

Developing Policy Evaluation Frameworks for Low- and Middle- Income Countries

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International Development Working Paper

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October 2018
No. 2018-01

* Authors each made an equal contribution to the completion of this paper.

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ABBREVIATIONS

CBHI	community-based health insurance
Cordaid	Catholic Organization for Relief and Development Aid
DECAM	<i>décentralisation de la couverture assurance maladie</i> (decentralization of health insurance coverage; Senegal)
DFID	UK Department for International Development
DHIS2	District Health Information System 2
DHS	Demographic and Health Survey
FNSS	<i>Fonds National de Solidarité Santé</i> (National Health Solidarity Fund, Senegal)
HCSP	HIV/AIDS Clinical Services Project (Rwanda)
HIC	high-income country
HNI	HealthNet International
HSS	Health Systems Strengthening
ICD	International Classification of Diseases
IDIQ	indefinite delivery, indefinite quantity
LMIC	low- or middle-income country
MHO	mutual health organizations
MICS	Multiple Indicator Cluster Survey
MSH	Management Sciences for Health
NBB	No Balance Billing
PBF	performance-based financing
PHI	protected health information
PhilHealth	Philippine Health Insurance Corporation
RTI	RTI International (registered trademark and trade name of Research Triangle Institute)
SIM	State Innovation Model
UHC	universal health coverage
UNAIDS	United Nations Joint Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
UNICO	Universal Health Coverage (World Bank study)
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

In this working paper, we seek to identify policy evaluation options in low- and middle-income countries (LMICs) by reviewing the appropriateness of specific quantitative models for evaluating universal health coverage (UHC)-related health policy reforms in LMICs. We do this by identifying policy changes taking place in LMICs to support UHC, available data, and potential evaluation methods. To apply this knowledge, we identify policy reforms in three country case studies and propose how to apply the identified methods to evaluate the effectiveness of these reforms.

The current evidence base for mechanisms to achieve UHC in LMICs remains weak and inconclusive due to attribution challenges, the lack of context-specific research, capacity gaps, and data availability barriers. Despite these challenges, policy makers need to decide how to address the health needs of their populations and implement reforms to make progress toward UHC. In high-income countries (HICs), the existence of robust health insurance programs allows researchers to use claims and cost data to evaluate the effects of policy reforms; however, the policy evaluation models used in HICs are less commonly applied to develop health policy analyses in LMICs.

Through a targeted literature review, we identified nine main reforms that LMICs were implementing to achieve UHC common health policy reforms and five outcome measures used to measure the effectiveness of those reforms. These outcomes of interest can be measured using common evaluation metrics and data sources. To gauge the state of evaluations of the above health policy reforms in LMICs, we conducted a second targeted literature review that found the use of quantitative models was mostly limited to pre-existing, country-level data sets, including Demographic Health Surveys (DHSs), World Development Indicators, and country-specific household surveys. We also identified several LMIC data availability concerns including the use of survey data, claims data repositories, health information management systems, and primary data collection.

To review HIC evaluation efforts, we examined two large policy evaluation projects that provided a cross-section of evaluation features. A review of these projects provides lessons on lag times between policy implementation and evaluation, partnerships with government(s), extracting maximum value from claims data, and evaluation team composition. We then review three analytic approaches common in HIC settings (difference-in-difference, interrupted time series, and cluster randomization) that can also be applied to evaluate health policy in LMICs.

To make these findings more concrete, we developed three case studies in the Philippines, Rwanda, and Senegal, in which we review policies relating to user fee elimination, performance-based financing, and contributory health insurance subsidies, respectively. Based on our case studies, we identify that critical policy reforms, including user-fee exemptions and new coverage mechanisms, are understudied, and that country-specific evaluations are not commonly conducted in LMICs. Conversely, in the United States, major policy reforms draw significant funding and evaluation expertise. Due to differences in data availability, policy implementation, and outcome measures, we propose a range of data sources and methods to evaluate the implemented policy reforms.

By suggesting an expanded range of tools to conduct policy-relevant research in LMICs, we hope that the evidence base for UHC will become more robust and country-specific answers to challenging policy questions will become more available. Using new tools and methods to expand the evidence base for UHC, however, does not preclude the need for strong knowledge translation efforts that engage the skills, talents, and expertise of local actors as they seek to move their countries closer to UHC.

INTRODUCTION

The United Nations' Sustainable Development Goal 3 calls for achieving universal health coverage (UHC) by the year 2030. As a result, countries are increasingly committed to reforms that address the three dimensions of UHC as outlined by the World Health Organization (WHO): increased population coverage, financial risk protection, and access to services (World Health Organization, 2010). With health policy reforms¹ evolving to meet the demands for UHC, countries and donors need timely and complete country-level data to improve decision making and reduce feedback loops. Unfortunately, evaluations of health policy change are often fragmented in low- and middle-income countries (LMICs), and knowledge of the impact of health-policy change is weak

Giedeon, Alfonzo, and Diaz (2013), for example, reviewed 105 studies of UHC reforms in LMICs, but found that none of the papers “comprehensively analyzes how the individual design features determine the results” (p. 84), and only a few papers provided causal evidence on the link between a single design feature and an outcome. The authors found that specific UHC-related interventions can improve access to care and reduce out-of-pocket expenditures, but the evidence was more mixed on health status impacts. The authors noted that “evidence is scarce and inconclusive on the impact of specific UHC design features on their intended outcomes” (Giedion et al., 2013, p. vii).

In addition, an expert panel assembled by Paul, Fecher, Meloni, & Van Lerberghe (2018) recommended none of the 18 reforms that they reviewed for implementation. They also found that the quality of evidence is “low and/or non-systematic” (p. 6), noting that only community-based health insurance and voucher programs led to improved service utilization and quality or reduced out-of-pocket expenditures. Paul and colleagues noted that the lack of consensus on evidence for these 18 policy reforms resulted from heterogeneous policy reforms, weak empirical evidence, and disagreement among policy makers and experts. Similarly, Coarasa, Das, Gummerson, & Bitton, (2017) in comparing two systematic reviews of private sector primary care, found that the reviews reached conflicting conclusions, which reflects different methodologies and a “weak underlying body of literature” (p. 1). In fact, only one of the reviewed studies met a predetermined gold standard of evidence.

One of the major reasons for this weak evidence base is that policy change often involves multiple interventions. Studies, therefore, often evaluate the impact of suites of reforms, which makes attribution difficult. Giedion et al. (2013), Gilson (2012), Maeda et al. (2014) and Rao et al. (2014) explain this weak evidence base by noting that multiple factors influence health systems, and that these factors often interact in confusing and contradictory ways. Baur et al. (2001) notes that “significant factors make it impossible to isolate the effects of a single development intervention” (p. 2). They suggest that instead of seeking to isolate effects, researchers should seek to determine “plausible linkages” between the policy change and impact (p. 14). Craig et al. (2006) broke down various mechanisms for

¹ For the purposes of this paper, we define *policy reform* as the “process in which changes are made to the formal rules of the game—including laws, regulations and institutions—to address a problem or achieve a goal” (OECD Glossary of Statistical Terms, 2007). As such, we are interested in not just legislative efforts, but also in ministerial circulars, executive orders, regulatory changes, and strategic plans that are intended to move a country closer to UHC.

evaluating the complex factors that affect health policy—developing a theory of policy change, process evaluation, addressing behavior, creating multiple outcome measures, and allowing for local adaptation to protocols. Although randomized experimental designs are considered the gold standard, Hanson (2012) noted that control groups are rarely used as counterfactuals in health system evaluations due to policy change taking place at a national level.

In addition, the implementation of similar interventions can still lead to different outcomes due to contextual differences. However, few studies are country-specific, which reduces the ability of national policy makers to understand whether specific policy reforms would lead to specific health outcomes in their country. As a result, evidence for specific reforms is often decontextualized and offers “relatively limited insights into its core questions of how and why policies are developed and implemented effectively over time” (Gilson, 2012, p. 13) Even when gold-standard approaches—such as randomized controlled trials—are used to evaluate policy reforms, new studies are needed to understand whether a policy that worked in one context will work in a new one (Cartwright & Hardie, 2012). These follow-up studies are often expensive and time consuming (Sanson-Fisher, Bonevski, Green, & D’Este, 2007).

For example, performance-based financing reforms in Rwanda showed significant improvements in treatment quality and utilization, especially for maternal health interventions (Iyer et al., 2017; Rusa et al., 2018; Skiles, Curtis, Basinga, Angeles, & Thirumurthy, 2015). The Rwanda case study presented later in this paper offers more information on this intervention. A similarly designed supply-side performance-based financing intervention in Cameroon, however, showed little impact on maternal and child health indicators, perhaps because “the supply-side incentives for providers were not sufficient given existing user fees which might act as a barrier on the demand-side” (Rusa et al., 2018; World Bank, n.d., p. 5). In these cases, the low-user-fee environment in Rwanda and the high-user-fee one in Cameroon likely created different impacts. Country-specific studies that consider these contextual differences are needed to ascertain whether specific policy reforms will lead to the desired outcomes of interest.

An additional gap is the descriptive, rather than exploratory or explanatory, nature of research in LMICs, despite the health systems and policy research literature increasingly emphasizing empirical models (Gilson, 2012; World Health Organization, 2010). For example, the World Bank’s Universal Health Coverage (UNICO) case studies documented positive examples of how countries were moving toward UHC, but they were designed as descriptive case studies, rather than as explorations of how specific reforms were achieving UHC (Cotlear, Nagpal, Smith, Tandon, & Cortez, 2015).

Much of this gap is due to limited staff skills, imperfect institutional arrangements, and data collection shortcomings. El-Jardali et al., (2015) found that none of the seven schools of public health in East and Central Africa offered degree programs in health systems research, while a capacity assessment of these schools of public health found that “limited staff competencies, outdated curricula, face-to-face delivery approaches, and restricted access to materials” limited research capacity (El-Jardali et al., 2015, p. 2). Other researchers have noted that data fragmentation due to decentralization and donor requirements and poor local and facility-level incentives for ensuring proper data collection also undermine data quality and the ability of researchers to evaluate health policy (Braa & Sahay, 2017; Karuri, Waiganjo, Orwa, & Manya, 2014).

As of 2018, however, information availability was improving. Demographic and Health Surveys (DHSs), a set of standardized household surveys that has been implemented in over 90 countries, are generally conducted every 5 years in LMICs, although some countries conducted more frequent rounds of surveys (Short Fabric, Choi, & Bird, 2012). Aggregated patient data collected via District Health Information System 2 (DHIS2), a platform used in many LMICs, is becoming more complete and timely (Braa & Sahay, 2017). Additionally, national health insurance programs, such as those in Ghana, Rwanda, and Indonesia, generate a great deal of claims information. These data sources have the potential to inform policy decisions in novel ways, yet their usefulness continues to be limited by ongoing concerns about public release of data, timeliness, and completeness.

Despite these challenges, some external funders—such as the United Kingdom’s Department for International Development (DFID), the United States Agency for International Development (USAID), and the World Bank—require health system interventions that they support to demonstrate evidence of impact, including improvements in the policy process and evidence-informed decision making (Hatt et al., 2015; Tine, Hatt, Faye, & Nakhimovsky, 2014). USAID projects have responded to this call by describing the evidence for policy and regulatory reform and aligning their technical assistance packages with increases in insurance coverage (Koon & Wright, 2017; Prabhakaran et al., 2017). Moreover, learning agendas form an essential part of USAID’s Collaborating, Learning, and Adapting Framework and are becoming an institutionalized part of USAID project design (USAID, 2017).

