

qualitative data, I performed thematic analysis where broad themes relevant to the research objective were extracted.

Findings: More households in male-headed households (MMHs) reported utilising facility-based healthcare compared to household with female heads (FHHs). Households with a male sick member were nineteen times more likely to utilise facility-based healthcare relative to sick female household members (19.50, 95% CI 9.62–39.52). There were more reports of sole custody of household resources in MHHs against FHHs (88% vs 61%). Joint decision-making on healthcare expenditure was higher in FHHs (28% vs 19%). Qualitatively, women spoke of seeking permission from male household head before any expenditure while male heads spoke of concealing household financial resources from their spouse.

Interpretation: This study confirms the role of gender in household resources allocation and healthcare utilisation and calls for efforts to redress these prevalent inequities. I recommend that interventions that seek to improve women's agency and autonomy should incorporate strategies to reduce household level gender differences and inequalities.

Source of Funding: None.

Abstract #: 2.012_WOM

Determinants of Contraception among Women with a Previous Caesarean Section in the Kumasi Metropolis, Ghana

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Background: A previous Caesarean section (CS) confers high risk on the index pregnancy. Ensuring optimal inter-pregnancy intervals and the reduction of unintended pregnancies among this sub-population of high risk pregnancies is important for maternal health and survival. Contraception is encouraged especially after CS in order to reduce the risk of a short inter-pregnancy interval. The determinants of contraception among women has been widely studied but there are few studies that have looked at the predictors of contraception among this high risk subpopulation - women with a previous CS.

Methods: A survey of 484 women with at least one previous CS was conducted in the top-5 hospitals in terms of deliveries in Kumasi, Ghana. A questionnaire with questions that sought to measure the predictors of contraception, exposure to contraceptive counselling during the continuum of care, and the quality of family planning counselling was used. Data were subjected to various levels of logistic regression analyses.

Findings: After adjusting for covariates, partners' occupation, previous contraception, exposure to counselling, and the number of previous CS were significant predictors of contraceptive uptake. When compared with women whose partners were professionals, women whose partners were artisans were significantly less likely to take up contraception after CS. Women with a history of previous uptake had a significantly higher odds of uptake post-CS compared with women without previous uptake. Women who received some form of counselling were significantly more likely to take up

contraception. At each point of care (from antenatal to postnatal) nearly 30% of respondents had some form of counselling; two-thirds did not receive any counselling along the continuum of care and only 11% received counselling at all points of care. When compared with women who had an inter-pregnancy interval of less than 24 months post-CS, women with an interval greater than 24 months were significantly more likely to have used contraceptives after CS.

Interpretation: Maternal and child healthcare staff should be trained to improve the quality of their counselling to encourage women to take up contraception post-CS. A context-based adaptation of the Balanced Counselling Strategy into family planning services maybe helpful.

Source of Funding: Bill and Melinda Gates Institute for Population and Reproductive Health, Johns Hopkins Bloomberg School of Public Health.

Abstract #: 2.013_WOM

Improving Emergency Obstetric and Neonatal Care (EmONC) Practices through Retrospective Analysis of Intrapartum Stillbirth Data at the Fort Portal Regional Referral Hospital, Southwestern Uganda

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Background: Through support from the Saving Mothers Giving Life Initiative, Fort Portal Regional Referral Hospital (FPRRH) has used the BABIES (Birthweight Age-at-death Boxes for Intervention and Evaluating System) matrix to track progress in perinatal care since 2013. The BABIES matrix is an epidemiological tool which uses birthweight and time of death to define newborn health problems, assess the performance of a health system, select interventions, and then monitor and evaluate these interventions. From 2013 to 2015, the birthweight-specific mortality rates of normal birthweight babies (2,500g+) increased from 12.1 to 19.2 intrapartum stillbirths per 1000 total births, indicating a gap in care during labor.

Methods: To identify these potential gaps in care during labor, we conducted an in-depth retrospective analysis of patient case sheet data from FPRRH. Inclusion criteria included intrapartum stillbirths of normal birthweight babies during 2015.

Findings: In 2015, 118 cases were identified but only 40.7% of the patient case sheets were found within the hospital's records and few were entirely complete. From the recovered patient case sheet data, 56% of the studied intrapartum stillbirths were accompanied by record of referral into the hospital. 14.6% were associated with cord prolapse, 14.6% with a ruptured uterus, 22.9% with an abnormal lie, and 16.7% associated with obstructed labor.

