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## A Case-Control Study of Correlates of Severe Acute Maternal Morbidity in Kabul, Afghanistan

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### Abstract

**Objective:** To identify correlates of severe acute maternal morbidity (SAMM) in Kabul, Afghanistan.

**Method:** Case-control study enrolled postpartum couples between 2007 and 2009. Case eligibility was determined by SAMM criteria abstracted from medical records and husband consent; controls (uncomplicated deliveries) were matched by age, parity, and interval from last delivery. Interviews queried sociodemographics, medical history, care access, and index pregnancy perceptions. SAMM correlates were analyzed with conditional logistic regression in models including (proximate) and excluding (distal) care factors.

**Results:** Among 285 matched couples, most frequent SAMM diagnoses were obstructed labor (104 (36.5%)) and hemorrhage requiring transfusion (102 (35.8%)). In distal and proximate models, SAMM was associated with >1 wife (Adjusted Odds Ratio (AOR)=48.6, 95% Confidence Interval (CI): 5.4 - 436.5 and AOR= 418, 95% CI: 3.5 - 5819, respectively) and prior stillbirth (AOR=16.2, 95% CI: 6.1 - 42.9, and AOR=8.0, 95% CI: 2.9 - 22.4, respectively). Visiting another facility before hospitalization (AOR=7.5, 95% CI:3.1 - 17.9), planned home delivery (AOR=5.5, 95% CI: 1.5 - 20.0), and provider-determined care-seeking (AOR=4.8, 95% CI: 1.6 - 14.9) were associated in proximate models.

**Conclusion:** Planned home delivery and referral to multiple facilities or by providers are SAMM-associated factors potentially amenable to intervention in Afghanistan.

### Keywords

Afghanistan; maternal mortality; maternal morbidity; antenatal care; pregnancy complications

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Conflict of interest

The authors declare that there are no conflicts of interest.

## Introduction:

Maternal mortality and morbidity have serious repercussions, disproportionately affecting families in low-resource settings [1,2]. While maternal mortality is decreasing, the annual burden remains high at 289,000 deaths [1-3]. Severe acute maternal morbidity (SAMM) occurs approximately 20 times as frequently, affecting 3 - 9% of women in developing countries [4,5]. SAMM assessments offer valuable perspectives on health system function and provide opportunities to obtain input regarding potentially modifiable predisposing factors [6-8].

Afghanistan ranks among 17 countries with highest maternal mortality ratio (MMR) [1,9]. Levels and direct causes of maternal mortality have been examined in several regions and are likely applicable to SAMM [9]. Hirose *et al.* described the construct of decision and departure delays in the Afghan context and by case diagnosis in a cross-sectional SAMM assessment [7]. Findings included strong linkage between decision delays to access care and socioeconomic factors and antenatal care (ANC) receipt, and departure delays with distance from care and social networks. However, index pregnancy perceptions and the husband's health decision-making role were minimally explored. Further, no couples with uncomplicated births were assessed to determine the relative weight of predisposing factors.

This study aims to identify correlates of SAMM between case and matched control couples with uncomplicated deliveries in Kabul, Afghanistan. Results will potentially guide programming efforts for reducing maternal morbidity and mortality.

## Methods:

This case-control study recruited postpartum couples, both women in stable medical condition who met criteria for either SAMM case or control and their husbands during the study recruitment period from four public maternity hospitals in Kabul, Afghanistan. SAMM case selection criteria were adapted from those described by Filippi *et al* and adjusted for context [11]. These criteria were selected prior to near-miss criteria standardization by the World Health Organization (WHO) and meet the WHO definition of severe maternal complication, but are not as detailed in that precise indices (e.g. creatinine >3.5 mg/dL or respiratory frequency >40 or <6) are not included (Box 1) [12]. Potential cases were selected retrospectively based on events leading to and during their hospitalization whereby they met SAMM criteria (Box 1). Further, these women needed to have a spouse who could be contacted and provided consent for the couple for study participation, in accordance with cultural norms. Upon meeting these eligibility criteria, both members of the identified case couple were asked by study staff to meet in a private area and provided information about the study, followed by written informed consent. Potential controls were approached based on matching criteria (maternal age; parity; and interval between index delivery, the pregnancy and birth leading to current hospitalization, and last live birth), chosen for their association with maternal mortality and to reduce masking potential associations with other factors [13,14]. Matching was done as possible, with accepted variance of two years for age, or one for number of children or years between index

