dead?
18	During this period, did you ever try to end your life?
Algorithm	To ascertain the depression from this set of questions two set of variables were computed. First set was based on the questions1, 2, 3, 4, 5 and 16. From this set three variables were computed taking values 0 and 1: a) first variable takes value 1 if response to any of questions 1, 4, and 5 was yes. b) second variable takes value 1 if question 2 or 16 has response yes. c) the third variable takes value 1 if question 3 has response yes. The second set of variables was based on questions 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17 and 18. From these questions seven variables were computed. a) first variable takes value 1 if response to questions 14 or 15 is yes. b) second variable takes value 1 if response to questions 12 or 13 is yes. c) third variable takes value 1 if questions 17 or 18 has response yes. d) fourth variable takes value 1 if questions 7 or 10 has response yes. e) fifth variable takes value 1 if response to questions 11 is yes. f) sixth variable takes value 1 if response to questions 8 or 9 is yes. g) seventh variable takes value 1 if the response to question 6 is yes. These newly created variables from the respective sets were added to obtain two new variables: first consisting sum of first set of variables (maximum value 3) and second consisting sum of second set of variables (maximum value 7). Based on these two variables, a respondent is said to suffer from depression if he has value for the first variable to be 2-plus and the value for second variable to be 4-plus.

5. Panel 2: Beyond the numbers – experiences in the health system: review

Between November 1st and November 25th, 2017, we conducted a rapid review of qualitative studies on the experiences of the poor within the health system in LMICs. A search of PubMed returned 335 results, which were screened using titles/abstracts. Of these, 60 were selected for full-text review and 39 were selected for final inclusion. The reference lists of included studies were reviewed for relevant papers, yielding an additional 9 studies. Themes and quotes were extracted with the focus on explaining how poor people experience elements of competent care and user experience in the health system.

Search strategy:

[“healthcare disparities” or “differential treatment”] + [“disparities” or “inequality” or “inequalities”] + [“poor” or “marginalized” or “indigent” or “disadvantaged” or “low-income” or “vulnerable”] + [“informant” or “focus group” or “qualitative”] + [LMIC hedge]

6. Adjusting for quality in the Lives Saved Tool

Victoria B. Chou, Mufaro Kanyangarara, and Neff Walker
Full manuscript forthcoming

Using a linking approach to combine available health facility and household survey data, baseline levels of coverage for key maternal and neonatal interventions were estimated in 17 countries. The maternal and newborn health interventions (n=19) span across the continuum of care covering the antenatal to postnatal period. The impact of scaling up these specific services was quantified using the Lives Saved Tool (LiST) for a representative sample of 81 focus countries adopted by the ***Countdown to 2030*** consortium. Of the global burden, these countries represent an estimated 89% of the neonatal deaths, 96% of the maternal deaths, and 87% of the stillbirths occurring worldwide.

Baseline coverage for countries with available data to analyze a linked dataset was estimated based upon uniform indicator definitions specifying the minimum components required for adequate delivery of each individual maternal or neonatal intervention. Median values derived from this sample were applied as the baseline or starting coverage for countries without a linked dataset and reported levels of utilization (e.g. proportion of women who attended four or more antenatal visits (ANC4+) or percentage of births delivered in a health facility) were applied as the country-specific targets or “cap” for modeling improvements in the quality of care provided. Ranges were calculated by applying lower or upper bounds to the estimates for baseline coverage in the set of 81 modeled countries.

7. Why quality of maternal mental health care may suffer for vulnerable groups: An illustration with perinatal depression care in primary care setting in Nigeria (Panel 4)

Olatunde Olayinka and Oye Gureje
Full manuscript forthcoming

We conducted a formative study as a part of an implementation research project to assess the factors that may promote or hinder the delivery of quality service to women with perinatal depression. The project, Scaling up Care for Perinatal Depression for Improved Maternal and Infant Health (SPECTRA), is being conducted in randomly selected primary health care (PHC) facilities across all the 11 local government areas (LGAs) in and around Ibadan city in the south-western part of Nigeria.

The formative study sought to address three questions: 1) What is the current organizational structure of the clinics in regard to the delivery of quality chronic care? 2) How able are providers in these clinics to identify and provide treatment for women with perinatal depression? And 3) How do women with maternal depression rate the standard of care in the clinics?
To address the first question, we administered the *Assessment of Chronic Illness Care (ACIC)* (8) to the facility managers in 23 maternal care clinics. The ACIC is a widely used tool to evaluate the standard of care provided to patients who are in need of sustained care. Specifically, we assessed the capacity of the maternal care facilities to provide care and support to patients with perinatal depression. The items of the tool, which are organised into 7 different domains, are scored on a Likert scale, giving an average domain score that ranges from 0 to 11. A score between "0" and "2" corresponds to the lowest level of support for chronic care while a score between "9" and "11" indicate fully developed chronic illness care programme.

