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PREGNANCY OUTCOMES, COMPLICATIONS AND EXPERIENCES IN OBSTETRICS AND GYNAECOLOGY REGISTRARS

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This research report is submitted to the University of the Witwatersrand Health Sciences Faculty as part of the degree of Masters of Medicine in Obstetrics and Gynaecology.

Johannesburg, 2020.

Declaration

I, Catherine Tew, declare that this work is original and contains no section copied in whole or in part from any other source, unless explicitly identified in quotation marks and with detailed, accurate referencing. It is being submitted for the degree of Master of Medicine at the University of the Witwatersrand, Johannesburg. I declare that this work has not been submitted to any other University for the purpose of a postgraduate degree.



Catherine Tew

6th day of December 2020

Dedication

I dedicate this Masters to my best friend and husband, for their help, understanding and continuous support.

Presentations

17/10/19: Oral presentation at Rahima Moosa Mother and Child Hospital

23/10/19: Oral presentation at the University of the Witwatersrand Research Day

24/10/19: Oral presentation at the SAATOG research symposium

Accepted for a poster presentations at SASOG March 2020 and RCOG March 2020

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I would like to thank SASOG, SAATOG and SASOP for all their help with the distribution of my questionnaires, as well as my supervisors, for their support and advice.

Abstract

Background

Registrar training is a stressful time associated with long working hours and strenuous physical activity that may impact pregnancy outcomes. There are few international and no South African studies which investigate the impact of registrar training on an obstetrician's own pregnancy.

Objectives

The primary objective was to evaluate pregnancy outcomes and complications in women who fell pregnant during their Obstetrics and Gynaecology (OBGYN) registrar time in South Africa. The secondary objective was to compare these findings to those experienced by psychiatry registrars and by the female partners of male OBGYN and psychiatry registrars who had fallen pregnant during registrar time, in order to determine the risk for adverse pregnancy outcomes in OBGYN registrars. The experiences of pregnant OBGYN registrars in a South African setting were described.

Methods

A retrospective, nationwide, case-control study was conducted. OBGYN (n=34) and psychiatry (n=26) registrars, specializing within the past 11 years, and partners of male obstetrics and psychiatry registrars (n=19) completed an anonymous, online questionnaire. Psychiatry registrars, and partners of male registrars formed two separate control groups. Questionnaire data included demographics, pregnancy-specific questions and work-condition related questions. The data was managed using REDcap and analyzed retrospectively.

Results

A total of 1984 questionnaires were distributed over a period of three months; seventy-nine respondents met the inclusion criteria and completed the survey. A positive pregnancy outcome was recorded for 86.4% of obstetricians, 96.7% of psychiatrists and 77.8% of partners. With regards to pregnancy complications, 48% of obstetricians and 50% of psychiatrists compared to 37% of partners reported at least one pregnancy complication (P=0.436). Working more than 17 hours in theatre (RR 1.95 CI 1.04 – 3.84) or more than 81 hours per week (RR 2.12 CI 1.20 – 3.84) were significantly associated with an increased relative risk of a complicated pregnancy in OBGYN registrars. OBGYN registrars had more night calls and hours of standing, less hours of sleep per call and greater exposure to

hazardous substances compared to psychiatry registrars ($p<0.01$). Most OBGYN registrars identified long hours and night calls as the predominant causes of stress in pregnancy.

Conclusion

These results suggest that both OBGYN and psychiatry registrars working in South African hospitals have a high proportion of pregnancy complications. They are subjected to adverse and stressful conditions such as long working hours, night calls and occupational hazards. Policies need to be put in place to address these working conditions for pregnant obstetricians during registrar training in South Africa.

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List of Abbreviations (Submissable article and protocol)

ANOVA Analysis of Variance
CMSA Colleges of Medicine South Africa
FCOG Fellowship of Obstetricians and Gynaecologists
HELLP Hemolysis Elevated Liver Enzymes Low Platelets Syndrome
HIV Human Immunodeficiency Virus
HPCSA Health Professions Council of South Africa
IUGR Intrauterine Growth Restriction
MBBCh Bachelor of Medicine and Bachelor of Surgery
MMed Masters of Medicine
OBGYN Obstetrics and Gynaecology
PSYCH Psychiatry
REDCap Research Electronic Data Capture
SAATOG South African Association of Trainees in Obstetrics and Gynaecology
SASOG South African Society of Obstetricians and Gynaecologists
SASOP South African Society of Psychiatrists
SD Standard deviation
TB Tuberculosis
UCT University of Cape Town
USA United States of America
WHO World Health Organisation

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Journal Article in submissable format for the 'South African Medical Journal'

Pregnancy Outcomes, Complications and Experiences in Obstetrics and Gynaecology Registrars

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Conflict of Interest
Nil

Capsule:

In a retrospective case-control study, obstetrics and gynaecology registrars in South Africa who fell pregnant while specialising, had positive pregnancy outcomes with an 86,4% chance of a singleton live birth but a high rate of pregnancy complications at 48%.