At the same time, LMICs are forging ahead with reforms intended to make progress toward UHC, even though policy makers lack information specific to their policy, context, or outcome of interest. For example, McIntyre, Obse, Barasa, & Ataguba (2018) note that many countries in sub-Saharan Africa want to implement contributory health insurance, even though they are “unlikely to be the most efficient or equitable means of financing health services in sub-Saharan African countries” (p. 44) and often lead to less progressive financing. For this reason, interpreting the evidence of impact for policy makers requires acknowledging a healthy amount of skepticism about translating imperfect evidence into implementable policies. Even without strong evidence of potential reforms’ effects, policy makers need to make decisions about how to address the health needs of their populations.

In high-income countries (HICs), the existence of robust health insurance programs allows researchers to use claims and cost data to evaluate the effects of policy reforms. High-quality household survey data are collected regularly, are widely accessible, and are used to evaluate health coverage and reform initiatives. In the United States, for example, federally sponsored survey data sets such as the American Community Survey, the Medical Expenditure Panel Survey, the Current Population Survey–March Supplement, the Survey of Income and Program Participation, and the Behavioral Risk Factor Surveillance System provide detailed data on household expenditures, program participation, insurance coverage, and other outcome indicators relevant to UHC. Even in upper-middle-income countries, data availability is quite high. Malaysia, for example, conducts yearly national Health and Morbidity Surveys and maintains a Health Data Warehouse of patient-encounter data (Maria, Kamal, & Salleh, 2017; MIDF Research, 2017). However, the state of policy evaluation in HICs also has gaps due to issues in study design and data availability. Under the Multi-Payer Advanced Primary Care Practice Demonstration evaluation, for example, the eight states involved in the evaluation implemented slightly different quality-of-care models. As a result, evaluation across the states showed little consistency (RTI International &

The Urban Institute 2017). In addition, data availability is a challenge, especially regarding electronic health records data (Chisholm, Denny, Fridsma, & Ohno-Machado, n.d.).

Despite these challenges, HIC policy evaluation expertise is rarely used to develop sophisticated health policy analyses in LMICs. This gap could be because few research organizations have policy analysis skills developed in both HICs—such as strategic advice and evaluation expertise—and LMICs—including managing data availability gaps, convening, and stakeholder analysis skills.

In this working paper, we have sought to bridge this gap by answering an overarching question: What quantitative models are most appropriate for evaluating UHC-related health policy reforms in LMICs? We decided to focus on quantitative methods in this review, rather than qualitative methods, for the following reasons. First, despite the recent movement away from using randomized controlled trials and other quantitative models as the gold standard of evaluation, they are still further up the “hierarchy of evidence” pyramid than qualitative methods such as case and ethnographic studies (Murad, Asi, Alsawas, & Alahdab, 2016). Second, global health practitioners are already well-versed in qualitative methods, which are commonly used to evaluate programming and policy.

In support of our main question, we address three related questions: (1) What policy changes are taking place in LMICs to support UHC? (2) What data are available in LMICs to evaluate the effects (if any) of these changes? (3) What evaluation methods are most appropriate for assessing the impact of policy reforms in LMICs? In addressing these questions, we apply what we learn to specific policy reforms in three case study countries to provide the depth and detail needed to respond to the overarching question driving this working paper.

WHAT POLICY CHANGES ARE TAKING PLACE IN LMICs TO SUPPORT UHC?

Many governments in LMICs have identified UHC as a goal and have named the three dimensions of UHC (i.e., coverage, financial protection, and access) as ways to measure progress toward UHC. As a result, governments are exploring policy mechanisms to achieve UHC, with contributory health insurance, provider payment reforms, and vouchers or fee exemptions taking center stage in most countries (Paul, Fecher, et al., 2018). However, even these policy reforms can incentivize low-priority services, protect wealthier individuals first, and exclude informal sector workers, depending on the specifics of the reform and the context in which they are implemented. These types of choices were described by a panel of “ethicists, philosophers, economists, health-policy experts, and clinical doctors” (p. 711) and defined by Norheim (2015) as the “Five Unacceptable Trade-Offs on the Path to UHC” (see box). For examples of how policies designed to improve universal health coverage can feature the five unacceptable trade-offs, please see the Case Studies section below.

To develop a list of common policy reforms specific to our needs, we reviewed previous studies. Paul, Fecher, et al. (2018) for example, highlighted 18 common reforms—such as fee exemptions, vouchers, public–private partnerships, and separation of provider and purchaser functions—that address financial barriers to access, improve health care funding, and improve the supply and management of services. The UNICO case studies mentioned in the introduction also identified some common key design features across the 11 case studies examined: prepayment, risk pooling, earmarked taxes, and targeting of subsidies to the poor and vulnerable (Giedion et al., 2013). In addition, we reviewed policy reforms in the seven countries that we identified for potential case studies (see Case Study section). For each country, we used advanced Google searches to identify country strategies and gray literature plus Google Scholar to identify peer-reviewed literature in English that described UHC-relevant policy reforms that were enacted between 2004 and 2016 in each country. Using this method, we retrieved and examined 42 documents.

We used two frameworks to review the identified documents. First, we reviewed what policy choices each country made along the three dimensions of universal coverage, as outlined by WHO (World Health Organization, 2010). Next, we reviewed those choices against the five unacceptable trade-offs. We then used these data to develop a generalized list of common policy reforms by comparing identified

Five Unacceptable Trade-Offs on the Path to UHC

Expanding coverage for low- or medium-priority services before there is near-universal coverage for high-priority services.

Assigning high priority to very costly services whose coverage will provide substantial financial protection when the health benefits are very small compared to alternative, less costly services.

Expanding coverage for well-off groups before doing so for worse-off groups when the costs and benefits are not vastly different.

First including in the universal coverage scheme only those with the ability to pay and not including informal workers and the poor, even if such an approach would be easier.

Shifting from out-of-pocket payments toward mandatory prepayment in a way that makes the financing system less progressive.

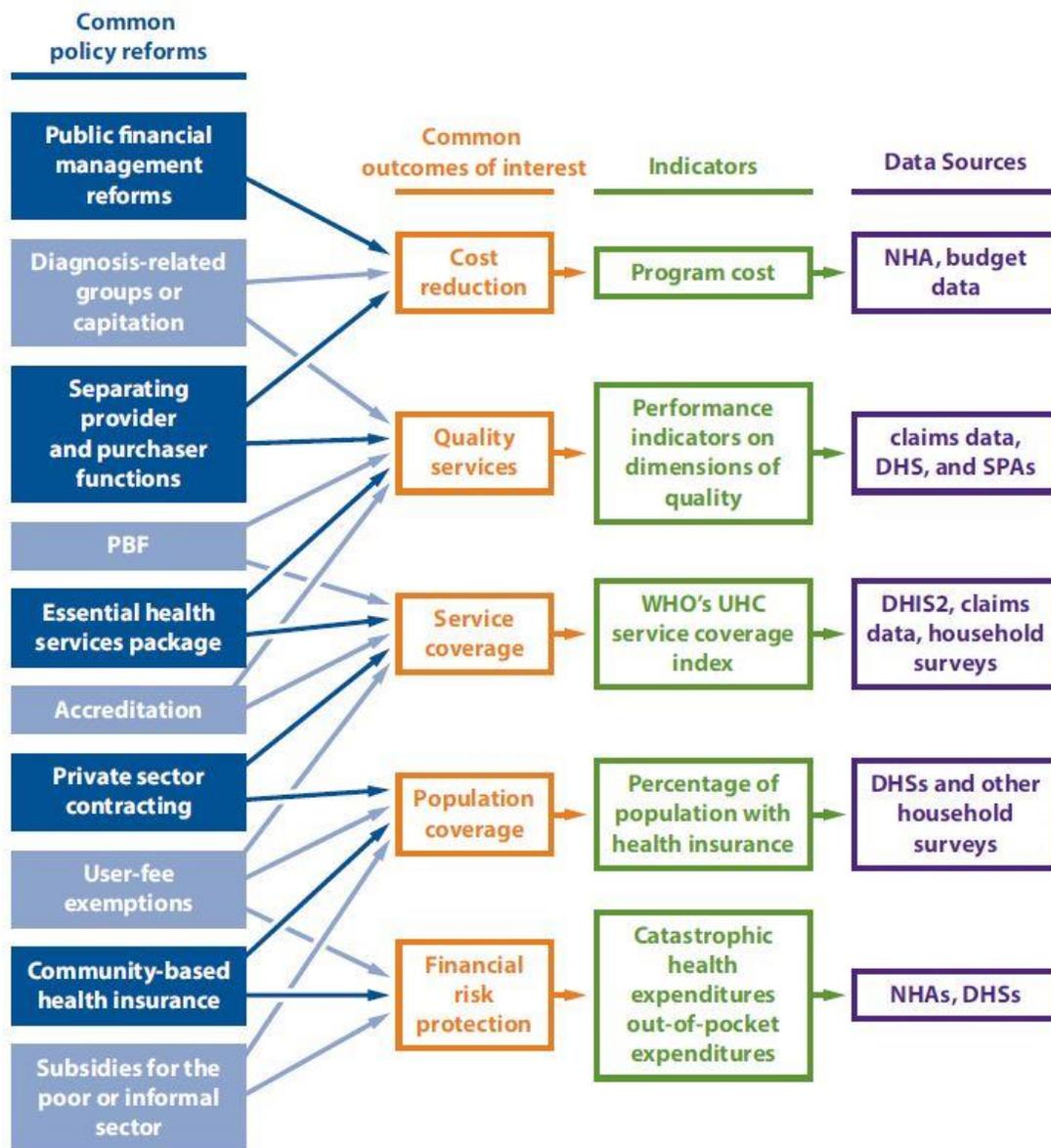
Source: Norheim (2015)

reforms to the Paul, Fecher, et al. (2018) list, grouping similar items together, and eliminating reforms that did not appear in our review.

Through this review of policy reforms, we identified ten main reforms that countries implement to achieve UHC (*Exhibit 1*). Our list of common policy reforms has elements similar to those of Paul, Fecher, et al., (2018), including insurance coverage expansion, user-fee exemptions, private sector contracting, and performance-based financing. We identified additional policy reforms, such as accreditation, capitation, and diagnosis-related groups, which our review indicated were generally thought to improve health or cost outcomes. We also found that countries commonly fell afoul of the unacceptable trade-offs described earlier, especially those that expanded insurance to the formal sector first (see the Case Study section for examples).

In addition to our review of policy reforms, we identified five common outcomes of interest for LMIC governments as they move toward UHC (*Exhibit 1*). Though these outcomes generally aligned with the WHO's dimensions of UHC, we also noted that quality services and reduced costs are common outcomes in the literature and added them to our list. While governments were interested in tracking other outcomes to evaluate the effectiveness of policy reforms, these outcomes either could be measured using existing data sets or varied based on reforms that countries pursued. For example, some countries identified "improved management" as a potential outcome, but we found "management" too process-oriented to include in our list of outcomes. On the other hand, we included financial risk protection as an outcome of interest, which can be measured using catastrophic and out-of-pocket health expenditures, using a National Health Accounts study as a data source. The five outcomes of interest identified in the literature can be measured using common evaluation metrics and data sources, identified in *Exhibit 1*.

Exhibit 1. Common policy reforms and health system outcomes



Note: DHIS2: District Health Information System 2; DHS: Demographic and Health Survey; NHA: National Health Accounts; PBF: performance-based financing; SPA: Service Provision Assessment; UHC: universal health coverage; WHO: World Health Organization;

WHAT DATA ARE AVAILABLE TO EVALUATE POLICY CHANGE?

To gauge the state of evaluations of health policy reforms in LMICs and understand data availability issues, we conducted a targeted literature review. Through this review, we identified the types of policies analyzed in a selection of LMICs as well as examples of data sets and methodologies. Due to the scope of activities we wished to review in a short period, we could not conduct a full systematic literature review. Instead, we conducted a targeted literature review designed to guide our research activities for the rest of the project.