To address the second question, consecutively registered women presenting for routine antenatal care and who had previously consented to participate in the study were screened with *Edinburgh Postnatal Depression Scale (EPDS)* (9) to identify those with perinatal depression, after they had been seen by the primary health care workers (PHCWs). The EPDS has been validated in our setting and, for the purpose of this exercise, a score of 10 or more out of a possible total of 30 was regarded as indicative of moderate depression. Over a period of 6 months, 218 of such cases were identified. We made a determination of whether a woman who screened positive to depression using the EPDS had been recognised as having a psychological problem by the maternal care provider. For this, we used a fairly broad definition of detection. First, we reviewed the case records made on each of the patients by the providers to see whether any entry had been made to indicate that any psychological problem had been noted or treated. That is, the entry did not have to specify a diagnosis, just an indication of any symptoms or reported emotional problem. Second, we conducted an assessment of the women who screened positive in their homes within 72 hours of being screened in the maternal care clinic. We enquired from them whether they had been asked any question about their mood, sleep, worry or any emotional concern. Irrespective of the answer they provided and to address the third research question, the respondents were asked to rate 1) the overall quality of care provided in the clinics and 2) their

level of satisfaction with care provided. Each of the items was framed in such a way that it can be rated on a binary "Yes/No" scale.

Section 3: The ethical basis of high-quality health systems

1. Social accountability for health quality review

We conducted a scoping review of systematic reviews on community accountability mechanisms in the health sector in low-and-middle income countries. We searched PubMed, Embase and Web of Science using a combination of search terms related to community accountability mechanisms. We excluded non-English language reviews, reviews published before 2000, reviews on high income countries, and reviews on accountability mechanism outside of the health sector. We assessed each study for quality, using GRADE ratings for quantitative studies and GRADE-CERQual for qualitative studies and excluded any studies rated as "Low" or "Very Low" quality.

2. Actions to support legal and social accountability, review (Panel 7)

Between September 18th and November 10th, 2017, we conducted a synthesis review informed by realist principles of incorporating iteration and purposeful article selection based on relevance to the research question. A WHO expert group with representatives from reproductive, maternal and child health and law and governance identified the underlying assumptions to the accountability-quality interface and designed a conceptual framework. We conducted PubMed and Google Scholar searches using the search terms "accountability," "quality" and "health" for English language reviews, systematic reviews or reports in low-income and middle-income countries (World Bank classification) since 2000. We combined this with suggestions of relevant literature from the expert group and snowballing using the reference lists. Articles were included based on their ability to provide information relevant to our research question and aim. Data from the identified articles was extracted based on a pre-defined data extraction table which sought to explore elements of what accountability approaches work, for whom, and why and in what contexts. This focused on explaining the relationships between accountability and quality, the contexts in which they interact, the mechanisms by which accountability for quality in health work and the quality outcomes described in the secondary literature. Data extraction was conducted by two reviewers, with synthesis of results in real time in discussion with the expert group.

Section 4: Measuring health system quality

1. Quality subdomains in global, cross-national, and national measurement sets, indicator review (Figure 12)

Hannah H. Leslie, Naima T. Joseph, David Sando, Carmen Santamaría, Laura del Pilar Torres-Arreola, Svetlana V. Doubova
Manuscript with detailed results of Mexican indicator review forthcoming

We purposively identified indicator sets defined by global and multi-country organizations for health system assessment or global development. We additionally obtained the most common standard health facility assessments and the household survey used most broadly in low- and middle-income countries. We invited national commissions to provide lists of national health system indicators and were able to find several such lists publicly available from Ministries of Health or similar entities.

The reviewed sets were:

- Countdown 2030 Indicators approved for 2017, Tier 1 and Tier 2: http://countdown2030.org/wp-content/uploads/2017/12/Technical-Review-Process_tables.pdf
- EURO Health for All Database, July 2016 version: http://data.euro.who.int/hfadb/
- OECD Health Indicators as of September 2017 in categories: health care quality, health expenditure and financing, health status, health care resources, health care utilisation, social protection, non-medical determinants of health. http://stats.oecd.org/index.aspx?datasetcode=Health
- SDG health indicators: indicators in the July 6 2017 Resolution adopted by the General Assembly on Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development (A/RES/71/313), Annex (https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework_A.RES.71.313%20Annex.pdf) and indicators within the proposed UHC coverage index for SDG 3.8.1: http://www.thelancet.com/journals/langlo/article/PIIS2214-109X(17)30472-2/abstract
- WHO Core 100 (2015 version): www.who.int/healthinfo/indicators/2015/en/
- WHO IPCHS global indicators, proposed September 2017
- DHS: Demographic and Health Survey Core questionnaire version 7 plus current modules – biomarkers, accident and injury, maternal mortality, disability, domestic violence, female genital cutting, fistula, health expenditure, male child circumcision, non-communicable disease, and newborn care. https://dhsprogram.com/What-We-Do/Survey-Types/DHS.cfm
- SARA: Service Availability and Readiness Assessment, indicators included in 2015 readiness indices (version 2.2). http://www.who.int/healthinfo/systems/sara_reference_manual/en/
- Service Delivery Indicator Survey – Health, Kenya 2012 version, including clinical vignettes. http://siteresources.worldbank.org/AFRICAEXT/Resources/SDI-Report-Kenya.pdf

- Service Provision Assessment, Core questionnaire June 2012 revision, including observation / exit of antenatal care, family planning, and sick child care https://dhsprogram.com/What-We-Do/Survey-Types/SPA-Questionnaires.cfm
- Ethiopia Federal Ministry of Health HMIS Indicator Definitions, Technical Standards: Area 1, March 2014
- Republic of Kenya Health Sector 2nd Edition Indicators, Health Information System, September 2012
- Mexico: the Mexican national HQSS Commission undertook a full review of indicators from the major health systems, assessing multiple sources to develop a full list of indicators. These sources were:

  1. Ministry of Health. Mexican Health Sector Program 2013-2018. Mexico, 2013. (Secretaria de salud. Programa Sectorial de Salud 2013-2018) Available at: www.conadic.salud.gob.mx/pdfs/sectorial_salud.pdf (accessed May 4, 2017).
  2. Ministry of Health. The National System of Quality Indicators in Health. Mexico (Secretaria de Salud. El Sistema Nacional de Indicadores de Calidad en Salud (INDICAS)) . Available at: http://dgces.salud.gob.mx/INDICASII/consulta.php (accessed May 4, 2017).
  3. Ministry of Health. Matrix of indicators for results 2016. Mexico. (Secretaria de Salyd. Matriz De Indicadores Para Resultados 2016) Availbale at: http://www.dgpop.salud.gob.mx/mir-resultados-2016.aspx (accessed june 10, 2017).
  4. General Health Council. Commission for the certification of medical care establishments. Standards for the certification of primary care clinics and consultation of specialties 2015. General Health Council. Mexico, 2015. (Consejo De Salubridad General. Comisión para la certificación de establecimientos de atención médica. Estándares para la certificación de clínicas de atención primaria y consulta de especialidades 2015. Consejo De Salubridad General. México, 2015.)
  5. General Health Council. Commission for the certification of medical care establishments. Model of the General Health Council for Health Care with Quality and Safety. Standards to certify hospitals 2015. Second edition. Mexico, 2015. (Consejo De Salubridad General. Comisión para la certificación de establecimientos de atención médica. Modelo del Consejo de Salubridad General para la Atención en Salud con Calidad y Seguridad. Estándares para certificar hospitales 2015. Segunda edición. México, 2015.)
  6. Cortés-Ponce IV. Model of Evaluation of the Integrated Clinical Record and of Quality. Ministry of Health. General Directorate of Quality and Health Education. Mexico, 2015. (Cortés-Ponce IV. Modelo de Evaluación del Expediente Clínico Integrado y de Calidad. Secretaria de Salud. Dirección General de Calidad y Educación en Salud. Mexico, 2015) Available at: http://calidad.salud.gob.mx/site/mail/2015/01/doc/02_J.pdf (accessed July 9, 2017).
  7. Tinoco-Morales LA. Citizen endorsement. Ministry of Health. General Directorate of Quality and Health Education. Mexico, 2016 (Tinoco-Morales LA. Aval cuidadano. Secretaria de Salud. Dirección General de Calidad y Educación en Salud. Mexico, 2016)
  8. Ministry of Health. Guidelines for the use of the unified management system tool (SUG), attention and guidance to the user of health services. Ministry of Health. General Directorate of Quality and Health Education. Mexico, 2015 (Secretaria de Salud. Lineamiento para el uso de la herramienta sistema unificado de gestión (SUG) atención y orientación al usuario de los servicios de salud. Secretaria de Salud. Dirección General de Calidad y Educación en Salud. 2ª edición. Mexico, 2015)
  9. Ministry of Health. Epidemiological indicators. Walking to excellence. Ministry of Health. General Directorate of Epidemiology. Mexico, 2015 (Secretaria de salud. Indicadores

epidemiológicos. Caminando a la excelencia. Secretaria de salud. Dirección General de Epidemiologia. Mexico, 2015)
10. Methodological Manual of Medical Indicators 2016. Mexican Institute of Social Security. Mexico, 2016. (Manual Metodológico de Indicadores Médicos 2016. Instituto Mexicano del Seguro Social. Mexico, 2016)
11. Indicators 2012-2016. Institute of Social Security of State Workers. Mexico, 2016. (Indicadores 2012-2016. Dirección médica. Subdirección de Gestión y evaluación en salud. El Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE). México, 2016.)
12. Technical Data Sheets of Indicators of Performance of the Second Level of Health Care. Institute of Social Security of State Workers. Mexico, 2016. (Fichas Técnicas de Indicadores de Desempeño del Segundo Nivel de Atención a la Salud. El Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE). México, 2016.).
13. ISSSTE. Stats reported to the government 2016. (ISSSTE. Estadísticas reportadas al gobierno, 2016.) (Available at: ttp://www.issste.gob.mx/datosabiertos/anuarios/anuarios2016.html#cap1) ((accessed August, 2017).)

- Nepal: HMIS Indicators Nov 25, 2013
- Senegal: Senegal DHIS2 indicators, August 2017

The intended purpose of these indicator sets differs (and is frequently left unstated). The global sets are intended to monitor progress between and within countries in distinct areas - maternal, newborn, and child mortality for Countdown 2030; SDG targets for the SDG indicators, health systems for the WHO Core 100 - presumably with the aims of holding stakeholders accountable and galvanizing action. In contrast, DHS household surveys are intended to provide estimates of basic demographic and health indicators to inform decision-making. SPA surveys are intended to provide information on availability and performance of health services, with minimal information on the intended use of such information. SDI surveys are intended to enable tracking of quality and performance of service delivery. The SARA survey clearly states the intended purpose to "assess and monitor the service availability and readiness of the health sector and to generate evidence to support the planning and managing of a health system."[7]

We extracted all indicators from each included set as defined above. We sorted the indicators into major groupings: i) disease incidence / prevalence / risk factors, ii) utilization, iii) content of care, iv) outcome, and v) health system. Indicators can be considered to fall into multiple groupings; we selected a single group for each indicator based on the following guidelines:

- Utilization vs. content of care: from the patient perspective, the service they come to the facility for is utilization – e.g., ANC, male circumcision, sick-child visit. The clinical services delivered during that visit – tetanus vaccination, malaria treatment, etc. – are the content of care.
- Disease incidence vs. outcome: primary incidence of disease would be incidence, while secondary incidence, complications, admissions, etc. would be outcomes. Overall mortality is considered incidence, while cause-specific mortality for healthcare amenable causes (maternal mortality, neonatal mortality) is an outcome

We next considered whether the indicator could be mapped to the HQSS quality framework in any area. If so, it is defined as a potential quality indicator in the health system. The assessment is informed by HQSS commission priorities. Given the people-centered focus of the commission, all measures are assessed in relation to the clinical visit rather than the component of the health

system, e.g. if the indicator measured human resource or lab services even if it measured an outcome in relation to these inputs it is still considered an input indicator in this analysis. Each indicator was classified into the single best fitting category.

Indicators relevant to quality were further subdivided based on the quality framework into domains and sub-domains: foundation (governance, platforms, workforce, tools, population), process measures (competent care and positive user experience) and impact measures (health, confidence, economic benefit). Each indicator should be mapped to one sub-domain. When an indicator is defined in a way that crosses sub-domains, such as 'lab with capacity to complete a specific test', we classified it into the more downstream sub-domain, in this case tools rather than platforms. We separately note whether the measure comes directly from patient (or population) reporting; indicators that are patient-reported will also be classified under an HQSS sub-domain. Classifications were performed iteratively with three raters all working through an initial pilot set to finetune methods and increase interrater agreement. Most sets were single coded; a single rater (HHL) checked all global and survey indicators for overall agreement and to identify revisions due to changes in the HQSS framework. Country indicator sets were assessed by national experts when possible, following the same guidelines but with the capacity to interpret sub-domains differently based on the context. Following classification, we color coded cells on a red-yellow-green spectrum. Within each indicator set, the most common sub-domains are green, the least (0 indicators) red, and those in between are shades of orange and yellow.

2. Innovation in patient experience and outcome measure: mobile data collection of patient reported outcome measures among women in Nairobi, Kenya (Panel 11)

Ishtar Al-Shammari, Lina Roa, Thomas Kelley, Christina Akerman, Annelies Dekker, Ramona Koech, Nicole Spieker, John Meara, David Ljungman
Full manuscript forthcoming

Introduction
The International Consortium for Health Outcomes Measurement (ICHOM) and the PharmAccess Foundation (PAI) set out to better understand the application of value based healthcare (VBHC) principles in a low resource setting. Using mobile technology to provide direct access to patients, this pilot aimed to design, test and evaluate the implementation of selected ICHOM outcome indicators to promote the inclusion of pregnant women in the care process and to deliver proof of concept with the following objectives:

1. Identify and test a model for collecting patient reported outcomes in pregnancy and childbirth in a low resource setting
2. Identify the feasibility and scalability of using mobile platforms to measure PROMs
3. Identify how to engage patients in collecting PROMs and motivate healthcare providers to measure outcomes

Selecting indicators to pilot
Following a structured review process with medical and local experts, key outcome variables to pilot were selected from the ICHOM PCB Standard Set (table). The aspects considered were:

1. Importance in the local Maternal Neonatal Child Health context

2. Feasibility (including length of questionnaire, ease of integration with mHealth, reporting source and time point for collection)
3. Acceptability (cultural and social)
4. Literacy (considering the complexity of questionnaires)

Table: Selection criteria and selected outcome indicators from the ICHOM pregnancy and childbirth standard set.

Selected case-mix variables	
Administrative	▪ Patient ID (mobile number) ▪ Facility type ▪ Route of delivery
Patient-reported	▪ Age ▪ Education Level ▪ Social support ▪ Parity ▪ Obstetric history ▪ Medical history (comorbidities) ▪ Multiple gestations ▪ Body height and weight ▪ Substance use (alcohol, drug and tobacco) ▪ Congenital anomalies
Selected outcome variables	
Patient reported health status	▪ Incontinence ▪ Pain with intercourse
Breastfeeding	▪ Success with breastfeeding
Mental Health	▪ Pre/ post-partum depression
Satisfaction with care	▪ During pregnancy, labour and after baby was born

Patient enrolment and data collection

Five facilities, providing antenatal, delivery and postnatal care services were involved and patient liaison officers (PLOs) were trained to support patient enrolment, maintain engagement and oversee follow-up. Two sources of data were collected: patient-centered outcomes and administrative data, utilising two mobile platforms currently and widely used in Kenya

- M-TIBA, a health wallet that tracks patients through the health system, used for real-time collection of medical and financial data
- mSurvey deploys SMS text messages for collection of PROM data on receipt of a trigger from M-TIBA regarding interaction with the health system

PLOs enrolled patients who had access to a mobile phone and comprehension of written English during antenatal care (ANC) visits in their third trimester of pregnancy. Data collection is illustrated in the Figure below.