Pregnancy Outcomes, Complications and Experiences in Obstetrics and Gynaecology Registrars

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Introduction

Due to the duration of medical training and the fact that it may span a number of reproductive years, many female doctors fall pregnant whilst specialising, and are exposed to a number of factors that may complicate a healthy pregnancy and have an impact on the outcome.[1] These include long working hours, prolonged standing, strenuous physical activity, sleep deprivation and psychological stress.[1] There is also the risk of exposure to hazards such as infections, cytotoxic and chemical substances, anaesthetic gases, radiation and the possibility of needlestick injuries.[1] Evidence indicates that there are increased rates of preterm labour and delivery, low birth weight babies and abruption placentae in women who have physically strenuous jobs and prolonged working hours.[1] A metanalysis of the impact of occupational shift work and working hours on pregnancy outcomes conducted in 2019 highlighted that pregnant woman working long hours or night shifts were more likely to have pregnancy complications such as preterm delivery, miscarriage and preeclampsia.[2] Although there are no definitive prospective studies, a literature review of pregnancy during residency by Finch in 2003 showed an increased risk of complications in pregnant registrars, ranging from 33 to 57%. [1] In addition, an American study focusing on pregnancy outcomes in Obstetrics and Gynaecology (OBGYN) registrars in 2003, highlighted a significant increase in the incidence of preterm labour, preeclampsia and fetal growth restriction in OBGYN registrars compared to the control group, although the overall pregnancy outcome was still favorable. [3] In contrast, studies conducted on physicians in Finland and Australia found no increase in pregnancy complications compared to the general population, but this was postulated to be due to improved working conditions, less working hours per week, and the option to work part-time while pregnant, compared to their American counterparts.[4,5]

The effect of long working hours on pregnancy outcomes is becoming particularly relevant because the number of female medical students, doctors and specialists is increasing steadily worldwide.[1] In South Africa, women have outnumbered men in medical school enrolments since 2000, with figures (university-dependent) ranging between 52 and 63% in 2005.[6] Moreover, an increasing number of female South African doctors are specialising further once qualified, illustrated by the fact that the female postgraduate Masters of Medicine (Mmed) enrolments at the University of Cape Town (UCT) had increased from 28% in 1999 to 42% in 2005.[6] In 2015, 65% of registrars enrolled for an Mmed in OBGYN at the University of the Witwatersrand were female (Harshila Dulabh, personal communication). This finding was mirrored nationally by statistics from the Colleges of Medicine South Africa (CMSA), which

showed that the number of female registrars passing the Fellowship of Obstetricians and Gynaecologists (FCOG) Part 2 final exams increased from 46% in 2013, to 58% in 2017 (Ronel Greyvenstein, CMSA Statistics and Archives Controller, personal communication).

Although most of the literature regarding pregnancy outcomes, complications and experiences during registrar time has been generated in North America, similar studies have been conducted in various other countries such as Finland, Australia, and Japan.[4,5,7] There are, however, relatively few studies that have focused on OBGYN registrars in particular, and no research that has been generated in the resource restricted, high stress hospital environments in South Africa. The aim of this study was to evaluate the pregnancy outcomes and complications of women who fell pregnant during their OBGYN registrar time in a South African setting, and secondarily to describe the registrars' experiences during this period, in order to identify possible areas of improvement in working conditions that could then be addressed.

Methods

Study design

An anonymous, self-administered online questionnaire was distributed by email to all members of the South African Society of Obstetricians and Gynaecologists (SASOG), the South African Association of Trainees of Obstetrics and Gynaecology (SAATOG) and the South African Society of Psychiatrists (SASOP), targeted to reach OBGYN and psychiatry registrars and consultants nationwide. This cross-sectional survey was emailed to members three times, and available for completion for three months, between October and December 2018.

The survey was distributed as a single-link questionnaire with branching logic, thus tailoring responses for female and male respondents as appropriate. Data for each reported pregnancy were collected on demography, personal history regarding pregnancy outcomes and complications during registrar time, working hours, overtime and maternity leave, sources of stress and support and breastfeeding practices. Open-ended questions about the experience of pregnancy during registrar time were also included (Appendix C and D). If a participant reported multiple pregnancies during their specialisation, then each pregnancy and its associated data was included as a separate entity.

