

# Kyrgyz Republic: Performance Based Payments for Maternal and Neonatal Health

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## Quantitative Baseline Survey Report

April 2016

This summary report is based on the baseline survey of the impact evaluation of the **Kyrgyz Health Results-Based Financing** project. The baseline survey was designed to capture the status of the health system in **the Kyrgyz Republic** prior to the start of the **Health Results-Based Financing Pilot**. As such, this survey and the corresponding report are the foundation/starting point for the prospective impact evaluation which is currently underway. This work is funded by the **Global Financing Facility in Support of Every Woman Every Child**, formerly the **Health Results Innovation Trust Fund**, with the generous support from the governments of the **United Kingdom and Norway**. While this report is intended to provide a snapshot of the **Kyrgyz** health system in **2012-13**, it should not be viewed as an assessment of that health system. These findings are part of work in progress and are disseminated to encourage the exchange of ideas about health issues in developing countries. The reports carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent. This report is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. The authors may be contacted at [ekandpal@worldbank.org](mailto:ekandpal@worldbank.org).

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## Executive Summary

This report presents results from a health facility survey conducted to support and generate evidence for the impact evaluation of the Kyrgyz Performance-Based Payments project. Global evidence suggests that improving the quality of obstetric care can directly reduce maternal and neonatal deaths. Most maternal deaths are caused by obstetric complications, including postpartum hemorrhage (PPH), obstructed labor, pre-eclampsia/eclampsia (PE/E), puerperal sepsis, and complications of unsafe abortion. The majority of neonatal deaths result from infections, birth asphyxia, birth trauma, or complications of prematurity.

The main objective of this Quality of Care (QoC) survey is to serve as a baseline to evaluate the effectiveness of a performance-based payments scheme to improve the quality of maternal and neonatal health services in Kyrgyz Republic. The primary outcome measures for the survey were overall facility readiness, particularly with regards to complicated labor and delivery, quality of antenatal care (ANC), quality of labor and delivery (L&D), infection control, management of complications of labor and delivery (PPH, severe PE/E, obstructed labor), essential newborn care, newborn resuscitation, harmful health practices, and health worker knowledge.

The study was conducted in all 65 secondary hospitals in the Kyrgyz Republic, most of which had corresponding primary health care clinics. The 65 hospitals were the main focus of the quality of care survey for maternal and neonatal health while on-site primary care clinics were included in the sample to assess the availability and quality of ANC services. Six tools were used to gather data and observations during health facility visits: a health facility assessment, health worker interviews/ knowledge tests, observations of labor and delivery and ante natal care visits, patient interviews, simulations of neonatal asphyxia and PPH using NeoNatalie and MamaNatalie anatomical models, and criterion based clinical audits (i.e., review of patient records against WHO-established clinical standards of care). This report presents key findings from the first six of these tools.

## Key Findings

The survey findings show that most tracer drugs and equipment were available at the vast majority of facilities. However, several areas of provider knowledge were lacking, including in how to correctly diagnose and treat maternal and neonatal health complications. During observed ANC consultations and deliveries, providers did not carry out key counseling, history-taking and patient assessment actions.

	Findings
Basic Infrastructure	<p>Virtually all surveyed facilities (98%) had functioning electricity and 83% reported having back-up power. Most facilities (89%) had water from a central or protected water source. 86% had functioning improved toilets. 88% had a phone on site.</p> <p>Although all surveyed facilities had an ambulance, over a quarter of ambulances were not functional or fuel.</p>
Tracer drug availability and pharmacy conditions	<p>Most tracer drugs for maternal and neonatal health were widely available at surveyed health facilities (over 95% availability) including injectable amoxicillin or ampicillin, magnesium sulphate, oxytocin or syntocinon, and nifedipine. Injectable gentamycin and misoprostol were less commonly available in 85% and 57% of facilities respectively. The availability of a few tracer drugs was particularly low: hydralazine or apresoline (3%), labetalol (6%) and ergometrine (9%).</p>

	<p>In general, pharmacy physical conditions were adequate for drug storage (mean score of 87%).</p>
Infection Control and Sterilization	<p>Infection control items such as soap and water, sharps containers, decontaminating solution and clean and sterile gloves were available at 98% of surveyed facilities.</p> <p>However, only 75% of surveyed facilities had electric or non-electric functioning sterilization equipment.</p>
Antenatal Care Services	<p>Tests and services for ANC were widely offered with the exception of tetanus toxoid vaccines. Reported availability of routine ANC tests ranged from 82% (for HIV tests) to 100% (for routine urine protein tests). However, Tetanus Toxoid injections were reported available at only 58% of facilities on the day of the survey.</p> <p>Although many facilities reported offering ANC services, basic ANC supplies were not universally available. Tetanus toxoid vaccines, iron or folic acid tablets, and Rapid Plasma Reagin test kits were available at fewer than 60% of facilities included in the ANC sample.</p> <p>Both routine urine protein testing and blood pressure readings were reportedly offered at every facility surveyed. On average 90% of the items needed for on-site testing were available.</p> <p>Gaps were observed in history-taking and health status assessments during the observed ANC check-ups. Health workers asked about current medications in only 63% of the observed ANC check-ups. On average, health workers carried out only 38% of the recommended history-taking actions for previous pregnancies. Health status assessment during ANC was limited with a mean score of 46%. Only 64% of observed ANC clients were screened for pre-eclampsia/eclampsia.</p> <p>Iron or folic acid pills were given or prescribed in only 63% of observed ANC cases, and no observed ANC checkups involved a tetanus toxoid injection.</p> <p>Counseling on danger signs and birth preparation was limited. Only 28% of ANC clients were advised to return to the health facility if they had convulsions and 21% were counseled on preparing for delivery (such as setting aside money for emergency transport).</p>
Routine Labor and Delivery	<p>Most supplies and equipment for deliveries were widely available at surveyed facilities with a mean score of 90% for essential delivery supplies.</p> <p>During observed deliveries, while many routine infection prevention tasks were carried out over 90% of the time, several key steps were only conducted approximately two-thirds of the time. These steps</p>

	<p>include putting on clean clothing prior to delivery (62%), proper sharps disposal (70%), and removing and disinfecting aprons (67%).</p> <p>Health workers typically carried out general client assessment tasks during observed deliveries. The mean score for completing general tasks for initial client assessment during the first stage of labor was 87%.</p> <p>However, providers were not adequately focused on identifying or monitoring danger signs for complications. On average, providers asked or performed about 40% and 45% respectively of the recommended screening questions/tasks for danger signs in the current pregnancy and complications during previous pregnancy during client assessments. The mother's vital signs were not measured after delivery in 22% of the observed deliveries.</p> <p>A partograph was used in only 69% of observed deliveries.</p> <p>An uterotonic was used in almost all (99%) of observed deliveries and administered correctly as an intramuscular injection in 98% of cases when used.</p>
Routine Newborn Care	<p>Essential supplies for newborn care, including items for frequently observed and serious complications, were commonly available. On average, 96% of essential newborn care items were available at the surveyed facilities.</p> <p>Knowledge tests revealed that health workers were generally knowledgeable about several aspects of immediate newborn care, such as thermal protection, eye prophylaxis, and immediate breastfeeding. However, knowledge about other key aspects of immediate newborn care was lower with correct responses ranging from 71%-83%.</p>
Emergency Obstetric and Newborn Care Signal Functions Capabilities	<p>Although 98% of facilities reported having the necessary equipment for assisted deliveries, 58% reported not being able to handle assisted deliveries.</p> <p>Medicines and supplies necessary to carry out 7 common emergency obstetric and newborn care (EmONC) functions were widely available at more than 95% of facilities, with the exception of items needed for caesarian sections, the removal of retained products of conception and newborn resuscitation. Only 30% of facilities were properly equipped to perform caesarian sections although 43% of facilities reported having performed one in the last three months. Items for the removal of retained products of conception were not available at 18% of facilities, while 13% of facilities did not have items for newborn resuscitation.</p>
Post-Partum Hemorrhage	<p>Health workers were not consistently knowledgeable about identifying and treating Post-Partum Hemorrhage (PPH), resulting in low overall</p>

	<p>scores for this complication. For instance, only a third of health workers knew that a weak pulse or full bladder could indicate PPH, and around two-thirds knew that compression of the uterus or aorta were appropriate responses.</p>
Pre-Eclampsia/ Eclampsia	<p>Four out of five observed health worker both checked the client's blood pressure and asked about a PE/ E danger sign during initial assessments, but only 25% conducted urine protein tests. Tested health workers scored poorly on its diagnoses and treatment.</p>
Obstructed Labor	<p>Health workers had low levels of knowledge on the diagnosis and management of obstructed labor. Between 42% to 57% of health workers identified each given sign of obstruction, and the only well-known intervention to treat complications was caesarian section (85%).</p>
Maternal Sepsis	<p>Nearly all tested health workers knew to check for low blood pressure (94%), high fever (92%), and rapid or faint pulse (87%) to diagnose maternal sepsis. Far fewer answered that foul smelling vaginal discharge (66%) and lower abdominal pain (55%) were indicators while only 59% and 70% respectively reported that they would check for anemia/ test for malaria and assess for vaginal bleeding respectively.</p> <p>Knowledge of management and treatment options for maternal sepsis was lower than knowledge of diagnosis. 85% of health workers knew to administer parenteral antibiotics, and 81% knew to administer an ultrasound, but most other scores were low.</p>
Neonatal Sepsis	<p>Nearly all health workers (91%) knew that fever or hypothermia might indicate newborn sepsis. Knowledge of other symptoms was lower and ranged between 55% (breathing difficulties) and 71% (restlessness/ irritability).</p>
Managing Neonatal Asphyxia	<p>In simulations of neonatal asphyxia using NeoNatalie anatomical models, only two-thirds of healthcare workers properly stimulated or ventilated asphyxiated newborns.</p>

## Introduction

Each year, more than half a million women die from complications experienced during pregnancy and childbirth, and more than 3 million babies die in their first week of life (Lawn, Cousens, and Zupan 2005; Hill 2006). Postpartum hemorrhage is the most frequent cause of maternal deaths globally and in developing countries, accounting for 27% of maternal deaths. It is followed by hypertensive disorders in pregnancy (such as pre-eclampsia/ eclampsia and sepsis (12%), and obstructed labor (6%) (World Health Organization 2008).

### *RBF in the Kyrgyz Republic*

Despite recent healthcare reform and improvements over the last decade, Kyrgyz Republic's death rates remain high; with an estimated 19 neonatal deaths per 1,000 live births and 71 maternal deaths per 100,000 live births (CAN-MNCH 2010), the country remains off-track to meet MDG targets. Kyrgyz Republic's healthcare system is universal, provides PHC level care universally, and is widely utilized for maternal and child health care services. All pregnant women are entitled to free antenatal care services, and over 95% of births take place in health facilities. Despite greater investment in health sector reforms over the past two decades, maternal and neonatal healthcare (MNH) outcomes have not improved substantially<sup>1</sup>. The maternal mortality ratio (MMR) is estimated to be above 70 for every 100,000 deliveries, while infant- and under-5 mortality rates are 33 and 38 for every 1,000 live births<sup>2</sup>. Poor quality of MNH care may be contributing to these poor outcomes despite the high utilization of services. Provider accountability is a necessary part of the efforts to improve the quality of care, as well as a shifting focus from quantity of provided services to quality. Effective interventions for screening, prevention, and treatment of life-threatening obstetric and newborn complications can be implemented in Kyrgyz Republic's facilities to help reduce maternal and newborn deaths globally and assist countries with meeting their targets for MDGs 4 and 5.

To address these gaps in quality of care, the Government of the Kyrgyz Republic has prioritized the improvement of maternal and neonatal health care quality. The World Bank Health Results Innovation Trust Fund (HRITF) is funding a multi-year project to test the effects of results-based financing (RBF) and enhanced supervision on the quality of MNH services in the Kyrgyz Republic.

### *Impact Evaluation of the Kyrgyz PBF Project*

The Performance-Based Payments (PBP) pilot project is a three-arm factorial design study that will be implemented across the Kyrgyz Republic involving 60 secondary (*rayon*) hospitals. One treatment arm will receive enhanced supervision in addition to bonus payments totaling up to 10% of a hospital's MNH budget for demonstrated quality improvements, while a second treatment arm will receive only enhanced supervision interventions, and a third study arm will serve as a pure control. Assignment to study arms was done using randomization within matched groups.

Impact evaluation activities are planned at project baseline, for the duration of the study, and at the end of the implementation period. As part of baseline preparation for this impact evaluation, in the fall and winter of 2012, researchers collected data at all secondary hospitals in the country using multiple complementary methods to assess the quality of care of maternal and newborn healthcare. This reports uses these baseline data to describe the state of the quality of MNH services provided as well as the infrastructure and institutional setting of the Kyrgyz health system.

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<sup>1</sup> Detailed information on Kyrgyz Republic health system reforms may be found in Ibrahimović et al., *Kyrgyzstan Health System Review*, 2011.

<sup>2</sup> Ibid. The World Bank.



The overall purpose of this survey is to generate information that can be used to guide quality of care improvement activities for maternal and newborn care in hospitals at the district, regional and central referral levels. The goal is to document the appropriate use, quality of implementation, and barriers to performance of key preventive, screening, and treatment interventions during facility-based maternal and newborn care. “Quality” in the practices we are assessing is determined by how closely the practices adhere to globally accepted evidence-based guidelines. The ultimate aim is to contribute to the reduction of preventable maternal and newborn deaths through increased use and quality of known life-saving interventions.

## Study Objectives

The objective of this Performance Based Payments (PBP) impact evaluation is to build evidence on the impact and cost-effectiveness of the proposed supply-side PBP model in order to inform the Kyrgyz MOH on whether PBP should be scaled-up to additional hospitals, and potentially expanded to the PHC level, as well as to add to the knowledge base on the effectiveness of RBF in health.

During consultations with the Ministry of Health (MOH) in 2010, it was agreed that measuring the impact of increased financing alone was not the only policy question of interest to the MOH. For this reason, the impact evaluation will test the effectiveness and cost-effectiveness of PBP as well as one of its constituent components – enhanced supervision of quality of care.

The primary research questions dictating the design of this evaluation are:

- (1) Do Performance Based Payments at the *rayon* hospital level improve quality of care?
- (2) Does enhanced supervision improve quality of care at the *rayon* hospital level above and beyond the impact of the incentive-based payment scheme?
- (3) What is the relative cost-effectiveness of the PBP package (including enhanced supervision) vis-à-vis enhanced supervision alone vis-à-vis business-as-usual in terms of quantifiable quality of care indicators?

In addition, the impact evaluation will also examine implications for maternal and neonatal health outcomes. However, the impact evaluation will likely not be powered to establish statistically significant changes in maternal or neonatal mortality. To achieve these study objectives, new components such as direct observations of labor and delivery, simulations of birth complications, Criterion Based Clinical Audits, and a greatly revised health facility assessment were introduced.

These questions will be answered through a randomized evaluation design. Successful randomization will ensure a balanced sample between treatment and control groups to facilitate causal inference. To maximize power, the design will involve a triplet matched strategy where facilities are grouped into triplets on the basis of similar observable information and then randomly assigned to one of the two treatment arms or the control group.

## Methodology

### Study Design

#### *Sampling Facilities*

Since the Kyrgyz PBF project assigns each of the 65 secondary hospitals in the country to one of three treatment arms, this baseline survey for the impact evaluation collected data from all 63 hospitals as well as the associated primary clinics known as Centers of General Practice (CGP). A Health Facility Assessment (HFA) was conducted to document the infrastructural and administrative context of each hospital while an ANC inventory checklist was used at the CGP. At least five deliveries were observed (including early stages of labor) per facility, as well as five instances of postpartum and neonatal care. Up to three instances of antenatal care were observed at the CGP.

#### *Sampling Health Workers*

Within each facility, field staff randomly selected up to seven health workers from a list of personnel currently working at the facility provided by the hospital administrator at the start of each hospital survey. These seven comprised the following:

1. One OB-GYN who performs deliveries
2. Three midwives who perform deliveries
3. One neonatologist, pediatrician or nurse-midwife who provides neonatal care
4. One nurse who provides neonatal care
5. One doctor who provides acute care in the Emergency Department

Selected health workers were then interviewed for demographic and employment information and observed conducting labor and delivery activities or during routine antenatal care checkups depending on quotas and services offered at the facility. In addition, clinical vignettes tested worker knowledge while simulations using an anatomical model called MamaNatalie were administered to the OB-GYN and nurses and midwives to test skill related to handling postpartum hemorrhage, while neonatal care specialists were given resuscitation simulations.