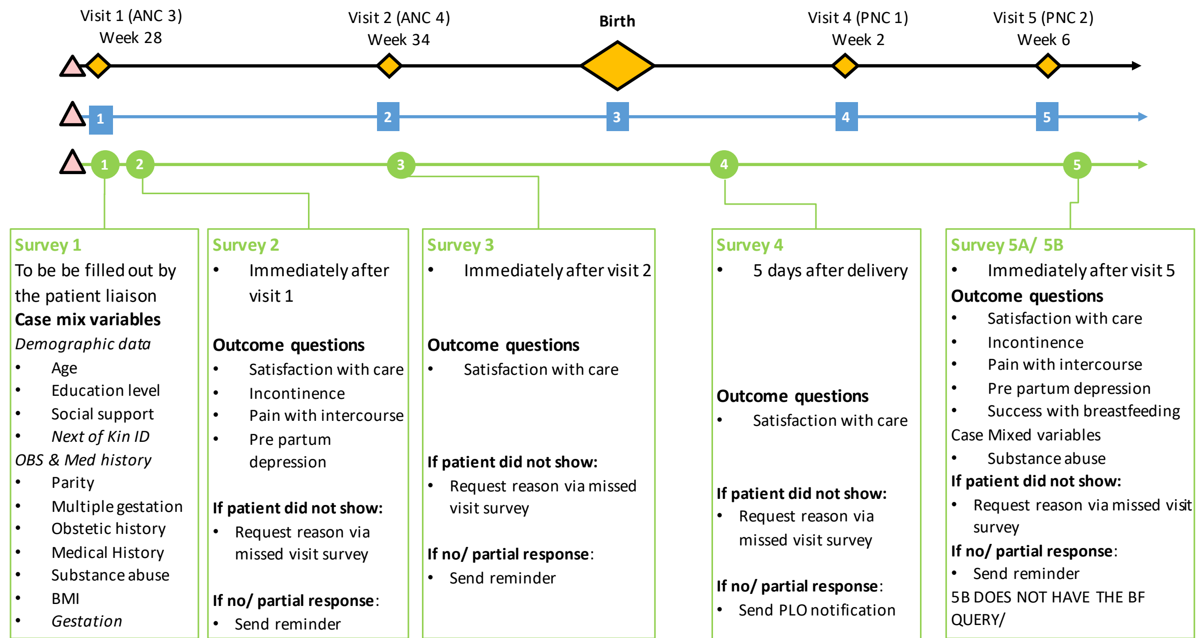

Figure: Patient ANC, delivery and PNC appointment timeline and data flow diagram for women enrolled in the pilot

Section 5: Improving health systems at scale

1. Intervention typology analysis

To better understand the content and distribution of published intervention types designed to improve the quality of healthcare in LMICs, we identified comprehensive lists or taxonomies through expert recommendation and review of the literature. Lists were included if they met the following criteria:

1. Peer reviewed
2. Systematically collected
3. Relevant to improving the quality of health care in LMICs

The HQSS health system language (micro, meso, macro) was used as a coding system. These codes were applied to the improvement interventions found in the comprehensive lists or taxonomies identified above. Interventions were coded with this deductive code system twice (by DM and PAC). Discrepancies were resolved by SRD and MEK. The full coded data was synthesized into an organizational system by SRD, ADG and MEK. An iterative process of review, discussion and feedback by the HQSS working group on improvement led to the final organizational system as well as a table with examples of interventions (see supplemental materials appendix). Dedoose was used for qualitative coding (Version 7.5.9, SocioCultural Research Consultants, LLC, Los Angeles, CA).

The following taxonomies and organizational systems were reviewed:

a. Effective practice and organisation of care (EPOC) Taxonomy[8]
b. Disease control priorities in developing countries[9]
c. United States Agency for Healthcare Research and Quality[10]
d. Rowe[11]
e. Leatherman[12]
f. Powell[13]

Deductive Codebook

Code	Definition	Example
Micro	Interventions that improve the quality of care and are implemented at the interface between the health system and users of the health system. These do not include interventions that are implemented at other levels of the health system that may have an impact at the interface with users. Health workers, facilities or individual users may be targeted	In-service training
Meso	Interventions that improve the quality of care and are implemented at the local government level (district, sub-national) through coordination or improved communication	Quality improvement collaboratives
Macro	Interventions that improve the quality of care and are implemented at the national level. These may include the public or private sector and may lead to improvement through the following areas: generating demand, governance, health professional education, incentives and financing	Citizen engagement in national health system design

2. Types of interventions and levels targeted to improve quality of primary health care: a scoping review (Figure 15)

Safiah Hwai Chuen Mai, Shannon Barkley, Hernan Montenegro
Full manuscript forthcoming

Search Strategy Overview

1. Article published 2008 onward which
2. Article includes literature review capturing both concepts: Primary Health Care + Quality Improvement
    a. "Primary Health Care" as MeSH term, keyword, abbreviation, or text in the title or abstract
    b. "Quality Improvement": articles containing at least one of the following three components:
        i. articles tagged with a major focus being any method by which quality of care may be improved (79 terms including clinical competence, guideline adherence, health care evaluation mechanisms, continuity of patient care, patient-centered care, progressive patient care, etc.)
        ii. articles tagged with or containing the "quality improvement" MeSH term, keyword, abbreviation or text in the title or abstract
        iii. articles containing other phrases which may refer to quality improvement (quality, improve, enhance, or optimize followed by intervention, initiation, strategy, program, outcome, or performance within 2 words)

Search Strategy Filters

-Health Information Research Unit (HIRU) filter for reviews (HEDGES group, McMaster University for Reviews, HIRU filter demonstrated to have 98% sensitivity, 91% specificity, 14% precision, 91% accuracy): article tagged by MEDLINE database as either a meta-analysis or review or contains "search" in the title or abstract

Databases Searched

-MEDLINE, Embase, CINAHL, Global Index Medicus (regions, databases: Americas LILACS, Western Pacific WPRIM, South-East Asian IMSEAR, Eastern Mediterranean IMEMR, and Africa AIM), and the Cochrane Library.