To complete this review, we began by examining the publication abstracts of three leading health economists: Adam Wagstaff, Eddy van Doorslaer, and Owen O'Donnell. We chose these authors due to their prolific output on a wide range of subjects using many different methods over a long period. We supplemented these studies with additional searches in Google Scholar and in the bibliographies of included studies. After compiling abstracts, we removed duplicate abstracts (e.g., a published article and a working paper on the same topic), abstracts in languages other than English, abstracts that did not focus on an LMIC, and abstracts for studies that did not include at least one of the following: quantitative policy evaluation, innovative measurement methods, or use of a potentially relevant data source.

We examined 49 unique studies published between 2005 and 2018, which covered 129 countries. Descriptive studies generally focused on a single key outcome, such as measures of universal health coverage, catastrophic health expenditures, or health insurance coverage. Studies examining interventions often evaluated the results of packages of interventions, such as instituting performance-based financing plus capitation or combining health care financing schemes with efforts to expand health insurance coverage.

The studies used methods of varying degrees of sophistication, from simple descriptive statistics through complex bespoke utility models. The most common study structure was a nonrandomized difference-in-differences or step-wedge evaluation, although the sample included both randomized trials and simple cross-sectional studies. Researchers also often constructed regression models, including linear, logistic, probit, and Poisson regression models.

Although some research teams gathered their own data, many took advantage of existing data sets to inform part or all of their analyses. DHSs and other health surveys were the most popular of these existing data sets in the sample we examined. WHO data sets, particularly the population-based World Health Survey, and World Bank data sets, particularly the country-level World Development Indicators, also served as data sources in the examined studies. In addition to these multi-country surveys, many LMICs implement their own household surveys of health outcomes, expenditures, labor structures, and other measures of household and individual well-being. The full list of extant data sets used in the reviewed records appears in the *Appendix*.

Using preexisting data sets, such as those described above, can reduce the cost of evaluating a policy, but several drawbacks offset the gains in convenience. The lack of customization of the surveys to the policy of interest can preclude analysis of key outcomes or force investigators to rely on proxy outcomes, and the long gaps between many standard survey rounds can prove too long for evaluating a

quick policy change. When the survey does contain the desired indicators, matching the implementation area of a program or policy change to the survey evaluation units can prove difficult. Even when the implementation area and the evaluation unit overlap, it can still be difficult to determine whether the policy affected a respondent. Also, even standardized surveys change over time and in different locations, which makes comparisons difficult; missing or incomplete data can compound this difficulty. In at least one instance, a country started tracking the researchers' outcome of interest only after policy implementation began, which made any sort of pre/post analysis impossible. Finally, the retrospective nature of many of the standardized surveys can introduce recall bias, in which people struggle to remember routine activities, such as paying for medicine, after a period of months or years.

Project-Level Evaluations of Health Policies in LMICs

Project-level evaluations of policy focus on evaluating the scale of policy enactment, changes in service utilization due to the policy change, and qualitative assessments of how the policy works in practice. The different priorities of donor organizations drive different types of research and evaluations on the results of policy implementation.

The USAID Health Policy Project (2010–2015) recommended impact evaluations of the “availability, quality, and equity of services” that the policy addressed (Hardee, 2013, p. 7). In practice, the project looked at program results, including the extent to which the policy was implemented—using indicators such as the number of policies that mentioned a point of interest—and the extent of changes in the intervention of interest (Hardee, Ashford, Rottach, Jolivet, & Kiesel, 2012). In its guidance documents, the project did not focus on attribution challenges or wider research but rather on the monitoring and evaluation of direct project activities.

Beyond individual project monitoring and evaluation work, the World Bank hosts the Strategic Impact Evaluation Fund, which evaluates the effects of World Bank-supported policy interventions (World Bank, 2016). Methods used encompass many that we gleaned from our literature review, including cluster randomized trials (Nyqvist, Björkman, Svensson, & Marcus, 2015), regression discontinuity and difference-in-differences designs (Berman, 2015), and simple cost-effectiveness evaluations (Marcus & Bank, 2010). The focus on more rigorous study designs reflects the difference in focus between USAID and the World Bank, as the World Bank primarily finances economic research, while USAID historically has preferred to focus on project implementation and evaluations, rather than research.

Data Availability

To understand the availability of data in LMICs, we completed a high-level landscape assessment of data sources available in potential countries of interest. Countries examined as part of this work included Ghana, Malaysia, the Philippines, Rwanda, Senegal, Tanzania, and the United Arab Emirates—specifically the Emirate of Dubai.

Identifying evidence of available sources for health claims data through Internet searches and a review of contractor reports proved difficult in most country contexts. We found:

- ◆ evidence of a developing encounter-data warehouse in Malaysia (Kelleher, 2017);

- ◆ an example of access to high-quality hospital claims data as part of the RTI-led Pricing Regulation of Healthcare Services in Dubai project, which develops, analyzes, and implements health insurance-related policy (Coomer & Trisolini, n.d.);
- ◆ indication of the absence of a standard coding terminology (such as the International Classification of Diseases—ICD9 or 10) in Tanzania (PATH & Government of Tanzania, n.d.);
- ◆ discussion of the District Mutual Health Insurance Schemes data repository in Ghana (Sodzi-Tettey, Aikins, Awoonor-Williams, & Agyepong, 2012), which was countered by a 2013 evaluation report stating that a proposed claims-based evaluation could not be completed due to data access issues (HERA & Health Partners Ghana, 2013); and
- ◆ an example of a study using data from the Philippine Health Insurance Corporation (PhilHealth) hospital claims database, which covered approximately 87% of the population in 2013 (Tumanan-Mendoza et al., 2017).

Other data sources available in our countries of interest included household surveys fielded across multiple countries, country-specific household or population surveys, disease registries, and health management information systems. Examples of data sources are outlined in *Exhibit 2*.

Exhibit 2. Examples of data sources (in English only)

Claims data	Household surveys fielded across multiple countries	Country-specific household surveys	Health management information systems	Other data sources
<p>Malaysian Health Data Warehouse (Kelleher, 2017)</p> <p>Pricing Regulation of Healthcare Services in Dubai (Coomer & Trisolini, n.d.)</p> <p>Insurance scheme data, Tanzania (PATH & Government of Tanzania, n.d.)</p> <p>District Mutual Health Insurance Schemes data repository (Sodzi-Tettey et al., 2012)</p> <p>Philippine Health Insurance Corporation (PhilHealth) hospital claims database (Tumanan-Mendoza et al., 2017)</p>	<p>Demographic and Health Surveys in Tanzania, Senegal, Rwanda, Ghana, and Philippines (Tine et al., 2014)</p> <p>Multiple Indicator Cluster Surveys, Senegal and Ghana (Tine et al., 2014)</p>	<p>National Health and Morbidity Survey, Malaysia</p> <p>National Panel Survey, Tanzania (Wagstaff et al., 2018)</p> <p>National Household Budget Survey, Tanzania</p> <p>Integrated Household Living Conditions Survey, Rwanda (Bredenkamp & Buisman, 2016; Wagstaff et al., 2018)</p> <p>Family Health Survey, Philippines</p> <p>Family Income and Expenditure Survey, Philippines (Bredenkamp & Buisman, 2016; Wagstaff et al., 2018)</p>	<p>Electronic Health Management Information System, Malaysia (Kelleher, 2017)</p> <p>Wareed health care information system, Dubai and Northern Emirates (Emery, 2017)</p> <p>DHIS2, Tanzania, Senegal, Rwanda (PATH & Government of Tanzania, n.d.; Tine et al., 2014; USAID & Republic of Rwanda Ministry of Health, n.d.)</p>	<p>Surveillance systems and disease registries, numerous in Malaysia and Tanzania (Kelleher, 2017; PATH & Government of Tanzania, n.d.)</p> <p>National Health Account and other government-sponsored statistical reports or databases with aggregate data</p> <p>Facility rating, accreditation and survey data, Tanzania (PATH & Government of Tanzania, n.d.)</p> <p>Insurance scheme data, Tanzania (PATH & Government of Tanzania, n.d.)</p> <p>Country-level population</p>

Claims data	Household surveys fielded across multiple countries	Country-specific household surveys	Health management information systems	Other data sources
		Malaysia Household Expenditure Survey (Wagstaff et al., 2018) Living Standards Survey, Ghana (Wagstaff et al., 2018)		indicators tracked by international organizations such as WHO, United Nations Development Programme, UNICEF, UNAIDS (Hogan et al., 2018)

This exercise illuminated differences between HIC and LMIC data availability, and several key themes emerged.

Availability and use of survey data. Survey data were commonly available in our countries of interest due to the use of the DHS and the Multiple Indicator Cluster Survey (MICS). Although multiple high-quality nationally representative surveys occur annually in the United States, a survey like the DHS may occur every 5 years in our countries of interest. Despite this limitation, the international studies reviewed in the earlier portion of our work often used DHS data. A few countries also have nationally sponsored, country-specific surveys that can serve as a foundation for future analytic work.

Developing repositories of claims data. Multiple countries were developing, or had already developed, a national claims database. However, we saw examples of data access or data quality challenges, which indicated that claims-based analyses might not be immediately feasible in our countries of interest. The Philippines and Dubai were two exceptions, with evidence of successful claims-based research under way in both places. Although claims-based policy evaluation is feasible in both locations, any research plan should account for data acquisition timelines and the potential need for partnerships to access these data. This lesson was clear in the State Innovation Model (SIM) Round 1 evaluation work in the United States—see the next section for more details—and perhaps would be of even greater significance for work in LMICs.

Privacy issues and data storage also require consideration when accessing claims data, which qualify as protected health information (PHI). Any researcher wanting to use these data must ensure that the intended study meets relevant standards for the approval and storage of data. Additionally, the research planning must account for privacy and data acquisition regulations in the country of interest.

Other data sources—primary data collection, health information management systems, and other forms of aggregate data. Depending on the country and research question of interest, relying upon facility-level data and population statistics from the DHIS2 may be a feasible research approach. For example, a recent study by Iyer et al. (2017) used “propensity score matched controlled interrupted time series analysis” (p. 1) with DHIS2 data to examine the effect of a Population Health Implementation and Training Partnership intervention policy on health systems strengthening that was implemented in selected districts in Rwanda. Outcomes of interest included “delivery rates, outpatient visits rates and referral rates for high risk pregnancies” (Iyer et al., 2017, p. 3). This study design was feasible for three

reasons: Rwanda DHIS2 data are high quality, the policy intervention occurred only in select districts, and outcome measures of interest were accessible at the right level of aggregation via the DHIS2 platform (Iyer et al., 2017).

Cross-sectional data—including information on national health expenditure accounts provided by national governments and country-level indicator data tracked by international organizations such as WHO—may also provide useful inputs. For example, a recent study by Hogan et al. (2018) constructed an index of essential health coverage based on numerous country-level population or subgroup indicator statistics often collected from WHO and other internal organization-sponsored databases. Hogan et al. (2018) tracked the index across 183 countries to provide information on country-level progress toward meeting Sustainable Development Goal 3.8.1. While this study was not a policy evaluation in the sense of measuring causal effect, it took an analytics-oriented approach to measure country progress toward UHC. Although the index can be used to track change over time, the authors suggested that a 5-year period would be needed, noting that the “asynchronous timing of data collection across indicator and countries makes time trends in an index challenging and a minimum period of 5 years is likely to be needed to reliably measure national changes in this index” (Hogan et al., 2018, p. e167). This caveat underlines some of the difficulties of combining many data sources into a single study.