Interpretation: The lack of detailed record keeping and organization resulted in a reduction of data for analysis. In addition to

affecting this study, the lack of complete record keeping may be affecting quality of care because of the inability to follow a mother throughout labor and delivery. For example, only a few records included use of the partograph, a tool used to track progress so as to avoid a prolonged labor or ruptured uterus. Additionally, high rates of complications accompanying intrapartum stillbirth could show a gap in care when such complications arise and EmONC practices must be followed. To improve EmONC practices and lower intrapartum stillbirth rates, detailed record keeping for continuous analysis is suggested. This may allow for improvement of care during labor, specifically surrounding common complications. Any improvement should then be monitored with continued use of the BABIES matrix.

Source of Funding: Kellogg Institute for International Studies, University of Notre Dame.

Abstract #: 2.014_WOM

Low-cost, Speculum-free, Automated Cervical Cancer Screening: Bringing Expert Colposcopy Assessment to Community Health

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Background: Although cervical cancer is on the decline in high income countries, the WHO estimates that 88% of worldwide invasive cervical cancer mortalities occur in LMICs and is expected to increase to 98% by 2030. Our work seeks to ameliorate key barriers to cervical cancer screening by developing: **1)** a speculum-free alternative, using an inserter and the POCkeT Colposcope, a Point of Care Tampon-sized digital colposcope, for a more comfortable exam, that also allows for self-colposcopy; and **2)** an image processing algorithm to aid health workers in the automated classification of cervical pre-cancer lesions real-time, using extracted features.

Methods: *Speculum-free device:* we explored a broad array of designs for a speculum alternative using computer aided finite element analysis and empirically validated the findings using a vaginal phantom. The top two designs were then evaluated under an IRB approved study (n = 15 volunteers) to assess the devices for cervix visualization, comfort and usability. *Automated screening:* we have developed image processing tools to extract features from digital colposcopy images based off acetowhitening and Lugol's Iodine staining. The algorithm first performs specular reflection removal, followed by Otsu's thresholding method, and feature extraction. Our algorithm was trained on 42 normal and pre-cancerous cervical images with Lugol's Iodine applied to determine sensitivity and specificity when compared to gold standard.

Findings: *Speculum-free device:* Studies with fifteen volunteers for self-insertion and physician-assisted cervix image capture, showed adequate cervix visualization for 83% of patients. Survey responses from volunteers indicated a 92.3% overall preference for the inserter over the speculum and all volunteers indicated that the inserter was more comfortable than the standard speculum. *Automated Diagnosis:* The pilot algorithm was able to classify 42 test images as normal or pre-cancerous with sensitivity of 85.7% sensitivity and specificity of 89.2%.

Interpretation: This study demonstrates the feasibility for comfortable, speculum-free image capture of the cervix and potential of an automated diagnostic algorithm for use by untrained community health workers and nurses in the field, with potential for self-screening. Ongoing studies seek to enable image classification as normal, low- or high- grade and also incorporate contrast enhancing approaches with the device.

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Abstract #: 2.015_WOM

Evaluating the Cost-Effectiveness of an Integrated Program to Reduce Maternal and Neonatal Mortality in Ghana

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Background: Few studies have examined the cost effectiveness of facility based interventions in low-resource settings aimed at improving obstetric care. From 2007–2011, Kybele, an international NGO, partnered with the Ghana Health Service (GHS) to improve obstetric care through an integrated program addressing systems, skills, and leadership at a large tertiary hospital in Ghana. Despite doubling of patient volume and quadrupling of high-risk patients during this period, maternal mortality and still births were reduced. This study evaluates the program's cost effectiveness.

Methods: Costs included those incurred by Kybele, the GHS, and the value of time of volunteer medical workers traveling to Ghana, reported in 2015 \$US dollars (USD) adjusted for purchasing power parity (PPP). Benefits were calculated by modeling the counterfactual. Baseline case-fatality rates (CFR) were determined for hemorrhage and hypertensive disorders, the most common causes of maternal mortality. Deaths averted were modeled using a steady-state assumption for CFR predicting mortalities that would have occurred without program implementation. Model assumptions were tested with Monte Carlo simulations over 10,000 hypothetical scenarios. Maternal and newborn disability-adjusted life-years (DALYs) averted and the cost-effectiveness ratio [(CER); cost per DALY averted] were determined for each modeled scenario. The WHO defines a project as highly cost-effective if the CER is less than the country-specific GDP per capita, which, for 2007–2011, is \$2,917 in Ghana adjusted for PPP.

Findings: The total program cost was \$2,723,700. Models predicted that 236 (±5) maternal deaths and 129 (±13) intrapartum stillbirths were prevented, translating into 24,330 DALYs and a CER of \$112 (±\$23) USD. This is well below the highly cost-effective threshold. Results were robust to sensitivity analyses with varying DALY calculation methods, yearly risk factor prevalence, and yearly case fatality rates. Across all scenarios modeled, the program remained highly cost-effective, with a CER ranging from \$112–\$265.