*Search strategies have been adapted for each database. For databases and regions from which literature is sparse and limited, search criteria were adapted to capture the maximum number of articles, recognizing that specificity and accuracy were reduced.

Exclusion Criteria (if no to any queries below):

-not a review
-Not at the PHC level
-Article did not report a change in quality of care
-Article did not make recommendations for improving the quality of care

3. Quality governance in a pluralistic health system: Mexican experience and challenges

Svetlana V. Doubova, Sebastián García-Saiso, Ricardo Pérez-Cuevas, Odet Sarabia-González, Paulina Pacheco-Estrello, Claudia Infante-Castañeda, Carmen Santamaría, Laura del Pilar Torres-Arreola, Hannah Leslie

Full manuscript forthcoming

The Mexico National HQSS Commission designed and conducted a QoC nation-wide cross-sectional survey to learn about barriers and facilitators in four areas of QoC: governance, leadership, evaluation, and improvement. The HQSS framework served to design the study. The survey used a semi-structured online questionnaire that included open-ended questions to capture the free expression of the study participants without imposing theoretical categories. The questions collected data on the general characteristics of the respondents and on the four QoC areas. Participation in the study was voluntary and anonymous. The key informants were top-level officials, mid-level managers and staff responsible for the QoC activities at National, States, and hospital and primary care clinics level.

The sampling strategy comprised two steps. First, the MoH, IMSS, and ISSSTE federal authorities were asked to identify the QoC institutional leaders; then, we invited these leaders to to answer the questionnaire. In each institution, we secured the participation of at least four informants at a national level and three informants at the state/delegation and facility levels. The sample of the social security systems was larger than the MoH sample, given the number and organization of MoHLHS and Social Security delegations in the country.

Study analysis. This was an exploratory study, hence, a thematic content analysis technique served to analyze the answers to the open-ended questions. The analysis comprised four stages: (1) Data was reviewed for emerging themes, grouped into meaning units and coded. (2) Search and revision of topics by converging (smaller fusion codes together) and linking (grouping smaller codes under a common topic) techniques. (3) Definition and denomination of topics; (4) Analysis of selected extracts of the topics identified. The analysis implied continual iteration between the complete data set, the codified extracts and produced data. The research question and the HQSS framework guided the creation of the categories that were subsequently organized into themes. The themes identified during the qualitative analysis and the data from the open-ended questions were analyzed by using descriptive statistics. The IMSS National Research and Ethics Committees approved the study protocol (CNIC: 2017-785-122).

4. Scoping review of reviews on accreditation

A scoping review of reviews addressing accreditation and its impact on quality of care in LMICs was conducted to answer the following research question: what is the impact of health facility accreditation on quality of care?

Search strategy (reviews only):

1. [Accreditation or licensing or licensure or “external inspection” or “external peer review”] + [quality hedge] + [LMIC Hedge] not laboratory
2. [Accreditation or licensing or licensure or “external inspection” or “external peer review”] + [quality hedge] not laboratory
3. [Accreditation] + [quality hedge] + [LMIC Hedge] not laboratory
4. [Accreditation] + [quality hedge] + not laboratory

Review of Reviews – Pubmed, CDC HCPPR, Snowballing

PubMed – = 33
CDC HCPPR – 7 *(outcome is improvement of provider performance)*
Snowball – 10
Total=50 titles

Eligibility: Year 2000+

Review results:

1. Greenfield D, Braithwaite J. Health sector accreditation research: a systematic review. *Int J Qual Health Care.* 2008; **20**(3): 172–83.
2. Matrix Knowledge Group. Literature review on the impact of hospital accreditation. Paris: Haute Autorité de Santé, 2010.
3. Alkhenizan A, Shaw C. Impact of Accreditation on the Quality of Healthcare Services: A Systematic Review of the Literature. *Annals of Saudi Medicine.* 2011; **31**(4): 407–16.
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5. Governing for quality: a stakeholder consultation in five LMICs

Paola Abril Campos, Sanam Roder-DeWan, Vivianna Rodriguez, Sebastían García-Saisó, Paulina Pacheco-Estrello, Letitia Rispel, Katherine A. Reyes, Ghanshyam Gautam, Aradhana Thapa, Margaret E. Kruk
Full manuscript forthcoming

The Commission conducted a qualitative analysis on governing for quality to address how countries have governed to promote, manage, monitor, maintain, and improve quality in health care across the health system as well as the best practices and lessons-learned around governing for quality in select low- and middle-income countries.