PREVIOUS RTI STUDIES IN THE UNITED STATES

In conjunction with gathering information about international policy evaluation work outside of RTI, we also adopted a targeted approach to understanding the current state of U.S.-focused policy analytics expertise at RTI. We examined two large policy evaluation projects: The SIM Round 1 Evaluation Project (2013–2018) and the SIM Round 2 Evaluation Project (2015–2021). We chose these two projects because they provided a cross-section of features common to evaluations that RTI conducts in the United States: quantitative analysis of administrative claims, eligibility, and/or enrollment data; use of site visits and qualitative research methods; strong partnerships with government stakeholders to acquire necessary data; and lengthy evaluation time frames.

State Innovation Model Round 1 Evaluation Project

As part of a broader effort to support health care delivery reform in the United States, the Centers for Medicare and Medicaid Services is collaborating with numerous states to test state-driven value-based payment reforms. RTI evaluated six states awarded funding in 2013 to test their innovation model: Arkansas, Maine, Massachusetts, Minnesota, Oregon, and Vermont. Each test state received between \$33 million and \$45 million in funds to support model testing. Value-based payment models tested under this initiative included primary-care focused health home models,² behavioral health home models, an episode-of-care model, and coordinated care or accountable care organization type models (RTI International, 2017a).

We focused our review on the Year 4 annual report, which was released in March 2018 (RTI International, 2018). This report presents preliminary quantitative evaluation results for five of the six evaluation states, with test periods as short as January 2014–December 2014 and as long as July 2014–March 2016. Four of the five evaluation states focused their innovation model initiative on the Medicaid population,³ while a fifth also included commercial and public employee populations. For each of the five states, the interim evaluation sought to answer the following core question: “What were the impacts [of the reform] on care coordination, health care utilization, expenditures and quality of care?” (RTI International, 2018, p. 2).

Quantitative evaluations for all five of the states used difference-in-differences methodologies with large claims data sets. Individuals were marked as part of the treatment or control group based on their health care provider, with deviations in the specific approach and frequency of this marking based on program design and data availability (e.g., rolling primary care provider attribution versus annual or less frequent attribution). Designs for four of five states used propensity score weighting with a

² A “health home” is defined in Section 2703 of the Affordable Care Act. They offer, “coordinated care to individuals with multiple chronic health conditions, including mental health and substance use disorders” (SAMHSA-HRSA, n.d.).

³ In the United States, the **Medicaid** insurance program covers health care services for low-income individuals, including children, pregnant women, adults, seniors, and people with disabilities. **Medicare** is not income-based; it covers people who are age 65 or older, under 65 with certain disabilities, or of any age with severe renal disease (Kaiser Family Foundation, 2017, 2018).

beneficiary level unit of analysis, while the fifth design incorporated fixed effects (clinic, month, and year) with a clinic-level unit of analysis. Outcome measures are listed in *Exhibit 3*.

Exhibit 3. State data sets and outcome measures

State	Core data sets	Measures	Page in report
Arkansas	<ul style="list-style-type: none"> Medicaid claims data Provider and beneficiary enrollment files from the state The Area Health Resources Files* 	<ul style="list-style-type: none"> Utilization Expenditures Quality of Care 	A-2-9 – A-2-1
Massachusetts	<ul style="list-style-type: none"> Medicaid claims data The Area Health Resources Files 	<ul style="list-style-type: none"> Utilization Expenditures 	C-2-3 – C-2-9
Minnesota	<ul style="list-style-type: none"> Medicaid claims data A beneficiary attribution file from the state The Area Health Resources Files 	<ul style="list-style-type: none"> Care Coordination Utilization Quality of Care 	D-2-5 – D-2-9
Oregon	<ul style="list-style-type: none"> Oregon All Payer All Claims database Directory of clinics The National Provider Identifier Registry 	<ul style="list-style-type: none"> Utilization Expenditures Quality of Care 	E-2-3 – E-2-9
Vermont	<ul style="list-style-type: none"> Medicaid claims data An attribution file from the state The Area Health Resources Files 	<ul style="list-style-type: none"> Care Coordination Utilization Quality of Care 	F-2-3 – F-2-10

*The Area Health Resources Files, maintained by the U.S. Health Resources and Services Administration, “include data on health care professions, health facilities, population characteristics, economics, health professions training, hospital utilization, hospital expenditures, and environment at the county, state and national levels, from over 50 data sources” (data.HRSA.gov, n.d.).

Source: Lloyd (2018).

State Innovation Model Round 2 Evaluation Project

In addition to the SIM Round 1 evaluation contract, RTI began evaluating Round 2 of the SIM initiative in 2015. Round 2 extended funding for designing interventions to 21 states and funding for intervention testing to 11 states (RTI International, 2017a). As of mid-2018, RTI had released two public reports under Round 2: a qualitative report released in August 2017 that examined the State Health System Innovation Plans developed by each of the 21 design states and the first annual evaluation report for the 11 test states (RTI International, 2017a). This second report presented qualitative evaluation results based on data collected from February 1, 2015, to June 30, 2016, from interviews with state officials, document reviews, and focus groups (RTI International, 2017a). Due to the qualitative nature of the Round 2 evaluation work, we invested minimal resources into a review of Round 2 evaluation activities. The subsequent discussion of lessons learned, however, draws from both initiatives.

Lessons learned: Applying SIM evaluation experience to LMIC contexts

Our targeted review of SIM evaluation efforts under way at RTI provided some context for key factors in designing health policy evaluations.

Evaluation timelines. The evaluation timelines for both SIM projects are multiyear, with substantial lag times between the start of the project initiative and the release of evaluation results. This is partially due to the multiyear nature of innovation model testing; it is notable, however, that quantitative evaluation results took longer to release than qualitative findings. Specifically, early-stage quantitative analysis had not been published publicly by mid-2018 for model tests funds awarded in early 2015.

Role of state and federal partnerships. Four of the five Round 1 state evaluations used claims data provided at the state level, while the fifth evaluation utilized a federal claims data source. In addition, state agencies often provided complementary program-specific data files, such as attribution files, which were used to design control and comparison groups. All five evaluations used an existing federal data set to supplement the claims data source. Most of the evaluation studies involved supportive partnerships and access to high-quality federal data. The reforms also reflected these partnerships, as the populations examined were subgroups for which states hold considerable control over payment structure and regulations.

Value of claims data. Claims and enrollment data are a rich resource when available in a high-quality and standardized format. *Exhibit 3* above illustrates the wide variety of claims-based outcome measures that researchers can use when they have access to high-quality health care claims. As such data become more available, policy evaluations in LMICs may evolve to take advantage of them.

Size of contract awards and project teams. SIM Round 1 and 2 are both multimillion-dollar contracts. Project funding and team size reflect the broad scope and the complex, multifaceted nature of the work. Evaluation teams have included a range of researchers, with multiple junior, mid-level, and senior researchers represented.

WHAT EVALUATION METHODS ARE MOST APPROPRIATE FOR ASSESSING THE IMPACT OF POLICY REFORMS IN LMICs?

Based on the literature reviews outlined in the previous sections, we identified three common analytic approaches for evaluating health policy in LMICs, which we summarize in *Exhibit 4*. Importantly, the selection of the methodology depends on the characteristics of the policy intervention and data source availability. Below, we briefly review three analytic approaches, including a discussion of the requirements for each method.

Exhibit 4. Comparison of three analytic approaches

Features assessed	Cluster randomized experiment	Difference-in-differences	Interrupted time series
Can choose nonrandomly who receives the intervention?	✗	✓	✓
Can be conducted after the policy has been implemented?	✗	✓	✓
Can be conducted using only previously existing data sets?	✗	✓	✓
Can evaluate policy rolled out uniformly in area of interest?	✗	✗	✓
Can evaluate without a valid comparison group that did not receive the intervention?	✗	✗	✓
What resources are required?*	Relatively expensive	Relatively cheap	Relatively cheap
What is the quality of the evidence generated?*	Relatively high	Relatively low	Relatively low

* Relative to other approaches described in the table.

Cluster randomized experiment. Future work might utilize the cluster randomized experiment method as a prospectively applied option for a study design. The cluster randomized design requires prospective planning and the ability to apply an intervention in only a subset of randomly selected geographic units. This approach therefore requires a high degree of support from the policy implementers and ethical concerns regarding the withholding of the intervention from selected groups must be addressed. In some cases, researchers can offer a standard of care intervention in the control group or provide the study intervention to the control group later than to the intervention group. In addition, the outcomes of interest must almost always be measured by collecting primary data due to needing data by clusters and on time scales as defined by the study, which may or may not track with administrative data collection practices. In some cases, however, it is possible to find the data in an existing data set with the appropriate data. The prospective nature of a cluster randomized study and the amount of influence the researchers must maintain over the implementation to ensure proper randomization require far more resources than the other two designs examined here, neither of which require prospective implementation

or researcher influence on the policy implementation. In exchange for these high research costs, however, cluster randomized experiments provide the gold standard quality of evidence, as randomization isolates the effects of the policy from the effects of all other sources, including effects for which the researchers might not have the knowledge or ability to control.

We examined in close detail three studies that adopted this design. The first, carried out by Capuno, Kraft, Quimbo, Tan, & Wagstaff (2016) examined the effect of two interventions on enrollment in the Philippines' voluntary social insurance Individually Paying Program. It predominantly used data from household surveys designed by the researchers. The second, a study by Wagstaff, Nguyen, Dao, & Bales (2016) measured the impact of information and vouchers on public coverage enrollment, based on data from household surveys designed by the researchers. The third study, by Yip et al. (2014), assessed whether a pay-for-performance scheme had an effect on the prescribing of antibiotics in China; the researchers employed data "from an electronic management information system that was set up for the purposes of the study" (p. 504).

Difference-in-differences. Difference-in-differences is a quasi-experimental approach used when a randomized controlled trial with true treatment and control groups did not occur, but a natural untreated comparison group exists. To use this research structure, the design must assume that the trends in the outcomes of interest would be the same in the comparison group as they would be in the intervention group, if the intervention group had not received the intervention. To estimate the causal effect of a policy, the method compares pre- and post-intervention data from the treated and untreated groups to identify the change attributed to the policy in the treatment group. Difference-in-difference calculations require applying statistical methods to adjust for non-policy-related changes observed over the same time frame in the nontreated group. Difference-in-differences studies can be conducted prospectively, but they can also be conducted after the policy change has been implemented if a source exists with data on the outcome of interest in both groups before and after the intervention. This data source could be claims data, a repeated household survey, or any other routinely collected data set. Because the researchers do not have to influence whom or where the policy change affects, the design can often take advantage of existing data, and the analysis can often take place all at once, difference-in-differences studies often require far less time and other resources than cluster randomized trials. This evaluation method is commonly used in U.S.-based policy evaluations, including the quantitative evaluation component of the SIM Round 1 studies.

Our target review of the international literature identified multiple studies that employed the difference-in-differences design. One of these studies examined 5 years of national household survey data to assess the effect of "contracting-in intergovernmental organizations to manage...[Basic Health Units]" on primary care utilization in Pakistan (Malik, van de Poel, & van Doorslaer, 2017). Another used three iterations (years 2000, 2005, and 2010) of the Cambodian DHS to examine the impact of performance-based financing on selected service utilization in Cambodia (van de Poel, Flores, Ir, & O'Donnell, 2016). A third inquiry used the 2010 Cambodian DHS to estimate the impact of public health facility maternity care subsidies and vouchers on maternal care in Cambodia (van De Poel, Flores, Ir, O'donnell, & van Doorslaer, 2014). A fourth study used the 2004 National Sample Survey Organization household survey and a 2012 household survey carried out using a comparable design to measure the impact of health

insurance schemes and other complementary health sector changes on inpatient out-of-pocket spending and access in two Indian states (Rao et al., 2014).