#### *Sampling Patients*

Up to fourteen patients were selected for exit interviews per facility. Up to seven of these were those whose labor and delivery had been observed as part of the survey. In addition, nearly as many patients were interviewed that were not observed.

#### *Sample Size*

The survey includes one Health Facility Assessment and one ANC Checklist conducted at each of the 63 secondary hospitals and associated CGPs in the Kyrgyz Republic. In addition, 419 Health Worker Interviews and 717 Patient Interviews were completed. Of the 419 Health Worker Interviews, 126 also included a Resuscitation Simulation, while 195 included Postpartum Hemorrhage Simulations (PPH). Direct Observation of Labor and Delivery was conducted in 388 cases while 195 ANC visits were observed.

<b>Table 1: Total achieved sample</b>			
	<b>Instrument</b>	<b>Total</b>	<b>Per Facility</b>
	Health Facility Assessment	65 <sup>3</sup>	1.00

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<sup>3</sup> This number includes two pre-test facilities

ANC Checklists	65 <sup>4</sup>	1.00
Patient Interviews	717	11.03
Health Worker Interviews	419	6.45
Resuscitation Simulations	126	1.94
PPH Simulations	195	3.00
Labor and Delivery Observations	388	5.97
ANC Observations	195	3.00

<b>Table 1b: Provincial Breakdown of Facilities Surveyed</b>		
<b>Province</b>	<b>Facilities</b>	<b>Percentage</b>
Chui	10	15%
Issyk Kul	7	11%
Narin	6	9%
Talas	4	6%
Osh	10	15%
Jalal-Abad	19	29%
Batken	9	14%
Total	65	100%

## **Data Collection Tools**

In all, six survey instruments were administered in each facility.

### ***Health Facility Assessment***

The facility surveys recorded the infrastructure conditions, management practices, and autonomy of each surveyed hospital, along with the availability of medications, supplies, and equipment. Particular focus was placed on the various areas related to childbirth, maternal, and neonatal care. The survey was administered to members of the hospital staff deemed most knowledgeable about a given section, such as the hospital director, department heads, or chief accountants.

### ***Patient Exit Interviews***

The sixth and final primary component was a patient interview administered to mothers who were observed during childbirth. In addition to basic demographic questions, the questionnaire asked each mother about her general medical history (with a focus on maternal history), her history of medical care related to the current pregnancy, satisfaction with service, and opinion questions on the medical system and health practices in Kyrgyz Republic.

### ***Health Worker Interviews and Knowledge Tests***

Information collected from the HWI instrument included medical qualifications, training and experience providing ANC, L&D, and newborn care services and supervision, as well as overall satisfaction with work and motivation. The knowledge tests, also conducted in the form of face to face interviews, asked health workers knowledge questions about identification, management, and treatment of common maternal and newborn health complications.

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<sup>4</sup> This number includes two pre-test facilities

### **Direct Observations**

In some cases, the health workers who were selected for the Health Worker Interview and Knowledge Test were also directly observed providing care. In a few cases, if this was not possible, other providers of PNC, ANC, and L&D services were substituted.

Field teams also evaluated health workers' real-world practices by observing routine pre-natal checkups and actual childbirths. The questionnaires for both pre-natal care and childbirth (including antenatal care) were developed based on the World Health Organization's manual, *Managing Complications in Pregnancy and Childbirth*. The instruments included both general information, such as client age, gravidity, and parity, health worker qualifications, and facility traits, as well as actual health care practices employed.

Practices evaluated were partograph usage, essential labor, birth and newborn care practices, newborn resuscitation practices, and screening and management of pre-eclampsia/ eclampsia, postpartum hemorrhage, and sepsis. Checklists used in this component were adapted from the instrument used by Stanton et al. in their international survey on AMTSL as part of the POPPHI project and Jhpiego's ACCESS Program Learning Resources Package on Best Practices in Essential and Basic Emergency Maternal and Newborn Care (Stanton et al. 2009; *Active Management of the Third Stage of Labor*, n.d.).

### **Childbirth Simulations**

Using Laerdal MamaNatalie simulation kits, this survey evaluated sampled health workers' procedural knowledge of either newborn resuscitation or postpartum hemorrhage. Trained clinicians on each field team used the kit to simulate a mother giving birth, while another member completed the questionnaire by noting the health worker's actions and asking probing questions.

### **Criterion Based Clinical Audits**

CBCAs were conducted at each facility by using a scorecard system to evaluate patient records from cases of maternal and newborn care that had taken place in the previous year. Records of patients with normal births were scored in addition to cases with complications involving acute myocardial infarction, acute stroke, newborn resuscitation, and a variety of maternal complications.

### **Instrument Development**

Starting with the World Bank's Health Facility Assessment tool and templates for direct observations, simulations, and CBCAs provided by MCHIP, all tools were pre-tested, extensively revised, and then field tested again.

**Pre-testing of draft tools.** Pre-testing of the draft tools were split into two rounds. In the first round, all tools were pre-tested, with the exception of the direct clinical observation and simulated patient observation instruments. This included pre-testing and finalization of the health facility assessment, health worker interview, patient exit interview and criterion-based clinical care audit tools. The second round involved pre-testing of the direct clinical observation tools.

**Training and capacity building.** Two clinical trainers trained the local research firm and data collectors during a 2-week period in the use of the data collection instruments. The training of data collectors on the clinical instruments focused primarily on competency-based training for clinical providers. Because the data collectors were required to conduct direct observations of clinical practices, it was essential that all clinical observers had the updated clinical skills.

### **Ethical Training**

Ethical approval for this study was obtained from the Kyrgyz Institutional Review Board.

## **Training and Field Work**

28 field workers were used as data collectors for this project, divided into 7 teams. Each team comprised of three interviewers and one supervisor, with all interviewers having medical backgrounds. Fieldwork lasted from November 2<sup>nd</sup> until April 4<sup>th</sup>.

Training was held in Bishkek over the first three days of October, and a practical training session was held October 4-5 to pilot the survey instruments. Training was separate for clinical data collectors and non-clinical data collectors, but the training sessions were parallel for the first two days. On the third of October and the practical training sessions, the groups were combined. Additional refresher trainings were held on the 30<sup>th</sup> and 31<sup>st</sup> of October, focusing on review of all instruments and procedures.

Additional regional sessions were held on November 1<sup>st</sup> for the northern part of the country, and November 5-7 in Jalalabad for southern data collectors.

### ***Bishkek Training Topics***

**Day 1** Introductions on the study objectives and structure. Fieldwork was explained in context, with emphasis placed on the importance of quality data and how to go about collecting it. Fieldworkers were explained what was expected of them during training and during fieldwork.

**Day 2** Reliability and validity of data. Fieldworkers introduced to MamaNatalie and NeoNatalie equipment and related survey materials. Technical medical updates covered aspects of normal childbirth, newborn care, newborn resuscitation, pre-eclampsia/ eclampsia, and postpartum hemorrhage to ensure all fieldworkers shared the same understandings.

**Day 3** Fieldworkers learned about informed consent protocol and how to standardize skills observations for quality data. Participants reviewed clinical observation tools in detail and practiced the procedures and logistics of their implementation. A special session covered respectful care for women and families.

**Days 4 and 5** A pilot study was administered to give fieldworkers practical experience collecting data. Every fieldworker conducted clinical observations and was instructed to note logistical issues and pay attention to procedures.

**Day 6** Fieldworkers discussed their experiences in the pilot, expressed concerns and asked questions. After discussion, fieldwork teams were formed and actual fieldwork logistics were discussed at length. At the end of training a course evaluation was held.

### **Data Quality Control and Management**

GORBI used a variety of techniques to ensure data quality, from data collection all the way to final data cleaning procedures. Below find an overview of employed techniques.

#### ***Field staff***

Well trained supervisors and data collectors are the first and most important method of data quality control. Supervisors were the primary liaison with facility management staff, and were trained to create open and cooperative relationships with health workers and managers. During data collection, supervisors verified completed instruments, ensured collection was carried out as instructed, ensured sampling procedures were observed, and communicated with field management on issues of scheduling. Additionally a special field team made unannounced visits in the field, at least twice for each team, to verify their quality of work.

Additionally, to maximize information transfer, all clinical data collectors had medical backgrounds. A robust understanding of the study topic allowed data collectors to easily understand instruments and terminology, medical norms and practices, and allowed better awareness of errors or inconsistencies in the data that laymen would not have had.

### *Pilot*

While primarily for training purposes, running a real world pilot survey allowed for the early identification of unforeseen logistical problems in implementation, data collection instrument flaws, and any other overlooked gaps in fieldwork procedures. Early identification of these problems allowed the field teams to plan for them and limit their effect on the final data.

### *GPS*

All our teams were outfitted with GPS devices to track the location of their facilities. This is a standard quality measure that limits the movement of the teams, discouraging data falsification and encouraging adherence to the schedule.

### *Data Management*

All survey instruments were entered into a database upon their arrival to the field headquarters in Bishkek. This data was then stored at GORBI headquarters in Tbilisi, Georgia, and backed up regularly on another server in the United States. After all the data was collected and back-checked, the data was cleaned and checked for errors.

### *Back Checking*

In addition to spot checking from the supervisors, several facilities were back-checked to verify already collected data. This entailed randomly identifying and visiting facilities and re-asking questions from the facility survey to see if the questions matched.

### *Randomization*

The following section outlines the methodology employed within to randomly assign three treatment arms (treatments one, two and control – t1, t2 and c) to each of the 63 hospitals in Kyrgyzstan. The study is thus being implemented in all nine oblasts of Kyrgyzstan, which is the first administrative level in the country, and among both district secondary hospitals and CGPs.<sup>5</sup>

Prior to the randomization of treatment assignments, the 63 hospitals were divided into 21 similar groups based on geographic location and an overall score, which was created by combining each of three standardized variables from the baseline data. The three variables, and their respective weights, were total number of physicians in the hospital (25%), the total number of patients discharged (25%) and a quality of care score (50%). The data were then sorted by oblast and the overall score value and outputted so that a grouping variable could be constructed manually. In general, hospitals within the same oblast that had similar overall scores were grouped together in triplets, though some oblasts had either a total number of hospitals that were not divisible by three or some hospitals that were so different in overall score that they could not be reasonably matched with hospitals in the same oblast. In either of these cases, the remaining hospitals were matched with geographically close (though in different oblasts) hospitals of similar overall scores. This procedure is admittedly ad hoc to some degree,

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<sup>5</sup> For the purposes of this assignment procedure, small town hospitals were considered as Rayon THs, so only two types of hospitals were considered.

though it is somewhat generalizable by adhering to the overall score value and approximate geographic requirements.

At this point, the data were re-imported into STATA to randomly assign each member of these triplets a t1, t2 or c status for the PBP project. In STATA, it is necessary to set arbitrary numbers called 'seeds' before generating random numbers with its commands (such as `runiform()`, `rnorm()` etc.). The site [random.org](http://random.org) was used to provide an arbitrary number for the initial seed, and then used STATA's `runiform()` to generate random numbers between 0 and 1 for all the hospitals. Data were then sorted by the triplet grouping and the random numbers and created an assignment variable, which produced ordered triplets of (0, 1, 2) every three rows. This established a random assignment for each hospital in the triplet groupings to the control (0), t1 (1) or t2 (2) treatment arms.

The procedure outlined above does guarantee some amount of similarity across treatment arms. For example, since each oblast has at least one complete triplet group, every oblast is guaranteed to have at least one hospital in each treatment arm. However, to ensure a greater degree of similarity between treatment arms, researchers tested for some stricter conditions after this random assignment. First, the means for the (standardized) quality of care score, number of physicians and number of discharged patients' variables for each treatment arm were calculated. Then, the requirement was established that the absolute value of the difference between the three treatment arm pairings within each of these variables was less than or equal to 0.1. It was further required that exactly 12 secondary hospitals and 9 CGPs were in each of the treatment arms.

Naturally, it is extremely unlikely that one would get a random assignment of hospitals to meet these requirements with a random initial choice of the seed. So, this procedure was augmented by generating 10,000 random numbers from [random.org](http://random.org) and nested the above procedures within a for-loop that used each of these 10,000 numbers as seeds.<sup>6</sup> Commands to output the choice of seed, the mean differences and hospital counts to a matrix (and then an excel spreadsheet) were added as well as an if-clause to break out of the loop when all of the above conditions were met. The loop terminated on the 2,907<sup>th</sup> iteration, which is seed 933,520,450, and this random assignment was used to divide the hospitals into the three treatment arms.

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<sup>6</sup> If you are setting seeds very often in STATA, it is important to use an entirely separate random number generating algorithm to pick your seeds, rather than incrementing by 1 or using STATA's random number generating commands themselves. We used [random.org](http://random.org), though other sites / programs would probably work just as well.

## Findings

This section of the report discusses in detail the findings of the impact evaluation. First, overall health facility infrastructure, including essential supplies for normal and complicated delivery, is discussed, followed by health worker knowledge of the appropriate management practices for complicated labor and delivery cases. Then, facility-level prevalence of birth complications and signal capabilities for such deliveries are discussed. Next, the report presents results related to direct observations of antenatal care visits, and labor and delivery.

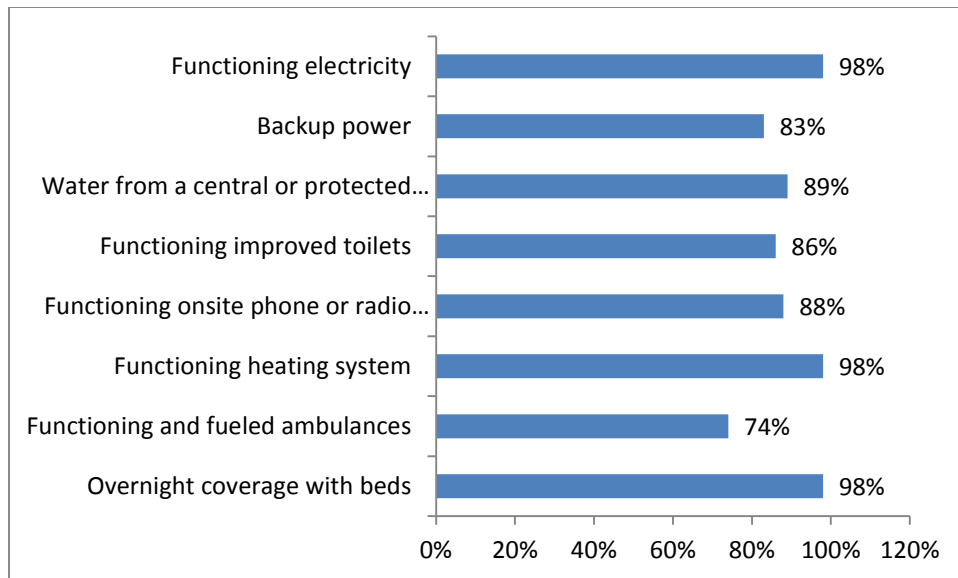
### Health Facility Infrastructure

The Health Facility Assessments show that the hospitals in this sample have the necessary infrastructure to deal with normal and complicated deliveries. Most had electricity, functioning backup power, running water, the essential equipment for complicated deliveries, as well as for infection prevention. However, one finding that may be of concern is that 11% of all facilities drew water from an unprotected water source; these hospitals were all smaller than the mean, perhaps suggesting that these hospitals may be lacking other basic infrastructure as well. Thus, while in general, secondary hospitals in the Kyrgyz Republic do not appear to suffer from notable gaps in basic infrastructure, small hospitals may be significantly lagging.