and last delivery. Potential controls were recruited from the postpartum ward and were similarly inclusive only of women with no complications meeting SAMM criteria. Control eligibility was restricted to meeting matching criteria with an identified case, availability for the initial interview, having a male spouse available for consent and interview, and providing written informed consent. Ethical approval was obtained from the institutional review boards of the Afghan Ministry of Public Health; the University of California, San Diego; the University of California, San Francisco; and Columbia University.

Kabul has a population of approximately 5 million, with 84.9% ANC single-visit coverage [10]. The estimated MMR for Kabul was 418 in 2002, decreasing to 95 in 2010, with an overall MMR of 285 for the Central Zone, containing much of Kabul's catchment area [9,10]. Kabul has the highest medical resource concentration nationally with a variety of public and private intrapartum services available. This study was conducted at 4 public maternity hospitals, Rabia Balkhi, Malalai, Istiqlal, and Khair Khana, which serve as regional referral centers.

Questionnaires were developed from formative data [15]. Male and female questionnaires were essentially identical to provide insight into sex-based differences in event recall and perceptions surrounding the index pregnancy (e.g. whether the index pregnancy was desired). The questionnaire assessed sociodemographics and past obstetric history, which considered only female participant report in analysis, as men are segregated from female medical care in Afghan culture. Factors reflective of delay in decision (e.g. planned home delivery) and destination (e.g. presenting to a separate facility before arriving at hospital) were explored. Male and female perceptions and events leading to index pregnancy admission were analyzed.

Trained male-female study teams, comprising Afghan health professionals, recruited couples between September 2007 and December 2009. Female staff made hospital rounds and consulted physicians regarding new complicated cases. Potential case participants in stable condition were approached, offered study entry, and, if interested, asked permission for chart to confirm eligibility. Eligible potential participants were asked for their husband's name (and telephone number if not present at the hospital). Male staff then approached case husbands and obtained their informed consent, prior to the wives giving consent. Following consent, study staff administered the questionnaire. Controls were identified and screened by matching criteria in the postpartum ward. Following eligible match identification, the same process was used to enroll control couples. Couples declining participation were not enumerated and no information was collected from them.

Analysis was performed with Stata Version 11 (Stata Corporation; College Station, TX, USA). Statistical significance was set at  $p < 0.05$ . Household members, monthly income, and age at marriage were analyzed as dichotomous variables, divided at the median. Number of children, abortions, and stillbirths were categorized for analysis. Matching criteria accuracy was assessed using Chi-square or t-tests.

For remaining analysis, only matched cases and controls were used. Descriptive statistics were generated by sex, with differences in select variables analyzed using t-test, Chi-square

test, or the kappa statistic, as appropriate. SMM correlates were analyzed using bivariate conditional logistic regression analysis. Multivariable models were constructed for each SMM definition: one model (distal) considered only factors preceding the index event, like prior stillbirth, while the other model (proximate) also included factors associated with decision or departure delays. Time to facility and cost of care were not analyzed as the decision process creating or exacerbating the complication was already underway and thus do not reflect key decision points. Criteria for multivariable model entry were  $p < 0.10$  in bivariate analysis or established epidemiologic significance. Variables significant at  $p < 0.05$  level or identified confounders were retained in the final model adjusted by enrollment site.

## Results:

A total of 321 SMM case and 285 control couples enrolled. For 36 cases without matched controls, mean maternal age was 31.8 years (Standard Deviation (SD) $\pm 7.1$ ; range: 20 - 47), parity was 6.7 pregnancies (SD $\pm 4.2$ ; range: 1 - 16), and interval from last live birth was 3.4 years (SD $\pm 3.2$ ; range: 0 - 18). For matched couples (number (n)=570; 285 cases, 285 controls), matching criteria or enrollment site did not differ significantly (Table 1). The most frequent SMM diagnoses were obstructed labor requiring Cesarean section and hemorrhage requiring transfusion (Table 1).