Interrupted time series. In contrast to the difference-in-differences study design, the interrupted time series evaluation method does not require the presence of a feasible comparison group that did not receive the intervention. Instead, the group that receives the intervention acts as its own control group; the design tests for a difference between the trend in the outcome of interest before the intervention and the trend after the intervention. Like the difference-in-differences approach, interrupted time series evaluation methods may be appropriate when an intervention cannot be tested using a randomized controlled design, which would produce higher-quality data but may not be feasible in many cases. Unlike the difference-in-differences and cluster randomized trial methods, an interrupted time series can evaluate interventions that were implemented uniformly across a whole country (Pape et al., 2013). Pape et al. (2013) prepared a particularly useful review of this evaluation methodology, which effectively factors out post-intervention changes in the outcome metric of interest that are attributable to an underlying time trend. This approach can be applied with a pre- and post-intervention data set that includes at least three observations at both stages. Like difference-in-differences studies, many interrupted time series studies can be conducted well after the policy has been implemented, and they do not require researcher influence on policy design or implementation. It therefore shares relatively low resource needs with the difference-in-differences design. Two examples of this study design include the previously discussed study by Iyer et al. (2017), and a second study led by Ir et al. (2015), which examined the impact of results-based financing on facility deliveries in Cambodia using health information system data.

After examining common health policy reforms in LMICs, previous studies conducted by other organizations to examine those reforms, the availability of data in LMICs, RTI's expertise in conducting health policy evaluations in the United States, and potential designs for policy evaluation, we developed three case studies to make these findings more concrete.

HOW CAN WE APPLY THESE METHODS TO SPECIFIC POLICY REFORMS IN CASE STUDY COUNTRIES?

To select country case studies, we used the following criteria: geographic diversity, economic diversity, existing policy debates or previous policy changes relevant to UHC, and the existence of frequent household surveys. We selected these criteria to ensure that that we would choose country case studies with (1) a policy change to review, (2) data to evaluate the policy change, and (3) country-level diversity to ensure applicability across a diverse range of contexts.

Based on these criteria, we selected seven countries for further review: Ghana, Malaysia, the Philippines, Rwanda, Senegal, Tanzania, and United Arab Emirates. Unfortunately, we were not able to identify countries in Latin America, the Caribbean, or Eastern Europe/Central Asia that met these criteria. Please see the section “What Policy Changes Are Taking Place in LMICs to Support UHC?” for an explanation of how we identified policy reforms to review.

For further study, we selected three case study countries from among these seven, based on the policy reforms in each country. To develop an evaluation model for each country case, we had two criteria. First, selected policy reforms had to be able to be evaluated using existing data sets and without gathering primary data. Second, policy reforms had to address a specific dimension of UHC. Using these selection criteria, we identified the Philippines, Rwanda, and Senegal as our country case studies.

We begin our descriptions of the cases with the Philippines, whose policy issue involved eliminating user fees for indigent populations to protect them financially. Then we turn to one of the best-known and most-studied health reforms of the past 15 years: the introduction of performance-based financing (PBF) in Rwanda. In this description, we focus on the quality implications of the reform and explore options for tying PBF to quality metrics (e.g., accreditation). Finally, we turn to national-level support for mutual health organizations (MHOs) in Senegal to improve insurance coverage. In each of these case studies, we examine the political background to each policy change, the structure of the reform, the expected outcome, and any previous assessments of the reform. Next, we identify the existence of external technical assistance packages to support the policy reform, specifically from USAID, DFID, the Australian Department of Foreign Affairs and Trade, or another major external donor. Then, we outline potential future policy questions from this reform. Finally, we propose a method for evaluating the effects of the policy.

Philippines

Facility user fees have been a major reform topic since structural adjustment reforms in many countries in the late 1980s and early 1990s (Akin, Birdsall, & De Ferranti, 1987). In this decade, however, studies have shown that even nominal fees can impact access to care for poor families and thereby reduce equity (Lagarde & Palmer, 2011). In this context, the Philippines introduced No Balance Billing (NBB) in 2011, along with case rate payments, which made health services free for covered populations. Under this policy, hospitals and health facilities are only allowed to charge PhilHealth the case rate payment, that is, the amount reimbursed by PhilHealth for covered populations. Prices higher than the case rate payment, which are paid by the patient, are allowed for non-covered populations. This policy was enacted “for the

purposes of providing optimal financial risk protection to the most vulnerable groups,” in line with PhilHealth’s mandate to “prioritize...health services to all Filipinos, especially that segment of the population who cannot afford such services” (House of Representatives, 2016, p. 1). Although the impact of user fees and user fee removal has been studied extensively in other settings, the NBB policy has yet to be rigorously evaluated in the Philippines (Lagarde & Palmer, 2011). In fact, it has been hypothesized that the structure of policies to remove user fees may not help covered populations if certain services disappear from facilities because of financial pressure (Xu et al., 2006). As such, evaluating NBB could provide valuable information on the design of future user-fee reforms.

Under NBB, providers receive payment for services according to rates set by PhilHealth’s National Health Insurance Program (RTI International, 2017b). That is, covered populations are not charged user fees at the point of service. The term *covered populations*, according to PhilHealth, includes indigent populations, or those with either no visible means of income or insufficient income to support a family; sponsored populations, or those whose contribution is covered by another individual, agency, or private entity, which includes orphans, abandoned and abused minors, out-of-school youths, and children who live on the streets; domestic workers employed on more than an occasional basis; Filipino resident citizens over the age of 60; and “lifetime” members who have reached the legal age of retirement after paying at least 120 monthly premium contributions (PhilHealth, 2017).

To support the government of the Philippines with implementing NBB, LuzonHealth (2013–2018), a USAID program implemented by RTI, provided trainings and support to health units, health worker staff, and local government officials to support facilities as they pursued accreditation, which requires compliance with the NBB policy. From 2015 through 2017, this support helped the number of accredited birthing facilities almost double, from 148 to 283 (RTI International, 2017b). Philippines Public Health (2012–2015), a now-closed World Bank program implemented by Population Services Pilipinas Incorporated, provided similar accreditation support in the Eastern Visayas Region (World Bank, 2016).

Previous assessments in the Philippines found that NBB had been unevenly implemented. In 2014, for example, only 41% of hospitals were following the NBB policy, with spending on medicines making up the bulk of out-of-pocket costs (Bredenkamp & Buisman, 2016). In addition, as government spending on health increased, the incidence of catastrophic health expenditures and out-of-pocket expenditures increased also, from 2.5% in 2000 to 7.7% in 2012 and from 52.7% in 2010 to 55.8% in 2014, respectively (Bredenkamp & Buisman, 2016; Wong et al., 2018). On the other hand, qualitative studies of utilization found that out-of-pocket costs for poor people are low in the Philippines public sector, mostly due to the NBB policy (Espallardo et al., 2015). Patients, however, did have to purchase supplies and medicines privately that were unavailable in the public sector.

For purposes of comparison with the Philippines, we note that evaluations of user fee policies in other countries have also shown mixed results. A Cochrane review, for example, found that “reducing or removing user fees increases the utilization of certain healthcare services,” although this review was not able to identify how user fee addition or removal impacted household health expenditures (Lagarde & Palmer, 2011, p. 2). A Zambian study found that user fee removal did not increase utilization, but that it did “virtually eliminate” health expenditures, including catastrophic health expenditures. This study used

cross-sectional survey data from the 1998, 2002, and 2004, and 2006 Living Conditions and Monitoring Surveys to develop synthetic control and treatment groups using the synthetic control method (Lépine et al., 2018).⁴ Further DHS data across 10 African countries showed that user fee removal had some health output and outcome effects, including increasing facility-based delivery and reducing neonatal mortality (McKinnon, Harper, Kaufman, & Bergevin, 2015). Finally, Orem, Mugisha, Kirunga, Macq, & Criel (2011) used basic tables and crosstabs to analyze Uganda National Household Survey data from 1999/2000, 2002/2003, and 2005/2006. They identified that abolishing user fees in Uganda improved access to care but did not affect financial protection, as out-of-pocket expenditures remained high and inequitably distributed after the reform.

Given the targeted pro-poor design of NBB, it is unlikely to have strayed into any of the unacceptable trade-offs identified by Norheim (2015) even if not fully implemented. The hypothetical reduction of access to hospital services because of issues of hospital financial viability, however, could make the health system less progressive, especially if it were to drive patients into private sector clinics that were less likely to comply with the NBB policy.

Future policy questions

As the Philippines has yet to fully implement NBB, despite its introduction in 2011, the major policy question remains the effect of the NBB policy on health expenditures by individuals. Although PhilHealth has committed resources to ensuring NBB is implemented, the resulting financial pressure on hospitals disincentivizes them from adhering to the NBB policy. PhilHealth has leaned on recognition programs to ensure compliance. Future regulations to ensure compliance with NBB are likely and will need to be evaluated to address financial protection concerns. Additionally, pharmaceuticals fall under NBB in theory, but in practice, as indicated in the research summary above, indigent clients often must go to private dispensaries and pay for medicines that are not in stock at public facilities. The NBB policy does not address this gap. Finally, private hospitals are also, in theory, supposed to adhere to the NBB policy. However, cost structures at these hospitals mean that compliance is a costly endeavor and places significant financial strain on them. Exempting them from the NBB policy could improve their financial standing. On the other hand, the private sector accounts for 60% of the hospitals and 50% of the hospital beds in the Philippines, which expands the reach of the health system into many underserved areas. Exempting private hospitals from the NBB policy would cause significant hardship for people covered by the NBB policy. PhilHealth will need to evaluate the impact of the NBB policy on private hospitals to inform this policy debate.

Evaluation opportunity

We propose using data from the PhilHealth inpatient claims database to evaluate the effect of the NBB policy on out-of-pocket expenditures among the indigent population enrolled in the Philippines National Health Insurance Program. A previous study using the PhilHealth claims database identified the

⁴ The synthetic control method (Lépine et al., 2018) involves constructing a counterfactual for the treated group (in this case, rural districts) by taking a weighted average of the available control units (urban districts), where a higher weight is given to control units that are more similar to the treated unit. This synthetic twin is created to follow the same pattern as the treated unit in the pretreatment period so that it can be used as a counterfactual after the policy implementation.

indigent population using the claims database and developed a working definition of out-of-pocket expenditures (reimbursed benefits subtracted from “incurred charges”) (PhilHealth, 2017). Without access to the data and a clear understanding of variable definitions, however, we could not determine with certainty whether inpatient claims would be the appropriate identification mechanism for quantifying out-of-pocket expenditures. Therefore, it would be prudent to further investigate this aspect of the data and proposed study design prior to proceeding with data acquisition.

We propose a difference-in-differences study to examine changes in out-of-pocket spending within the indigent population before and after the implementation of NBB, compared with changes in out-of-pocket spending within patients not covered by NBB. To do so, we propose constructing a discharge-level data set with information on out-of-pocket spending, discharge date, and numerous other patient and service characteristics attached to each observation. The PhilHealth claims are a robust data set with information on patient age, sex, residence, disease severity, length of stay, hospital type, and hospital location (PhilHealth, 2017). As such, the final analytic design would incorporate adjustments for multiple key factors impacting intensity and cost of services provided prior to discharge. Probit regression methods could be applied to examine the association between receipt of services in the post-implementation time frame (2011) and likelihood of any out-of-pocket spending within the indigent population. Key factors to consider in moving forward with this type of analysis include obtaining Institutional Review Board approval and managing the complexities and time considerations involved with acquiring PHI. Data access and quality challenges would be the primary barrier to completing this type of study.

Rwanda

The Rwandan health system uses PBF to address institutional and provider incentives to improve the quality of care. The efficacy of this reform is a heavily researched policy question, with multiple studies reviewing various quality, access, and cost effects. Although this reform is over a decade old, PBF is still a topic of considerable debate in health policy circles, with recent articles questioning its efficacy (Paul, Albert, et al., 2018). Unfortunately, few opportunities exist to evaluate payment reform mechanisms in LMICs, mostly due to data availability challenges. In Rwanda, however, PBF has been evaluated in the past using broad child health outcomes defined in the DHS, along with other measures, which points the way for future opportunities to measure quality of care with survey data, rather than claims or utilization data.