Table 2.1 General inventory		
Number of Beds per Facility		
Mean	142	
Median	100	
Standard Deviation	138	
Groupings		
0-199	80%	52
200-399	14%	9
400+	6%	4
Is there 24-hour staff coverage?		
YES, 24-hour duty roster observed	92%	60
YES 24-hour coverage listed but roster not observed	6%	4
NO 24-hour coverage	2%	1
Is there 24-hour emergency department in the facility?		
Yes	85%	55
No	15%	10

The average hospital in the sample has 142 beds, with little variation across the distribution of hospitals: 80% had fewer than 200 beds and only 6% had 400 beds or more. All but one facility had 24-hour coverage, and most had emergency departments (85%).



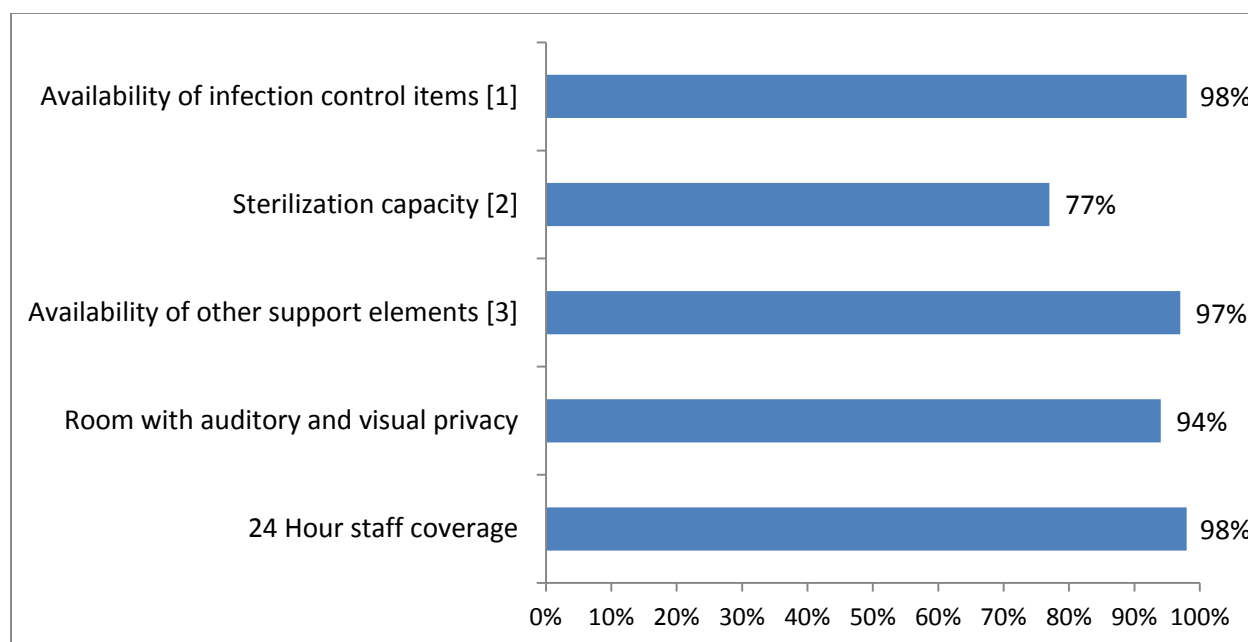


All but one facility had functioning electricity at the time of the survey, and most (83%) had backup power systems. A few facilities (11%) drew water from an unprotected source, but the remaining had either central water or a local protected source. All the facilities without protected water sources are smaller than the mean – one facility had 120 beds but the remaining were 74 beds or smaller. Improved, functioning toilets were found in 86% of facilities, but 8% of facilities had no functioning flush toilet.

Two facilities had no access to a phone, but most (88%) had a phone on site. All facilities had ambulances, but about a quarter of them were either not functioning or were without fuel.

## Essential Supplies for Normal and Complicated Delivery

The survey found that while most hospitals had the essential supplies for normal deliveries, preparedness for complicated deliveries was significantly lower, with only 30% of the facilities having the necessary equipment and medications for Caesarian-sections. Of further concern is the finding that despite only 30% of the facilities having all the necessary supplies for C-sections, 43% of all facilities actually reported having conducted a C-section in the past three months. This difference suggests that at least 13% of all facilities conducting C-sections are not prepared to do so. Conversely, while 98% of facilities reported having the necessary equipment for assisted deliveries, 58% reported not being able to handle assisted deliveries, perhaps suggesting that staff were not trained in how to use the equipment.



- [1] Soap and water or disinfectant, sharps container, decontaminating solution, clean or sterile gloves  
 [2] Functioning electric or non-electric equipment for sterilization, functioning automatic timer or TST indicator strips, written protocols or guidelines for sterilization or disinfection  
 [3] 24hr coverage, guidelines for normal delivery, guidelines for emergency obstetric care, blank partographs

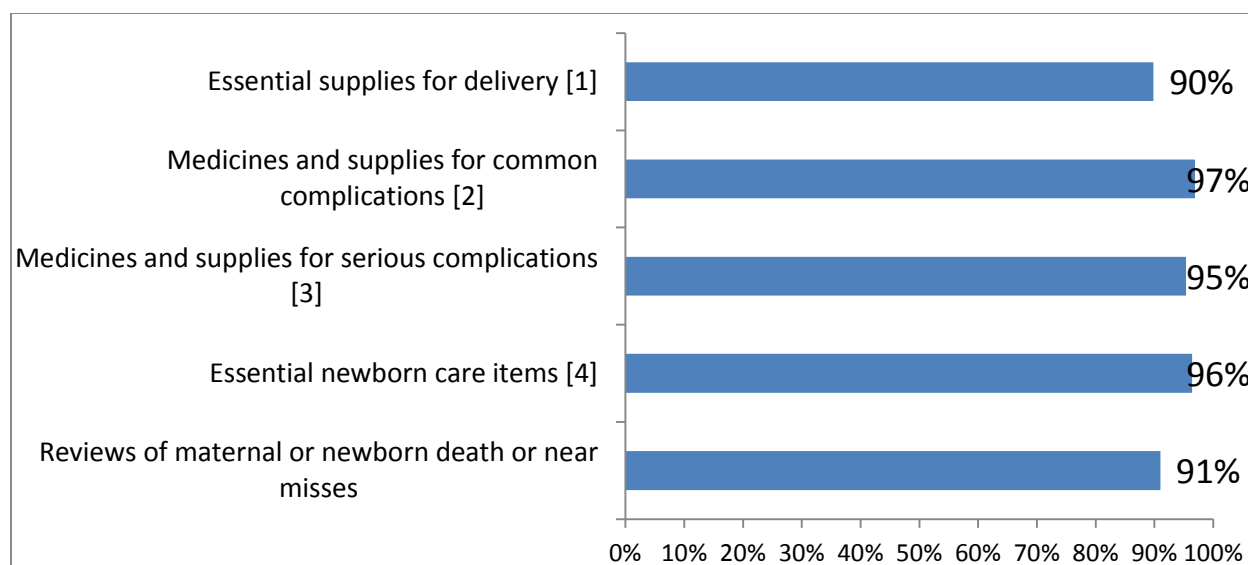
Over 98% of all facilities had access to all infection control items, suggesting that with few exceptions, facilities are generally well-equipped for infection prevention.

Sterilization items were less common, with a mean sterilization capacity score of 77%. 63% of facilities had either an electric (54%) or non-electric (9%) autoclave, and dry heat sterilizers were found in 68% of facilities and boiler or steamer sterilizers in 11%. In total, 75% of facilities had some kind of sterilization equipment, either electric or non-electric, but fewer had a method to monitor the process (58%). All but one facility had written protocols for sterilization.

Almost all rooms used for labor and delivery, including post-delivery rooms, had auditory and visual privacy for patients. General Service rooms were less private, with only half of the rooms having both auditory and visual privacy measures. Other delivery support elements were near-universal, with a mean percentage of 97% for all facilities.

Basic supplies and medicines for normal and complicated delivery were well represented in the sample, with a mean percentage of 90% for essential supplies, 97% for common complications, and 95% for serious complications. The only supplies that were missing in a little over 10% of the facilities were suction apparatuses, skin antiseptic, and eye ointment, though each were present in more than 80% of facilities.

## Essential Newborn Care Items



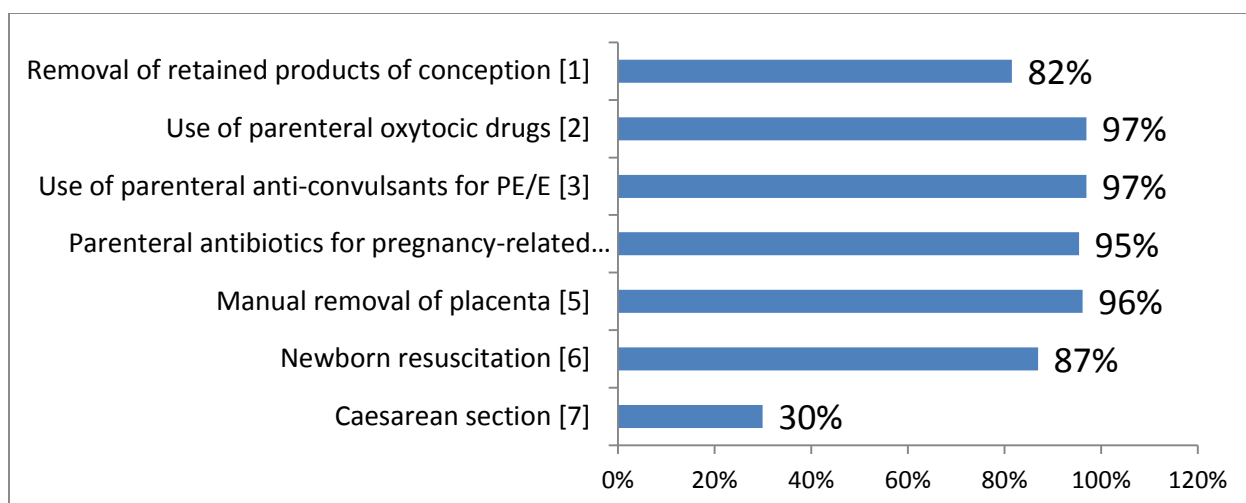
- 1 Mean percentage for sterile scissors or blade, disposable cord ties or clamps, suction apparatus for use with catheter, skin antiseptic, antibiotic eye ointment for newborn
- 2 Mean percentage for syringes and needles, injectable oxytocic (oxytocin or ergometrine), IV infusion set, suture material with needle, needle holder, oral antibiotic (cotrimoxazole or amoxicillin)
- 3 Mean percentage for injectable anticonvulsant (magnesium sulfate or diazepam), injectable antibiotic (ampicillin or gentamicin)
- 4 Mean percentage for disposable cord ties or clamps, towel or blanket to wrap baby, sterile scissors or blade

Essential items for newborn care were very common, with a mean score of 96%. Thermal care items were less common, though 80% of facilities had either an incubators or other functioning heat source. Most all facilities (85%) had Ampicillin or Gentamycin for sepsis management.

Maternity wards in hospitals were typically about 16 beds in size, while a few (18%) had more than 24 beds. Most facilities hold newborn and maternal death reviews regularly, with reviews at most facilities being held when the cases occur (78% of facilities).

## Emergency Obstetric and Neonatal Care Signal Functions Capabilities

### Availability of items necessary to conduct EmONC functions

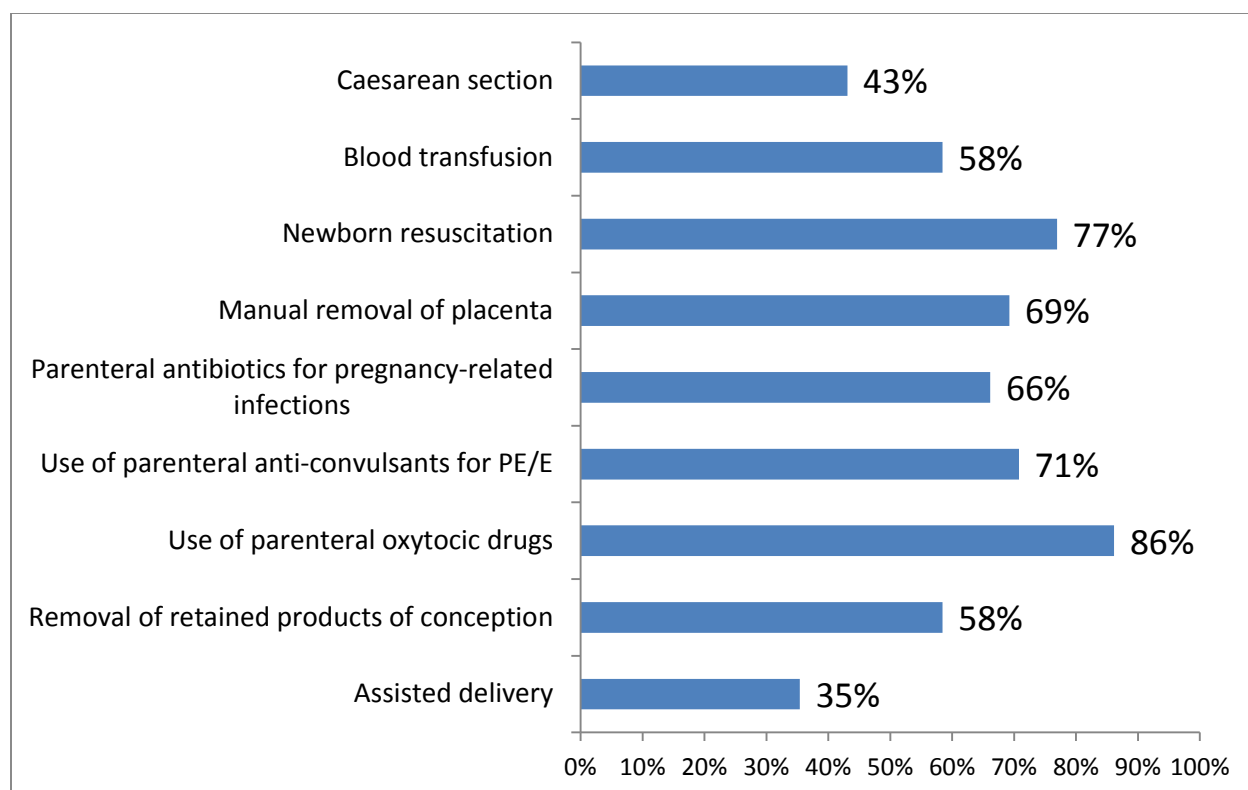


- [1] Manual vacuum aspirator or dilation and curettage kit, injectable oxytocin or ergometrine, syringes and needles, ringer's lactate, D5NS or NS infusion
- [2] Injectable ampicillin or gentamicin, syringes and needles, ringer's lactate, D5NS or NS infusion
- [3] Injectable oxytocin or ergometrine, syringes and needles, ringer's lactate, D5NS or NS infusion
- [4] Injectable magnesium sulfate, diazepam or phenytoin, syringes and needles, ringer's lactate, D5NS or NS infusion
- [5] Injectable ampicillin, injectable oxytocin or ergometrine, syringes and needles, ringer's lactate, D5NS or NS infusion
- [6] Oxygen and newborn-sized oxygen mask and tubing, suction bulb, suction equipment and suction tubing, resuscitation table for newborn
- [7] Operating table, operating light, anesthesia giving set, scrub area adjacent to or in the operating room, tray, drum, or package with sterilized instruments ready to use, halothane, ketamine, health worker who can perform C-section present or on call 24hr/day (schedule observed), anesthetist present or on call 24hr/day (schedule observed)

The availability of supplies needed to carry out all indicated emergency obstetric care functions was very common except for Caesarian sections, with only 30% of all surveyed facilities having all the necessary supplies and medication for them. While the availability of supplies needed to remove retained products of conception seems high, only 35% of hospitals have access to a manual vacuum aspirator or dilation and curettage kit, preventing proper removal.

Most other drugs related to EmONC functions were ubiquitous, with the exception of anti-hypertensives other than magnesium sulfate (present in 57% of facilities), and phenobarbital (25%).

### EmONC functions carried out in the last 3 months



While nearly all facilities have the capacity to carry out most EmONC functions, not all facilities actually had carried out most of the functions in the previous 3 months. Parenteral oxytocic drugs and anticonvulsants were used in a majority of facilities (86% and 71% respectively), along with antibiotics for pregnancy related infections (66%). Resuscitation, the manual removal of placenta and other retained products of conception, and blood transfusion were carried out in a majority of facilities as well, though were a bit less common.