Ethical approval was obtained from the Human Research Ethics Committee (medical); clearance certificate no. M180373. The study was registered on the National Health Research Database. Completion of the questionnaire was voluntary and implied consent.

Study population

The study sample consisted of OBGYN registrars and consultants in South Africa, who fell pregnant whilst specializing, between 2007 and 2018. One control group consisted of past or present psychiatry registrars in South Africa who fell pregnant during registrar time, as they were of comparable age, socioeconomic status and education background to the OBGYN registrars, and had frequent night calls but no operating time, less periods of standing and physical exertion, and less potential exposure to needlestick injuries and anaesthetic agents.[8] A second control group consisted of female partners of male registrars who fell pregnant whilst their partner was specialising in either OBGYN or psychiatry (as per previous research by Gabbe et al, 2003) [3], yielding a conveniently obtainable control group of demographically and socioeconomically similar women. The male registrars reported the occupations and working hours of their partners and it was assumed from the occupations reported whether the female partners worked night shifts.

Inclusion Criteria

- Past or current female OBGYN or psychiatry registrars who had specialised or were specialising in South Africa and fell pregnant during registrar time.
- Past or current male OBGYN or psychiatry registrars who had specialised or were specialising in South Africa, and whose partners fell pregnant during this time.
- Limited to OBGYN and psychiatry registrars and consultants who were specialising or had completed and registered their specialisation with the Health Professions Council of South Africa (HPSCA) between the first of January 2007 and 31 December 2018.

Exclusion Criteria

- Male OBGYN and psychiatry registrars whose partners were also doctors.
- Pregnancy outside of registrar time.

Data Analysis

Data were collected and managed using REDcap electronic data capture tools hosted at the University of the Witwatersrand. All data were analysed using R studio (R version 3.4.2; https://www.r-project.org). All tests were two-tailed probability values, and statistical significance accepted when $\alpha \leq 0.05$. Categorical variables are presented as frequency and percentages. Continuous variables are presented as mean ± standard deviation (SD).
For comparisons between the OBGYN registrars compared to the psychiatry registrars and partners of registrars, categorical variables were analysed using Pearson's chi-square tests. Continuous variables such as age, birth weight and gestational age at delivery were analysed using a one-way Analysis of Variance (ANOVA) with Dunnett's multiple comparisons post hoc test. The relative risk of developing a pregnancy complication associated with a work-related stressor in the OBGYN registrar group was calculated using a Fisher's exact test. Experiences of OBGYN registrars during pregnancy were described using a five point Likert score. These scores were truncated to agree, neutral and disagree categories and analysed using Pearson's chi-square tests (with Yates' continuity correction). The open-ended responses were thematically analysed based on the literature to obtain emerging themes.

Results

A total of 1984 online questionnaires were distributed by SASOG, SAATOG and SASOP over the designated three-month period. Seventy-nine respondents met the inclusion criteria and completed the survey. This included 34 (44%) female OBGYN registrars, 26 (32%) female psychiatry registrars and 19 (24%) male registrars who answered on behalf of their partners. The characteristics of the study group are summarized in Table 1.1.

Pregnancy outcomes and complications

Table 1.2 describes the pregnancy outcomes and complications experienced by the study groups. 88 (87%) of respondents had positive pregnancy outcomes, resulting in a singleton live birth at term. There were two terminations of pregnancy: one medical termination in the OBGYN registrar group for early-onset severe preeclampsia and Hemolysis Elevated Liver enzymes and Low Platelets (HELLP) syndrome, and one in the partner group for congenital abnormalities (Trisomy 21). A total of ten pregnancies resulted in miscarriages; five in the partner group (four of the five in one individual), four amongst the OBGYN registrars (two of

the four in one individual) and one in the psychiatry group. Five (16,7%) of the psychiatry registrars had preterm births, resulting in four (13.8%) low birth weight babies, which was significantly higher than the OBGYN and partner group (p =0.005). The registrar groups were significantly more likely to have caesarian sections compared to the partner group (p=0.02), with 36 (59.6%) of caesarian sections in all groups being elective. Personal preference for an elective caesarian section accounted for 6 (17.6%) of the OBGYN registrars, 6 (23.1%) of the psychiatry registrars and 1 (5.3%) of the partner group. Pregnancy and labour-related complications accounted for between 36 -65% of caesarian sections (both elective and emergency) in all groups. Pregnancy complications were experienced by 21 (48%) of the OBGYN and 15 (50%) of Psychiatry registrars compared to a 10 (37%) in the partners group (p=0.436).