Starting with pilot programs in 2001 and 2002 and progressing to country-wide implementation in 2005 and 2006, the government of Rwanda has instituted a PBF reform in which facilities and providers receive monetary incentives for delivering high-quality care in large quantities (Kalk, Paul, & Grabosch, 2018; Lannes, Meessen, Soucat, & Basinga, 2015; Skiles et al., 2015). The Rwandan package rewards providers and facilities through an increased fee for providing 14 high-value maternal and child health primary care services and through a quarterly weighted payment based on a quality score developed from monthly assessments (Skiles et al., 2015). Although these payments can significantly increase providers’ income, they are generally provided at the facility level to reduce individual competition for the payouts (Kalk et al., 2018). The Rwandan PBF reforms were designed to (1) increase vulnerable populations’ access to health services by increasing the supply of those services, (2) improve

health care workers' productivity, and (3) improve the quality of service delivery (Rusa et al., 2018; Skiles et al., 2015). As with any change in incentives, however, the reform does produce a risk of providers gaming the system, in this case by exaggerating their performance of incentivized work or neglecting non-incentivized but still important activities in favor of those that will result in direct compensation (Kalk et al., 2018).

The Rwanda Ministry of Health received technical support from numerous partners, including Catholic Organization for Relief and Development Aid (Cordaid), HealthNet International (HNI), Management Sciences for Health (MSH), and U.S. government organizations (Ministry of Health & Republic of Rwanda, 2009). HNI assisted with the initial piloting of PBF financing and with setting the initial payments in Butare Province through the *Santé d'Abord II* [Health First II] project (Meessen, Kashala, & Musango, 2007; Meessen, Musango, Kashala, & Lemlin, 2006). Cordaid carried out similar piloting work in Cyangugu Province (Soeters, Habineza, & Peerenboom, 2006). USAID supported the implementation of PBF throughout Rwanda through two projects implemented by MSH: *Virus de l'Immunodéficience Humaine/Financement Base sur la Performance* [Human Immunodeficiency Virus/Performance-Based Financing; 2005–2009], and the Integrated Health Systems Strengthening Project (2008–2013) (USAID & Republic of Rwanda Ministry of Health, n.d.). The German international aid agency and the World Bank also collaborated on the national rollout of performance-based financing (Basinga et al., 2011). In addition, disease-specific USAID programs—such as the 2007–2012 HIV/AIDS Clinical Services Project (HCSP) implemented by FHI 360, the Elizabeth Glaser Pediatric AIDS Foundation, and IntraHealth—have integrated PBF into their work. The final evaluation of the project used the quality measures required for implementing PBF to evaluate the quality of the overall program (Shepherd, Nassali, & Karasi, 2012).

Previous assessments of the PBF project in Rwanda generally found that it improved the quality of care, which was the initial goal of the PBF model, but that it had negligible effects on access to care. Using a difference-in-differences estimation on DHS data from 2005 and 2007/8, Skiles et al. (2015) found that PBF improved treatment quality but did not affect care-seeking behavior among poor children. Also using a difference-in-differences model, Lannes et al. (2015) found that PBF improved efficiency of care, by improving access for people who were easier to reach, including those patients who were relatively affluent. By contrast, Kalk et al. (2018) used qualitative methods, including interviews, to highlight that PBF led providers to pay more attention to incentivized services, but they were not able to isolate the effects of greater training and higher salaries on the PBF program. Finally, Rusa et al. (2018) used a time series study, which took advantage of phased implementation to allow a control group for 15 months of implementation. He found that PBF improved utilization of previously poorly organized maternal and child health services, such as growth monitoring and institutional deliveries, but had little impact on other services. Confounding factors were numerous, as total health expenditures increased nearly fourfold during PBF implementation and health insurance (*mutuelles de santé*) rollout resulted in 75% coverage by 2015 (USAID, 2005).

The 14 indicators included as part of PBF heavily incentivize high-priority primary care, although they are not specifically expanding access for lower wealth quintiles. In fact, some evidence has indicated that PBF did not make services more available to the poor. Therefore, whether the reform instituted the

unacceptable trade-off related to expanding coverage for the well-off before doing so for worse-off groups is a matter of debate.

Future policy questions

PBF has been a reality in Rwanda since 2006. In light of the persistence of PBF, the 2015 Health Financing Sustainability Policy outlines future development of the PBF model as one of its five policy directions (Ministry of Health & Republic of Rwanda, 2015). Specifically, the Ministry of Health would like to better integrate PBF into the facility accreditation process, including providing incentives for accreditation and payments based on comprehensive measures of quality as measured through the accreditation process. According to the Ministry's *PBF Procedures Manual*, hospitals will receive a 3% budget increase for achieving accreditation, with health facility accreditation to be rolled out in the next phase (Ministry of Health & Republic of Rwanda, 2015).

Although a number of national health insurance schemes, such as PhilHealth in the Philippines, reimburse facilities for services for which they are accredited, Rwanda's proposed model is unique in LMICs in tying PBF payments to a comprehensive accreditation process rather than to tracer indicators for priority services. As such, Rwanda will need to develop an evaluation approach and metrics for ensuring that tying payments to accreditation standards address the quality metrics they are seeking to improve.

Evaluation opportunity

Given the richness of the DHIS2 platform as a source for high-quality data in Rwanda and the proven use of this data source in an evaluation context, we suggest looking to the DHIS2 platform as a potential data source in an evaluation of the impact of facility accreditation in Rwanda. However, it is important to recognize that opportunities to evaluate the impact of accreditation standards will depend on the nature of accreditation implementation. Assuming that accreditation will be achieved differentially over time across facilities, we suggest a future evaluation might adopt a controlled time series evaluation approach similar to that employed by Iyer et al. (2017). Specifically, an evaluation could use the DHIS2 data to examine the impact of facility accreditation on receipt of high-quality maternity care and childhood vaccination visits among accredited facilities' catchment populations. This approach would entail constructing panel-level data (by month, quarter, year, etc.) and capturing population utilization rates attached to accredited treatment facilities to those from propensity-score-matched, nonaccredited control facilities. The panel would cover a pre- and post-accreditation time frame for accredited facilities. Future evaluation work would need to consider time frames involved in securing data access and working through any necessary Institutional Review Board approvals for accessing PHI.

Senegal

Unlike many of its counterparts in Asia and anglophone Africa that have built national health insurance schemes, the Senegalese Ministry of Health decided to build on its well-developed network of nongovernmental community-based health insurance (CBHI) schemes to provide UHC. This scheme had three features designed to incentivize voluntary participation: a 50% government subsidy for all participants, a 100% subsidy for indigent population, and retention of the existing nongovernmental

MHOs (Fonteneau, Vaes, & Van Ongevalle, 2017). Evidence from LMICs has highlighted coverage plateaus in voluntary schemes, which limit the true universality of voluntary mechanisms (Averill & Mariott, 2013). For example, Ghana's coverage rate has been stuck at 40% since 2008 (Blanchet, Fink, & Osei-Akoto, 2012). However, these schemes, with the partial exception of Rwanda's, are designed and managed at the national level, with nationalized benefit packages, premiums, and reimbursement rates. On the other hand, CBHI schemes have been a key component of West African health systems for three decades without institutionalized government support (Zeleeuw, 2015). Senegal, specifically, has been at the forefront of CBHI since developing the first MHOs in the 1980s, though enrollment has remained low, at around 4% of the population (Tine et al., 2014). Recognizing that small-scale, fragmented CBHI schemes could not reach national scale, the Ministry of Health developed a plan for improving health insurance coverage among residents who did not receive coverage through their formal-sector employer (Senegal Ministry of Health and Social Action, 2013). This plan, now known as *décentralisation de la couverture assurance maladie* (decentralization of health insurance coverage, or DECAM), depended on strong support from President Macky Sall, who had campaigned on extending health insurance in the 2012 presidential election.

Under DECAM, enrollees sign up for health insurance as family units or through a recognized group (cooperatives, economic interest groups, women's groups, microfinance organizations, etc.) although individuals may also register. The insurance schemes must cover a minimum service package established at the central level. Each commune/community develops a *mutuelle*, which then falls under the jurisdiction of a *département* (district)-level organization of *mutuelles*. The local and district-level organizations carry out complementary functions for revenue collection, risk pooling, and health care purchasing, with the local-level organizations handling care at health centers and health posts and the district-level organizations handling care for patients referred to hospitals. Local *mutuelles* also take care of identifying and enrolling eligible individuals. The district-level organizations are then further grouped into regional-level organizations, which organize training, facilitate information sharing, and provide supervision and support (Senegal Ministry of Health and Social Action, 2013).

To increase coordination between household contributions to health and the National Health Solidarity Fund (*Fonds National de Solidarité Santé*, FNSS), DECAM established mirror health solidarity funds in each district. These funds provide partial subsidies for expanding benefits packages and pooling risk at the district level, targeted subsidies for enrolling members of indigent and vulnerable populations in local *mutuelles*, and grant mechanisms for ensuring member retention through decentralized financing mechanisms (microfinance, microcredit, and microsavings organizations). Under DECAM, the FNSS was charged with fully subsidizing the *mutuelles*' premiums for "the poorest" and providing a 50% subsidy of premiums for all households. These reforms were designed to reduce the proportion of households' expenditures on health that went to out-of-pocket payments at the time of treatment (Senegal Ministry of Health and Social Action, 2013).

Through the Senegal Health and Nutrition Financing Project (2013–2019), the World Bank is providing the funding and technical support to establish at least one *mutuelle* in each commune of Senegal. The financial support covers the 50% subsidy of all premiums and the 100% subsidy of premiums and copayments for the poorest residents (World Bank, 2013). In addition, the Bank is providing training and procurement support for the expansion of *mutuelles*. To assist with directing aid to

the poorest, the World Bank will provide consulting services and investments in information technology equipment. The effort also will help demarcate poor households in the unified national identification system that is being set up independently of this project (World Bank, 2013).

USAID/Senegal supported DECAM implementation through the Health Systems Strengthening (HSS) project (2011–2016), which is continuing through the Health Systems Strengthening Plus project (USAID Senegal, 2017). The HSS project assisted with three feasibility studies in three districts that helped to determine and harmonize the structure of the DECAM reforms. It provided tools and training for the administrators of the *mutuelles*, for community leaders who needed to support the new scheme, and for elected officials. It also assisted with establishing new *mutuelles* and restructuring existing ones. From 2013 through 2015, to inspire the extension of UHC in 12 regions, HSS also supported DECAM implementation in a demonstration district in each region. USAID also assisted with the implementation of the national identification system and used it to identify and enroll indigent residents into health insurance (USAID Senegal, 2017).

As DECAM is only a few years old, there are no assessments of its impact on health insurance coverage, although Mladovsky (2014) highlighted the importance of high-quality health services, participation, and social capital in keeping people enrolled in CBHI schemes. However, as previously noted, voluntary, premium-based schemes typically result in increased, but not universal, coverage (Averill & Mariott, 2013). Additionally, these schemes tend to enroll wealthier and more urban populations, raising equity concerns (Dake, 2018). Therefore, from the perspective of the five unacceptable trade-offs, the question for these schemes is whether they are progressively financed, pro-poor in coverage, and primary-care centric. The answers to these questions depend on the structure of the insurance scheme. In Ghana and Indonesia, the governments prioritized formal-sector schemes and hospitalization over primary care, thereby introducing at least two of the unacceptable trade-offs, while Thailand's voluntary system achieved universality using tax-based financing. In Senegal, DECAM's 100% premium subsidy for indigent populations appears to have addressed equity concerns, although poor people often have other barriers to using insurance, including copayments and deductibles. The highly variable, community-focused benefit packages mean that each *mutuelle* may or may not settle in idiosyncratic ways for accepting some of the trade-offs. It remains to be seen how, or whether, DECAM addresses the unacceptable trade-offs and to what extent these MHOs are viable and able to carry the responsibilities of channeling public resources.

