



## PRIMARY HEALTH CARE PERFORMANCE INITIATIVE

### Methodology Note

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## I. Introduction

The PHC Performance Initiative (PHCPI) is a new partnership that brings together country policymakers, health system managers, practitioners, advocates and other development partners to catalyze improvements in PHC in low- and middle-income countries (LMICs) through better measurement and knowledge-sharing. PHCPI will help countries track key performance indicators for their primary health care (PHC) systems, identifying which parts of the system are working well and which ones need attention. This will enhance accountability and provide decision-makers with essential information to drive improvements. To make data actionable, the partnership will also provide a platform for countries to share lessons and best practices.

This background note provides a detailed description for how indicators were selected and constructed for the PHCPI website (<http://PHCperformanceimprovement.org>) tool. Section II begins with a description of how PHCPI developed its conceptual framework, which was used as a guide for indicator selection. Section III presents the PHCPI Conceptual Framework. Section IV describes the methods used to select and validate the PHC Vital Signs indicators. Section V presents the PHC Vital Signs indicators. Finally, Section VI describes the logical rules used to inform the presentation of indicator results on the PHCPI website. This note is current as of September 25, 2015.

## II. Conceptual Framework Development

PHCPI developed a Conceptual Framework in order to identify and communicate the components that are crucial for achieving strong PHC system performance. Based on literature available on PHC systems performance, this Conceptual Framework is foundational for the initiative. It reflects our best understanding of what contributes to strong PHC systems. We acknowledge that it may evolve over time as our understanding of PHC systems improves and new perspectives are incorporated. It is the starting point from which the PHCPI indicators and the measurement agenda are derived and is also intended as a communications tool to highlight important aspects of PHC that are too often neglected.

The development of the PHCPI Conceptual Framework relied on two key steps. As a starting point, we reviewed the literature on key characteristics and determinants of high performing PHC systems, including conceptualizations of the following characteristics of strong PHC: first-contact access, continuity, coordination, comprehensiveness, accountability, and person-focus. The themes and system components that these reviews highlighted informed our thinking about what should be included in the framework.

Recognizing that there are many health system frameworks already in use, we also reviewed approximately 40 different frameworks and measurement platforms on PHC, health systems, and health scorecards to identify their strengths, limitations, and common features (Table 1).

**Table 1. Health System Frameworks and Scorecards Reviewed**

1. Afghanistan Health Sector Balanced Scorecard*	28. Open Health Initiative
2. African Leaders Malaria Alliance (ALMA) Scorecard*	29. Primary Care Assessment Tools (PCAT)*
3. Balanced Scorecard	30. PHC Activity Monitor for Europe (PHAMEU)
4. Baldrige Framework	31. Programme for International Student Assessment (PISA)
5. CGD Commitment to Development Index	32. Partnership for Maternal, Newborn & Child Health (PMNCH)
6. Commonwealth Fund Health Systems Scorecards	33. RMNCH Country Scorecards*
7. Control Knobs Framework	34. RWJ/TARSC Primary Care Practice Case Studies
8. Countdown to 2015*	35. Service Availability and Readiness Assessment (SARA)
9. Dartmouth Atlas	36. Service Delivery Indicators (SDI)
10. Demographic and Health Surveys (DHS)*	37. Service Provision Assessment (SPA)
11. Doing Business (and BizCLIR)	38. Starfield's Characteristics of Primary Health Care
12. Every Woman Every Child	39. Systems Approach for Better Education Results (SABER)
13. Healthy Partnerships Initiative	40. Trends in International Mathematics and Science Study (TIMSS)
14. Hunger and Nutrition Commitment Index	41. UNICAT Readiness Assessment
15. Ibrahim Index of African Governance	42. USAID Measuring Results of Health Sector Reform for System Performance
16. International Budget Partnership	43. WHO Global Strategy on Integrated People-Centered Health Services (IPCHS)
17. Institute for Health Improvement Triple Aim	44. WHO Health System Building Blocks
18. Kellogg Foundation Logic Model	
19. Learning from Effective Ambulatory Practices (LEAP) Project	
20. Learning Metrics Task Force (LMTF)	
21. Living Standards Measurement Study (LSMS)	
22. Medicare Hospital Readmissions Reduction Program	
23. Millennium Development Goals (MDGs)*	
24. UHC Monitoring Framework	
25. Multi Indicator Cluster Survey (MICS)*	
26. NHS Star Rating System	
27. OECD Health Care Quality Indicators Project Framework	

\*Frameworks that were explicitly used in the development of the PHCPI Conceptual Framework.

## Selected Findings from Literature on PHC Determinants

### (1) Strong PHC systems lead to improved health system goals

The association between strong PHC systems and improved health outcomes is supported by studies in LMICs. Macinko et. al's systematic review of 36 studies on the impact of PHC on health outcomes in LMICs showed that strong PHC leads to improved and more equitable health outcomes, particularly for infants and children (Macinko, Starfield, & Erinosh, 2009). The impact is influenced by factors like improved coverage of vaccinations, use of oral rehydration solution and potable water, as well as socioeconomic characteristics such as women's literacy.

Kruk et al. assessed the contributions of major LMIC PHC initiatives to a range of health system goals including access, mortality, equity, and responsiveness. They point to specific interventions that contributed to improved outcomes (Kruk, Perignon, Rockers, & Lerberghe, 2010):

- Training and deployment of non-physician providers increased access to care;
- National-level PHC reforms reduced mortality and the burden of infectious diseases;
- Local delivery of health services improved responsiveness to and confidence in the health system; and
- Pro-poor health funding and a focus on the economically disadvantaged increased equity.

The evidence base clearly supports the conclusion that PHC system performance is deterministic of the achievement of overall health system goals and suggests that the achievement of health goals (improved patient health outcomes, improved responsiveness to patient needs, and fairness in financial provision and protection) depends on the delivery of efficient, equitable, and high quality care.

## (2) Strong PHC systems are well integrated into the broader health system architecture

The next logical question is how to characterize PHC system performance. Starfield suggests that PHC services should ideally serve as a point of first contact to provide coordinated, continuous, and comprehensive care. The performance of a PHC system also depends on how well it is integrated into the structural components of the larger health system (Starfield, 1994).

Kringos et al. showed that across 31 high-income countries (HICs) in Europe, those with the strongest PHC systems have a supportive health care system structure in terms of governance, economic conditions, critical infrastructure input, and workforce development; and a service delivery process in which PHC is accessible, comprehensive, continuous, and coordinated both within the PHC system and across the larger health system (Kringos, DS, Boerma, Van der Zee, & Groenewegen, 2014). These characteristics are associated with improved health outcomes, reduced socioeconomic inequality in health outcomes, fewer unnecessary hospitalizations, and slower increases in overall health care expenditures. However, variation in PHC system development occurs in large part due to differences in contextual factors including health care system structure, culture, economic development, and political support for PHC (Kringos D. , 2013).

Across 30 LMICs, Rohde et al. showed that countries with the highest average yearly reduction in under-5 mortality are characterized by (Rohde, et al., 2008):

- Having accountable leadership that includes PHC and maternal and child health in the national health plan; creating consistency in major health policies; investing in health, social sectors, social development, and good governance; and linking donor aid to the national health plan;
- Building coverage of care and comprehensive health systems with time; prioritizing high-effect interventions as a starting point; creating integrated service delivery and building on each program; moving from selective PHC to a continuum of care; increasing workforce resources and investing in workers' skills; delegating care to community health workers (CHWs) and other workers; and ensuring availability of essential drugs and technology;

- Empowering communities and families, both in health promotion and demand for care, with community cadres and health extension workers;
- Focusing at the district level; having access to data to set priorities for district-level funding and track results; and creating functional links at the district level with private providers and NGOs to reduce referral distance and equalize service standards and costs; and
- Prioritizing equity by removing financial barriers for the poorest and protecting against unaffordable health costs.

As seen in high-income countries, the variation in PHC systems across LMICs can be attributed to poor organization and management systems; conflict (through damaged or destroyed infrastructure, infections, and malnutrition); high HIV/AIDS prevalence (as inadequate or delayed responses to HIV/AIDS often overwhelms PHC systems); specific adult mortality challenges despite low child mortality (e.g., alcohol, TB, violence, suicide, and chronic disease); governance challenges; economic development; culture; and marked social inequity (Rohde, et al., 2008).

## **Findings from Review of Existing Frameworks**

### **(1) Frameworks for Higher-Income Settings**

The OECD Health Care Quality Indicators Project, which is a broad health system framework, identified 15 commonly used domains of health system performance frameworks: accessibility; continuity of care; governance; efficiency; equity; patient-centeredness and responsiveness; safety; effectiveness; competence/capability; appropriateness; acceptability; timeliness; expenditure/cost; care environment and amenities; and sustainability.

The European Primary Care Monitor project reviewed the literature, consulted with international primary care experts, and developed nine relevant domains for primary care measurement categorized by structure, process, and outcome. In their framework, primary care structure consisted of primary care governance, workforce development, and economic conditions; primary care process consisted of accessibility, continuity, coordination, and comprehensiveness; and primary care outcomes consisted of equity, quality, and efficiency.

### **(2) Frameworks for Low-Income Settings**

The majority of scorecard frameworks tend to include a mix of systems level, health condition/disease-specific, and target-oriented domains. Scorecards commonly organize domains and indicators according to a structure-process-outcome framework used in health care system analysis.

The Balanced Scorecard (BSC) for health services in Afghanistan, which was developed by Afghanistan's Ministry of Public Health to monitor and evaluate the delivery of quality health services, includes six domains: patient perspectives, staff perspectives, capacity for service provision (structural inputs), service provision (technical quality), financial systems, and overall vision for the health sector. In addition to assessing each domain, they also developed composite scores for overall performance (Peters et al., Bulletin WHO 2007).

Similar to the Afghanistan BSC, the rural maternal, neonatal, and child health (RMNCH) scorecard of Liberia was developed to customize management tools, monitor high-impact interventions, and focus on key priority indicators reflective of maternal and child health. At present, the RMNCH scorecard monitors care related to pregnancy, childbirth, post-partum and neonatal care (newborn health), infancy and childhood (child health), and adolescence and pre-pregnancy (maternal health).

Given the success of the Afghanistan BSC, the International Organization for Migration (IOM) and the district health offices (DHOs) of Aceh, Indonesia, developed a scorecard (Aceh Scorecard) to track the quality of primary health services to people displaced following a natural disaster. The scorecard focuses on four main domains: staff (e.g., job satisfaction and thermometer skills); quality of health facilities (e.g., running water and waste disposal); community (e.g., outreach and active leaders); and service provision (e.g., hours of service and child health). Importantly, data on these domains are collected every two months to allow development of interventions and rapid assessment (Chan et al., Bulletin WHO 2010). The African Leaders Malaria Alliance (ALMA) initiative, which uses country-led scorecards as a management tool to improve health services, is another example of a successful scorecard that tracks progress towards target outcomes of optimal malaria, maternal health, and child care.