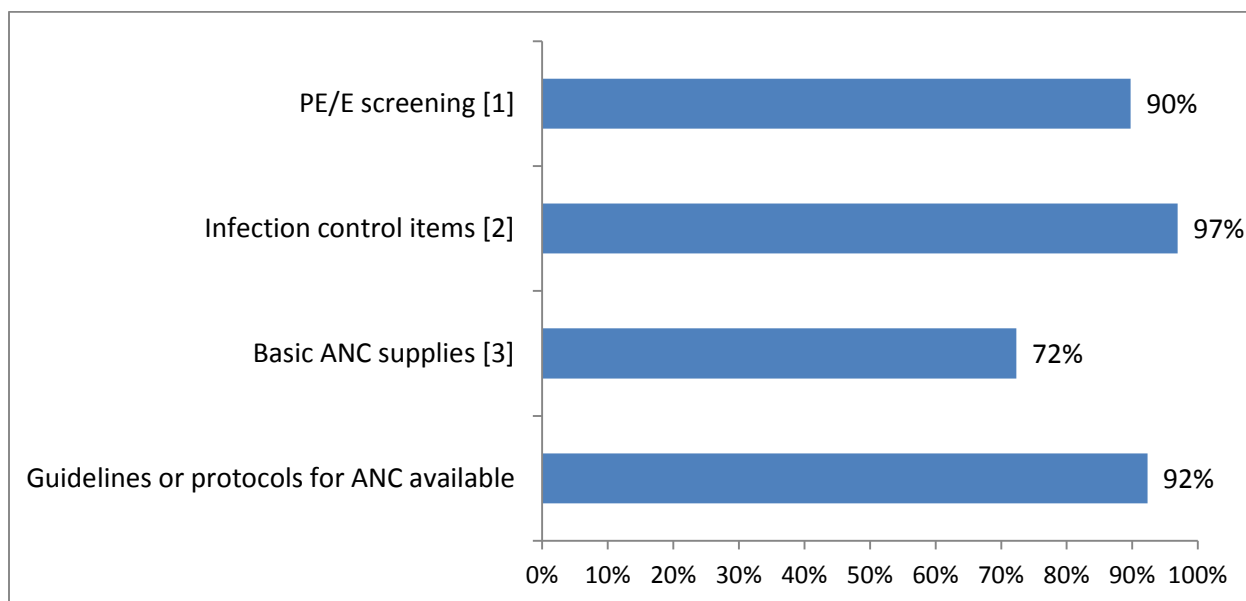
While only 43 percent of facilities had conducted C-sections in the past three months, only 30% of the facilities were found to have the adequate supplies and medication for C-sections suggesting that 13% conducted C-sections without having the necessary infrastructure or equipment. Interesting, only a third of facilities conducted assisted deliveries, despite their capacity to do so. Before each question on actual procedures conducted in the last three months, we asked “Does this unit handle assisted deliveries—that is, use forceps or ventouse (vacuum extractor)?” 38 facilities answered “no,” despite 98% claiming access to forceps or ventouses. This discrepancy may suggest the question was misunderstood or mistranslated. Only 35% of those asked then replied that they had an assisted delivery in 3 months; alternatively, the discrepancy may suggest that while equipment is available, staff are not trained in how to handle assisted deliveries.

## Facility Capabilities in Antenatal Care

Basic tests and services related to antenatal care were generally available at most facilities, with the exception of tetanus toxoid injections, which were supposedly available at only 65% of facilities and were actually available during the survey at even fewer (58%).

Table 2.9 ANC tests offered		
Tests and services routinely offered		
Urine test for protein	100%	65
Blood test for anemia (hemoglobin)	98%	64
Blood test for syphilis	89%	58
Blood tests to check blood group and Rhesus D status	92%	60
Counseling for family planning	98%	64
Testing for HIV/AIDs	82%	53
Tetanus toxoid immunization	65%	42
Tetanus toxoid available today	58%	38
Screening for PE/E		
Routine urine protein testing and blood pressure taken prior to ANC consult	100%	65

The results also show that, in general, supplies for screening for pre-eclampsia/eclampsia was widely prevalent, with 90% of the sample having some necessary items for such screening, although the ability to conduct urine tests was only available at 71% of facilities.



- [1] Either urine test strips or ability to do boiled urine test, Functioning blood pressure apparatus, Stethoscope
- [2] Clean latex gloves, Sharps container, Already mixed decontaminating solution, Hand washing soap, Water for hand washing, Waste receptacle with plastic liner
- [3] Blood pressure apparatus, fetal stethoscope, Iron or folic acid tablets, Tetanus toxoid vaccine, RPR test kit for Syphilis

Infection control is also very common as well with 97% of facilities having the necessary supplies. Basic ANC supplies were less available: tetanus toxoid vaccine, iron or folic acid tablets, and RPR test kits were available at less than 60% of facilities. Overall, the study finds that all basic ANC supplies were available at 72% of the facilities.

## Pharmacy Inventory

While several indicator drugs were in stock at most facilities surveyed, the pharmacy inventory also highlighted several gaps in the available of key drugs for the treatment and prevention of the leading causes of maternal mortality, including drugs for PE/E and PPH.

Table 2.11 Pharmacy inventory		
Stock cards match for key drugs		
Injectable amoxicillin or ampicillin	94%	61
Injectable gentamicin	85%	55
Magnesium sulfate	97%	63
Oxytocin/ syntocinon	97%	63
Hydralazine or apresoline	3%	2
Nifedipine	95%	62
Labetalol	6%	4
Ergometrine	9%	6
Misoprostol	57%	37
Mean percent score for stock	60%	
Room clean of evidence of rodents or pests	97%	63
Room free of water infiltration	89%	58
Protected from sun	74%	48
Drugs are on an elevated platform	89%	58
Mean percent score for adequate physical conditions	87%	
Adequate control of stock		
Pharmacy uses stock cards or register	98%	64

For instance, hydralazine or apresolin and labetalol, both of which are crucial in treating hypertension in PE/E, were stocked in less than 7% of the facilities. Given the relatively high incidence of PE/E-related

maternal mortality in Kyrgyz Republic, the lack of these drugs in secondary hospitals is of significant concern. Ergometrine is another key indicator drug that was frequently not in stock at the pharmacies surveyed; ergometrine is used to facilitate delivery of placentas and prevent bleeding after birth, so its lack of supply is troublesome. Finally, while oxytocin was available at 97% of the facilities, the other drug commonly used to induce labor, misoprostol, was only present in 57% of the facilities. Overall, only 60% of the indicator drugs were found in the facilities surveyed.

The pharmacies themselves fulfilled basic physical requirements in most hospitals, with a physical conditions score of 87%, and all but one facility using a stock card or registry system. The one substandard condition was sunlight: 26% of facilities did not adequately shield medication from sunlight.

## Antenatal Care Services

The survey also observed 195 ANC visits, 51 of which were first visits and 144 were follow-up visits. The average duration of first visits was 21 minutes while follow up visits typically only lasted 18 minutes.

### Description of the Sample

Table 4.1. Description of observed ANC visits and outcome

Client Characteristic	Percentage of Cases (%)	Number of Cases n=195
Type of ANC visit		
First visit	26%	51
Follow-up visit	74%	144
Time of visit (mean duration)		
First visit		0:21
Follow-up visit		0:18
Gestational age at visit		
< =20 weeks	43%	84
21-36 weeks	41%	80
>= 37 weeks	9%	17
Unknown	7%	14
Gravida		
Primigravida	30%	58
Multigravida	70%	137
Number of prior pregnancies (gravidity)		
1 to 2	44%	43
3 to 4	18%	35
5 or more	8%	16



Outcome of visit		
Client goes home	91%	177
Referred within facility	6%	11
Admitted to facility	1%	1
Referred to another facility	3%	5
DK	1%	1

Of these 195 patients, 43% were at 20 weeks of gestation or less, and another 41% had been pregnant between 21 and 36 weeks. 7% of the time the observed doctors were unable to recall gestational age, as it was asked at the end of the interview if the gestational age was not verbally mentioned during the visit. Most visiting patients (70%) were multigravida, the plurality of which had either one or two previous pregnancies. 9 times out of 10 the patient was sent home after the check-up.

Table. Healthcare workers performing ANC		
Healthcare worker qualifications	Percentage of Cases (%)	Number of Cases n=195
MD- Obstetrician/Gynecologist	61%	119
MD- Family Physician	30%	59
Nurse	2%	3
Midwife	5%	10
Family Nurse	2%	4

Nearly all observed check-ups were conducted by medical doctors, 61% by OB-GYNs, 30% by general practitioners, and the remaining 9% by nurses and midwives.

### First Antenatal Care Visit

Of those observed ANC visits that were first visits, a large majority of healthcare workers asked the patient's age (88%), last period (94%) and about gravidity (84%). Fewer asked about the medications the patient is taking, though still a majority (63%). 63% of patients were also prescribed or given iron or folic acid pills, though there was not one worker who gave the client a tetanus toxoid injection, which, in conjunction with the finding that 65% of these facilities stock tetanus toxoid injections, suggesting that they may be given at later ANC visits, if necessary.

Table 4.3. Assessments and preventative treatments at 1st ANC visit		
Health worker asked about or client mentioned	Percentage of Cases (%)	Number of Cases n=51
Client's age	88%	45
Medications client is taking	63%	32
Client's LMP	94%	48
Health worker asked about number of prior pregnancies	84%	43

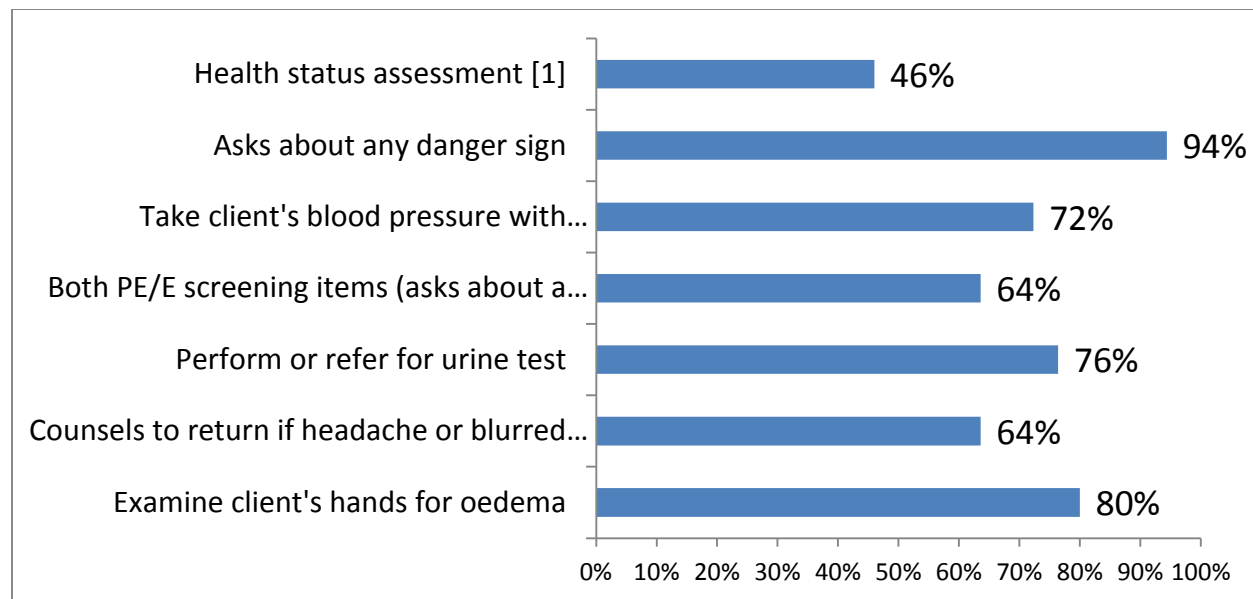
Health worker prescribed or gave:		
Iron or folic acid pills	63%	32
Tetanus toxoid injection	0%	0
Mean percent score for 1st ANC visit	65%	

Evidence suggests significant lapses in record taking for the first ANC visit: history of prior stillbirths was only asked about in 32% of the cases, heavy bleeding around delivery was only asked about in 49% of the cases, while previous history of prolonged labor or convulsions were asked about in 14% and 16% of the cases, respectively. This lack of detail in history taking suggests that ANC visits may not be picking up many potential risk factors for birth complications.

Table 4.4 History taking about previous pregnancies during 1st ANC visit for multigravida		
Health worker asked about or client mentioned:	Percentage of Cases (%)	Number of Cases n=37
Prior stillbirth	32%	12
Heavy bleeding, during or after delivery	49%	18
Previous caesarean section	35%	13
Previous abortions	65%	24
Previous multiple pregnancies	22%	8
Previous prolonged labor	14%	5
Previous pregnancy induced hypertension	73%	27
Previous pregnancy related convulsions	16%	6
Previous assisted deliveries (forceps, ventouse)	19%	7
Anemia	68%	25
Prior neonatal death(s)	27%	10
Mean percent score for 1st ANC visit for multigravida clients	38%	

For the multigravida mothers' first visit, the complications most discussed were hypertension (73%), anemia (68%), and past abortions (65%). The mean percentage score for the discussion of complications with multigravida patients on their first visit was 38%, brought down by low instances of questions related to prolonged labor, convulsions, or past assisted deliveries, all of which were asked less than 20% of the time.

## Assessment of Health Status



[1] Asks about any danger sign, Swollen face or hands, Severe abdominal pain, Headaches or blurred vision, If there are any other problems the client is concerned about, Vaginal bleeding, Foul smelling discharge, Whether the client has felt a decrease or stop in fetal movement, Frequent or painful urination, The threat of termination of pregnancy, Fever, Persistent cough for 2 weeks or longer, Severe difficulty breathing, Convulsions or loss of consciousness

Nearly all observed healthcare workers asked about at least one indicator of current health, 94%. Two of the most asked questions were related to pre-eclampsia/ eclampsia, swollen hands or face (77%), and headaches or blurred vision (60%). 65% asked about severe abdominal pain. Less frequently discussed were convulsions or loss of consciousness (only 15% of patients), difficulty breathing (16%), or persistent cough (21%). About half of doctors performed a syphilis test.

## Screening and Prevention During Follow-up Visits

Pre-eclampsia/ eclampsia received some attention from most doctors, with 64% of observed clients being screened for signs of the disease and given a proper blood pressure reading. A large majority of clients (86%) were asked about either of the two surveyed PE/E indicators; more asked about swollen hands or face (77%) than headaches or blurred vision (60%). Blood pressure tests were given to 72% of observed clients and urine tests were given to 76%.

Most health workers counseled patients to return if they experience headaches or blurred vision (64%), but even more physically examined the patient's hands (80%)

Table 4.7. Preventive treatments		
Worker prescribed or gave:	Percentage of Cases (%)	Number of Cases n=195
Iron pills or folic acid or both	50%	98
Tetanus toxoid injection	1%	2

Half of our observed health workers gave their client either iron pills, folic acid, or both. Tetanus toxoid injections were virtually non-existent – only 2 cases were observed

## Counseling

Table 4.8 Counseling for preventive treatments		
Counseling tasks for iron pills or folic acid:	Percentage of Cases (%)	Number of Cases n=98
Explain the purpose of the treatment	95%	93
Explain how to take	95%	93
Explain side effects	54%	53
Mean for iron/folic acid counseling	81%	
Counseling tasks for tetanus toxoid injection:		
Explain the purpose of the treatment	100%	2

The ANC visits observed in which patients were given preventative treatment commonly involved some counseling about the purpose and method of treatment. Of those given iron pills or folic acid, virtually all (95%) were explained its purpose and how to take the pills. Likewise, both tetanus toxoid injections were explained. Side effects were less frequently discussed (in only 54% of cases), but the overall counseling mean was 81% for these two preventative treatments.