Most participants were Afghan nationals, lived in the Kabul area, and had not lived outside Afghanistan in the last 5 years (Table 2). Only 16 (3.4%) of men reported having >1 current wife. There were low levels of agreement between sexes for socioeconomic indicators and stated desirability of index and previous pregnancies.

In the peripartum period, 178 (62.5%) cases received 1 transfusion (mean $\pm$ SD=1.8 $\pm$ 1.2 units, range: 1-7). Cases had lengthier hospitalizations (5.7 vs. 3.3 days,  $p < 0.01$ ) and higher neonatal mortality (89 (31.2%) vs. 4 (1.4%),  $p < 0.01$ ). Male case spouses reported longer mean hospital transport time (61.2, SD $\pm 109.3$  vs. 25.9, SD $\pm 19.2$  minutes,  $p < 0.01$ ) and transportation (424 $\pm 1001$  vs. 134  $\pm 157$  Afghani (Afs; U.S.\$1=54 Afghani,  $p < 0.01$ ) and hospitalization costs (5,438 $\pm 5484$  vs. 1,172 $\pm 1244$  Afs,  $p < 0.01$ ). More case families obtained loans from family members (150 (52.8%) vs. 60 (21.4%)), while most controls (227, (81.1%)) were able to cover hospital costs with savings.

SMM case status was significantly associated with male lack of formal education, not owning a television, residing outside Kabul, not receiving ANC, and perceived poor pre-pregnancy health (Table 3). Male's perceptions that prior pregnancies were unplanned, unwillingness by men to accept any contraception, and having >1 current wife were also associated. Multigravid SMM cases were significantly more likely to report prior stillbirths, prior pregnancy complications, death of the last live born child before age one year, to have been advised not to become pregnant again prior to the index pregnancy, and were less likely to report skilled attendance at last delivery. Proximate factors reflecting decision or departure delays associated with SMM included planned home delivery, care at facility prior to hospitalization, and reporting a medical provider as the decision-maker for hospital care. Reporting the husband as decision-maker for hospital care was negatively associated with SMM.

In the adjusted distal model, SAMM remained associated with having >1 current wife, prior stillbirth, lack of ANC, residing outside Kabul, male-reported undesired index pregnancy, and low income (Table 4). Male acceptance of contraception was negatively independently associated with SAMM case status. In the proximate model, having >1 current wife, prior stillbirth, care at a facility before hospitalization, complications in prior pregnancies, reported planned home delivery, and reporting a medical provider as the decision-maker for hospitalization were independently associated with SAMM (Table 4). Though not independently associated in the final model, ANC in the index pregnancy was noted to modify the relationship with female-reported planned home delivery (Adjusted Odds Ratio (AOR)=5.3 to AOR=4.6) with limited effect for male-reported planned home delivery (AOR=5.5 to AOR=5.4).

## Discussion:

The study's main findings are that factors proximate to intrapartum decisions are among the strongest SAMM correlates and that male and female perspectives differ, with male perspectives more likely associated with SAMM. Proximate factors reflecting delays in decision (planned home delivery) and destination (presenting at another facility before hospitalization) and having a medical provider as decision-maker to access care were independently associated with SAMM and are well-established maternal mortality predictors [8,16]. Delay in receiving care at a facility was not measured, though delay in emergency Cesarean section is documented in Afghanistan; this limitation may have resulted in misclassification bias [17]. Destination-related delays may reflect reduced ability of facilities below district hospital level to manage obstetric complications, as noted among 58% of facilities in a national survey [18].