Future policy questions

MHOs have existed in Senegal for over 30 years, yet they have never achieved the kind of scale first envisioned. DECAM is the latest attempt to promote MHOs; it remains to be seen whether this specific package of premium subsidies, political support, and technical assistance will finally result in scale-up. As a result, the impacts of DECAM on coverage remain the major UHC-related policy question in Senegal. Sustainability of the scheme will prove a major challenge in the future, as donors establish MHOs district by district in Senegal and premium support relies on significant donor budget support.

Evaluation opportunity

We propose using the DHS to evaluate whether the 2013 policy guidance and rollout of DECAM had a positive impact on key maternal and child health indicators, as the expectation is that DECAM should have a positive impact on vulnerable populations, including mothers and children. Importantly, the rollout of MHOs did not occur universally under DECAM; instead, implementation varied with geography and development partners. We propose using a difference-in-differences evaluation design, given the staggered implementation of MHOs in Senegal. The DHS has occurred annually in Senegal starting in 2012, which makes this evaluation approach possible if geographies in the MHO “treated” and “untreated” groups can be identified in the survey data. Maternal health data available in the DHS include information on prenatal, delivery, and postnatal care; child health data; and information on vaccinations, newborn medical care, and childhood illnesses (Senegal Ministry of Health and Social Action, 2013). Access to DHS data should not present a challenge to completing an evaluation, although researchers would need to partner with a subject-matter expert to further understand the timing and geographies of DHS rollout.

CONCLUSIONS

Methods for evaluating policy reforms are clearly established and well known. Researchers use them to evaluate particularly new or contentious policy reforms, even in LMICs, such as performance-based financing in Rwanda. This paper, however, reveals that critical policy reforms, including user-fee exemptions and new coverage mechanisms, remain understudied, especially at the country level. Although evidence for these reforms exists in some contexts, policy makers and technical assistance providers need information specific to their countries to inform health policy debates. Despite a growing focus on achieving UHC, these types of country-specific evaluations are not commonly conducted in LMICs. Conversely, in the United States and other HICs, major policy reforms draw significant funding and evaluation expertise, which results in a great deal of knowledge concerning the effects of policy reforms, especially for Medicaid and Medicare populations.

We started this paper with three driving questions. First, what policy changes are taking place in LMICs to support UHC? Second, what data are available in LMICs to evaluate the effects (if any) of these changes? Third, what evaluation methods are most appropriate for assessing the impact of policy reforms in LMICs? We then applied what we learned to three country case studies.

To the first question, we see a grand convergence of health policy reforms due to the movement toward UHC. Our literature review identified many common policy reforms that countries are undertaking to move toward UHC, including voluntary contributory insurance, premium subsidies, capitation, user-fee exemptions, accreditation, PBF, and private sector contracting. Outcomes of interest aligned with the three dimensions of UHC, although cost reduction and service quality improvement were often desired outcomes as well. In addition, we found that policy reforms are rarely conducted in isolation. They can, and often do, overlap to form a complex network of financing and regulatory schemes. Additionally, while some of these reforms, such as PBF, have been well studied in specific settings, others have a very limited evidence base. The reforms we reviewed in our case studies—user-fee exemptions, PBF tied to accreditation, and voluntary insurance with premium subsidies—reflect this uncertainty, with little evidence of impact on UHC goals. Apart from PBF in Rwanda, this uncertainty results from understudied policy reforms rather than mixed evidence.

In addition to the research gap related to UHC goals, a real danger exists that many of these common reforms incorporate some of the five unacceptable trade-offs. Voluntary insurance, even with premium subsidies, differentially provides coverage to more urban and wealthier quintiles. There is mixed evidence that user-fee exemptions reduce catastrophic expenditures for poor people, but they could also, under certain circumstances, reduce access to primary care and drive care toward more expensive settings. Similarly, PBF can be used to drive service quality but also can prove to be inequitable. Private sector contracting may provide access to higher levels of care through insurance, but it often prioritizes more expensive tertiary services over less expensive primary ones.

To the second question, we have identified that data availability is a major stumbling block, as we reviewed common data types for availability, privacy, quality, frequency, and use. In this review, we identified three major data sources in LMICs that could be used to evaluate policy reforms. These three, however, had various challenges and opportunities. DHIS2 data are available easily and have few privacy

concerns due to aggregation to the facility level. Data quality is, however, highly variable and only useful for facility-level analysis due to aggregation. Similarly, DHS and other routine household survey data are of high quality, are easily available, and have few privacy concerns. The time lag between the surveys and the limited range of questions on quality and financing, however, limit their usefulness to inform policy decisions in a reasonable timeframe. In addition, these surveys can only answer a constrained set of high-level questions. Although claims databases provide unparalleled information about service quality, they are still a nascent tool with significant availability, storage, and privacy challenges. Insurers maintain tight control over these databases, and their contents often are PHI, even when the contents have been de-identified. Additionally, data quality can vary widely, especially when most claims data are collected on paper, as in Ghana. Despite drawbacks, however, claims data allow measuring individual-level outcomes and expenditures in a way that is not possible with other data sources. Regardless of their limitations, these existing data sources are underutilized for secondary data analysis.

To the third question, we found that no one model, method, or technique is appropriate for all policy questions. Rather, a differential approach, based on data availability, the research question, policy selection, and policy implementation, is required. In this paper, we proposed using difference-in-differences and time series evaluation approaches for our three case study questions, although we do not mean to imply that these are the only models available to researchers. We also discussed cluster randomized trials, which is the gold standard of evidence, but whose high resources costs and need for researcher control over intervention implementation prevented us from recommending it for one of our case studies. Difference-in-differences methods are useful when a policy has been differentially implemented by geography or across social groups, resulting in a natural experiment, as is likely in Senegal or the Philippines. Unlike difference-in-differences, time series evaluation does not require a comparison group who did not receive the intervention, and it is useful when a policy is implemented all at once nationwide, as is happening with accreditation in Rwanda. Even though we proposed pairing these methods with the three potential data sources in our case studies, each method could also be used on a different data source. We selected the best data source and methodology that fit our policy question and available information.

IMPLICATIONS AND NEXT STEPS

By suggesting an expanded range of tools to conduct policy-relevant research in LMICs, we hope that the evidence base for UHC will become more robust and country-specific answers to challenging policy questions will become more available.

Opportunities exist to improve the quality of policy evaluation in LMICs, as more external donors are recognizing the importance of research to drive program and policy designs. Both DFID and USAID have emphasized the importance of using research to inform policy and programmatic design changes (DFID, n.d.; USAID, 2017). For example, DFID uses the Health Research Programme Consortia to conduct health policy and systems research on critical health policy issues, although these issues need not be UHC-specific. USAID projects increasingly have learning agenda components that require research and evaluations that address critical health outcomes. At the end of projects such as these, contractors often struggle to address how projects have improved health outcomes. Donors often require projects to provide evidence of population-level impact. Donors often require projects to provide evidence of population-level impact. Projects, however, rarely collect or analyze the right information to measure impact at this level. Rather than using population-level surveys, they rely on project monitoring data.

In the three specific case study countries, we identified policy questions that could be answered through methods commonly used in HIC policy evaluations. These questions address various aspects of financing, insurance design, and quality of care, and answers to these policy question should inform ongoing efforts to achieve UHC in Senegal, Rwanda, and the Philippines. Bringing to bear all available tools, within the data availability and financing constraints identified, will help these countries achieve UHC sooner and more efficiently.

To that end, we hope that the points raised in this paper will promote future examination of approaches to evaluate health policy questions in LMICs, strengthening both government and research institution's efforts to evaluate efforts to achieve UHC. This paper points in the direction of three potential next steps concerning evaluation efforts.

First, though the identified policy questions address critical aspects of UHC, the users of policy research—such as ministries of health, insurance providers, and parliament—should drive the development of policy-relevant research questions. We identified policy questions through a detailed literature review, aligning with the three dimensions of UHC, and using existing data sources and methods, yet this method lacked input from critical stakeholders. In-country actors often have different ideas about what research is needed to drive the UHC agenda forward, and their input is critical in identifying research questions that can inform policy directions.

Second, most governments in LMICs do not have the available funds or contracting mechanisms in place to ensure that high-quality research is conducted on UHC policies. For the foreseeable future, we expect most of this type of research to be funded by external donors (e.g., DFID, USAID, the World Bank) and conducted by external research institutions. Considering this dynamic, international donors and research institutions should incorporate population-level health policy evaluations into existing and future health systems programming and forge connections with local research institutions and universities to

ensure that policy changes have the intended effect. The ability to provide policy-relevant research to ministries of health and other research users would be invaluable under these projects. For those countries that fund research efforts, such as the Philippines, strengthening local research institutions to collect and analyze data could improve uptake and use of policy-relevant research.

Third, even with new methods and tools for evaluating health policy in LMICs, the fundamentals of knowledge translation remain the same. Translating research into practice requires consideration of who should receive the information, the power dynamics between actors, who should deliver results, and the potential mechanisms of to transfer information. Using new tools and methods to expand the evidence base for UHC does not preclude the need for strong knowledge translation efforts that engage the skills, talents, and expertise of local actors as they seek to move their countries closer to UHC.

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APPENDIX: DATA SETS FOUND IN THE LITERATURE REVIEW

Organization or geographic region	Data set	Link	Citation
Australia	Health Expenditure Australia	https://www.aihw.gov.au/reports-statistics	Wagstaff, Bilger, Buisman, & Bredenkamp (2014)
Bangladesh	Bangladesh Household Income Expenditure Survey	http://catalog.ihsn.org/index.php/catalog/2257	O'Donnell et al. (2008), Van de Poel, O'Donnell, & Van Doorslaer (2007), van Doorslaer et al. (2006)
Bangladesh	Organisation for Economic Co-operation and Development (OECD), System of Health Accounts (SHA) – SHA-Based Health Accounts in the Asia/Pacific Region: Bangladesh	http://www.oecd-korea.org/Download/Social/Manager/General/File/201007/01%20Bangladesh(1).PDF	Wagstaff et al. (2014)
Brazil	<i>Pesquisa Nacional de Demografia e Saúde (PNDS) Brasil</i> [Brazil National Demographic and Health Surveys], 1996 and 2006	http://bvsmis.saude.gov.br/bvsmis/pnds/index.php	Atun et al. (2015)
Cambodia	Cambodia Demographic and Health Survey	https://nada-nis.gov.kh/index.php/catalog/CDHS	van de Poel et al. (2016), Van de Poel et al. (2014)
Cambodia	Cambodia National Census	https://www.nis.gov.kh/index.php/en/15-gpc/14-population-census-2008-final-result	Ir et al. (2015)
Cambodia	Cambodia Socioeconomic Surveys	https://nada-nis.gov.kh/index.php/catalog/CSES	Flores, Ir, Men, O'Donnell, & van Doorslaer (2013)
China	China Health and Nutrition Survey	http://www.cpc.unc.edu/projects/china	Wagstaff, Lindelow, Jun, Ling, & Juncheng (2009)
China	China Income and Expenditure of Urban and Rural Households	http://data.stats.gov.cn/english/static/req.htm?m=aboutcountryinfo	O'Donnell et al. (2008), Van de Poel et al. (2007), van Doorslaer et al. (2006)