Table 4.9. Counseling		
Pregnancy counseling tasks	Percentage of Cases (%)	Number of Cases n=195
Inform client of progress of pregnancy	90%	176
Tell client to return if vaginal bleeding	67%	131
Tell client to return if severe headache or blurred vision	64%	124
Tell client to return if she has convulsions	28%	55
If she has fever and is too weak to get out of bed	59%	115
If she has severe abdominal pain	75%	146
Mean percent score for pregnancy counseling	64%	
Birth preparation counseling tasks		
Ask client where she will deliver	28%	55
Advise client to prepare for delivery (e.g. set aside money, arrange for emergency transport)	21%	40
Advise client to use skilled health worker during delivery	17%	34
Discuss with client what items to have on hand at home for emergencies (e.g. sterile blade)	12%	23
Mean percent score for birth preparation counseling	19%	38

Postpartum family planning counseling	28%	55
Use of visual aids	29%	57

Nine out of ten health workers observed discussed the pregnancy's progress with the client, and counseling was generally well observed – the mean score for general pregnancy counseling was 64%. Most of the time, clients were advised to return if they experienced severe abdominal pain (75%), vaginal bleeding (67%), severe headaches or blurred vision (64%), or fever and weakness (59%), however, only 28% were warned to return in the event of convulsions.

Counseling aimed at preparing the mother was relatively poorly conducted, with only one third of mothers receiving any advice on the birth itself, only 17% being advised to use a skilled health worker during delivery, and only 12% being asking about necessary preparations at home for emergencies.

## Client Card Usage

Table 4.10. Client card usage		
Health worker looked at client's health card:	Percentage of Cases (%)	Number of Cases n=195
Yes	90%	176
No	9%	17
DK	1%	2
Health worker wrote on client's health card:		
Yes	92%	180
No	6%	11
DK	2%	4

In most all observed cases (>/=90%) health workers used clients' health cards during the visit.

## Labor and Delivery Services

### Sample Description

In total, we observed 388 cases of labor and delivery, covering all stages of labor and delivery. Nearly all observations covered the second and thirds stages of labor and immediate postpartum care (>/= 95%). A great deal also covered the first stage of labor (85%), but fewer observers were present for the initial client assessment (65%). Complications were rare enough to limit our observations of postpartum hemorrhage (13 cases) and newborn resuscitation (10 cases), and we were not able to observe any instances of pre-eclampsia/ eclampsia.

Table 5.1. Description of observed Labor and Delivery sessions and outcome		
Component of L&D observed	Percentage of Cases (%)	Number of Cases n=388
Initial client assessment	65%	253
1st stage of labor	85%	328

2nd & 3rd stages of labor	96%	374
Immediate newborn & postpartum care	96%	374
Management of postpartum hemorrhage	3%	13
Management of pre-eclampsia/ eclampsia	0%	0
Newborn resuscitation	3%	10
Total number of L&D observations		388
Type of delivery		
Spontaneous vaginal	96%	373
Assisted	1%	2
Caesarian section	1%	4
Parity		
Nulliparous (0)	15%	59
Primiparous (1)	28%	107
2-4	48%	188
Grand multipara ( $\geq 5$ )	7%	26
Outcome for mother		
Goes to recuperation ward	94%	366
Referred to other health worker or area within same facility	1%	2
Goes to surgery in same facility	1%	2
Referred to other facility	2%	8
Sent Home	1%	2
Death of mother	0%	0
DK	2%	8
Outcome for newborn		
Goes to regular nursery	6%	23
Referred to specialist care within same facility	0%	0
Referred to other facility	1%	3
Goes to ward with mother	88%	343
Death of newborn	0%	1
DK	3%	10

Nearly all deliveries were spontaneous vaginal. Few women (15%) were observed for their first childbirth, and a plurality (48%) had had between 2 and 4 previous successful pregnancies. Nearly all

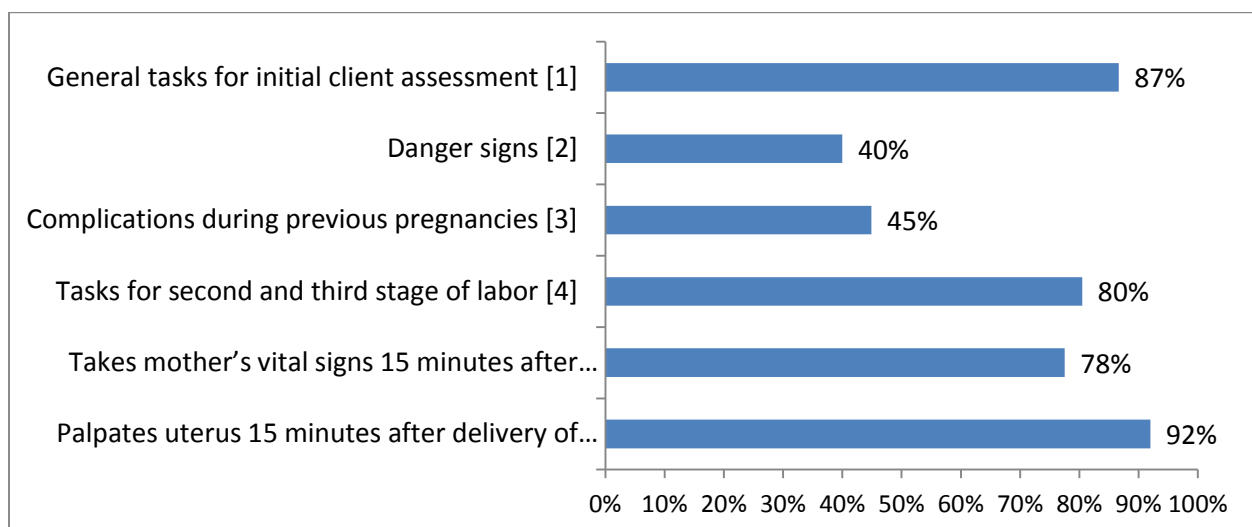
pregnancies ended with the mother being sent to the recuperation ward (94%), and the newborn was usually sent with her (88%). Some few cases saw the child delivered to the nursery instead (6%). There were no cases that ended with maternal death, and only one case of newborn death was observed.

Table 4.x		
Primary health worker observed	Percent	Frequency
MD-Obstetrician/Gynecologist	36%	139
MD-Neonatologist	15%	58
Nurse	6%	22
Midwife	44%	169

Just over half of health workers observed were MDs, more of which were OB-GYNs than neonatologists, followed closely by midwives (44%). A small number of times a nurse was identified as the primary health care worker.

### Essential Tasks for Initial Client Assessments

A total of 253 initial assessments were observed. Most physical tests and procedural tasks were very frequent – health workers checked client cards for essential information, performed vaginal examinations, and all indicated forms of abdominal examinations the vast majority of the time ( $\geq 98\%$  of cases). Temperature and pulse were measured most of the time, 84% and 62% of cases respectively. Urine output was only noted in 42% of observed initial assessments.



- [1] Checks clients card or asks client her age, length of pregnancy, and parity, Takes temperature, Takes pulse, Asks/notes amount of urine output, Performs general examination (e.g. for anemia, edema), Performs abdominal examination: checks fundal height with measuring tape, Performs abdominal examination: checks fetal presentation by palpation of abdomen, Performs abdominal examination: checks fetal heart rate with fetoscope/ultrasound, Performs vaginal examination (cervical dilation, fetal descent, position, membranes, meconium)
- [2] Fever, Foul smelling discharge, Headaches or blurred vision, Swollen Face or Hands, Convulsions or loss of consciousness, Shortness of breath, Vaginal bleeding
- [3] High blood pressure, Convulsions, Heavy bleeding during or after delivery / hemorrhage, Previous C-section, Prior stillbirth, prolonged labor, prior neonatal death, Abortion, Prior assisted delivery
- [4] Supports perineum as baby's head is delivered, Assesses completeness of the placenta and membranes, Assesses for perineal and vaginal lacerations

Tasks involving direct communication were relatively less seen. A majority of health workers only asked about two danger signs during the initial assessment - headaches or blurred vision (69%) and fever (57%). Patients were asked about the remaining indicated danger signs less than half of the time. This resulted in a mean score for this indicator of 40%.

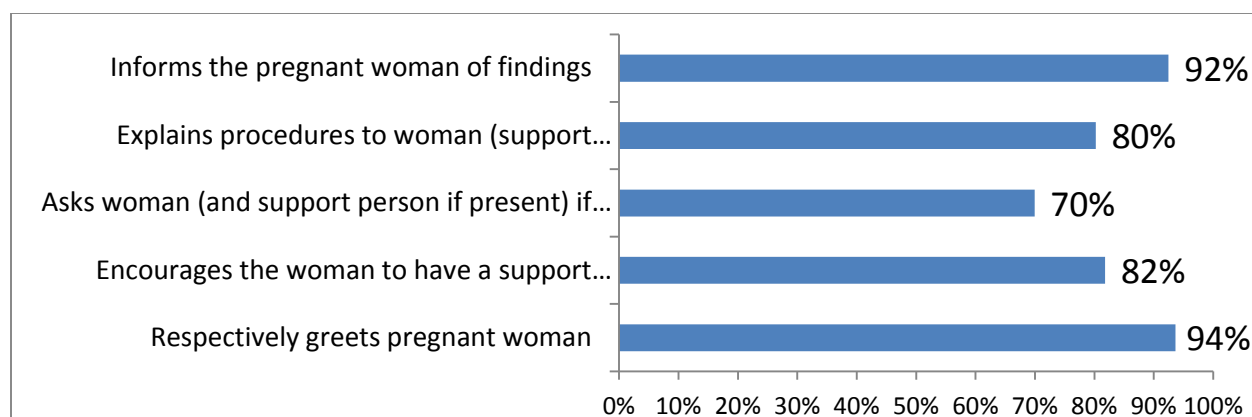
Verbal screening for multigravida mothers during the initial client assessment was inconsistent. A few complications were discussed frequently including high blood pressure (72% of cases), hemorrhage during previous pregnancies (63%), and abortions (75%). Other danger signs were discussed less than half the time, resulting in a 45% mean score for initial assessment of multigravida patients.

### Essential tasks for Labor and Delivery

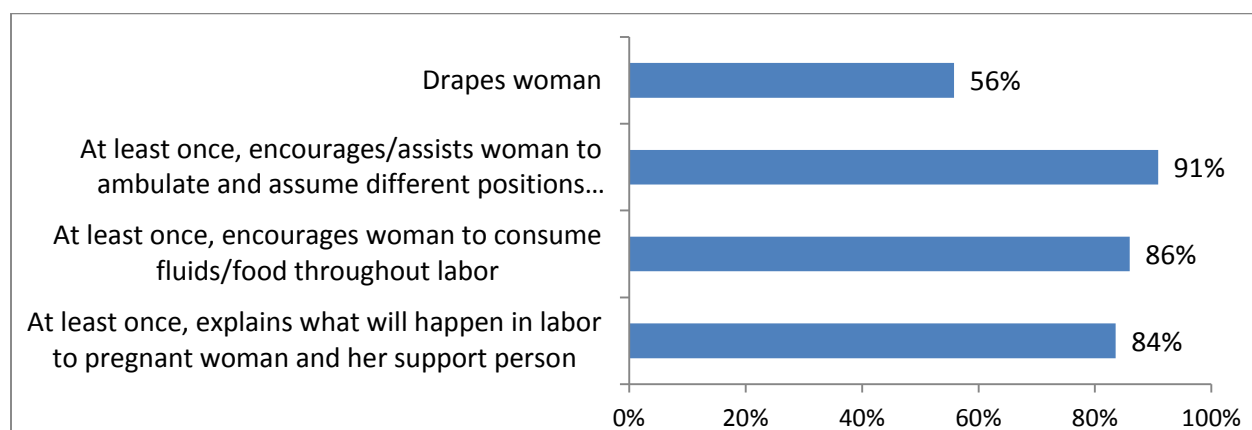
Tasks for second and third stage of labor	Percentage of Cases (%)	Number of Cases n=374
Supports perineum as baby's head is delivered	60%	225
Assesses completeness of the placenta and membranes	88%	328
Assesses for perineal and vaginal lacerations	94%	350
Tasks for immediate postpartum care		
Takes mother's vital signs 15 minutes after birth	78%	290
Palpates uterus 15 minutes after delivery of placenta	92%	344

Most health workers observed during the second and third stages of labor checked for perineal and vaginal lacerations (94%) and assessed the completeness of the placenta and membranes (88%). Health workers supported the perineum as the baby was delivered, but still happened a majority of the time (60%). After childbirth, 92% of workers palpated the uterus 15 minutes after the placenta delivery, and 78% took the mother's vital signs at the appropriate time.





Interpersonal communication during the initial assessment was generally very positive and common. Most observed health workers greeted women respectfully, encouraged the presence of a support person, explained the procedures to the clients as they happened, and kept them informed of the results. It was slightly less common but a majority of workers still asked the mother if she had questions.

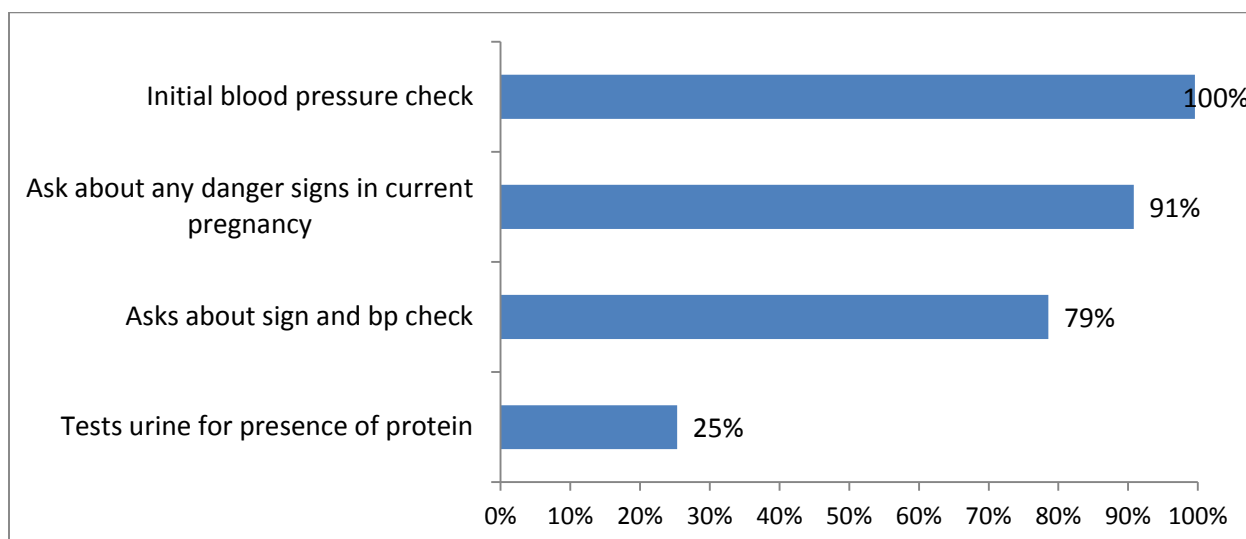


As labor began, communication was still positive in most cases; the only communication act that was not recorded more than 80% of the time was the use of a drape for privacy, which happened just over half the time.

Table 5.5. Infection prevention during labor and delivery		
Prevention tasks for initial assessment	Percentage of Cases (%)	Number of Cases n=253
Washes his/her hands before any examination	91%	230
Prevention tasks for first stage of labor	Percentage of Cases (%)	Number of Cases n=328
Washes his/her hands before any examination	95%	313
Wears high-level disinfected or sterile gloves for vaginal examination	99%	326

Puts on clean protective clothing in preparation for birth that protects face, hands, and body from contact with bodily fluids	62%	202
Prevention tasks for immediate postpartum care	Percentage of Cases (%)	Number of Cases n=374
Disposes of all sharps in puncture-proof container immediately after use	70%	262
Decontaminates all reusable instruments in 0.5% chlorine solution	93%	348
Disposes of all contaminated waste in leak-proof containers	93%	346
Removes apron and wipes with 0.5% chlorine solution	67%	251
Sterilizes or uses high-level disinfection for all reusable instruments	99%	370
Washes his/her hands with soap and water or uses antiseptic	95%	354

Infection prevention measures were widely observed throughout the labor process, with hand-washing and glove usage noted in at least 95% of observations. Health workers also routinely decontaminated reusable instruments and disposed of waste properly; over 90% of the time. The use of clean protective clothing was noted in 62% of first-stage observations, and sterilizing the apron with chlorine after birth was observed 67% of the time. Proper sharps disposal was also common (70%), but not routine.