Experiences of OBGYN Registrars

Compared to psychiatry registrars, OBGYN registrars completed 5-6 night calls per month - 4 (18%) vs. 23 (68%), with a maximum of two hours sleep per call - 3 (13%) vs. 20 (60%), more than eight hours standing per call - 3 (14%) vs. 33 (98%), stopped night calls between 37-39 weeks - 11 (45%) vs. 19 (56%) and spent 9-24 hours in theatre per week - 0 vs. 10 (29%) ($p<0.01$) (Figure 1.1).

Both OBGYN and psychiatry registrars worked significantly more hours a week (93.2% and 86.3% worked 41-100 hours per week respectively) than the partner group (55.6% worked 1-40 hours per week) ($p<0.01$). 32 (95.4%) OBGYN registrars worked between 41-80 hours per week; in addition, 10 (29.5%) OBGYN registrars worked between 81 and 100 hours per week. Spending more than 17 hours in theatre (relative risk 1.95; 95% confidence intervals 1.0 -3.8), or working more than 81 hours per week (relative risk 2.17; 95% confidence intervals 1.2 -3.9), were significantly associated with an increased risk of pregnancy complications in the OBGYN registrars (Figure 1.1).

Both OBGYN and psychiatry registrars were exposed to numerous occupational hazards during pregnancy. Both groups had similar exposure to infections, primarily tuberculosis, OBGYN 11 (34%) and Psychiatry 6 (25%); while the risk of exposure to inhalation agents, radiation and needlestick injuries was significantly greater for the OBGYN registrars compared to the psychiatry registrars (Figure 1.2). Needlestick injuries whilst pregnant required antiretroviral therapy in 4 (13.6%) of the OBGYN registrars. An additional

occupational hazard reported by the registrars was the potential danger of being exposed to aggressive patients: OBGYN 2 (6.8%) and Psychiatry 8 (33.3%).

Sources of stressors and support based on responses to Likert scale questions are illustrated in Figure 1.3. Long hours and night calls were identified as the greatest contributing factors towards stress whilst pregnant in registrar time. In terms of support, most agreed that there was a lack of support from colleagues, but not from their partners whilst pregnant.

Discussion

In a cohort of South African registrars (OBGYN and psychiatry) and female partners of male registrars, all three groups reported both a high percentage of live births and a high percentage of pregnancy complications. Pregnancy complications were varied, however psychiatry registrars had a significantly greater percentage of preterm births and subsequent low birth weight babies compared to the other two groups. There was a high incidence of gestational hypertension in the partner group (7.4%). The female partners of male registrars had a high overall pregnancy complication rate of 37%. The reasons for these findings are beyond the scope of this study. Both registrar groups had a significantly longer working hours per week compared to the partner group. Overall, OBGYN registrars spent more time in theatre per week, completed more night calls, had less hours of sleep per call, stood for longer hours, stopped doing night calls later in their pregnancy and had greater exposure to occupational hazards compared to psychiatry registrars. Specifically, working more than 81 hours per week or more than 17 hours per week in theatre may have contributed to the risk of pregnancy complications in the OBGYN registrars however the small sample size limits definitive conclusions. The overall perception amongst OBGYN registrars was that long working hours, numerous night calls and lack of support from colleagues contributed to stressful pregnancy conditions during specialisation.

All groups in this study had favorable pregnancy outcomes, with a singleton live birth rate of 86,4% in South African OBGYN registrars, which was slightly lower than live birth rate of 92.1% in American obstetricians.[3] The lower pregnancy outcome rate (77.8%) in the partner group can be explained by the fact that a single partner had five miscarriages, which might have skewed the live birth rate in that group.

Two predominant themes emerged from the open-ended questions. The first was the impact of working conditions and stress on pregnancy during registrar time, with one woman stating that 'pregnant women are expected to do heavy carrying, pushing and lifting of patients for theatre, which could result in adverse outcomes' whilst another postulated that 'the long hours in theatre and calls with no sleep put strain on my pregnancy and caused severe intrauterine growth restriction'. The second theme focused on the response from colleagues and the support given, with one registrar saying that 'the hostility experienced from fellow registrars is a particularly prevalent issue', and another that 'I didn't fall pregnant again in registrar time for fear of what the department would say and now regret it as I am unable to have another child'. One registrar summed up their experiences by stating that 'the lack of support of pregnant females is alarming. Working in obstetrics, one would expect better support, but I was made to feel like a burden'.