While the scorecards above focus on different dimensions of care, the World Bank's Service Delivery Indicators (SDI) initiative has provided robust information on the quality of care provided at health facilities as experienced by patients and staff directly. The SDI initiative has evaluated the quality of facility infrastructure, provider knowledge (through the use of clinical vignettes), and provider effort, and has helped to understand the "know-do gap" in PHC facilities. This initiative lends itself to the development of interventions that can rapidly be evaluated through measures of provider knowledge and effort. This program is active in seven countries in Africa.

## Conclusions

The assessment revealed several commonalities and limitations. Starfield's core primary care functions – first-contact access, comprehensiveness, coordination of care, and continuity of care – have been broadly accepted and included in all PHC frameworks. Domains such as efficiency and equity are often depicted in health system frameworks as cross-cutting attributes. Dimensions reflecting "hardware" inputs (funds, human resources, supplies, facilities, information systems, and leadership) are prevalent, but those measuring "software" inputs (financing, provider payment incentives, regulations, and market structures) are less prevalent. LMICs measure hardware inputs more than HICs do, and provide an opportunity to focus on holistic system functioning, as opposed to only on the availability of inputs.

In addition to the skewed focus on hardware inputs, very few frameworks have a focus on the people involved in the system, including the providers, families, communities, and individual patients that interact with the PHC system. The integration of PHC with other health care sectors was given little attention in most frameworks.



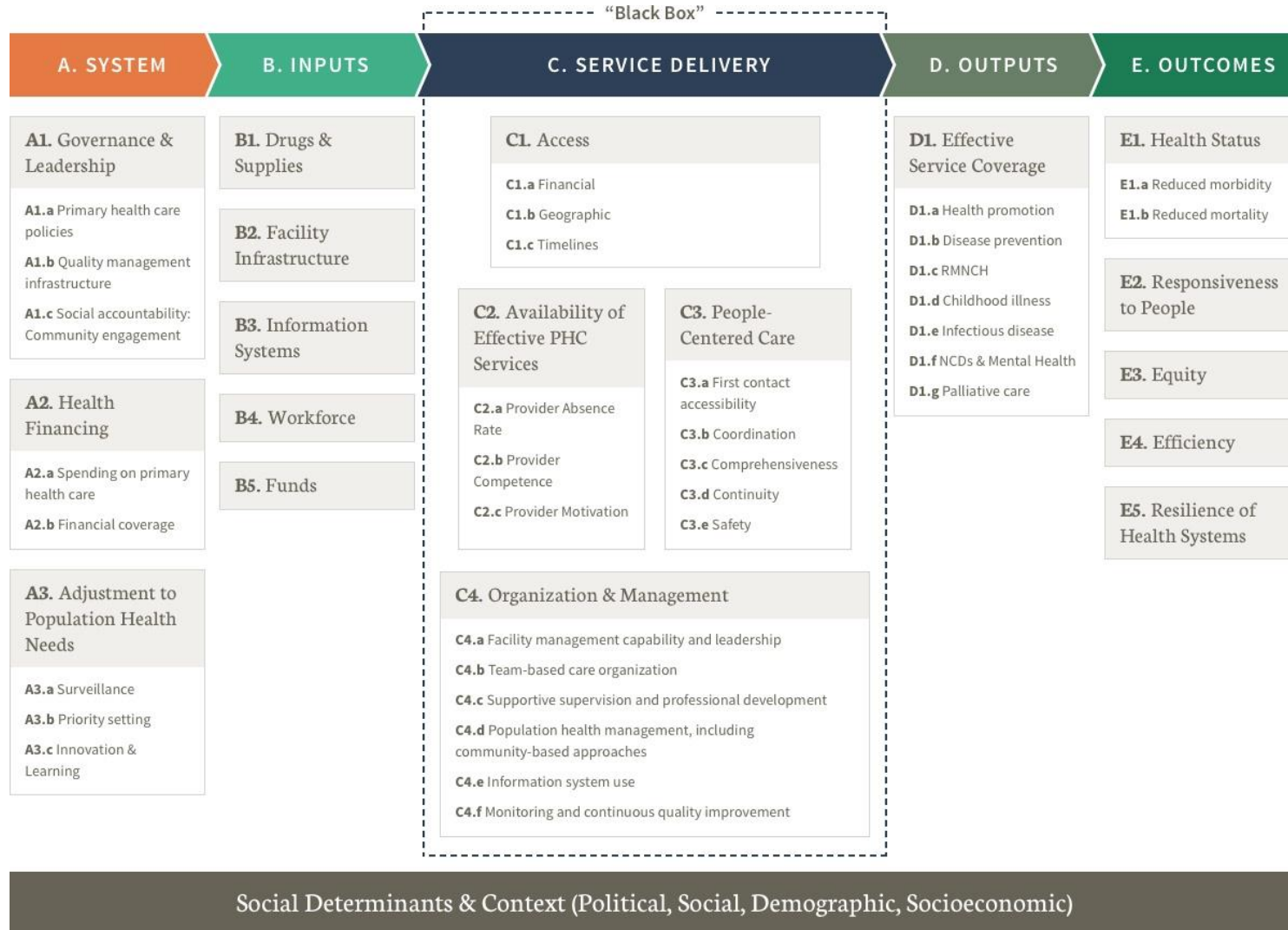
### III. PHCPI Conceptual Framework for PHC

PHCPI starts to address these limitations with a Conceptual Framework for PHC measurement and improvement (Figure 1). We draw on several important prior systems frameworks, such as the logic model (W.K. Kellogg Foundation, 2001), Control Knobs Framework (Roberts, Hsiao, Berman, & Reich, 2003), Health System Performance Assessment (Murray & Evans, 2003), economic models of supply and demand, and Starfield's key characteristics of high performing PHC systems (Starfield, 1994).

The PHCPI Conceptual Framework articulates the key inputs, functionalities, and desired goals of an effective PHC system. We aligned this framework with other measurement frameworks, while offering a novel focus on the intersection between service delivery and the core functions of PHC (access, continuity, coordination, and comprehensiveness) as key drivers of performance variation. The PHCPI Conceptual Framework highlights people- and community-centered care, supply and demand functions, and integrated service delivery through effective organization and management.

The framework reflects a structure similar to the commonly used input-process-output-outcome logic model, indicating logical relationships between constructs. We included a *System* domain prior to the *Inputs* domain to indicate the importance of the modifiable PHC system structure as emphasized in the Control Knobs Framework. Additionally, we more clearly defined process as the various critical sub-domains of *Service Delivery*. The framework exhibits an overall directionality of influence, where the *System* domain influences the *Inputs* domain, which affects the complex interplay within the *Service Delivery* domain. Successful service delivery contributes to effective *Outputs*, which subsequently affect *Outcomes*. Additionally, this framework incorporates the health system goals for the *Outcomes* domain – health status, responsiveness, equity, efficiency, and resilience – as articulated by numerous health systems performance assessment frameworks. We acknowledge that PHC performance lies within a larger health system, which itself lies within wider political, cultural, demographic, and socioeconomic contexts.

Figure 1. PHCPI Conceptual Framework for PHC



## **(A) System Domain**

The System domain is meant to complement the more proximal (i.e., close to an intervention or interaction) Input and Service Delivery domains. Systems contextual factors, while more distal to performance outputs and outcomes, influence the proximate determinants that impact outcomes. System functions enable the provision of services, and thus understanding the systems context is critical to explain determinants of PHC performance. System characteristics include:

*Governance & Leadership (A1)*: This subdomain includes regularly disseminated policies that reflect the importance of PHC, policies that promote equity; quality management infrastructure, including licensing and accreditation, standards of care, consistency in standards of care from public to private sector; community engagement and social accountability -- including Involvement of private sector, civil society organizations, non-governmental organizations, and other stakeholders in health care planning and governance.

*Health Financing (A2)*: This subdomain addresses the efficacy of health systems to: 1) mobilize adequate funds for health in order to ensure access to PHC in a financially sustainable manner; 2) provide protection from catastrophic financial expenditure on health leading to impoverishment; and 3) ensure equitable and efficient use of resources.

*Adjustment to Population Health Needs (A3)*: This subdomain reflects the need for a system to monitor and adapt to population needs. It includes specific areas such as disease surveillance, priority setting, and innovation and learning.

## **(B) Inputs Domain**

Inputs include sub-domains that are necessary – but not sufficient – for strong performance of PHC. This domain focuses on the crude availability of inputs at the facility level and reflects whether the systems in place to ensure availability of inputs are functioning. Inputs include:

*Drugs & Supplies (B1)*: This measures the availability of essential medicines, vaccines, and commodities (e.g., cotton gauze). It also includes measures of essential equipment, such as scales and thermometers.

*Facility Infrastructure (B2)*: This measures the actual availability of facilities, including numbers of facilities, the mix of facilities (health posts and health centers), and the distribution of facilities, both public and private, throughout the country.

*Information Systems (B3)*: The health information system should be produce reliable, complete, and timely information that allows for the use of data for performance management over time. This sub-domain focuses on the availability of infrastructure for information systems, including things like internet connectivity and information system hardware, such as computers or paper registers.

*Workforce (B4)*: This subdomain reflects the need to have a trained workforce, sufficient numbers of health personnel, and the right mix of staff that is well distributed geographically to promote equitable access for the population.

*Funds (B5)*: This measures the availability of funds at the facility level, looking at the ability to address recurrent and fixed costs incurred at the facility level.

### (C) Service Delivery Domain

The Service Delivery domain reflects the intersection of supply components (providers, infrastructure, supplies) and the demand side (patient/population needs, access, utilization). Importantly, our framework includes Starfield's well-established concepts of high quality, people-centered PHC service delivery – first contact accessibility (which is user-oriented, coordination, comprehensiveness, continuity, and safety). The specific sub-domains included are:

Access (C1): This sub-domain measures whether patients have affordable, timely access to a PHC facility that is geographically convenient (The Commonwealth Fund, 2014). Facility-level access in LMICs can be assessed by adopting the operational definition used in high-income countries. This basic structural precondition for care (is there a facility with a provider available for care when it is needed by the community?), is a starting point for understanding effective service delivery. However, it should be clearly distinguished from the related, but separate understanding of a user's perspective on accessibility. A facility with a provider can be structurally present, but if the user still experiences barriers to use it, then accessibility is compromised. Thus, both perspectives (structural and user-centered) are necessary.

Availability of Effective PHC Services (C2): This subdomain represents how raw inputs are transformed into actual functioning facilities and workers able to provide PHC services. In this domain, we measure the presence of competent, motivated providers at a health facility when patients seek care. Motivation captures intrinsic and environmental characteristics that affect the behavior and performance of providers in the system, with a particular focus on degree of provider autonomy, level of intrinsic motivation, degree of remunerative motivation, supportive supervision, and level of burnout. Competence captures technical clinical quality – specifically, the levels of knowledge and skill of providers, demonstrated through diagnostic and treatment accuracy. Competence also captures what providers do during a typical work-day and the level of effort they expend on care provision. In many facilities, providers are frequently absent, and even when present are not actively working.

Organization and Management (C4): The Organization and Management subdomain reflects that optimal delivery of PHC services requires an overall organization of team-based care, supportive supervision, population health management, and use of information systems that aid in monitoring services and continually improve quality.