In both models, SAMM was consistently and more strongly than proximate factors associated with prior stillbirth and prior pregnancy complications. This finding and the high index stillbirth rate among SAMM cases reflect the related nature of poor maternal and neonatal outcomes and increased risk of poor outcomes with prior pregnancy complications [19]. More concerning is that past events appear not to have altered index pregnancy decision-making, potentially resulting in recurrent SAMM cases. These cross-sectional data do not capture interval change in service availability, particularly skilled attendance at delivery, between a prior pregnancy with poor outcome and the index pregnancy. However, low reported skilled provider utilization at last delivery and the sizeable minority reporting planned home delivery, particularly among SAMM cases, suggest persistent low rates of skilled care utilization despite health infrastructure improvements. Recent findings concerning gaps in ANC provision and low facility delivery rates suggest that service availability may not have changed or is not a compelling factor for utilization in Afghanistan [18].

SAMM status was strongly independently associated with men reporting >1 current wife in proximate and distal models. This association was independent of living outside Kabul, so cannot be attributed to rural areas where polygamy is more common. Possible reasons may include perceptions regarding equal resource distribution between wives or valuation of women. Polygamy/polygyny has been associated with increased infant and child under five

mortality in Nigeria and Burkina Faso [20,21]. Formative research may better characterize this association in the Afghan context.

Lack of ANC and living outside Kabul were independently associated with SAMM in the distal model. ANC access, an established SAMM predictor, has improved in the last decade but remains challenging in Afghanistan, particularly in rural and insecure areas [7,10,22] For those living outside Kabul, distance from facilities may delay both decision-making and care receipt due to travel time [7]. Insecurity from threat of attack may have influenced timing for care-seeking at large tertiary hospitals. Many participants from outside Kabul came from insecure districts (e.g. Sorobi) and provinces (e.g. Wardak, Logar) where facilities may be less likely to have female staff or a skilled obstetric provider [18].

Differences between male and female report ranged from concrete information (e.g. radio ownership) to perceived index pregnancy desirability. The stronger and more consistent relationship between SAMM and male-reported undesired index pregnancy likely underscores the male role in health decisions under duress, as these decisions are less likely to be negotiated due to their acuity. Undesired pregnancy has been associated with poor neonatal outcomes and pregnancy complications in the United States [23].

In addition to not assessing delays after accessing facility-based care, other limitations must be considered. Case definition criteria were somewhat open to interpretation during based on chart review as criteria based on end-organ damage were not practical into this setting. Further, case and control participants were most accessible at point of care at the point of care in referral hospitals, bot for case and control participants. MostThe majority of interviews were conducted in the immediate postpartum period and may have missed SAMM cases that developed between 48 hours and 42 days postpartum, potentially misclassifying control participants. Reported ANC receipt was high, consistent with reported urban levels, but may limit generalization to rural populations or those with greater barriers to care access [10]. Interviewer-administered questionnaires may have resulted in socially-desirable response; to decrease bias, we trained sex-matched interviewers. Last, discrepancies between male and female report on the same indicator complicate determining report reliability. For key measures, like planned home delivery, analysis of both perspectives was undertaken to limit this effect.

In summary, context-specific SAMM correlates reveal several factors that might be modified through educational or service-delivery interventions, particularly efforts to decrease unwanted pregnancies and to educate communities of risks associated with unattended home delivery. As chief reasons for accessing care at large referral hospitals were hemorrhage and obstructed labor, efforts to prevent these conditions should be redoubled and information disseminated on which facilities can manage emergencies. Programs have conducted community-based referral of pregnant women with prior complications, including stillbirth, for facility-based delivery and have pilot-tested misoprostol to prevent hemorrhage for home deliveries [24]. These programs should be expanded and potentially utilize mobile health solutions given ongoing insecurity.

The male role as decision-maker and spousal differences in index pregnancy desirability and willingness to use contraception indicate urgent need for male involvement in maternal mortality reduction programs. Both associations underline the need for greater family planning education for all and male-targeted interventions [25]. After implementing multiple strategies to combat factors associated with SAMM, interval evaluations to determine whether SAMM rates and associated factors will help to ensure programming remains relevant and targeted to families at greatest risk.

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**Synopsis:**

Planned home delivery and reliance on medical personnel for referral are potentially correctable factors associated with maternal morbidity for targeted interventions in Kabul, Afghanistan.