In contrast to observed ANC visits, screening tasks for eclampsia were more common at the secondary hospitals during labor and delivery, with 91% of observed health workers asking about at least one danger sign related to PE/E and taking blood pressure. Far less frequent were urine tests for protein, observed only 25% of the time. However, evidence suggests that screening for PE/E at labor may be too late to prevent complications, so the lack of attention during ANC visits may limit potential reductions in mortality and morbidity from PE/E.

## Partograph Use

Table 5.7. Partograph usage		
	Percentage of Cases (%)	Number of Cases n=388
Partograph used during labor	69%	263
Correct timing of partograph use by type	Percentage of Cases (%)	Number of Cases n=263
3 centimeters (old WHO partograph)	98%	255
4 centimeters (new WHO partograph)	0%	1
Partograph filled in at least every half hour during labor with:		
Frequency and duration of contractions	97%	256
Fetal heart tones	99%	260
Maternal pulse	86%	225
Partograph plotted at least every half hour during labor (all items)	84%	222
Birth information recorded after delivery:		
Birth time	98%	257
Delivery Method	96%	252
Birthweight	96%	253
Birth information recorded after delivery (all items)	93%	244

Partograph use was noted for 69% of the observed cases, though when it was used it was largely used correctly and completely. Of the 263 observations, nearly all partographs were old WHO partographs. Nearly every health worker correctly recorded contractions (97%) and heart tones (99%) every half hour, and a large majority (86%) recorded maternal pulse regularly. Post-delivery partograph use was also correct well more than 90% of the time for each indicator.

Health workers did not reach the action line most of the time, only 21 of the observed cases (8%). There were no consistent trends, 5 patients were referred to a specialist, 3 were sent for C-sections, and about half of the actions taken were labeled as “other.”

Table 5.7. Partograph Action Line Usage		
Partograph action line		
Action line reached during observation	8%	21
Action taken at action line		
Consult with specialist	24%	5
Refer to facility for specialized care	0%	0
Prepare for assisted delivery	5%	1
Prepare for caesarean section	14%	3

Other	48%	10
No action recorded	10%	2

### Uterotonic Usage and Active Management of the Third Stage of Labor

An uterotonic was used during virtually every observation of the third stage of labor (99%), and oxytocin was virtually always the uterotonic of choice (99%). Of those who gave patients an uterotonic, 84% prepared it in advance, and 74% administered the drug within one minute of childbirth. It was virtually always administered correctly, as an intramuscular injection (98% of cases). The majority of observed doses were 10ml (63%), but about a third of the time the health worker injected 2ml.

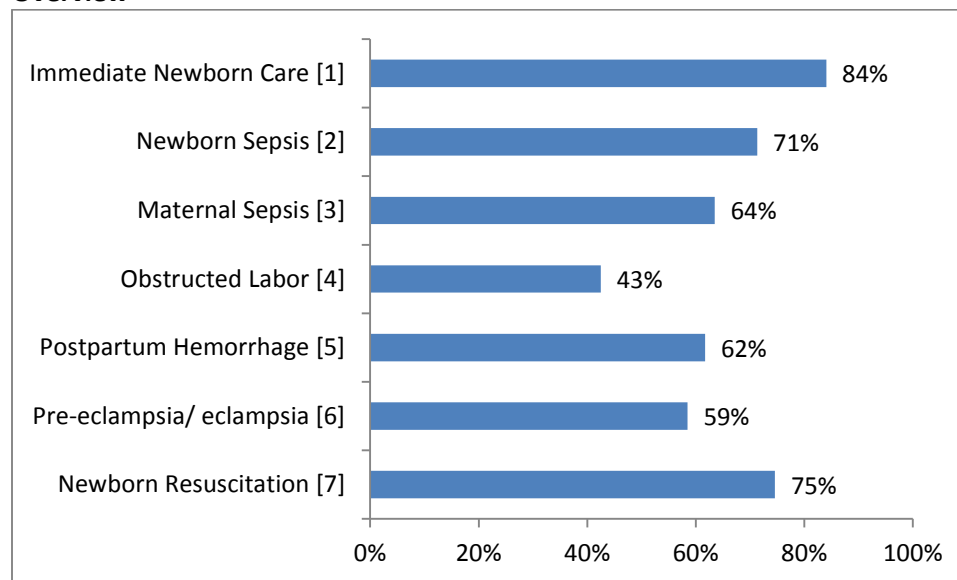
Table 5.8. Uterotonic usage and AMTSL		
	Percentage of Cases (%)	Number of Cases n=374
Uterotonic used	99%	369
Timing		Number of Cases n=369
Prepares uterotonic in advance	84%	311
When administered		
At delivery of anterior shoulder	17%	62
Within 1 min of delivery of baby	74%	273
Within 3 min of delivery of baby	8%	30
More than 3 min after delivery of baby	1%	4
Type of uterotonic		
Oxytocin	99%	367
Ergometrine	1%	2
Dosage		
1 ml	2%	7
2 ml	34%	126
10 ml	63%	232
> 10 ml	1%	4
Intramuscular Injection	98%	361
Intravenous	1%	5
Other	0%	1

Harmful and non-indicated practices were very rarely seen, in about 1% of cases.

## Health Worker Knowledge of Management of Obstetric and Newborn Complications

This study used multiple choice questions, a clinical case study on PE/E, and simulations of newborn resuscitation and postpartum hemorrhage to assess health provider knowledge of the prevention, identification and management of common obstetric and newborn complications. Since each question had multiple correct answers, mean scores were calculated by averaging the percentage of health workers who gave each of the possible correct answers to a question. It is usually assumed, but not always correctly, that health worker knowledge is strongly correlated with or can predict correct performance of clinical skills (Harvey et al. 2007).

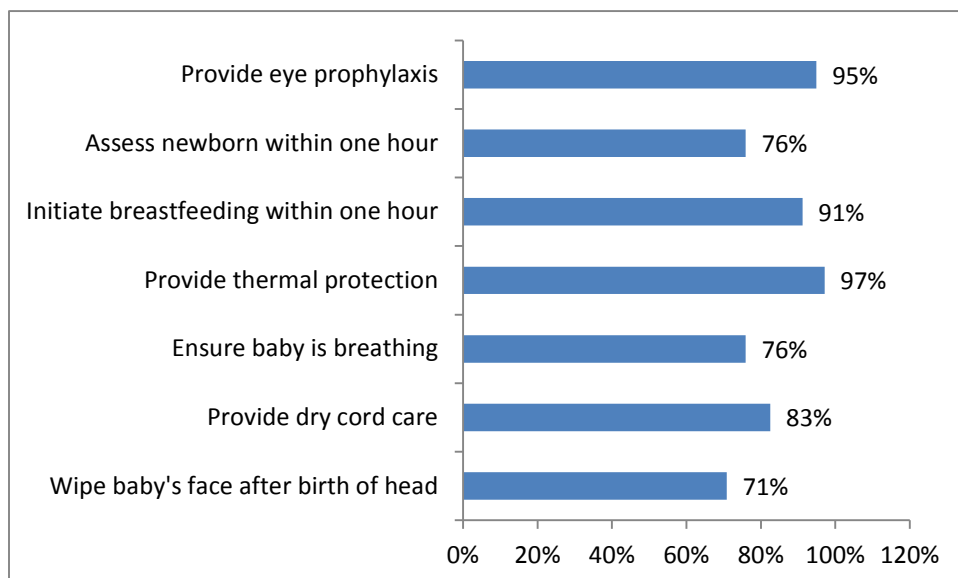
### Overview



- [1] Mean score for immediate newborn care
- [2] Mean score of signs of sepsis in newborn
- [3] Mean of scores for (1) evaluation and (2) actions for a woman who
- [4] Mean of scores for (1) signs of obstructed labor and (2) actions to identify/treat obstructed labor
- [5] Mean of scores for (1) signs to assess in a woman with heavy postpartum bleeding, (2) actions for woman with PPH due to atonic uterus and (3) actions for retained placenta and/or products of conception
- [6] Mean of scores for PE/E case study
- [7] Mean score for newborn resuscitation simulation

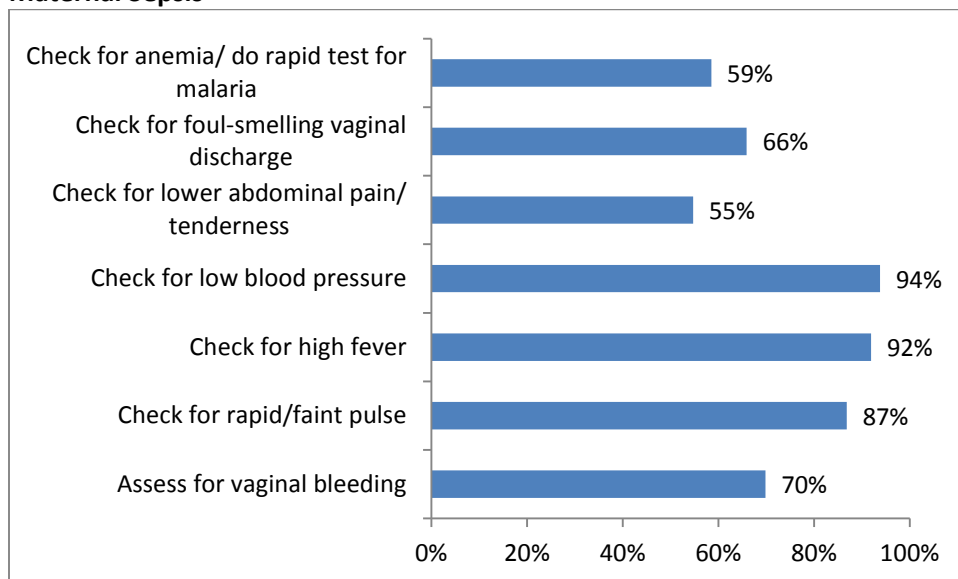
In general, the level of knowledge about maternal complications was low across respondents. The highest means achieved were in immediate newborn care without complications, newborn resuscitation, and newborn sepsis. Obstructed labor received a score below 50%. For all delivery complications, including maternal and newborn sepsis, post-partum hemorrhage and obstructed labor, health workers were unable to identify key symptoms as well as appropriate management techniques. These low levels of health worker knowledge are worrisome because they imply poor quality of care provided and also speak directly to the relatively high levels of maternal and neonatal mortality in Kyrgyz Republic.

### Knowledge of immediate newborn care

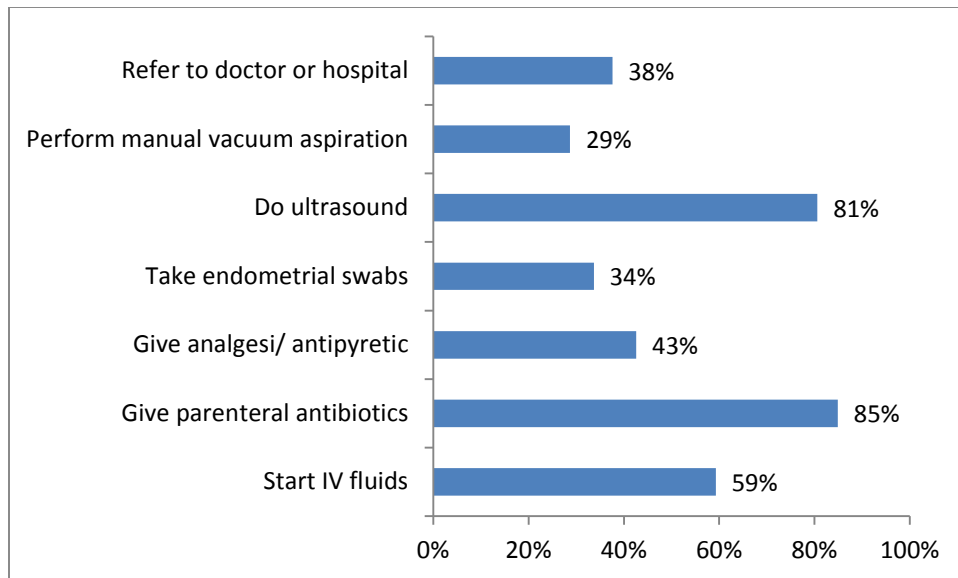


Immediate newborn care is well understood in the survey population. Nearly all health workers correctly identified newborn care measures of thermal protection (97%), eye prophylaxis (95%), and breastfeeding within one hour (91%). The remaining measures were identified a majority of the time.

### Maternal Sepsis

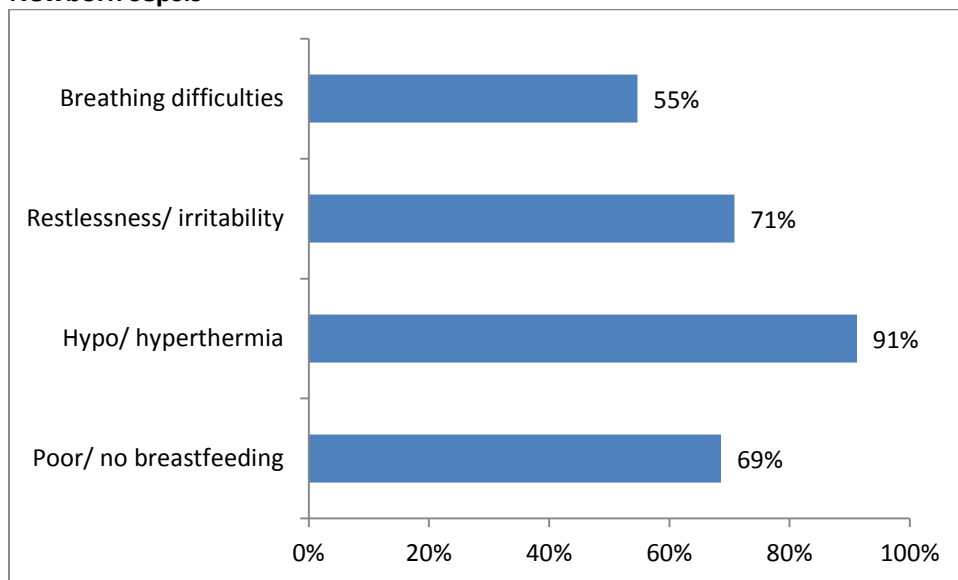


The knowledge of maternal sepsis was significantly more limited. While nearly all tested health workers knew to check for low blood pressure, high fever, and rapid or faint pulse to diagnose maternal sepsis, far fewer (closer to 50% of the sample population) identified foul smelling vaginal discharge and lower abdominal pain as indicators.



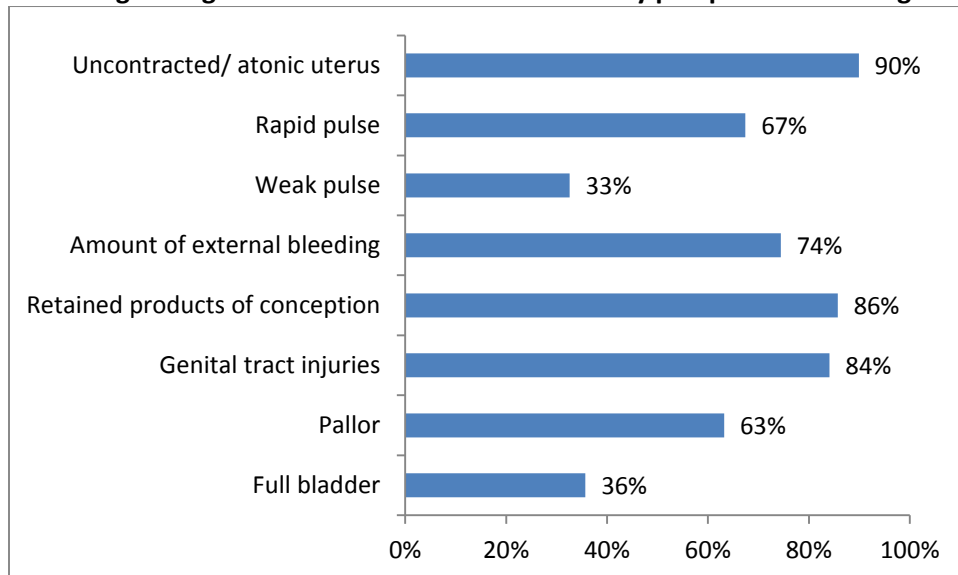
Knowledge of management and treatment options for maternal sepsis was even lower than the knowledge of symptoms. Most (85%) of health workers knew to administer parenteral antibiotics, and 81% knew to do an ultrasound, but most other scores were very low. For instance, only 29% knew that a manual vacuum aspiration may be indicated, while only 34% knew about endometrial swabs. Finally, 38% of the health workers said they would refer such a case to another doctor or hospital, when in fact the hospitals in this survey are equipped to treat maternal sepsis.