- *Facility management capability and leadership (C4.a):* Successful delivery of PHC services requires strong management at the facility level in order to ensure that the human resources, finances, and hardware come together at the point of service delivery. Good management is difficult to obtain, but can be a translational component that's critical for high functioning systems.
- *Team-based care (C4.b):* Previous studies have shown that a team-based approach to PHC results in improved management of diabetes, reduced hospitalizations, better patient experience, and reduced provider burnout (Shojania 2006, Reid 2010, Grumbach 2004). A team approach works well when members hold themselves mutually accountable towards a common set of performance goals (Katzenbach and Smith, 1996).
- *Supportive supervision (C4.c):* In low and middle-income countries, supervision is the mechanism that is used to provide informal training opportunities to health workers. Through supportive supervision, supervisors can help strengthen health worker clinical skills as well as management capacity (Rowe A, 2005).

- *Population Health Management (C4.d)*: PHC extends beyond the confines of a clinic or health facility into the community. Community linkages and orientation are vital to the integration of PHC facility-based services with community-based public health and promotion efforts. Proactive outreach and connections, including the utilization of community health workers (CHW) have been shown to promote a wide variety of population health management goals.
- *Information Systems (C4.e)*: In addition to having effective team members, high-functioning PHC systems also have well designed electronic or information systems. Recent studies suggest that well designed electronic health systems can empower and engage patients, improve communication among team members, and improve continuity and coordinated care, all of which are essential to the delivery of PHC (Bitton 2012, Delbanco 2010, Moore 2014).
- *Monitoring & Continuous Quality Improvement (C4.f)*: Finally, an efficient PHC system should have well designed management systems that supervise and engage team members, as well as identify deficits and focus on monitoring and quality improvement (Edmondson 2004, Sugarman 2014).

*People-Centered Care (C3)*: Several core functions are central underpinnings of high quality care delivery in PHC systems. These factors, defined by Barbara Starfield and colleagues, include first contact accessibility, coordination, continuity, and comprehensiveness. These functions, in addition to safety, presuppose the existence of effective and available PHC services. Through strong organizational management, provider training, information systems, and community orientation, these basic PHC services can be transformed to provide high quality PHC functions.

- *First contact accessibility (C3.a)*: As discussed above, patients have good accessibility to PHC when they perceive they can conveniently access primary health services when and how they need them.
- *Coordination (C3.b)*: Coordinated Care is defined as the ‘coordination of patient care throughout the course of treatment and across various sites of care to ensure appropriate follow-up treatment, minimize the risk of error, and prevent complications.
- *Comprehensiveness (C3.c)*: Comprehensiveness refers to the notion that a wide range of preventive, promotive, curative and rehabilitative services should be available and appropriately delivered (Starfield, 1994).
- *Continuity (C3.d)*: There are at least three types of continuity considered to be important for primary care:
  - Relational continuity – An ongoing therapeutic relationship between a patient and one or more providers (made up of longitudinal continuity with one provider, or continuity with a regular team)
  - Informational continuity – The use of information on past events and personal circumstances to make current care appropriate for each individual
  - Management continuity – The extent to which services delivered by different providers are timely and complementary such that care is experienced as connected and coherent. It can also be thought of as a consistent and coherent approach to the management of a health condition that is responsive to a patient's changing needs (known as flexible continuity, or as a property of care coordination). Examples might include closed information loops about the requested needs, outcomes, and next steps from a vital referral to secondary or tertiary care from primary care.
- *Safety (C3.e)*: Safe care determines whether safe practices are in place in communities and facilities and being routinely followed.

#### **(D) Outputs Domain**

Since PHCPI hopes to contribute to the Universal Health Coverage (UHC) movement through measurement of effective coverage, we are adopting many of the measures relevant to PHC as prioritized by the UHC Monitoring Framework (World Health Organization and International Bank for Reconstruction and Development, 2014) and the Global Reference List of 100 Core Health Indicators (World Health Organization, 2015). The PHCPI Conceptual Framework includes both prevention and treatment outputs. The outputs do not rely solely on coverage of key services, but also on effective coverage, meaning quality-adjusted service coverage. Outputs subdomains are:

- Health promotion (D1.a);
- Disease prevention (D1.b);
- RMNCH (D1.c);
- Childhood illness (D1.d);
- Infectious disease (D1.e);
- NCDs and mental health (D1.f); and
- Palliative care (D1.g).

#### **(E) Outcomes Domain**

PHC Outcomes are influenced by outputs and the indicators reflect the increasing burden of disease attributed to chronic conditions and people-centered care through user reported outcomes. Outcome subdomains are:

- Health Status (E1): morbidity (E1.a) and mortality (E1.b);
- Responsiveness to People (E2);
- Equity (E3);
- Efficiency (E4); and  
Resilience of Health Systems (E5).

### **V. PHCPI Approach to Measurement**

No PHC system can be effectively managed and continuously improved over time without the right performance information, effectively captured and then delivered to the right individuals within the system – whether policymakers, managers, or clinicians – at the right moment and in the right format to enable its use for decision making. The reality is that the information needed to understand the performance of PHC systems and manage performance improvement will vary greatly by stakeholder and by level in the health system. A Finance Minister needs one set of information, a Health Minister another, and a district medical officer in charge needs yet another set of information. Depending on the purpose, this information is needed at different levels of granularity (e.g., national level, district level, facility level, or the level of the individual patient) and in different formats (e.g., publicly reported online data, management dashboards, or clinical point of care information). There are also different platforms and tools that can be used to collect key data, ranging from globally comparable surveys, to direct reporting at the facility level, to administrative data systems, to special local surveys – each with advantages and disadvantages around data quality, the

ability to produce comparable data within and across facilities, regions or countries, and degree of granularity. Table 2 visualizes this complexity, showing the different levels of granularity, the different information and data needs, and the different data collection platforms.

**Table 2: Data Needs and Platforms**

Data Needs	Level of Granularity	Data Platforms
Accountability	Global & Region	Globally Comparable Surveys (National Health Accounts, Demographic and Health Survey)
Diagnosis, Priority Setting, Surveillance, Monitoring & Evaluation	National & Sub-National	Facility Surveys (SDI, PMA2020, SPA, SARA)
Performance Reporting	District	Routine Administrative Data <ul style="list-style-type: none"> <li>○ CRVS</li> <li>○ EMR/DHIS2</li> <li>○ Disease Surveillance</li> <li>○ Health System Sources (Human resources, finance, data, drugs, infrastructure)</li> </ul>
Performance Monitoring & Management	Facility	
Medical Records	Patient/User	Individual Patient Surveys (mobile-enabled surveys, facility exit surveys) and household surveys
Access (user), Responsiveness	Household & Community	

The approach we have taken is to recognize the need for information at multiple levels and for disparate stakeholders. We seek to promote greater accountability for results, better management of performance, and mutual learning about how to improve performance by cascading performance indicators at various levels (national, sub-national, and local levels) with increasing levels of granularity in performance measurement as information gets closer to providers. The information is organized consistently through a common performance measurement framework oriented toward better health system outcomes. We recognize the opportunity for managers and researchers to leverage information about performance variation across each level of the PHC system to identify positive outliers, best practices, underlying performance determinants, and understand variation.

Other key consumers of performance information include civil society organizations that can use this information to hold their government at national or sub-national levels accountable for providing high quality services to the population. In developing this initiative, we recognize that while achieving our full vision for future health systems performance measurement is a long-term endeavor, there is a need to make rapid partial progress even as we work toward the longer term vision.

In addressing the complexity of measurement for PHC performance improvement, PHCPI's scope, logic, and approach to measurement have been guided by answers to critical questions, outlined in Table 3.

**Table 3. PHCPI Key Questions**

Question	Answers	Implications
What is the goal of measurement?	PHC improvement	Link performance measurement to performance improvement (i.e., engage countries, build on learning/doing networks, and foster practice innovation).
What do we want to measure?	PHC performance and performance determinants	A Conceptual Framework for both levels of PHC performance and determinants of PHC performance.
What level of granularity of measurement is needed?	National, sub-national, and facility levels	Indicators reflect key system functions at the national level and highlight service delivery at the facility level.
Where will the data come from? How will we ensure data availability?	Maximize use of existing data platforms	Leverage existing measurement platforms to capture new data. Develop new measures to address knowledge gaps.

The need for metrics that summarize high-level PHC performance, as well as detailed information on local PHC performance, has led us to an approach that rests on two core sets of key performance indicators (KPIs). Similar to the vital signs and diagnostics in medicine, the PHC Vital Signs indicators assess the health of the system, indicative of how well it is performing; the PHC Diagnostic indicators provide insight into why performance varies and how it can be improved.

**PHC Vital Signs** – The PHC Vital Signs are a core set of 25 key performance indicators (KPIs) that provide a snapshot of PHC system performance and can be compared across countries. Key target audiences of the PHC Vital Signs include:

- National-level policymakers to determine where the system is under-performing and set priorities for resources and attention;
- Civil society, advocates, and media to hold national policymakers accountable for system performance and improvement;
- Researchers to identify positive outliers from which to learn best practices; and
- Development partners to make decisions about countries of focus and investments.

The list of PHC Vital Signs indicators is presented in Section IV.

**PHC Diagnostics** – This complementary menu of indicators, which is under development, will help countries drill down further to understand the causes of PHC system performance. These indicators, designed to be collected at the facility or district level, will focus on key aspects of service delivery to give countries insight into how to improve their PHC systems. Many of the PHC Diagnostic domains are part of the “Black Box” – areas of PHC that are not currently well-measured. Thus, the bulk of our new measurement efforts will be focused on further development of PHC Diagnostic indicators. Key target audiences for PHC Diagnostic indicators include:

- o Policymakers and system managers to understand root causes of poor system performance;
- o Civil society and advocates to access and consult performance information for social accountability purposes;



- o Researchers to identify performance determinants that inform best practices at sub-national and facility levels; and
- o Development partners to help inform investment decisions.

A description of the se Diagnostic Indicators is present in Section V.

## V. Indicator Selection Methodology

Guided by the Conceptual Framework in Figure 1, we turned to comparative global databases to identify indicators that could meaningfully represent key features of PHC performance. The objective was to select a parsimonious number of indicators satisfying the criteria of reliability, validity and importance and to ensure that the core set of indicators selected would offer strong face validity from a PHC systems performance perspective. In addition, the indicators had to be readily reportable, ideally with historical results and they had to be presentable in a way that policymakers, media and the general public could understand.

The list of criteria used for indicator selection is presented in Table 4 below.