Organization or geographic region	Data set	Link	Citation
China	China National Health Household Interview Survey	http://ghdx.healthdata.org/record/china-national-health-services-survey-2008	O'Donnell et al. (2007), Wagstaff et al. (2009)
China	Gansu Survey of Children and Families	http://china.pop.upenn.edu/	Wagstaff & Lindelow (2008), Wagstaff & Yu (2007)
China	SHA-Based Health Accounts In the Asia/Pacific Region: China, 1990–2006	http://www.oecd-korea.org/Download/Social/Manager/General/File/201007/08%20CHINA(1).PDF	Wagstaff et al. (2014)
ICF	Demographic and Health Surveys	https://dhsprogram.com/data/index.cfm	Atun et al. (2015), Bonfrer, van de Poel, Grimm, & Van Doorslaer (2014), Bonfrer, Van de Poel, & Van Doorslaer (2014), Hartwig et al. (2015), Meheus & Van Doorslaer (2008), O'Donnell et al. (2007), Van de Poel et al. (2007), Wagstaff (2011), Wagstaff, Cotlear, Eozenou, & Buisman (2016)
European Commission	Surveys conducted by the European Commission (Rural Health Insurance in China and Vietnam)	https://cordis.europa.eu/result/rcn/52978_en.html	Hou, Van de Poel, Van Doorslaer, Yu, & Meng (2014)
Eurostat	Eurostat Health Care Expenditure Database	http://ec.europa.eu/eurostat/data/browse-statistics-by-theme	Wagstaff et al. (2014)
Eurostat	The Eurostat Harmonized Household Budget Survey Initiative (Eurostat)	http://ec.europa.eu/eurostat/web/microdata/household-budget-survey	Wagstaff et al. (2018)
Hong Kong	Hong Kong Household Expenditure Survey	https://www.censtatd.gov.hk/hkstat/sub/sp290.jsp	O'Donnell et al. (2008), van Doorslaer et al. (2006)
Hong Kong	Hong Kong Thematic Household Survey	https://www.censtatd.gov.hk/hkstat/sub/sp140.jsp?productCode=B1130201	O'Donnell et al. (2007)
India	India Consumer Expenditure Survey	https://data.gov.in/catalog/household-consumer-expenditure-national-sample-survey	O'Donnell et al. (2008)
India	India National Sample Survey	https://data.gov.in/dataset-group-name/national-sample-survey	O'Donnell et al. (2007), Rao et al. (2014), van Doorslaer et al. (2006, 2007)

Organization or geographic region	Data set	Link	Citation
Indonesia	Indonesia Socioeconomic Survey (SUSENAS)	https://microdata.bps.go.id/mikrodata/index.php/catalog/SUSENAS	Hartwig et al. (2015), Kruse, Pradhan, & Sparrow (2012), O'Donnell et al. (2008), Sparrow et al. (2017), Sparrow, Suryahadi, & Widyanti (2013), van Doorslaer et al. (2006, 2007)
Indonesia	Indonesia Village Potential Statistics (PODES)	https://library.duke.edu/data/collections/podes	Hartwig et al. (2015)
Institute for Health Metrics and Evaluation	Institute for Health Metrics and Evaluation Global Burden of Disease Study	http://www.healthdata.org/gbd	Atun et al. (2015)
Japan	Japan Comprehensive Survey of Living Conditions (CSLC)	http://www.mhlw.go.jp/english/databases/db-hss/cslc-index.html	O'Donnell et al. (2008)
Kyrgyzstan	Kyrgyzstan Household Budget Survey	http://catalog.ihsn.org/index.php/catalog/3134	O'Donnell et al. (2008)
Bill & Melinda Gates Foundation	<i>A Comparative Risk Assessment of Burden of Disease and Injury Attributable to 67 Risk Factors and Risk Factor Clusters in 21 Regions, 1990–2010: A Systematic Analysis for the Global Burden of Disease Study 2010.</i>	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4156511/	Atun et al. (2015), Lim et al. (2012)
Latinobarómetro	Latinobarómetro	http://www.latinobarometro.org/latContents.jsp	Atun et al. (2015)
Luxembourg	Luxembourg Income Study	http://www.lisdatacenter.org/our-data/lis-database/	Wagstaff, Cotlear, et al. (2016), Wagstaff et al. (2018)
Malaysia	Malaysia Household Expenditure Survey	https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=323&buI_id=WnZvZWNVeDYxKzJjZ3RIUVVYU2s2Zz09&menu_id=amVoWU54UTI0a21NWmdhMjFMMWcyZz09	van Doorslaer et al. (2006, 2007)

Organization or geographic region	Data set	Link	Citation
Malaysia	Malaysia National Health and Morbidity Survey	http://iku.moh.gov.my/images/IKU/Document/REPORT/NHMS2017/ANS_KEDAH.pdf	O'Donnell et al. (2007)
Mexico	<i>Encuesta Nacional de Salud y Nutrición</i> [National Survey of Health and Nutrition], Mexico	http://ensanut.insp.mx/	Atun et al. (2015)
Nepal	Nepal Living Standards Survey	http://cbs.gov.np/nada/index.php/catalog/9/download/773	O'Donnell et al. (2008), van Doorslaer et al. (2006)
OECD	OECD National Health Account tables	http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT	Wagstaff et al. (2014)
Pan-American Health Organization (PAHO)	PAHO. <i>Health in the Americas: Regional Outlook and Country Profiles</i> . Scientific and Technical Publication No. 636. PAHO: Washington, DC, 2012	http://www.worldcat.org/title/health-in-the-americas-regional-outlook-and-country-profiles/oclc/829939926	Atun et al. (2015)
Pakistan	Pakistan Household Integrated Economic Survey	http://www.pbs.gov.pk/pslm-publications	Malik et al. (2017)
Pakistan	Pakistan Social and Living Standards Measurement Survey	http://www.pbs.gov.pk/pslm-publications	Malik et al. (2017)
Peru	<i>Encuesta Nacional de Hogares Peru</i> [National Household Survey]	http://inei.inei.gob.pe/microdatos/	Neelsen & O'Donnell (2017)
Philippines	Philippines Family Income and Expenditure Survey	https://psa.gov.ph/content/family-income-and-expenditure-survey-fies	O'Donnell et al. (2008)
Philippines	Philippines Poverty Indicator Survey	https://psa.gov.ph/content/annual-poverty-indicators-survey-apis	O'Donnell et al. (2008), Van de Poel et al. (2007), van Doorslaer et al. (2006)

Organization or geographic region	Data set	Link	Citation
South Africa	Health Financing and Expenditure in Post-Apartheid South Africa 1996/97–1998/99	http://uct-heu.s3.amazonaws.com/nhafinal-1.pdf	Wagstaff et al. (2014)
South Korea	South Korea Urban Household Survey	http://kostat.go.kr/portal/eng/survey/Outline/6/1/index.static	O'Donnell et al. (2008), van Doorslaer et al. (2006, 2007)
Sri Lanka	Sri Lanka Consumer Finance Survey	http://www.cbsl.gov.lk/htm/english/10_pub/p_1.html	O'Donnell et al. (2007, 2008), van Doorslaer et al. (2006, 2007)
Taiwan	Taiwan Survey of Family Income and Expenditure	https://eng.stat.gov.tw/np.asp?ctNode=1542	O'Donnell et al. (2007, 2008), van Doorslaer et al. (2006, 2007)
Thailand	Thailand Health and Welfare Survey	http://www.nso.go.th/sites/2014en/Pages/Statistical%20Themes/Population-Society/Social%20Security/Health--Welfare.aspx	Limwattananon et al. (2015), Limwattananon, Tangcharoensathien, & Prakongsai (2005)
Thailand	Thailand Health Profile	http://wops.moph.go.th/ops/thp/thp/en/index.php?id=288&group_=05&page=view_doc	Limwattananon et al. (2005)
Thailand	Thailand Labor Force Survey	http://web.nso.go.th/en/survey/lfs/lfs_main.htm	Wagstaff & Manachotphong (2012a, 2012b)
Thailand	Thailand Socioeconomic Survey	http://web.nso.go.th/eng/stat/socio/socio.htm	Limwattananon et al. (2005), O'Donnell et al. (2007, 2008), van Doorslaer et al. (2006, 2007)
UNICEF	UNICEF Multiple Indicator Cluster Survey (MICS)	http://mics.unicef.org/	Wagstaff, Cotlear, et al. (2016)
UNICEF	UNICEF TransMONEE Database	http://transmonee.org/	Wagstaff & Moreno-Serra (2009)
Vietnam	Vietnam Household and Living Standards Survey	http://www.gso.gov.vn/default_en.aspx?tabid=483&	Nguyen, Bales, Wagstaff, & Dao (2017), O'Donnell, et al. (2007), van Doorslaer et al. (2006), van Doorslaer et al. (2007), Wagstaff & Pradhan (2005), Wagstaff (2010), Wagstaff & Bales (2012)
Vietnam	Vietnam Social Security Administrative Records	http://www.gso.gov.vn/default_en.aspx?tabid=483&	Nguyen et al. (2017)

Organization or geographic region	Data set	Link	Citation
World Health Organization (WHO)	WHO Global Health Data Repository	http://apps.who.int/gho/data/node.main.A827?lang=en	Atun et al. (2015)
WHO	WHO Global Health Expenditure Database	http://apps.who.int/nha/database/ViewData/Indicators/en	Wagstaff et al. (2018)
WHO	WHO Health Expenditure Series	http://apps.who.int/nha/database/DataExplorerRegime.aspx	Atun et al. (2015)
WHO	WHO Health For All Database	http://data.euro.who.int/hfad/	Moreno-Serra & Wagstaff (2010), Wagstaff & Moreno-Serra (2009)
WHO	WHO Multicountry Survey	http://apps.who.int/healthinfo/systems/surveydata/index.php/catalog/mcs/about	Wagstaff, Cotlear, et al. (2016), Wagstaff et al. (2018)
WHO	WHO National Health Accounts	http://www.who.int/health-accounts/en/	O'Donnell et al. (2007), Wagstaff et al. (2014)
WHO	WHO World Health Report	http://www.who.int/whr/previous/en/	O'Donnell et al. (2007)
WHO	WHO World Health Survey	http://www.who.int/healthinfo/survey/en/	Bonfrer, van de Poel, et al. (2014), Flores et al. (2013), Hogan et al. (2018), Moreno-Serra & Wagstaff (2010), Sun et al. (2014), Wagstaff et al. (2014, 2018), Wagstaff, Cotlear, et al. (2016)
WHO	WHO/UNICEF Joint Estimates 2012	http://www.childinfo.org/bluebook/profiles.html	Atun et al. (2015)
WHO	WHO-CHOICE (cost effectiveness and strategic planning)	http://www.who.int/choice/en/	Wagstaff et al. (2014)
World Bank	World Bank Governance Indicators	http://info.worldbank.org/governance/wgi/#home	Bonfrer, van de Poel, et al. (2014)
World Bank	World Bank Health Equity and Financial Protection Datasheet	http://www.worldbank.org/en/topic/health/publication/health-equity-and-financial-protection-datasheets	Atun et al. (2015)

Organization or geographic region	Data set	Link	Citation
World Bank	World Bank Health Systems in Transition	http://www.euro.who.int/en/about-us/partners/observatory/publications/health-system-reviews-hits	Moreno-Serra & Wagstaff (2010), Wagstaff et al. (2014)
World Bank	World Bank Living Standards Measurement Study	http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0,,contentMDK:21610833~pagePK:64168427~piPK:64168435~theSitePK:3358997,00.html	Wagstaff, Cotlear, et al. (2016), Wagstaff et al. (2018)
World Bank	World Bank World Development Indicators	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Atun et al. (2015), Bonfrer, van de Poel, et al. (2014), Moreno-Serra & Wagstaff (2010), O'Donnell et al. (2007), Wagstaff et al. (2014), Wagstaff & Moreno-Serra (2009)
World Bank	World Bank Worldwide Governance Indicators	http://info.worldbank.org/governance/wgi/	Wagstaff et al. (2014)