A joint research team from the HQSS Secretariat and National Commissions led the exploration. They developed an interview guide based on the following aggregated domains of governance defined by the WHO Action Plan *Health Systems Governance for Universal Health Coverage*[14]:

1. Formulating policy and strategic plans
2. Generating intelligence: information and analysis for decision-making
3. Putting in place levers or tools for implementing policy – including design of health system organizational structures and their roles, powers and responsibilities; design of regulation; standard-setting; incentives; enforcement and sanctions
4. Collaboration and coalition-building across sectors and with external partners
5. Ensuring accountability by putting in place: governance structures, rules and processes for health sector organizations; mechanisms for independent oversight, monitoring, review and audit; transparent availability and publication of policies, regulations, plans, reports, accounts, etc.; and openness to scrutiny by political representatives and civil society

All countries with an HQSS National Commission were invited to participate, and five countries completed the study: Mexico, Argentina, Nepal, the Philippines and South Africa. In each participating country, a coordinator identified the key informants through purposive sampling and conducted the interviews. Informants were health systems leaders, a representative from each of the following groups was identified:

3. Ministry of health leadership (ministers, permanent secretaries, directors of planning, health services, public health, primary health care) responsible for quality of care in the public and/or private sector
4. A national monitoring and evaluation expert
5. An individual who has been involved in developing the national health/quality policy and strategy.
6. A leader from a national professional association (doctors, nurses, midwives)
7. State or district level manager or administrator responsible for quality of care

39 interviews across the five countries were conducted. Transcripts of the interview and notes taken by the coordinator were analyzed for thematic content.

6. Improving delivery care quality at scale: Modeling service redesign in six countries

Anna Gage, Fei Carnes, Jeff Blossom, Jalemba Aluvaala, Archana Amatya, Kishori Mahat, Address Malata, Sanam Roder-Dewan, Nana A.Y. Twum-Danso, Talhiya Yahya, Margaret E. Kruk
Full manuscript forthcoming

We estimated the percent of pregnant women who would no longer have geographic access to a facility offering delivery care if services were shifted to hospitals, defined as women living over two hours from a delivery facility.[15] We developed a cost surface model based on the methods used by Fogliati et al to estimate the travel cost (i.e. the travel time in seconds) per pixel using digital road network, elevation, and land cover data.[16]

Two surfaces for driving and walking were created, then overlaid with the assumption that women would walk to the nearest road and then take motorized transport. For the driving surface, speeds were classified based on the road type; unknown road types were classified to match the closest known road type. The walking surface was created from slope and land cover coefficients with a baseline walking speed of 4 km/hour (see Appendix 1 for further detail). The cost surface was created using ArcGIS 10.4.1 software (ESRI, Redlands, CA). Population distribution data is from WorldPop, which estimates the number of annual pregnancies per square kilometer grid cell, with national totals adjusted to match estimates from the Guttmacher Institute.[17,18]

Data on health facility location and availability of delivery services was from geo-coded master facility lists. We used the SPA census in Haiti (2013), Malawi (2013) and Namibia (2009), which includes availability of delivery services in each facility. Nepal facility geocodes and delivery service availability was provided by correspondence with the Ministry of Health in November 2017. Kenya facility geocodes are from an October 2011 export of the Kenya Master Facility List.[19] Tanzania facility geocodes are from a 2018 export of the Health Facility Registery.[20] Delivery service availability was not included in either the Kenya or Tanzania master facility lists. In these countries, we used the SPA surveys to look at the types of facilities offering care for normal deliveries and classified the facilities accordingly.[21] We assumed that all hospitals, health centers and maternity centers in Kenya and all hospitals, maternity homes, health centers and public dispensaries in Tanzania currently provide delivery services. We used country-specific definitions of hospitals. This included public, private, district and referral hospitals, though we considered only public facilities in a sub-analysis.

We estimated the cumulative travel time from each pixel to the nearest facility offering delivery services and the nearest hospital using the Cost Distance Tool in ArcGIS. Due to inconsistencies in the geocodes, all facilities less than one kilometer from the nearest road were re-located to be on the nearest road. We generated a facility catchment area within two hours of the facilities using the Zonal Statistics tool and summed the pregnant women within the catchment area. We divided the percent of pregnant women living in the catchment area by the total pregnant women to estimate the percent living within two hours.

7. Quality of care among recent clinical graduates (first 3 years of practice) in nine LMICs

Todd Lewis, Sanam Roder-DeWan, Address Malata, Youssoupha Ndiaye, Margaret E. Kruk
Full manuscript forthcoming

We analyzed the Service Provision Assessment data to assess the quality of care provided by health workers who recently graduated from their clinical training. We constructed an index of good medical practice including 18 clinical activities across antenatal care (10 items), family planning care (8 items), and sick child care (10 items) based on WHO guidelines.[1,2,4] Clinical activities were selected for the index if they fell within the scope of practice of any clinician type. The resulting index includes essential activities all providers should perform in every clinical visit across countries. The index includes items covering history-taking, physical examination, and counseling actions that should be conducted for all patients regardless of the reason for presentation or the local epidemiology. The primary outcome is a good medical practice score calculated as an average of the proportion of index items a clinician completed across patient encounters. Clinician scores may include patient visits in each of the three service areas. The resulting score ranges from 0 to 100 with a higher score corresponding to greater adherence to recommended clinical actions.

We included providers only in the first three years of practice since completing their education. Providers were grouped into three categories, including physicians, associate clinicians (e.g., clinical officers), nurses (e.g., registered nurses, nurse midwives), and other providers (e.g., counselors, social workers). Associate clinician and nursing classifications varied too greatly across countries to accurately distinguish these categories further.