**Table 4: Indicator Selection Criteria**

Category	Description	Operational Definition
Relevance and importance	The indicator reflects important aspects of PHC systems performance	<ul style="list-style-type: none"> <li>• Consistent with conceptual framework</li> <li>• Amenable to intervention by PHC systems</li> <li>• Aligned with other global initiatives</li> </ul>
Feasibility	The underlying data required to calculate this performance indicator are readily available or obtainable with reasonable effort	<ul style="list-style-type: none"> <li>• Data available or easily obtainable</li> </ul>
Reliability	The indicator produces consistent results	<ul style="list-style-type: none"> <li>• Minimized standard error</li> </ul>
Validity	The indicator is an accurate reflection of the dimension of PHC systems performance that it is intended to assess	<ul style="list-style-type: none"> <li>• Minimized measurement error, as compared to true value</li> </ul>
Actionability	The indicator is useful for PHC systems performance improvement purposes	<ul style="list-style-type: none"> <li>• Indicator results point to tangible interventions for performance improvement, ideally supported by strong evidence of effectiveness</li> </ul>

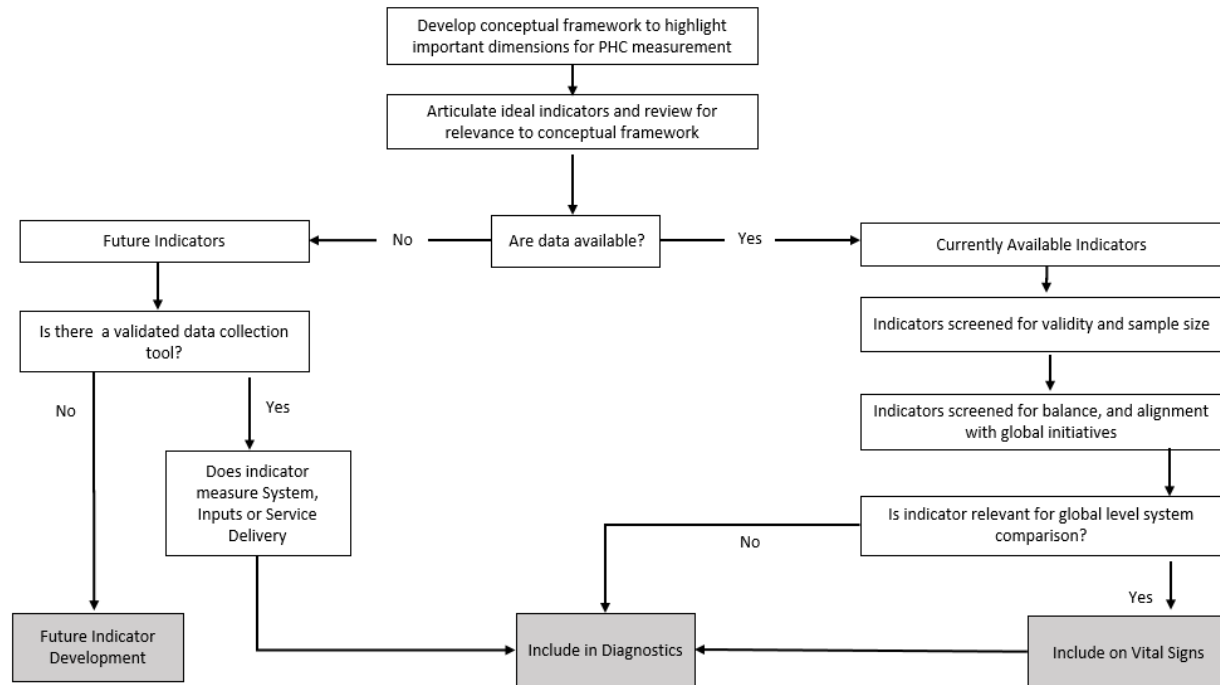
The specific steps in the indicator selection process are described below.

1. We began by articulating the ideal set of measures that are relevant to the Conceptual Framework. The indicators identified as part of the ideal set clearly represented an underlying phenomena that was represented in the Conceptual Framework and were specific to PHC. Research was conducted in the following areas of new measurement in order to identify potential indicators and relevant data collection approaches: first-contact access, coordination, comprehensiveness, continuity, safety, and

organization and management. These domains were prioritized because they fall into the Service Delivery domain, which is highly predictive of PHC performance.

2. We developed an inventory of existing PHC systems performance indicators available for low- and middle-income countries and reviewed this preliminary inventory against criteria of validity and reliability, feasibility, and importance. We then cross-referenced the ideal measures against the set of existing global measures. Existing indicators were identified from the following sources:
  - Health facility surveys: Service Delivery Indicators, Service Availability and Readiness Assessment, Service Provision Assessment
  - Household surveys: DHS, MICS, PMA2020
  - National surveys: NHA (including SHA 2011)
  - Global databases: Global Health Observatory (GHO), World Health Survey, UNICEF, World Bank World Development Indicators (WDI)
3. From the 600+ indicators identified, a working list of close to 100 indicators, mapped to the Conceptual Framework, was developed.
4. Information gathered on the definitions of numerator, denominator and excluded cases, the validity and reliability of the indicator, existing data collection mechanisms, and main references to the scientific literature supporting the use of this indicator were developed for each of the pre-selected indicators and the Conceptual Framework.
5. The list of performance indicators and their descriptive information was shared with 10 independent measurement experts for review.
6. The feedback from international experts was consolidated and the criteria defined above applied to propose (1) a core set of 25 performance indicators (the PHC Vital Signs) and (2) a long list of Diagnostic indicators to gather more granular information about drivers of variation in performance of PHC systems, still meeting the same criteria defined above (see Figure 2).
7. The final step in the process was to statistically validate the indicators. We reviewed the indicator distribution, looked at the correlation between input and output/outcome indicators to assess directionality and reviewed the highest and lowest performers to ensure logical consistency.

Figure 2: PHCPI Indicator Selection Process



#### IV. PHC Vital Signs Indicators

The indicator selection process led to the identification of 25 PHC Vital Signs indicators, which are listed in Table 5.

Table 5. PHC Vital Signs Indicators

Domain	Sub-Domain	Name	Source
A. System	A2. Health Financing	Per capita PHC expenditure (PPP)	WHO SHA 2011
		Percent of government health spending dedicated to PHC	WHO SHA 2011
B. Inputs	B1. Drugs & Supplies	Basic equipment availability	SDI, SARA
		Essential drug availability	SARA, SPA
		Vaccine availability	SDI, SARA, SPA
	B2. Facility Infrastructure	Health center and health post density (per 100,000 population)	GHO
	B4. Workforce	CHW, nurse, and midwife density (per 1,000 population)	GHO
C. Service Delivery	C1. Access	Access barriers due to treatment cost	DHS
		Provider absence rate	SDI

Domain	Sub-Domain	Name	Source
	C2. Availability of Effective PHC Services	Diagnostic accuracy	SDI
		Caseload per provider (daily)	SDI
	C3. People-Centered Care	Continuity of care: ANC dropout rate	UNICEF
		Continuity of care: DTP dropout rate	WHO/UNICEF
		Continuity of care: TB treatment success rate	GHO
D. Outputs	D1. Effective Service Coverage	Coverage index	UNICEF, WHO, World Bank – WDI
		Antenatal care coverage (4+ visits)	UNICEF
		Contraceptive prevalence rate	DHS
		Children with diarrhea receiving appropriate treatment	World Bank - WDI
		DTP3 coverage	WHO/UNICEF
		Facility-based deliveries	UNICEF
E. Outcomes	E1. Health Status	Maternal mortality ratio (per 100,000 live births)	GHO
		Adult mortality from non-communicable diseases	GHO
		Under-five mortality rate (per 1,000 live births)	GHO
	E3. Equity	Equity: Under-five mortality wealth differential	GHO
	E4. Efficiency	Efficiency: Under-five mortality relative to per capita PHC expenditure	GHO, WHO SHA2011

## V. PHC Diagnostic Indicators

The set of Diagnostic Indicators was developed as a complementary menu to the PHC Vital Signs. The vision for the Diagnostics is to allow one to dig deeper into the system to diagnose underlying issues and then design, test, and measure new ways of improving these areas. The initial list of Diagnostics that was developed included more than 60 indicators. In relation to the PHC Vital Signs list, this menu expanded all domains, but primarily focused on the service delivery domain, since this is the area that lacks robust measurement across countries. The development of the list was guided by the Conceptual Framework

and many of the specific suggestions for indicators were derived from existing data collection tools in use either in LMICs or HICs. The table below provides illustrative examples of these indicators.

**Table 6. Example Diagnostic Indicators in Service Delivery Domain**

Sub-Domain	Indicator	Data/Question Source
Access	Cost-related access: Did you not fill a prescription; skipped recommended medical test, treatment, or follow-up; or have a medical problem but did not visit doctor or clinic in the past year because of cost?	Commonwealth Fund
Availability of Effective Services	Provider burnout	Abbreviated Maslach Burnout Inventory
People-Centered Care	First contact access: How far do you regularly travel to receive PHC?	Primary Care Assessment Tool (PCAT)
	Relational continuity: When you go to your PHC facility, are you taken care of by the same doctor/nurse/provider each time?	PCAT
	Management continuity: Thinking about all the persons you saw in different places, is there <u>one</u> person who ensures follow-up of your health care (doctor or nurse or other?)	PCAT
	Coordination: Does your regular doctor/nurse/provider help coordinate referrals to a specialist?	PCAT
Organization and Management	Community attendance at management meetings	SPA
	Health facilities providing supervision and support to community health workers	PMA2020

We sought feedback on this list through an advisory Delphi process in July 2015. An online survey was sent to 33 experts in PHC, health policy, maternal and child health, and leaders in various ministries of health, of whom 23 responded (70%). Respondents were requested to rate each indicator on a five-point Likert scale on five dimensions (relevance, validity, actionability, reliability, and feasibility); recommend if the indicator should be included on the Diagnostic Indicators list, included with adaptation, or excluded; and recommend additional indicator(s) in each area. An advisory group of 13 international experts convened on July 27, 2015 to review the indicators and provide advice on the set of Diagnostics.

There was clear consensus that the domains of measurement that are included in PHCPI's Conceptual Framework are important. However, it also became clear that there is significant work required to test and validate these indicators in LMICs, and in some cases, where appropriate data collection tools do not exist, we will need to develop new tools. PHCPI will engage countries in the continued refinement of the set of Diagnostic Indicators through partnership with the [Joint Learning Network for Universal Health Coverage \(JLN\)](#) – a network of 22 countries in Africa, Asia, and Latin America committed to ensuring that essential health services are available and affordable for everyone who needs them – and other global networks.

## VI. Construction of PHC Vital Signs Indicators

Several indicators on the PHC Vital Signs list required a new method for construction based on existing data elements. These indicators are described below.

### Community health worker, nurse, and midwife density (per 1,000 population)

The values for the combined community health worker (CHW), nurse, and midwife density measure were generated by summing the values for CHW density and nurse and midwife density. The values were taken from the same year for each indicator in order to construct trend data.

### Health center and health post density (per 100,000 population)

The values for this indicator were taken from the Global Health Observatory and the combined measure was generated by summing the values for health center density with the values for health post density. The values were taken from the same year for each indicator in order to construct trend data.

### Continuity of care: ANC dropout rate

The ANC drop-out rate =  $(\text{ANC1} - \text{ANC4}) / (\text{ANC1})$ . The percentage change between the percentage of women who had one ANC visit and the percentage who had at least four ANC visits represents the percentage of women who dropped out of the system. The values for ANC coverage are from UNICEF.