#### Newborn sepsis



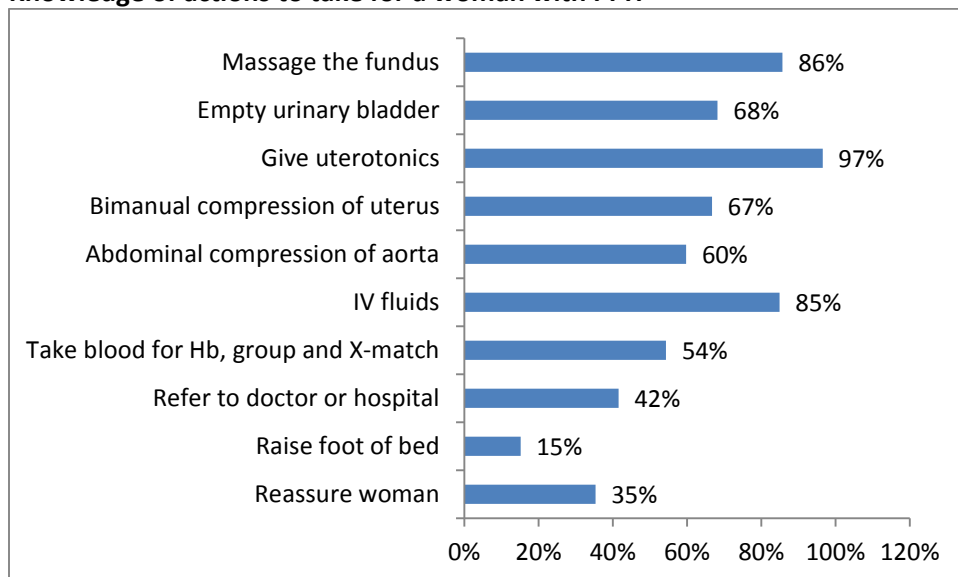
Most tested health workers knew that high or low temperatures might indicate newborn sepsis (91%), and remaining indicators were mentioned by a majority of workers.

### Knowledge of signs to assess in a woman with heavy postpartum bleeding



Many signs of postpartum hemorrhage were known to a majority of tested health workers, including atonic uterus (90%), retained products of conception (86%), and genital tract injuries (84%), but very few knew that a weak pulse (33%) or a full bladder (36%) can also be signs of PPH.

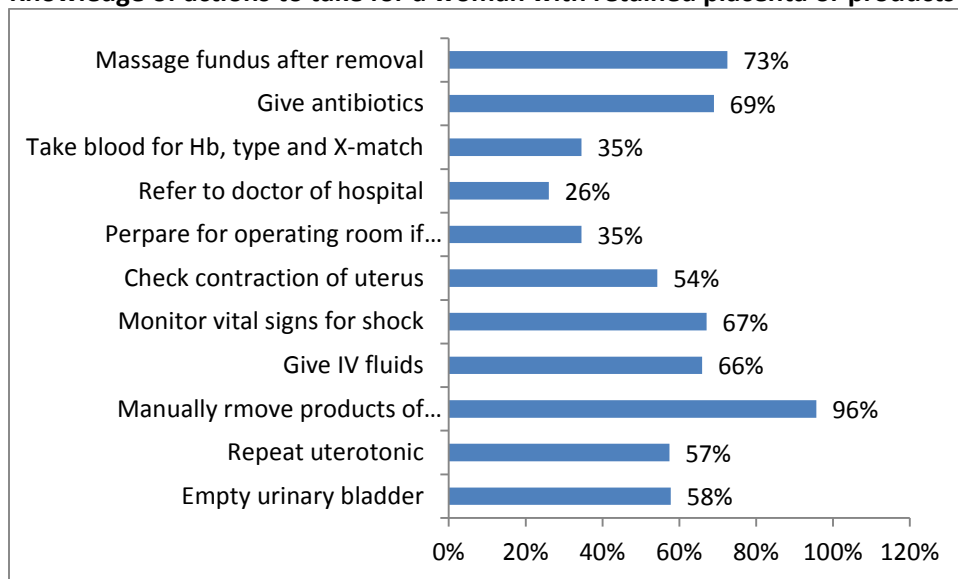
### Knowledge of actions to take for a woman with PPH



Appropriate actions in response to PPH were not widely known, with the exception of uterotonics (97%), fundus massage (86%) and IV fluids (85%). For instance, raising the foot of the bed, a simple and non-invasive action to deal with PPH, was only identified by 15% of the caregivers.

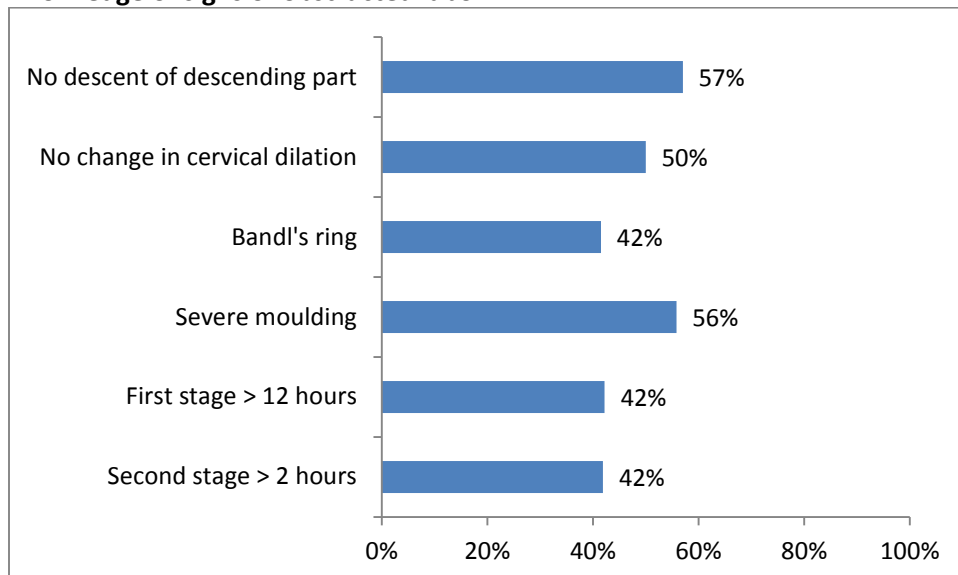


### Knowledge of actions to take for a woman with retained placenta or products of conception



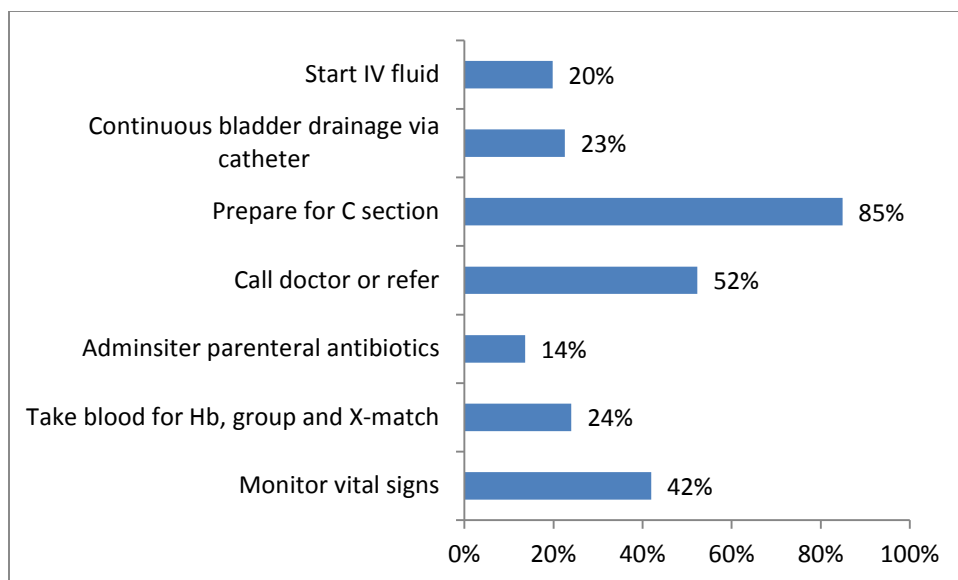
Most health workers knew to remove products of conception manually (96%), but the remaining actions received far lower scores. Testing the blood for type and X-match were only mentioned by 35% of the health workers.

### Knowledge of signs of obstructed labor



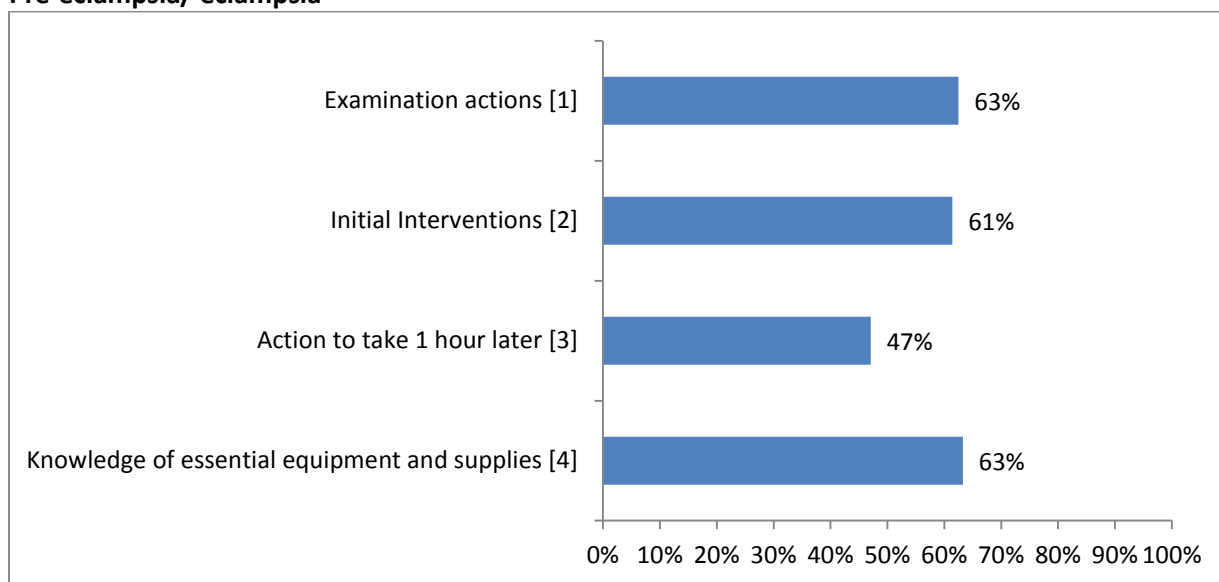
Sampled health workers also exhibited a low knowledge of the signs of obstructed labor, with only 57% identifying the lack of descending parts as a symptom. Other symptoms, like Bandl's ring or a first or second stage of labor lasting for more than 12 hours, were only mentioned by 42%, suggesting a really low level of familiarity with obstructed labor.

### Knowledge of actions for identifying and treating obstructed labor



Knowledge of both the identification and treatment procedures for obstructed labor are among the lowest of tested complications. Only 40% to 60% of medical workers identified each given sign of obstruction, and the only well-known option to treat the complication was a Caesarian section (85%), with other measures like administering parenteral antibiotics or IV fluids only being mentioned by 20% or less of the sample.

#### Pre-eclampsia/ eclampsia

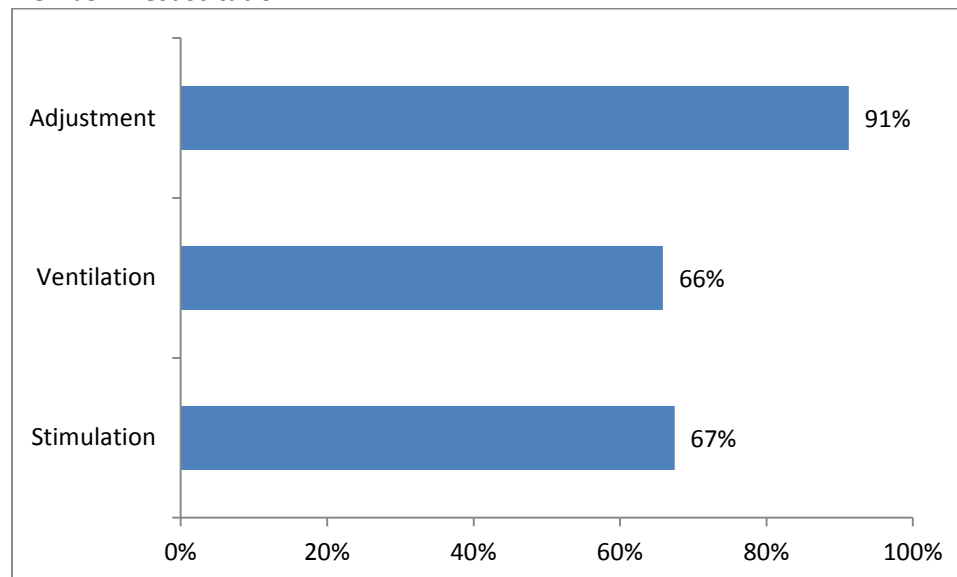


- [1] Record time of onset of present symptoms, assess level of consciousness, assess for any convulsions, check vitals, assess fetal heart tones, check urine protein, and correct diagnosis (Severe pre-eclampsia)
- [2] Stabilize with magnesium sulfate and anti-hypertensives, administer oxygen at 4-6L per minute, place in side-lying position, protect from injury, give magnesium sulfate, and provide anti-hypertensives
- [3] Repeat magnesium sulfate 4 hours after last dose if reflexes and respiration are normal, maintain diastolic blood pressure between 90 and 100 with anti-hypertensives , monitor labor and begin partograph , auscultate lungs hourly , record fluid intake and output hourly , get and record respirations, reflexes and patellar reflexes hourly
- [4] IV with normal saline or Ringer's lactate , urinary catheter and urinary bag , patellar hammer , suction machine & catheter , oxygen & adult mask , injectable magnesium sulfate , calcium gluconate , injectable anti-hypertensives

Identification and treatment of pre-eclampsia and eclampsia were tested by using a medical vignette rather than direct questioning. Health workers were given a description of a hypothetical medical case and asked to diagnose, manage and treat the patient with their answers. Additionally, respondents were asked about equipment and supplies needed to treat the patient.

In general, knowledge of diagnosis and treatment is low. In particular, appropriate actions within an hour of stabilization were correctly identified by less than half of the sample, while even the remainder of the treatment process was only correctly identified by two-thirds of the sample, again suggesting a significant and potentially dangerous knowledge gap.