8. Update of a systematic review of the effectiveness of strategies to improve health care provider performance in low- and middle-income countries (Table 3)

Alexander K. Rowe, Samantha Y. Rowe, David H. Peters, Kathleen A. Holloway, John Chalker, Dennis Ross-Degnan
Full manuscript forthcoming

The Health Care Provider Performance Review included published and unpublished studies conducted in LMICs that quantitatively evaluated a strategy to improve health worker performance. Eligible strategies had to include at least one component that plausibly could affect health worker performance either directly (e.g., training, supervision, or incentives) or indirectly, by changing the physical, economic, or policy environment in which health workers work (e.g., providing medicines, changing user fees, or implementing new health regulations). Studies without any component directly or indirectly targeting health workers were excluded (e.g., only community education by radio broadcasts). Health workers were broadly defined as hospital-, other health facility-, or community-based health workers; pharmacists; and shopkeepers and informal vendors who sell medicines. Studies of traditional healers were excluded if the providers were not part of a well-defined program to implement standards of care based on "Western" or allopathic/osteopathic medical principles. LMICs were countries with a low, lower-middle, or upper-middle income economy, as defined by the World Bank. Studies from

both the public and private sector were eligible. Studies were included on any health condition, in any language. There were no restrictions on types of study outcomes (e.g., health facility characteristics; health worker knowledge, attitudes, and practices; patient behaviors and health outcomes; and cost). Eligible study designs included pre- versus post-intervention studies with a randomized or non-randomized comparison group, post-intervention only studies with a randomized comparison group, and interrupted time series studies with at least three data points before and after the intervention.

Common methods to measure provider competence were chart review, patient interview and re-examination, and observation of consultations; simulated clients were used infrequently. Health worker performance was measured with percentage outcomes (e.g., percent of patients correctly treated) and continuous outcomes (e.g., average number of medicines prescribed per patient), with effect sizes calculated as absolute changes.)

Effect sizes were calculated in terms of an absolute percentage-point (%-point) change in the outcome—i.e., (outcome follow-up value – baseline value)$_{\text{intervention group}}$ – (follow-up – baseline)$_{\text{controls}}$. E.g., if the outcome increased from 50% to 75% in the intervention group and increased from 51% to 56% among controls, the effect size = (75 – 50) – (56 – 51), or 20 percentage points. I.e., for every 100 patients seen, an additional 20 patients received correct treatment that could be attributed to the strategy. For continuous outcomes that could not be expressed as a percentage, effect sizes are in terms of an absolute percentage-point change in the outcome—i.e., 100% x ([(outcome follow-up value – baseline value)/baseline value]$_{\text{intervention group}}$ – [(follow-up – baseline)/baseline]$_{\text{controls}}$). Effect sizes were adjusted for effect modifiers (baseline performance level and public health facility only setting) to reduce bias when comparing strategies by creating a partly standardized study context (e.g., a context in which all studies have the same baseline performance level). Effect sizes for all primary outcomes within a defined outcome group (e.g., health worker practices, patient health outcomes, etc.) for a given study were summarized by a single median effect size.

9. Systematic review of quality improvement collaboratives in LMICs

Ezequiel García Elorrio, Lisa Hirschhorn, Pierre Barker, Jerker Liljestrand, Alexander K. Rowe
Full manuscript forthcoming

To characterize the effectiveness of quality improvement collaboratives (QICs) in LMICs, data from the Health Care Provider Performance Review were analyzed along with data abstracted from additional QIC studies identified in an updated search through November 2017. Following previously reported selection criteria for collaboratives, PRISMA, and EPOC guidelines, 26 studies that generated 49 papers were selected. Most of these studies aimed to improve maternal and perinatal care, as well care for communicable diseases such as HIV.

For a discussion of effect sizes please see methods for the Health Care Provider Performance Review.

10. Improving health care provider performance in LMICs: how strategy effectiveness changes over time

Catherine Arsenault, Samantha Y. Rowe, Dennis Ross-Degnan, David H. Peters, Sanam Roder-DeWan, Margaret E. Kruk, Alexander K. Rowe
Full manuscript forthcoming

Using results of the Healthcare Provider Performance Review (see above), we modeled the effect of follow-up time on strategy effectiveness. The ability to estimate decay of effectiveness is limited in studies without (or with few) repeated post-intervention measures. We created three groups of studies based on the number of follow-up measures and study design: interrupted time series (ITS), non-ITS studies with at least two effect sizes per outcomes (at least two repeated measures) ("2P") and studies with only one effect size per outcome ("1P"). We first analyzed ITS studies alone, ITS and non-ITS studies with at least two repeated measures and finally, analyzed all studies including those with only one follow-up measure. For each strategy group separately, we used three-level random effects linear regression models (with effect sizes clustered within outcomes and outcomes clustered within studies) to estimate the association between follow-up time and strategy effectiveness. Because effect sizes tend to be lower when baseline performance is high (less room for improvement), we adjusted the models for baseline performance for each outcome. The slope of the model represents the mean %-point change in effectiveness per additional month of follow-up. We repeated these analyses for the three types of study groups: (1) only ITS studies, (2) ITS studies and 2P studies combined, and (3) ITS, 2P, and 1P studies combined. If there were less than 10 groups (i.e. less than ten studies or less than ten outcomes), we used a fixed effects model.

Additional methods and notes

1. Reference list for figures, panels and tables

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4. HQSS National Commissions

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The commission received expert advice from two advisory groups:

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