### Continuity of care: DTP dropout rate

The DTP drop-out rate =  $(\text{DTP1} - \text{DTP3}) / \text{DTP1}$ . The percentage change between the percentage of children who receive the first dose of the DTP vaccine and the percentage of children who receive the third dose of the DTP vaccine represents the percentage of children who dropped out of the system. The values for DTP coverage are from WHO/UNICEF.

### Equity: Under-five mortality wealth differential

The under-five mortality (per 1,000 live births) wealth differential was generated by calculating the difference between the values for under-five mortality rate (U5MR) for the first and fifth wealth quintiles, as reported on the Global Health Observatory's health equity monitor. The value for U5MR for the fifth quintile was subtracted from the value for U5MR for the first quintile.

### Coverage Index

*The coverage index is a work in progress and expert feedback is being sought in order to strengthen this measure. If you have specific ideas, please share them by emailing us at [info@PHCperformanceinitiative.org](mailto:info@PHCperformanceinitiative.org).*

The purpose of the coverage index is to act as a tracer for a country's performance on PHC service coverage. To create a single indicator that reflects PHC coverage in these countries, we created a

composite indicator that relies on PHCPI's Vital Signs output indicators. The possible indicators for inclusion – PHCPI's list of output indicators – included:

1. Antenatal care coverage (4+ visits)
2. Children with diarrhea receiving appropriate treatment
3. Contraceptive prevalence rate
4. DTP3 coverage
5. Facility-based deliveries

The three individual indicators that we selected for inclusion are:

1. Antenatal care coverage (4+ visits)
2. Children with diarrhea receiving DTP3 coverage

We excluded two coverage measures for the following reasons:

- We chose not to use contraceptive prevalence rate because the target for coverage is dependent on a country's need for family planning services. This varies across countries and should not be viewed on a 0-100% scale.
- We chose not to use facility-based deliveries because the recommended policy is that a women have a skilled attendant at birth, whether in a facility or not, which suggests that we should not view facility-based deliveries on a 0-100% scale. The reason for including facility-based delivery as opposed to skilled attendance at birth in PHCPI's Vital Signs indicator list is because facility-based delivery has greater validity. Women have a difficult time discerning whether their provider was skilled or not, which causes lower validity for the measure of skilled attendance at birth.

There is variation across the number of observations for each indicator, as well as the number of indicators with data for each country. To address this, the composite is created as a scaled residual. Countries with populations of at least 1 million were used to calculate the sample mean and standard deviation for each indicator, but the coverage score was calculated for all countries. The residual (the country's indicator value minus the indicator mean) is divided by the standard deviation of the indicator. This gives each country a score that reflects the number of standard deviations they are from the mean.

The composite score for each country is the sum of input indicators divided by the number of indicators reported for that country. This use of mean (rather than sum) ensures that we are not introducing a bias towards countries reporting on more indicators. These values were re-scaled to range from 0 to 1. Only countries with available data on at least two indicators are reported.

Efficiency: Under-5 mortality rate relative to per capita PHC expenditure

*The efficiency measure is a work in progress and expert feedback is being sought in order to strengthen this measure. If you have specific ideas, please share them by emailing us at [info@PHCperformanceinitiative.org](mailto:info@PHCperformanceinitiative.org).*

This efficiency indicator measures how well countries achieve a key PHC outcome—low under five mortality rate (per 1,000 live births)—relative to their spending on PHC. It is a proxy for how well a country is allocating its resources for PHC. This measure is currently available only for countries with data on per capita PHC expenditure (PPP) (21 countries).

We first estimate a linear regression equation between under-five mortality rate (U5MR), the dependent variable, and per capita PHC expenditure, the independent variable. We then use the estimated equation to predict what the U5MR would be for any particular country, on the assumption that the country's U5MR performance is as efficient as the global average. We then compare the actual U5MR of the country in question to the predicted U5MR to determine if its U5MR performance is relatively more (or less) efficient than the global average.

Given the wide range in observed U5MR, the final efficiency indicator is measured as a percentage of observed deaths and is standardized on a 0-1 scale, relative to the performance of all countries.

The correlation between per capita PHC expenditure and under five mortality rate is -0.51 ( $P=0.02$ ). The beta-estimate for the linear regression of under-five mortality rate against total health care expenditure is -0.20 (i.e. on average, for every additional \$100 (PPP) spent per capita, the under-five mortality rate drops by 20 deaths per 1,000).

## VII. Performance Benchmarking

The PHC Vital Signs indicators are visualized on the PHCPI website (<http://phcperformanceinitiative.org/>) for purposes of performance benchmarking across countries. In order to benchmark country performance, we developed a set of methods to guide the analysis of the Vital Signs indicators.

### Methods for Top Results

Top results were determined for indicators for which we had data available for at least 50 countries. For each country, their most recent result (for that indicator) was used. If the most recent result was from before 2008, that country was not included in the top results analysis for that indicator.

Top results were defined as countries with results greater than the cut-off for 10<sup>th</sup> percentile of reporting countries (where the top 10<sup>th</sup> percentile is defined as the “best” scores regardless if this is high or low) and whose point estimate falls outside of the 95% confidence intervals for the unweighted overall sample mean.

### Identification of Top and Bottom 10% Cut-Offs

An unweighted sample mean was calculated using all available country data for each indicator. A country estimate was considered valid if (a) the population estimate was at least 1 million and (b) the indicator estimate was from within the previous five years. Confidence intervals around the sample mean were calculated at  $\alpha=0.05$  (i.e. 95% CIs).



The 10<sup>th</sup> percentile was determined as the cut-off indicating the best 10% of countries. Therefore, for indicators where the ideal is high (e.g. DTP coverage) this is the highest 10% of scores, whereas, for indicators where the ideal is low (e.g. DTP dropout rate) this is the lowest 10% of scores.

Country estimates that equaled the 10<sup>th</sup> percentile cut-off were not considered to be top results.

### Identification of Benchmarks

The Top Results calculation is a helpful tool in calibrating relative country performance. Yet in most cases, the top results for any one indicator could likely still improve. For example, the highest value for the percentage of children with diarrhea receiving appropriate treatment is 77.1% yet countries would ideally improve to get closer to 100%. In order to provide information about the absolute desired performance, we identified internationally accepted benchmarks, where possible.

In order to visualize the benchmark across all countries, we limited the benchmarks to those with absolute targets (e.g. 90%) and excluded relative benchmarks (e.g. a 2/3 reduction). Table 7 lists the benchmarks identified. In some cases, we adopted the targets for the Sustainable Development Goals (SDGs). Recognizing that the SDGs are still open for public comment, the targets could change and if so, will be updated on the site. The benchmarks were not used in the identification of Top Results because many of them are aspirational, with target deadlines of 2030.

**Table 7. Performance Benchmarks**

Indicator	Target	Source	Description
Under-five mortality rate (per 1,000 live births)	Less than or equal to 25 per 1,000 live births	Sustainable Development Goals	By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births
Antenatal care coverage (4+ visits)	100%	Sustainable Development Goals	By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.
DTP3 coverage	90%	UN Resolution during 27 <sup>th</sup> Session	Ensure full immunization of children under one year of age, at 90 per cent coverage nationally, with at least 80 per cent coverage in every district or equivalent administrative unit; reduce deaths due to measles by half by 2005; eliminate maternal and neonatal tetanus by 2005; and extend the benefits of new and improved vaccines and other preventive health interventions to children in all countries

Indicator	Target	Source	Description
Continuity of care: DTP3 dropout Rate	10%	WHO/UNICEF	When the drop-out rate is less than 10%, children who receive the first dose of DTP are highly likely to receive all three doses.
Continuity of care: TB treatment success rate	85%	Resolution WHA 44.8. In: Forty-fourth World Health Assembly, Geneva, 6-16May, 1991.	"The WHO's 1991 World Health Assembly (WHA) set two targets for national tuberculosis (TB) control programmes, to be reached by year 2000. These targets were to detect at least 70% of all new sputum smear-positive cases arising each year and to cure at least 85% of them. Individual countries have adopted these global targets as national targets." (Dye C, Hosseini M, and Watt C. <i>WHO Bull.</i> Vol 85:2007; 325-420.)

### Country Comparison Tool

Comparison of multiple countries across multiple indicators requires that all indicators be plotted on a consistent axis. To achieve this, we sorted values in order from smallest to largest and ranked all countries within each indicator. The country with the best score (best being defined as either high or low depending on the directionality of the indicator) was given a ranking of 1. The next best score was assigned a rank of 2, the third best value ranked 3, and so on. For neutral indicators, such as caseload per provider, the rank of 1 was given to the largest scoring country. In cases where countries had the same value, their rank was assigned the better value. For example, the five countries with the lowest Maternal Mortality Ratios (MMR shown in brackets) are Belarus [1], Bulgaria [5], Macedonia [7], Montenegro [7], and Bosnia and Herzegovina [8]. These five countries will be given ranks of 1, 2, 3, 3, and 5 respectively; the tie between Macedonia and Montenegro means that both countries share the better rank.

Since the number of countries with data available differed widely by indicator, rank ratios were calculated so that all indicators could be plotted on the same axis (0 to 1). This was calculated as (largest rank – country rank) / (largest rank – 1). Therefore the best ranking country (rank=1) has a rank ratio of 1 and the worst ranking country has a rank ratio of 0.

## VIII. PHC Vital Signs Indicator Reference Sheets

Please note that you can access the indicator library on PHCPI's website. Click here to access this link:

<http://phcperformanceinitiative.org/content/indicator-library>.

(\*) = Indicator was constructed by the PHCPI Working Group.

### 1. Percent of government health spending dedicated to PHC

Indicator Name	Percent of government health spending dedicated to PHC
PHCPI Domain and Sub-Domain	A. System A2. Health Financing
Definition	<i>Numerator:</i> Total government PHC expenditure <i>Denominator:</i> Total government health expenditure
Rationale	This is a core PHC systems financing indicator that directly measures the investment in PHC by a country's government. In most low- and middle-income countries there is a need to increase public investments in PHC. This indicator enables increased accountability and transparency of those investments.
Data Source	Data are collected using the System of Health Accounts (SHA) 2011 standards, which were jointly developed by WHO, OECD, and USAID. A working definition for PHC expenditure has been developed which includes (1) all expenditures for providers who only provide PHC services (2) expenditures for PHC preventive services provided by additional providers; (3) a proportion of overall capital costs and (4) a proportion of administrative expenditures.
Limitations	The SHA2011 standards were not designed to collect PHC expenditure information, and there is no explicit PHC expenditure category in its data set. Thus, the estimates are based on a "working definition" for PHC expenditure based on SHA2011 expenditure codes of health care providers and health care functions. The PHC expenditures may be underestimated due to inability to identify the PHC curative services provided by higher-level facilities, such as secondary or tertiary hospitals.