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**Box 1.****Case Definitions for Severe Maternal Morbidity to Determine Case Eligibility<sup>1</sup>**

1. Shock (all types – ie. Septic shock, which refers to a constellation of infection-mediated clinical findings marked by impaired vascular integrity resulting in inadequate tissue oxygenation and circulatory failure. Cellular hypoxia, organ dysfunction, and death ensue if the course of this process is left unaltered), hypovolemic shock (refers to rapid volume depletion resulting in hypoxia, organ dysfunction, and possible death).
2. Postpartum Hemorrhage requiring/receiving blood transfusion: classic definition of postpartum hemorrhage for normal spontaneous delivery is blood loss greater than 500cc and for cesarean delivery is blood loss greater than 1000cc, required blood transfusion due to excessive bleeding that makes the patient symptomatic (eg, lightheadedness, vertigo, syncope) and/or results in signs of hypovolemia (eg, hypotension, tachycardia, or oliguria)
3. Severe Pre-Eclampsia/ Eclampsia: Preeclampsia refers to the new onset of hypertension and proteinuria after 20 weeks of gestation in a previously normotensive woman. Eclampsia describes the development of grand mal seizures in a woman with preeclampsia.
4. Incomplete Abortion requiring blood transfusion: excessive bleeding from a miscarriage/abortion that makes the patient symptomatic (eg, lightheadedness, vertigo, syncope) and/or results in signs of hypovolemia (eg, hypotension defined as mean arterial pressure less than 40 or systolic blood pressure 20% below baseline, tachycardia defined as heart rate > 150 or heart rate 20% greater than baseline, or oliguria defined by urine output less than 30cc per hour).
5. Obstructed labor requiring emergency Caesarean section: Arrested labor in the 1st or 2nd stage requiring transfer to the hospital for emergent caesarean section to prevent further morbidity/mortality of mother or fetus.
6. Ectopic pregnancy requiring emergent surgery: hemodynamically unstable patient with symptoms of lightheadedness, vertigo, syncope, and/or results in signs of hypovolemia (eg, hypotension, tachycardia, or oliguria), due a suspected ruptured ectopic pregnancy.

<sup>1</sup>Criteria based on the World Health Organization “Evaluating the Quality of Care for Severe Pregnancy Complications: The Who Near-Miss Approach for Maternal Health.” Available at: [http://whqlibdoc.who.int/publications/2011/9789241502221\\_eng.pdf](http://whqlibdoc.who.int/publications/2011/9789241502221_eng.pdf).  
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**Table 1.**

Complication types and verification of matching criteria for women with severe acute maternal morbidity cases and their controls in Kabul, Afghanistan (n=570).

Criterion	Cases	Controls	p-value
	Mean ( $\pm$ SD)	Mean ( $\pm$ SD)	
Age (years)	27.1 ( $\pm$ 6.02)	27.1 ( $\pm$ 5.94)	0.87
Total Pregnancies	4.12 ( $\pm$ 2.69)	4.05 ( $\pm$ 2.64)	0.99
Interval from Last Delivery (years)	2.33 ( $\pm$ 1.63)	2.29 ( $\pm$ 2.19)	0.74
	n, %	n, %	
Enrollment Site:			0.22
Rabia Balkhi Hospital	101, 35.4%	101, 35.4%	
Mallalai Hospital	126, 44.2%	114, 40.0%	
Istiqlal Hospital	39, 13.7%	37, 13.0%	
Khair Khana Hospital	19, 6.7%	33, 11.6%	
Classification of Maternal Complication (n=285):		n, %	
Hypovolemic/hemorrhagic shock		9, 3.2%	
Hemorrhage requiring Transfusion		102, 35.8%	
Severe Pre-eclampsia/ Eclampsia		32, 11.2%	
Obstructed Labor with Emergent Surgery		104, 36.5%	
Ruptured Ectopic Pregnancy		4, 1.4%	
Other		34, 11.9%	

n=number

SD= standard deviation

**Table 2.**

Characteristics of and reporting differences between select socioeconomic indicators, event, and perception variables male and female postpartum couples from Kabul, Afghanistan (number (n)=1139).