#### Newborn resuscitation



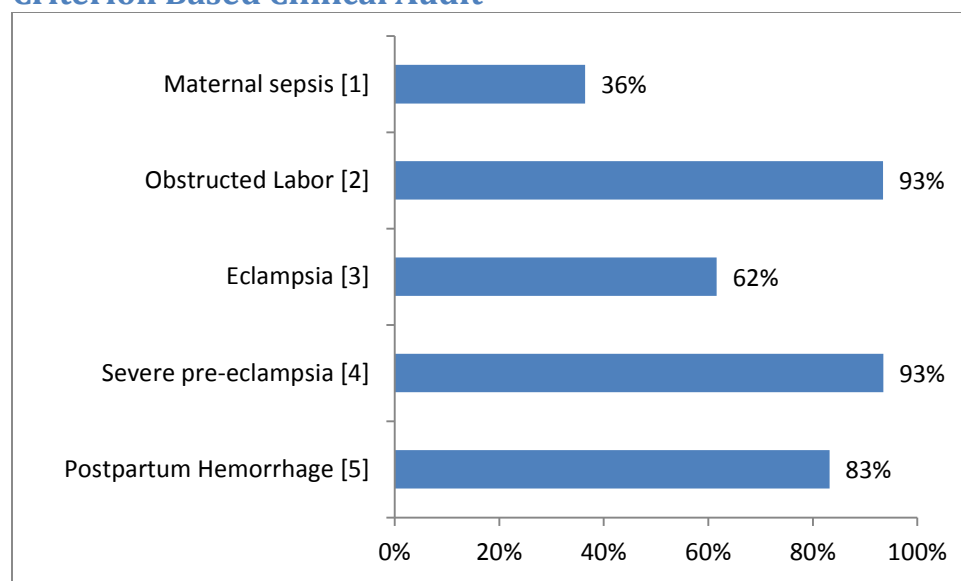
Adjustment: any proper adjustment, including checking neck position, checking seal, repeating suction, squeezing harder

Ventilation: places correct size mask covering chin, mouth and nose, squeezes bag appropriately, ventilates at 30-50 breathes/min (all items)

Stimulation: stimulates baby with back rubbing, places on warm clean surface, positions head, suctions mouth and nose (all items)

Newborn resuscitation knowledge was tested by simulation using the MamaNatalie kits. Health workers were given a description of the childbirth complication and asked to respond by physically performing their tasks on the NeoNatalie while interacting with the field worker to explain. Most observed workers properly adjusted the mask once it was in place, but only a third properly stimulated or ventilated the doll. While there may be concerns that some of these outcomes are poor simply because the health worker did not understand how to use the anatomical model or did not exert her/himself as she/he would in the event of an actual birth complication, these outcomes are consistent with observed rates for screening correctly for pre-eclampsia (64%) and significantly higher than observed rates of checking for danger signs during labor and delivery (40%).

### Criterion Based Clinical Audit



[1] IV antibiotics used

[2] Time of intervention to resolve obstructed labor recorded

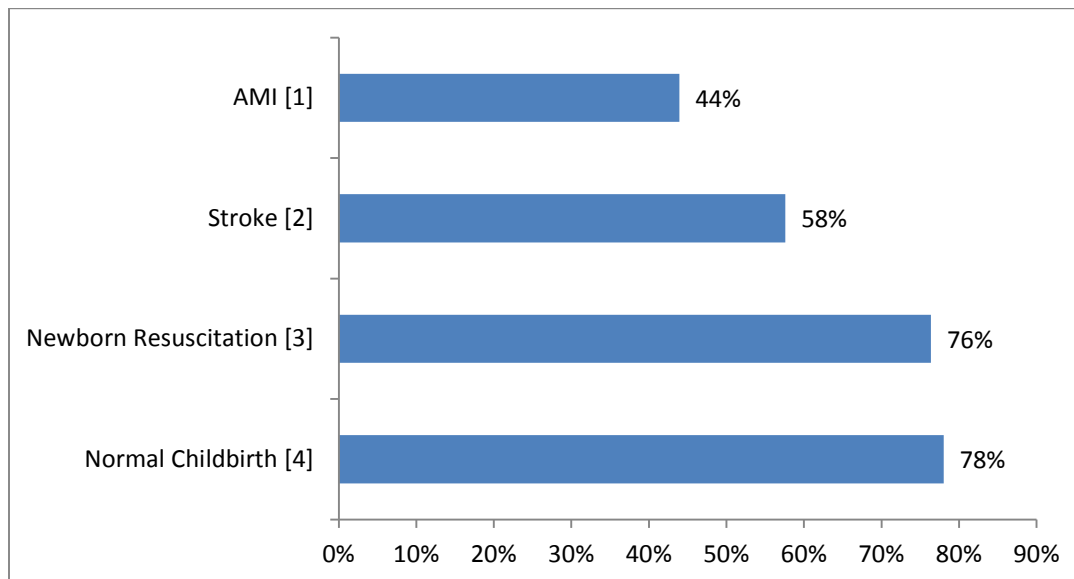
[3] MgSO<sub>4</sub> administered within 15 minutes of onset of convulsion

[4] If diastolic blood pressure  $\geq 110$  AND urine protein  $\geq 3+$  magnesium sulfate was administered by IV, urine protein measured and recorded

[5] Time of onset of hemorrhage recorded, IV infusion initiated, uterine massage at least once, uterotonics at least once

Best practices for maternal complications received high mean scores for some cases, severe pre-eclampsia and obstructed labor for instance (both 93%). The only indicator for maternal sepsis

treatment included was the administration of IV antibiotics, and only 36% of audited cases included notations as such.



- [1] Ensures airway protection and breathing, electrocardiogram, measurement of biomarkers of cardiac damage, imaging, oxygen, ECG monitoring on 12-lead ECG, reperfusion therapy initiated, oral aspirin administered
- [2] Blood pressure, pulse, respirations, ensures airway protection and breathing, brain imaging, cardiac monitoring
- [3] Baby dried at birth, positioned properly, mouth and nose suctioned, breastfed after resuscitation, condition monitored for 2 hours after resuscitation
- [4] Vital signs noted on admission (temperature, blood pressure, pulse), partograph filled, AMTSL performed, maternal vital signs recorded every 15 minutes for 1 hour

Practices for normal childbirth and newborn resuscitation were generally well observed, receiving a 78% and 76% mean score respectively. Stroke received a lower mean (58%), and acute myocardial infarction received below a 50%.

## Patient Composition and Satisfaction

The baseline survey collected various measures of patient characteristics and satisfaction. These measures, presented below, show that the average woman interviewed was 24 years old, likely to have attended school (98%) with 10.5 years of schooling, and currently married (99.8%). Her husband is also likely to have attended school (98.2%), also with 10.5 years of schooling on average. Most households had electricity (99.72%), a cellphone (95.8%), and a television (99.72%). On the other hand, only 44.63% had tapped water inside the house, and 57.74% had a car.

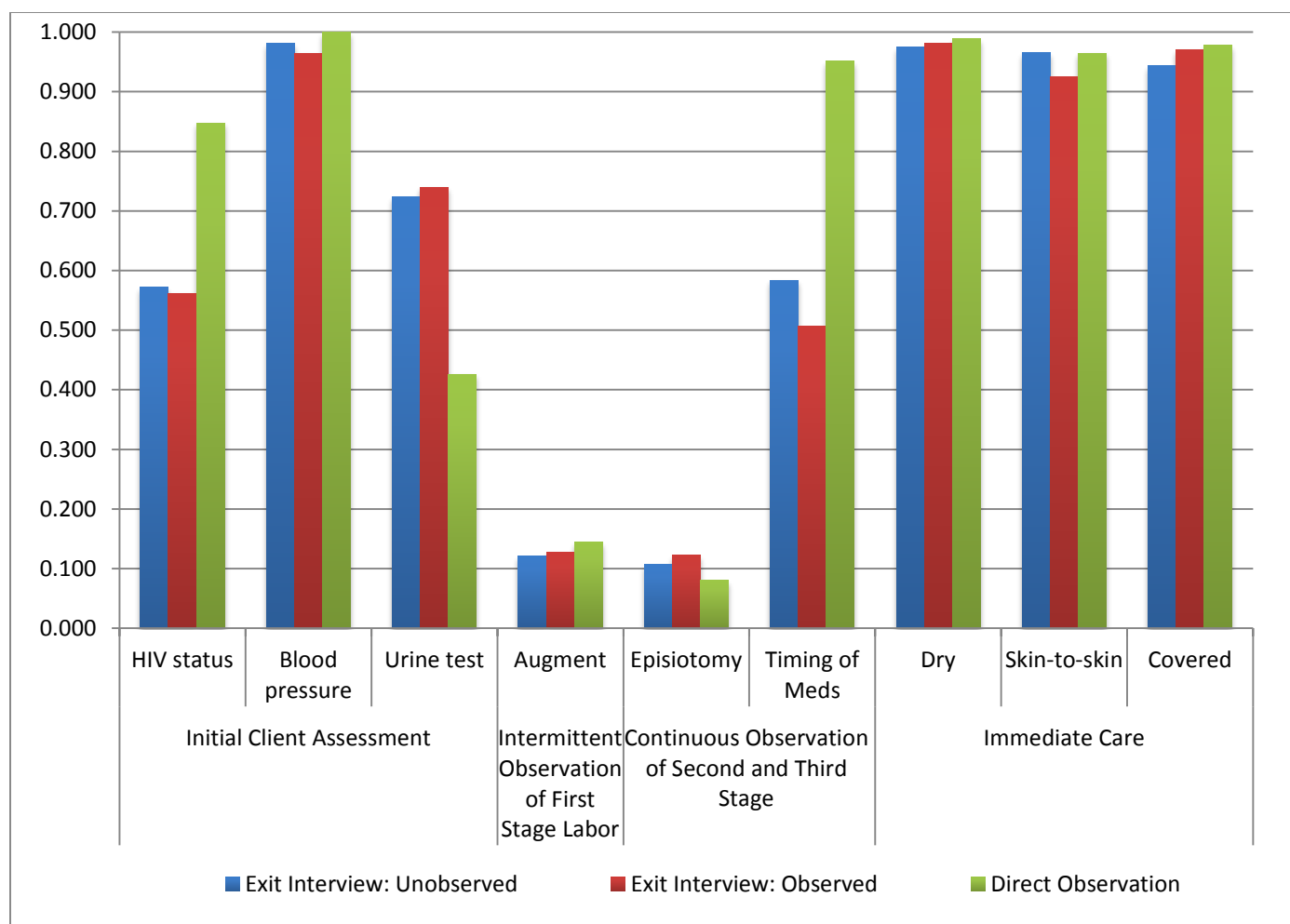
Patient satisfaction was uniformly high, ranging from 85% for transport fees being reasonable to 98.46% for the overall quality of care. However, satisfaction was notably lower for the registration fees (79.47%) and lab fees (70.81%). Satisfaction was also a bit lower for ease of access to prescribed medicines (77.65%) than for most other dimensions of quality.

Respondent Characteristics				
	Mean	Std. Dev.	Min.	Max.
Woman's Age	24.46	5.49	16	41
Ever Attended School	0.998	0.04	0	1
Years of Schooling	10.53	1.01	3	11
Currently Married	0.986	0.12	0	1
Husband Ever Attended School	0.982	0	1	1
Husband's Years of Schooling	10.53	4.79	1	11

Household Asset Ownership		
Tapped water source inside the house	0.4463	320/717
Electricity in the house	0.9972	715/717
Cellphone	0.9582	687/717
Television	0.9972	715/717
Refrigerator	0.7727	554/717
Bicycle	0.378	271/717
Motorcycle	0.0307	22/717
Car	0.5774	414/717
Own house	0.9163	657/717
Rent house	0.0809	58/717
Live with relative	0.0028	2/717

Patient Satisfaction		
Convenient to travel to from house	0.8799	630/716
Facility is clean	0.9679	693/716
Staff is courteous	0.9581	686/716
Health workers explained procedures	0.9497	680/716
Easy to get medicine prescribed	0.7765	556/716
Registration fees were not too high	0.7947	569/716
Lab fees were not too high	0.7081	507/716
Transport fees were not too high	0.8408	602/716
Time spent waiting was reasonable	0.9539	683/716
Enough privacy	0.9372	671/716
Health worker spent enough time	0.9846	705/716
Overall quality was satisfactory	0.9846	705/716

Comparing Patient Exit Interviews with Direct Observations, we find that in general exit interviews replicate direct observation quite closely for most outcomes. However, significant differences exist in reporting urine tests, episiotomies, and the timing of medications.

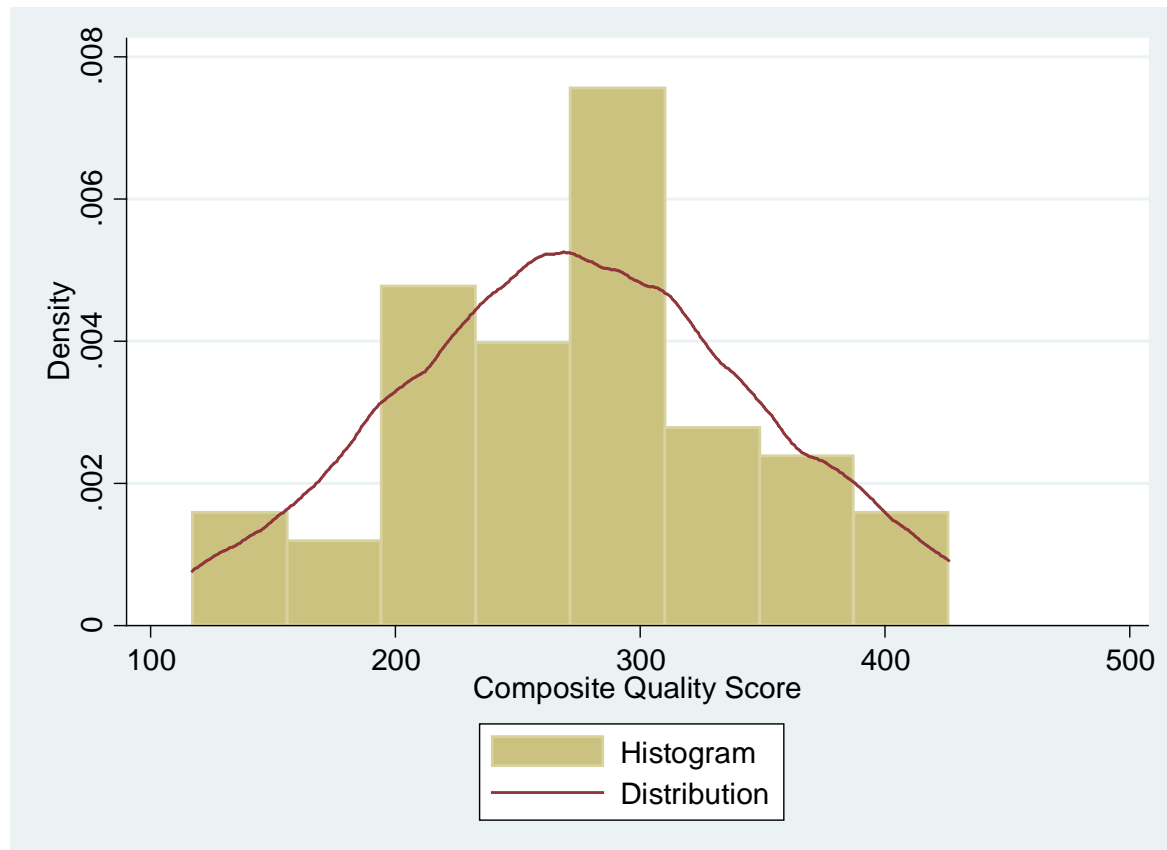


## Replicating the Balance Score Card

The Kyrgyz RBF pilot will use a largely structural Balance Score Card (BSC), **implemented quarterly at all secondary hospitals and CGPs**, to build a composite index of hospital quality. The full BSC was not available at the time of the baseline survey, but a draft BSC was available and was incorporated into the baseline. As a result, over 95% of the final project BSC across all domains of measured quality was incorporated in the baseline survey. The following quality score uses this 95% overlap to construct a hospital quality score.

Areas of overlap included all minimum stock of tracer drugs questions with the exception of latex examination gloves, IV giving sets and catheters, which were not included in the baseline survey. Under availability of packed red blood cells, the baseline did not ask about Coombs reagent. All medical equipment and patient and staff hygiene practices included in the project BSC were also included in the baseline survey. Similarly, all the questions about patient satisfaction, treatment of stroke, AMI and normal and complicated deliveries as well as neonatal care used in the project BSC were included in the baseline survey.

This composite quality score, as shown below, shows a wide range of scores, but all fall significantly short of the maximum possible score of 535. Indeed, the average score was only 274.91, the minimum attained score was 117.14 and the maximum attained was 426.



## Conclusion

The results presented here summarize the variations in quality across all secondary hospitals and associated Centers of General Practice in the Kyrgyz Republic. These findings show that while on average facilities do well in terms of infrastructural quality, gaps remain in the quality of care, with facilities providing services they are not fully equipped or trained for. Further, patient satisfaction is generally high, except with the fee structure. However, constructing a cross-validated Balanced Score Card quality index, we find that even the best scoring Kyrgyz facility falls far short of attaining the highest score possible. Thus, there appears to be significant scope for the RBF pilot to improve the quality of care provided by these facilities.