### 2. Per Capita PHC expenditure (PPP)

Indicator Name	Per capita PHC expenditure
PHCPI Domain and Sub-Domain	A. System A2. Health Financing
Definition	<i>Numerator:</i> Total expenditure on health (THE) expressed in PPP international dollars <i>Denominator:</i> Total population  Data are presented in purchasing power parity (PPP int. \$) to enable international comparison.
Source	Data are collected using the System of Health Accounts (SHA) 2011 standards, which were jointly developed by WHO, OECD, and USAID. A working definition

	for PHC expenditure has been developed which includes (1) all expenditures for providers who only provide PHC services (2) expenditures for PHC preventive services provided by additional providers; (3) a proportion of overall capital costs and (4) a proportion of administrative expenditures.
Rationale	This is a core indicator of health financing systems. This indicator contributes to the understanding of the total expenditure on PHC health relative to the beneficiary population, expressed in Purchasing Power Parities (PPP) to facilitate international comparisons.
Limitations	The SHA2011 standards were not designed to collect PHC expenditure information, and there is no explicit PHC expenditure category in its data set. Thus, the estimates are based on a working definition for PHC expenditure based on SHA2011 expenditure codes of health care providers and health care functions. The PHC expenditures may be underestimated due to inability to identify the PHC curative services provided by higher-level facilities, such as secondary or tertiary hospitals.

### 3. [Basic equipment availability](#)

Indicator Name	Availability of basic equipment
PHCPI Domain and Sub-Domain	B. Input B1. Drugs & Supplies
Definition	<p><i>Numerator:</i> Number of pieces of equipment on the defined list available and functioning at a facility</p> <p><i>Denominator:</i> Total number of pieces of equipment on the defined list</p> <p>The specific list of equipment facilities are assessed against varies depending on the data source. We chose to include values from SARA and SDI facility assessments where available, recognizing that there are slight definitional differences.</p> <ul style="list-style-type: none"> <li>SDI includes the following items: thermometer, stethoscope, weighing scale, refrigerator, and sterilization equipment. For additional details, click <a href="#">here</a>.</li> <li>SARA includes the following items: thermometer, stethoscope, adult scale, child scale, blood pressure apparatus, and a light source. For additional details, click <a href="#">here</a>.</li> </ul>
Rationale	To effectively provide essential health services, health facilities must have available minimum levels of equipment, including a weighing scale, stethoscope, sphygmomanometer, and thermometer. In addition, health centers and hospitals should have available sterilizing equipment and a refrigerator.
Data Source	<a href="#">Service Delivery Indicators (SDI)</a> <a href="#">Service Availability and Readiness Assessment (SARA)</a>

Limitations	Different health facility assessments note the availability of different sets of equipment, making this indicator more complicated to standardize across methods. The availability of minimum equipment is a point-in-time indicator and thus does not reflect whether facilities have the resources and capacity required to maintain minimum equipment levels over time. Further, it does not reflect provider ability or knowledge to use the equipment appropriately.
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4. **CHW, nurse, and midwife density\***

Indicator Name	Community health worker (CHW), nurse, and Midwife density per 1000 population
PHCPI Domain and Sub-Domain	B. Inputs B4. Workforce
Definition	<i>Numerator:</i> Total number of community health workers, nurses and midwifery personnel <i>Denominator:</i> Total population of country (per 1,000 population)
Rationale	Preparing the health workforce to work towards the attainment of a country's health objectives represents one of the most important challenges for its health system. Methodologically, there are no gold standards for assessing the sufficiency of the health workforce to address the health care needs of a given population. It has been estimated however, in the World Health Report 2006, that countries with fewer than 23 physicians, nurses and midwives per 10,000 population generally fail to achieve adequate coverage rates for selected PHC interventions as prioritized by the Millennium Development Goals framework ( <a href="#">GHO</a> , accessed August 2015).
Data Source	<a href="#">Global Health Observatory (GHO)</a> . This indicator is derived from two separate indicators (community health worker density and nurse and midwife density). Population is derived from United Nations Population Division's World Population Prospects database. CHW counts are derived from: population censuses, labor force and employment surveys, health facility assessments and routine administrative information systems (including reports on public expenditure, staffing and payroll as well as professional training, registration and licensure).
Limitations	The classification of health workers is based on criteria for vocational education and training, regulation of health occupations, and the activities and tasks involved in carrying out a job, i.e. a framework for categorizing key workforce variables according to shared characteristics. While much effort has been made to harmonize the data to enhance comparability, the diversity of health worker roles and information sources means that considerable variability remains across countries and over time in the coverage and quality of the original data. Some figures may be underestimated or overestimated when it is not possible to distinguish whether the data include health workers in the private sector, double counts of health workers holding two or more jobs at different locations, workers who are unpaid or unregulated but performing health care tasks, or people with a health-related education working outside the health care sector (e.g. at a research or teaching institution) or who are not

	currently engaged in the national health labour market (e.g. unemployed, migrated, retired or withdrawn from the labour force for personal reasons). ( <a href="#">GHO</a> , accessed August 2015)
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#### 5. [Essential drug availability](#)

Indicator Name	Availability of essential drugs
PHCPI Domain and Sub-Domain	B. Input B1. Drugs & Supplies
Definition	<p><i>Numerator:</i> Number of unexpired drugs on the defined list of which a facility has at least one available</p> <p><i>Denominator:</i> Total number of drugs on the defined list, which includes tracer medicines for children and mothers identified by the World Health Organization</p> <p>The specific list of drugs facilities are assessed against varies depending on the data source. We chose to include values from SARA and SPA facility assessments where available, recognizing that there are slight definitional differences. Details on the items included in the SARA and SPA surveys can be found <a href="#">here</a> (SARA) and <a href="#">here</a> (SPA). The list of essential drugs is derived from the <a href="#">WHO Model List of Essential Medicines</a>.</p>
Rationale	To effectively provide essential health services, health facilities must have available minimum levels of essential drugs.
Data Source	<a href="#">Service Availability and Readiness Assessment (SARA)</a> <a href="#">Service Provision Assessment (SPA)</a>
Limitations	Different health facility assessments note the availability of different sets of essential drugs, making this indicator more complicated to standardize across methods. In addition, the list must reflect the national standards. The availability of essential drugs is a point-in-time indicator and thus does not reflect whether facilities have the resources and capacity required to maintain essential drugs stock levels over time, nor does it measure frequency of stock-outs. Further, it does not reflect provider ability or knowledge to administer drugs appropriately.

#### 6. [Health Center and Health Post Density\\*](#)

Indicator Name	Health center and health post density per 100,000 population
PHCPI Domain and Sub-Domain	B. Input B2. Facility Infrastructure
Definition	<p><i>Numerator:</i> Total number of health centers and health posts from the public and private sectors</p> <p><i>Denominator:</i> Total population of country</p>

	Health posts are either community centers or health environments with a very limited number of beds with limited curative and preventive care resources normally assisted by health workers or nurses ( <a href="#">GHO</a> , accessed August 2015).
Rationale	Facility density is primarily an indicator of outpatient service access, and may indicate the accessibility of PHC facilities. Health centers and health posts were selected because they are often the first contact point that many individuals have with the PHC system.
Data Source	<a href="#">Global Health Observatory (GHO)</a> . This indicator is derived from two separate indicators (density of health centers and density of health posts). Information is collected directly from country focal points from ministries of health through the baseline country survey on medical devices 2013 update, conducted by HQ/HIS/EMP/PAU. The population data was obtained from World Population Prospects 2012 Revision (2013 medium estimates) ( <a href="#">GHO</a> , accessed August 2015).
Limitations	This indicator does not take into account the size or capacity of the facilities. More developed health systems may not utilize health posts as a primary point of contact. As a result, those systems may have low density on this measure. Additionally, the density of health centers and health posts is often reported as an average and therefore doesn't reflect the equity of distribution of health centers and health posts throughout the country.

## 7. Availability of vaccines

Indicator Name	Availability of vaccines
PHCPI Domain and Sub-Domain	B. Input B1. Drugs & Supplies
Definition	<p><i>Numerator:</i> Number of unexpired vaccines from the defined list available in a facility</p> <p><i>Denominator:</i> Total number of vaccines on the defined list</p> <p>The specific list of vaccines facilities are assessed against varies depending on the data source. We chose to include values from SARA and SDI where available, recognizing that there are slight definitional differences.</p> <ul style="list-style-type: none"> <li>• Details on the SDI survey can be found <a href="#">here</a>.</li> <li>• Details on the SARA survey can be found <a href="#">here</a>.</li> </ul>
Rationale	To effectively provide essential health services, health facilities must have available minimum levels of vaccines, including but not limited to measles, DTP, oral polio, and pneumococcal.
Data Source	<a href="#">Service Delivery Indicators (SDI)</a> <a href="#">Service Availability and Readiness Assessment (SARA)</a>
Limitations	Different health facility assessments note the availability of different sets of essential vaccines, making this indicator more complicated to standardize across methods. In addition, the list must reflect the national standards. The availability of vaccines is a point-in-time indicator and thus does not reflect whether facilities have the resources and capacity required to maintain vaccine stock levels over time, nor does it measure frequency of stock-outs.

#### 8. Access barriers due to treatment cost

Indicator Name	Percent of women who report barriers in care access due to cost of treatment
PHCPI Domain and Sub-Domain	C. Service Delivery C1. Access
Definition	<i>Numerator:</i> Number of women who report specific problems in accessing health care when they are sick due to issues related to getting money for treatment <i>Denominator:</i> Number of women interviewed
Rationale	Financial access is a critical component of health services access. This indicator reflects user-reported access barriers and is a complement to measurement of overall out-of-pocket expenditures on health. Access barriers due to cost can have detrimental effects on the utilization of health services.
Data Source	<a href="#">Demographic and Health Survey (DHS)</a>
Limitations	This indicator captures access barriers due to treatment costs, but it may not capture financial barriers to access that are related to transport or medicines required following diagnosis.

#### 9. Caseload per provider (daily)

Indicator Name	Number of outpatient visits per clinician per day
PHCPI Domain and Sub-Domain	C. Service Delivery C2. Availability of Effective PHC Services
Definition	<i>Numerator:</i> Number of outpatient visits recorded in outpatient records in the health facility three months prior to the survey <i>Denominator:</i> Number of days the facility was open during the three-month period and the number of health workers who conduct patient consultations (i.e. excluding cadre-types such as public health nurses and out-reach workers)
Rationale	From the perspective of a patient visiting a health facility, caseload is a critically important measure impacting wait time and access to providers. From a provider perspective, caseload is a central component of total workload and measure of efficiency and productivity. A shortage of providers may cause patient caseload to rise and potentially compromise service quality and reduce provider motivation.
Data Source	<a href="#">Service Delivery Indicators (SDI)</a>
Limitations	Caseload does not measure the full workload experienced by a provider, which includes administrative work and other non-clinical activities. It also does not capture the quality of care.

#### 10. Continuity of care: DTP dropout rate\*

Indicator Name	Dropout rate between 1st and 3rd DTP vaccination
PHCPI Domain and Sub-Domain	C. Service Delivery C3. People-Centered Care
Definition	This indicator is constructed from two separate measures: DTP1-3 drop-out rate = $(DTP1 - DTP3)/DTP1$



Rationale	Immunization is an essential component for reducing under-five mortality. Immunization coverage estimates are used to monitor coverage of immunization services and to guide disease eradication and elimination efforts. Measuring the gap between DTP1 and DTP3 reflects continuity within a health system, including the system's ability to capture and follow up with patients.
Data Source	<a href="#">WHO/UNICEF</a> aggregates data from the Demographic and Health Survey and Multiple Indicator Cluster Survey.
Limitations	Given the prevalence of global support for immunization efforts, a high coverage rate of DTP3 immunization may be reflective of strong support from vertical programming in some countries. As such, DTP3 coverage alone is not necessarily a proxy for primary care health system performance.