<b>Variable</b>	<b>Female (n=570) Mean±SD</b>	<b>Male (n=570) Mean±SD</b>	<b>p-value</b>
Age	27.1±6.0 years	33.0±8.0 years	<0.001
Age at marriage	18.3±3.8 years	23.5±4.8 years	<0.001
	n (%)	n (%)	
Afghan national	550 (96.5%)	561 (99.5%)	0.21
Live in Kabul area	487 (85.4%)	478 (83.9%)	0.46
Lived outside Afghanistan in last 5 years	67 (11.8%)	100 (17.6%)	0.001
Education:			
No formal education	380 (66.7%)	172 (30.5%)	<0.001
Up to primary school	96 (16.8%)	143 (24.4%)	<0.001
Up to secondary school	78 (13.7%)	188 (33.3%)	<0.001
Above secondary school	16 (2.8%)	67 (11.8%)	<0.001
Sex-based reporting discrepancies	n (%)	n (%)	Kappa score
Functioning radio in home	420 (73.8%)	379 (67.2%)	0.21
Functioning television in home	434 (76.3%)	385 (68.3%)	0.61
Eat meat >1x/weekly	235 (41.2%)	170 (29.8%)	0.23
Previous contraceptive use *	241 (49.2%)	185 (35.9%)	0.49
Discussed contraception with spouse previously *	250 (51.1%)	313 (60.8%)	0.32
Prior unplanned pregnancy	289/539 (53.6%)	65/564 (11.5%)	0.16
Current pregnancy desired	298 (52.3%)	432 (76.6%)	0.31
Planned home delivery	147 (25.8%)	77 (13.8%)	0.35
Sought care at other facility before coming to hospital:	132 (23.2%)	104 (18.4%)	0.56

\* Of participants aware of contraception: 490 females and 514 males.

n= number

SD= standard deviation

Variables significantly associated with severe acute maternal morbidity (SAMM) among a Kabul postpartum population in bivariate conditional logistic regression analysis (n=570).

**Table 3.**

Variable	SAMM Cases (n=285)	Control patients (n=285)	Odds Ratio, 95% CI
<i>Socioeconomic factors</i>			
No formal education:	n (%)	n (%)	
Female	200 (70.2%)	180 (63.2%)	1.4, 1.0 – 2.0
Male	102 (35.8%)	76 (26.7%)	1.6, 1.1 – 2.2
Television in home	173 (60.9%)	212 (75.7%)	0.5, 0.3 – 0.7
Residence outside Kabul area	50 (17.5%)	33 (11.6%)	1.6, 1.0 – 2.5
<i>Obstetric factors (n=544 multigravid participants; n=269 cases and 275 controls):</i>			
Skilled attendant at last delivery	141 (52.4%)	164 (59.6%)	0.6, 0.4 – 0.9
Complications in prior pregnancy	72 (26.8%)	20 (7.2%)	4.9, 2.7 – 8.9
Advised to have no future pregnancies by medical provider	38 (14.1%)	9 (3.3%)	5.7, 2.4 – 13.5
Total Abortions:			Reference
0	186 (69.1%)	221 (80.4%)	
1	57 (21.2%)	40 (14.5%)	1.6, 1.0 – 2.5
2	18 (6.7%)	11 (4.0%)	1.8, 0.8 – 4.0
3	8 (3.0%)	3 (1.1%)	2.5, 0.6 – 9.5
Total Stillbirths:			Reference
0	191 (71.0%)	258 (93.8%)	
1	61 (22.7%)	14 (5.1%)	7.2, 3.5 – 14.7
2	17 (6.3%)	3 (1.1%)	12.1, 3.1 – 47.5
<i>Child Health Factors (n=430 women with live births prior to index pregnancy; 212 cases and 218 controls):</i>			
Last child died before age 1 year **	18 (8.5%)	3 (1.4%)	8.0, 1.8 – 34.8
<i>Health Care Utilization Prior To Parturition &amp; General Health Status:</i>			
No antenatal care in index pregnancy	34 (11.9%)	12 (4.2%)	2.8, 1.5 – 5.5
Frequency bedridden prior to pregnancy:			Reference
Never	181 (63.5%)	206 (72.3%)	
<1 time/year	89 (31.2%)	66 (23.2%)	1.5, 1.0 – 2.2
>1 time/year	15 (4.6%)	13 (3.5%)	1.3, 0.6 – 2.8
Perceived health status prior to index pregnancy:			Reference
Always healthy	176 (61.7%)	193 (67.7%)	
Nearly always healthy	87 (30.5%)	85 (29.8%)	1.2, 0.8 – 1.7