#### 11. Continuity of care: ANC dropout rate\*

Indicator Name	Dropout rate between 1st and 4th antenatal (ANC) visits
PHCPI Domain and Sub-Domain	C. Service Delivery C3. People-Centered Care
Definition	<p>This indicator is constructed from two separate measures.</p> <p>ANC drop-out rate (%) = [ANC coverage-at least one visit (%)] – [ANC-at least four visits (%)]/[ANC-at least one visit (%)]</p> <p>Antenatal care coverage (at least one antenatal visit) is the percentage of women aged 15 to 49 with a live birth in a given time period that received antenatal care provided by skilled health personnel (doctor, nurse or midwife) at least once during pregnancy.</p> <p>Antenatal care coverage (at least four visits) is the percentage of women aged 15 to 49 with a live birth in a given time period that received antenatal care four or more times. Available survey data on this indicator usually do not specify the type of the provider; therefore, in general, receipt of care by any provider is measured.</p>
Rationale	Antenatal care coverage is an indicator of access and use of health care during pregnancy. The antenatal period presents opportunities for reaching pregnant women with interventions that may be vital to their health and wellbeing and that of their infants. Receiving antenatal care at least four times, as recommended by WHO, increases the likelihood of receiving effective maternal health interventions during antenatal visits. Measuring the gap between ANC1 and ANC4 reflects continuity within a health system, including the system's ability to capture and follow up with patients.
Data Source	<a href="#">UNICEF</a> . WHO and UNICEF compile empirical data from household surveys. At the global level, data from facility reporting are not used. Before data are included into the global databases, UNICEF and WHO undertake a process of data verification that includes correspondence with field offices to clarify any questions regarding estimates.

Limitations	Receiving antenatal care during pregnancy does not guarantee the receipt of interventions that are effective in improving maternal health (effective coverage). Although the indicator for “at least one visit” refers to visits with skilled health providers (doctor, nurse, midwife), “four or more visits” usually measures visits with any provider because national-level household surveys do not collect provider data for each visit. In addition, standardization of the definition of skilled health personnel is sometimes difficult because of differences in training of health personnel in different countries ( <a href="#">UNICEF</a> ). Recall error is a potential source of bias in the data.
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## 12. Continuity of care: TB treatment success rate

Indicator Name	Treatment success rate for new TB cases
PHCPI Domain and Sub-Domain	C. Service Delivery C3. People-Centered Care
Definition	<i>Numerator:</i> Number of new TB cases registered in a given year (excluding cases placed on a second-line drug regimen) that successfully completed treatment whether with or without bacteriological evidence of success ( <a href="#">GHO</a> , accessed August 2015) <i>Denominator:</i> Number of TB cases registered in a given year
Rationale	Treatment success is an indicator of the performance of national TB programs. It also serves as a proxy for a number of aspects of successful service delivery within a health system, including diagnostic and treatment accuracy and the system’s ability to capture and follow up with patients. Further, this serves as an indicator of patient continuity within a health care system.
Data Source	<a href="#">Global Health Observatory (GHO)</a> . Preferred data sources include patient record and surveillance systems.
Limitations	This indicator does not capture the system’s ability to identify new TB patients. As a result, a country could perform well on this indicator, but poorly on the identification of new TB cases.

## 13. Diagnostic Accuracy

Indicator Name	Diagnostic Accuracy
PHCPI Domain and Sub-Domain	C. Service Delivery C2. Availability of Effective PHC Services
Definition	<i>Numerator:</i> For each clinical case, a score of one is assigned for each clinical case if the diagnosis is mentioned. The numerator is the sum of the total number of correct diagnoses identified. Where multiple diagnoses were provided by the clinician, the diagnosis is coded as correct as long as it is mentioned, irrespective of what other alternative diagnoses were given.  <i>Denominator:</i> Total number of clinical cases tested

	Data are collected for the following clinical vignettes: (i) acute diarrhea; (ii) pneumonia; (iii) diabetes mellitus; (iv) pulmonary tuberculosis; (v) malaria with anemia.
Rationale	Having health professionals present in facilities is a necessary but not sufficient condition for delivering quality health services. This indicator is a proxy for the clinical quality of care that is delivered to patients.
Data Source	<a href="#">Service Delivery Indicators (SDI)</a>
Limitations	The limitation of clinical vignettes is that they measure a provider's abilities in a theoretical scenario, but do not capture "real world" phenomena. They are designed to approximate and isolate aspects of the decision-making process that occur in real world settings. However, making the correct diagnosis does not ensure the provision of appropriate care (the "know-do" gap). Other approaches to evaluate adherence to guidelines include use of standardized patients, patient reporting, and observations of clinical encounters.

#### 14. [Provider absence rate](#)

Indicator Name	Provider absence rate
PHCPI Domain and Sub-Domain	C. Service Delivery C2. Availability of Effective PHC Services
Definition	<i>Numerator:</i> Number of health professionals that are not off duty who are absent from the facility on an unannounced visit  <i>Denominator:</i> Ten randomly sampled workers who are supposed to be on duty at the facility on the day of the assessment. Health workers doing fieldwork (mainly community and public health workers) were counted as present.
Rationale	Having health professionals present in facilities is a necessary condition for delivering health services. Staff absenteeism is also a reflection of the quality of organization and management processes within a health facility.
Data Source	<a href="#">Service Delivery Indicators (SDI)</a>
Limitations	Having providers present in facilities is necessary but not sufficient for delivery of quality health services, which is dependent on other aspects of service delivery including provider competence and motivation, and availability of equipment.

#### 15. [Antenatal Care Coverage \(4+ visits\)](#)

Indicator Name	At least 4 antenatal care (ANC) visits
PHCPI Domain and Sub-Domain	D. Outputs D1. Effective Service Coverage
Definition	<i>Numerator:</i> The number of women aged 15-49 surveyed with a live birth in a given time period that received antenatal care four or more times <i>Denominator:</i> Total number of women aged 15-49 with a live birth in the same period surveyed
Rationale	Antenatal care coverage is an indicator of access and use of health care during pregnancy. The antenatal period presents opportunities for reaching pregnant

	women with interventions that may be vital to their health and wellbeing and that of their infants. Receiving antenatal care at least four times, as recommended by WHO, increases the likelihood of receiving effective maternal health interventions during antenatal visits. This is an MDG indicator.
Data Source	<a href="#">UNICEF</a> . WHO and UNICEF compile empirical data from household surveys. At the global level, data from facility reporting are not used. Before data are included into the global databases, UNICEF and WHO undertake a process of data verification that includes correspondence with field offices to clarify any questions regarding estimates.
Limitations	Receiving antenatal care during pregnancy does not guarantee the receipt of interventions that are effective in improving maternal health (effective coverage). Although the indicator for “at least one visit” refers to visits with skilled health providers (doctor, nurse, midwife), “four or more visits” usually measures visits with any provider because national-level household surveys do not collect provider data for each visit. In addition, standardization of the definition of skilled health personnel is sometimes difficult because of differences in training of health personnel in different countries ( <a href="#">UNICEF</a> ). Recall error is a potential source of bias in the data.

16. [Children with diarrhea receiving appropriate treatment](#)

Indicator Name	Percent of children under 5 with diarrhea receiving oral rehydration and continued feeding
PHCPI Domain and Sub-Domain	D. Outputs D1. Effective Service Coverage
Definition	<i>Numerator:</i> Number of children aged 0–59 months with diarrhea in the two weeks prior to the survey receiving oral rehydration therapy or increased fluids, and continued feeding during the time the child had diarrhea <i>Denominator:</i> Total number of children aged 0–59 months with diarrhea in the two weeks prior to the survey.
Rationale	The percentage of children under five with diarrhea receiving oral rehydration and continued feeding is an important indicator of access to health commodities and effective treatment of a common cause of child mortality.
Data Source	<a href="#">World Development Indicators (World Bank)</a> . Data are sourced from UNICEF, State of the World’s Children, ChildInfo, and Demographic and Health Surveys.
Limitations	This indicator does not reflect whether oral rehydration salts and continued feeding were given appropriately. Most diarrhea-related deaths are due to dehydration, and many of these deaths can be prevented with the use of oral rehydration salts at home. However, recommendations for the use of oral rehydration therapy have changed over time based on scientific progress, so it is difficult to accurately compare use rates across countries. Until the current recommended method for home management of diarrhea is adopted and applied in all countries, the data should be used with caution. Also, the prevalence of diarrhea may vary by season. Since country surveys are administered at different times, data comparability is further affected ( <a href="#">World Development Indicators (World Bank)</a> , accessed September 2015).

#### 17. Contraceptive prevalence rate

Indicator Name	Contraceptive prevalence rate (modern methods)
PHCPI Domain and Sub-Domain	D. Outputs D1. Effective Service Coverage
Definition	<i>Numerator:</i> Number of currently married women aged 15-49 who use a modern method of contraception except for the lactational amenorrhea method (LAM). Modern methods include female sterilization, male sterilization, oral contraceptive pill, intra-uterine device, injectables, implants, male condom, female condom, diaphragm, and foam or jelly. <i>Denominator:</i> Number of women ages 15-49 surveyed
Rationale	Use of modern contraception is a critical component of women's, maternal, and population health.
Data Source	<a href="#">Demographic &amp; Health Surveys (DHS)</a>
Limitations	In some surveys, the lack of probing questions, asked to ensure that the respondent understands the meaning of the different contraceptive methods, can result in an underestimation of contraceptive prevalence. Sampling variability may be an issue, particularly when contraceptive prevalence, modern methods is measured for a specific subgroup (according to method, age-group, level of educational attainment, place of residence, etc.) or when analyzing trends over time. This indicator is a measure of both service coverage and fertility preferences and, as such, no target exists.

#### 18. Coverage Index

Indicator Name	Coverage Index
PHCPI Domain and Sub-Domain	D. Outputs D1. Effective Service Coverage
Definition	<p><i>The coverage index is a work in progress and expert feedback is being sought in order to strengthen this measure. If you have specific ideas, please share them by emailing us at <a href="mailto:info@PHCperformanceinitiative.org">info@PHCperformanceinitiative.org</a>.</i></p> <p>The composite score is derived from the following underlying indicators: (1) ANC 4+ visits (2) Percentage of children under 5 with diarrhea receiving oral rehydration and continued feeding and (3) DTP3 immunization coverage. The composite is created as a scaled residual to address the variation across the number of observations for each indicator. Countries with population of at least 1 million were used to calculate the sample mean and standard deviation for each indicator, but the coverage score was calculated for all countries. The residual is divided by the standard deviation of the indicator. This gives each country a score that reflects the number of standard deviations they are from the mean. The composite score for each country is the sum of input indicators divided by the number of indicators reported for that country. This use of mean (rather than sum) ensures that we are not introducing a bias towards countries</p>

	reporting on more indicators. These values were re-scaled to range from 0-1. Only countries reporting on at least two indicators are reported.
Rationale	The purpose of the coverage index is to act as a tracer for a country's performance on PHC services.
Data Source	(1) UNICEF, (2) World Bank World Development Indicators, and (3) WHO/UNICEF
Limitations	The coverage index was limited to those indicators that are part of the Vital Signs indicator set. As a result, there are only five potential coverage indicators that could form the metric, and only three of which are measured on a true 0-100% scale.