Variable	SAMM Cases (n=285)	Control patients (n=285)	Odds Ratio, 95% CI
Sometimes to never healthy	7 (7.7%)	22 (2.5%)	3.4, 1.4 – 8.0
<i>Factors reflecting Relationship Dynamics &amp; Pregnancy Valuation:</i>			
Index pregnancy undesired	147 (50.2%)	129 (45.3%)	1.3, 0.9 – 2.0
Female participants			
Male participants	80 (28.3%)	51 (18.2%)	2.0, 1.3 – 3.0
Prior unplanned pregnancy:	150 (56.4%)	139 (50.9%)	1.3, 0.8 – 1.9
Female participants	40 (14.1%)	25 (8.9%)	1.8, 1.0 – 3.1
Male participants	69 (24.2%)	70 (24.6%)	1.0, 0.7 – 1.5
Willing to accept any contraceptive method:	139 (48.9%)	165 (57.9%)	0.6, 0.5 – 0.9
Female participants			
Male participants	14 (4.9%)	2 (0.7%)	6.5, 1.5 – 28.8
Number of current wives of male spouse (n=284 case, 280 control responding)	2		
<i>Factors contributing to delay at parturition:</i>			
Planned home delivery:	114 (40.1%)	33 (11.6%)	5.8, 3.5 – 9.7
Female participants			
Male participants	69 (24.6%)	8 (2.9%)	11.0, 4.8 – 25.4
Presented to Different Health Facility Prior to Hospital of Delivery/Care:	114 (40.0%)	18 (6.3%)	9.0, 5.0 – 16.3
Female participants			
Male participants	85 (29.9%)	19 (6.8%)	5.9, 3.3 – 10.7
Decision-maker to Come to Hospital (female response):	95 (33.3%)	141 (49.5%)	0.5, 0.3 – 0.7
Male spouse			
Medical provider	58 (20.4%)	13 (4.6%)	4.8, 2.6 – 8.9

\* Significant discrepancy between male and female report; displaying male report as most conservative estimate.

\*\* Of 145 case and 151 control participants with any live births prior to index pregnancy.

CI= confidence interval

n=number

**Table 4.**

Factors independently associated with severe acute maternal morbidity (SAMM) among a Kabul postpartum population in multivariable conditional logistic regression analysis.

Factor	Distal Model (n=508): AOR*, 95% CI	Proximate Model (n=500): AOR*, 95% CI
>1 current wife	48.6, 5.4 – 436.5	141.8, 3.5 – 5819.0
Prior stillbirth(s)	16.2, 6.1 – 42.9	8.0, 2.9 – 22.4
Complications in a prior pregnancy	5.4, 2.5 – 12.1	7.1, 2.5 – 20.4
Received no antenatal care in index pregnancy	4.1, 1.8 - 9.5	
Reside outside Kabul metropolitan area	2.9, 1.5 – 5.7	
Index pregnancy undesired: Male report	2.2, 1.2 – 3.9	
Monthly income <7500 Afghani	1.7, 1.1 – 2.7	
Male spouse accepting of all contraceptive methods	0.5, 0.3 – 0.9	
Planned home delivery: Male report		5.5, 1.5 – 20.0
Female report		5.3, 2.3 – 12.0
Presented to health facility prior to hospital of care: Female report		7.5, 3.1 – 17.9
Medical provider made decision for couple to go to hospital		4.8, 1.6 – 14.9

\* Models adjusted by enrollment site

AOR= adjusted odds ratio

CI= confidence interval

n=number