19. **DTP3 coverage**

Indicator Name	DTP3 immunization coverage
PHCPI Domain and Sub-Domain	D. Outputs D1. Effective Service Coverage
Definition	<i>Numerator:</i> Number of children aged 12 months surveyed who have received three doses of the combined diphtheria, tetanus toxoid and pertussis vaccine in a given year <i>Denominator:</i> Total population of children aged 12 months surveyed
Rationale	Immunization is an essential component for reducing under-five mortality. Immunization coverage estimates are used to monitor coverage of immunization services and to guide disease eradication and elimination efforts.
Data Source	<a href="#">WHO/UNICEF</a> aggregates data from the Demographic and Health Survey and Multiple Indicator Cluster Survey.
Limitations	Given the prevalence of global support for immunization efforts, a high coverage rate of DTP3 immunization may be reflective of strong support from vertical programming in some countries. As such, DTP3 coverage alone is not necessarily a proxy for health system performance.

20. **Facility-based deliveries**

Indicator Name	Percent of births taking place in a health care facility
PHCPI Domain and Sub-Domain	D. Outputs D1. Effective Service Coverage
Definition	<i>Numerator:</i> Number of interviewed women who had one or more live births in a public or private health facility in the five years preceding the survey <i>Denominator:</i> Total number of interviewed women who had one or more live births in the five years preceding the survey
Rationale	Increasing the proportion of women who deliver in a health facility can be an important component in reducing maternal and neonatal mortality in low-income settings. Deliveries in health facilities can increase the likelihood that women deliver with a skilled birth attendant and are connected to a referral system in the case of delivery complications.
Data Source	<a href="#">UNICEF</a> aggregates data from the Demographic and Health Survey and Multiple Indicator Cluster Survey.

Limitations	Delivery in a health facility does not necessarily ensure that high quality health services are received, as this is dependent on the presence and competence of providers and the availability of essential drugs, equipment, and infrastructure.
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## 21. [Adult mortality from non-communicable diseases](#)

Indicator Name	Probability of dying between ages 30 and 70 from cardiovascular disease, cancer, diabetes, or chronic respiratory disease
PHCPI Domain and Sub-Domain	E. Outcomes E1. Health Status
Definition	<i>Numerator:</i> Number of 30-year-old-people who would die before the age of 70 years from cardiovascular disease, cancer, diabetes, or chronic respiratory disease, assuming that s/he would experience current mortality rates at every age and s/he would not die from any other cause of death (e.g., injuries or HIV/AIDS). <i>Denominator:</i> Population aged 30-70  Expressed as a percent
Rationale	Disease burden from non-communicable diseases (NCDs) among adults - the most economically productive age span - is rapidly increasing in developing countries due to aging and health transitions. Measuring the risk of dying from target NCDs is important to assess the extent of burden from mortality due to NCDs in a population. This indicator has been selected to measure NCD mortality for the "25 by 25" NCD mortality target ( <a href="#">GHO</a> , accessed August 2015)..
Data Source	<a href="#">Global Health Observatory (GHO)</a> . Preferred data source: civil registration with complete coverage and medical certification of cause of death. Life tables specifying all-cause mortality rates by age and sex for WHO Member States are developed from available death registration data, sample registration systems (India, China) and data on child and adult mortality from censuses and surveys.  Cause-of-death distributions are estimated from death registration data, and data from population-based epidemiological studies, disease registers and notifications systems for selected specific causes of death. Causes of death for populations without useable death-registration data are estimated using cause-of-death models together with data from population-based epidemiological studies, disease registers and notifications systems.  Probability of death between exact age 30 and exact age 70 was calculated using cause-specific mortality rates in each 5-year age group and standard life table methods ( <a href="#">GHO</a> , accessed August 2015).
Limitations	Data on adult mortality, particularly in low-income countries, is often limited. Methods to estimate adult mortality from censuses and surveys are retrospective and possibly subject to measurement error ( <a href="#">GHO</a> , accessed August 2015). They also rely on accurate cause of death.

22. **Efficiency: Under-5 mortality relative to per capita PHC expenditure \***

Indicator Name	Efficiency: Under-five mortality relative to per capita PHC expenditure
PHCPI Domain and Sub-Domain	E. Outcomes E4. Efficiency
Definition	<p><i>The efficiency measure is a work in progress and expert feedback is being sought in order to strengthen this measure. If you have specific ideas, please share them by emailing us at <a href="mailto:info@PHCperformanceinitiative.org">info@PHCperformanceinitiative.org</a>.</i></p> <p>We first estimate a regression equation between under-five mortality rate (U5MR), the dependent variable, and PHC per capita spending, the independent variable. We then use the estimated equation to predict what the U5MR would be for any particular country, on the assumption that the country's U5MR performance is as efficient as the global average. We then compare the actual U5MR of the country in question to the predicted U5MR to determine if its U5MR performance is relatively more (or less) efficient than the global average.</p> <p>Given the wide range in observed under-five mortality rate, the final efficiency measure is reported as a percentage of observed deaths and is standardized on a 0-1 scale, relative to other country performance.</p> <p>The correlation between PHC expenditure and under five mortality rate is -0.51 (P=0.02). The beta-estimate for the linear regression of under-five mortality rate against total health care expenditure is -0.20 (i.e. on average, for every additional \$100 (PPP) spent per capita, the under-five mortality rate drops by 20 deaths per 1,000).</p>
Rationale	Under-five mortality relative to PHC spending is an important measure of the efficiency of the health system in converting inputs (such as financing) into desired health outcomes. By comparing countries against peers with similar levels of spending, one can assess whether they are achieving more/less value for money. This can indicate whether or not the current allocation of resources is as effective as possible.
Data Source	<a href="#">Global Health Observatory (GHO)</a> , SHA2011
Limitations	This indicator relies on the availability of per capita PHC expenditures. As a results, the indicator is only available for countries that have data available and the regression equation that is estimated to predict U5M values relies on the underlying data. As a result, the relative efficiency scores will change slightly over time as the number of countries with data available on per capita PHC spending increases.

23. **Equity: under-five mortality wealth differential**

Indicator Name	Under-five mortality equity: difference between 1 <sup>st</sup> and 5 <sup>th</sup> wealth quintiles
PHCPI Domain and Sub-Domain	E. Outcomes E3. Equity



Definition	(Wealth Q5 U5 mortality rate) – (Wealth Q1 U5 mortality rate)
Rationale	Equity is an important dimension of PHC systems, but is often masked by national level statistics. Large differences in under-five mortality between wealth quintiles may indicate disparities in access to child health care services.
Data Source	<p><a href="#">Global Health Observatory (GHO)</a>. The Inter-agency Group for Child Mortality of Estimation, which includes representatives from UNICEF, WHO, the World Bank and the United Nations Population Division, produces trends of under-five mortality with standardized methodology by group of countries depending on the type and quality of source of data available. For countries with adequate trend of data from civil registration, the calculations of under-five and infant mortality rates are derived from a standard period abridged life table. For countries with survey data, under-five mortality rates are estimated using the Bayesian B-splines bias-adjusted model.</p> <p>These under-five mortality rates have been estimated by applying methods to the available data from all Member States that aim to ensure comparability of across countries and time; hence they are not necessarily the same as the official national data (<a href="#">GHO</a>, accessed August 2015).</p>
Limitations	<p>The reliability of estimates of under-five mortality depends on the accuracy and completeness of reporting and recording of births and deaths.</p> <p>Underreporting and misclassification are common. This indicator reports only socioeconomic quintile differences, and there does not capture other aspects of equity.</p>

#### 24. [Maternal mortality ratio \(per 100,000 live births\)](#)

Indicator Name	Maternal mortality ratio
PHCPI Domain and Sub-Domain	<p>E. Outcomes</p> <p>E1. Health Status</p>
Definition	<p><i>Numerator:</i> Annual number of female deaths from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy</p> <p><i>Denominator:</i> 100,000 live births for a specified year</p>
Rationale	<p>Complications during pregnancy and childbirth are a leading cause of death and disability among women of reproductive age in developing countries. The maternal mortality ratio represents the obstetric risk associated with each pregnancy, i.e. the obstetric risk. It is also a Millennium Development Goal Indicator for monitoring Goal 5, improving maternal health.</p> <p>The indicator monitors deaths related to pregnancy and childbirth. It reflects the capacity of the health systems to provide effective health care in preventing and addressing the complications occurring during pregnancy and childbirth (GHO, accessed August 2015).</p>
Data Source	<a href="#">Global Health Observatory (GHO)</a> . Data on maternal mortality and other relevant variables are obtained through databases maintained by WHO, UNPD, UNICEF, and WB. Data available from countries varies in terms of the source

	and methods. Given the variability of the sources of data, different methods are used for each data source in order to arrive at country estimates that are comparable and permit regional and global aggregation.
Limitations	Vital registration and health information systems in most developing countries are weak, and thus, cannot provide an accurate assessment of maternal mortality. Even estimates derived from complete vital registration systems, such as those in developed countries, suffer from misclassification and underreporting of maternal deaths (GHO, accessed August 2015).

25. **Under-five mortality rate (per 1,000 live births)**

Indicator Name	Under-five mortality rate
PHCPI Domain and Sub-Domain	E. Outcomes E1. Health Status
Definition	<i>Numerator:</i> Number of deaths at age 0-60 months <i>Denominator:</i> Number of surviving children at beginning of specified age range during the specified time period
Rationale	Under-five mortality rate measures child survival. It also reflects the social, economic and environmental conditions in which children (and others in society) live, including their health care. Because data on the incidences and prevalence of diseases (morbidity data) frequently are unavailable, mortality rates are often used to identify vulnerable populations. Under-five mortality rate is an MDG indicator ( <a href="#">GHO</a> , accessed August 2015).
Data Source	<a href="#">Global Health Observatory (GHO)</a> . The Inter-agency Group for Child Mortality of Estimation which includes representatives from UNICEF, WHO, the World Bank and the United Nations Population Division, produces trends of under-five mortality with standardized methodology by group of countries depending on the type and quality of source of data available. For countries with adequate trend of data from civil registration, the calculations of under-five and infant mortality rates are derived from a standard period abridged life table. For countries with survey data, under-five mortality rates are estimated using the Bayesian B-splines bias-adjusted model.  These under-five mortality rates have been estimated by applying methods to all Member States to the available data from Member States that aim to ensure comparability of across countries and time; hence they are not necessarily the same as the official national data ( <a href="#">GHO</a> , accessed August 2015).
Limitations	The reliability of estimates of under-five mortality depends on the accuracy and completeness of reporting and recording of births and deaths. Underreporting and misclassification are common.

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