The likelihood of an increased risk of pregnancy complications and the possibility of adverse outcomes associated with pregnancy during registrar time remains controversial and differs between countries, which may be explained by the differences in working conditions, regulations, and occupational hazards amongst them.[3] Regarding pregnancy complications, a literature review of pregnancy outcomes during residency by Finch (2003) found an increased risk of complications in pregnant registrars (ranging between 33 to 57% depending on the study), especially during the third trimester, in all 27 research reports that were included in the review.[1] Focusing on OBGYN registrars in particular, an earlier retrospective study by Grunbaum in 1987, describing pregnancies in 1025 American obstetricians before, during and after registrar time, highlighted that babies born to mothers during registrar time were significantly more likely to have low birth weights and intrauterine growth restriction.[9] More recently, an American study of duty hours and pregnancy outcomes amongst OBGYN registrars in 2003, showed that OBGYN registrars had significantly more complications, namely premature labour, preeclampsia and fetal growth restriction, compared to partners of male registrars.[3] Our study found a high rate of pregnancy complications in all three groups, with OBGYN and psychiatry registrars experiencing the highest number of complications (48% and 50% respectively). This is higher than the 34% complication rate experienced by pregnant medical and surgical registrars in registrar programs throughout North America, and comparable to the 49.3% pregnancy complication rate in those North American registrars who worked more than six nights per month.[10] In contrast, research conducted on pregnant physicians in Australia showed no increase in pregnancy complications compared to the general population, with only 22% of Australian doctors having a complicated pregnancy.[5]

The author postulated that this finding might differ from the American studies due to a difference in working conditions, fewer working hours per week, and the choice to work part-time while pregnant.[5] Similarly, a study in Finland showed no difference in pregnancy complications between physicians and other 'upper white-collar' workers, possibly due to improved working hours.[4]

Our research emphasizes the important association between working hours and increased pregnancy complications, as OBGYN registrars who worked more than 17 hours in theatre per week or a total of more than 81 hours per week were shown to have a significantly increased relative risk of a complicated pregnancy. This finding is supported by the current literature, namely a 2014 Canadian study on complications in pregnant medical and surgical registrars, which showed a significantly greater risk of pregnancy complications amongst registrars who worked more than six night calls per month, or who spent more than eight hours in theatre per week.[10] In addition, another 2014 study conducted amongst pregnant physicians in Japan showed that doctors who worked more than 71 hours per week, regardless of specialty, had a significantly increased risk of experiencing both a threatened miscarriage and a preterm birth.[7] According to our study, South African OBGYN registrars had slightly improved working hours than their American counterparts, with the majority working between 41 and 80 hours per week, compared to most pregnant American OBGYN registrars (68.3%-73.2% depending on the trimester) who worked more than 80 hours per week.[3] However, 27,3% of South African OBGYN registrars still reported working between 81 and 100 hours per week, which has been associated with an increased risk of complications as shown in both my study and the above literature.[3,7,10]. Interestingly, although psychiatry registrars worked fewer hours per week than the OBGYN registrars, with less hours of standing and more hours of sleep per call, they had a significantly increased risk of preterm labour and delivery than the OBGYN and partner groups. This highlights the fact that other factors, in addition to hours worked, may contribute to pregnancy complications, and is an important area for future research.

In addition to prolonged working hours, OBGYN and psychiatry registrars were exposed to various other occupational hazards and infections during pregnancy, which could further contribute to pregnancy complications through the use of prophylactic medications.[1] Infections found to affect South African doctors in particular, were the potential exposure to Human Immunodeficiency Virus (HIV) and tuberculosis (TB) whilst pregnant, due to their high prevalence rates in South Africa (HIV prevalence 13,1% in 2018 and TB incidence 520

new TB cases per 100 000 in 2015).[11,12] Participants also noted that aggressive patients were a danger to pregnant registrars. There are few studies either in South Africa or globally that report the effect of the above occupational hazards and infections on the pregnancy outcomes of registrars, suggesting another important area for further study.

Pregnancy experiences and sources of stress and support whilst specialising were also analysed in the review paper by Finch (2003).[1] The most pertinent stressors recognized included long working hours and incessant calls resulting in physical and emotional exhaustion, guilt regarding work and the possibility that other registrars might have to take on the workload, insufficient time spent with family, inadequate maternity leave, decreased support from partners and colleagues, and childcare difficulties when back at work.[1] South African OBGYN registrars expressed similar opinions, with long hours (93%) and night calls (95%) being the greatest contributory factors towards stress whilst pregnant. Lack of colleague support was also a concerning factor, although lack of support from partners was not an issue.

Limitations of this study include the relatively small sample size and low response rate, although the survey was distributed nationally. The target sample size was not reached: most likely due to the low response rate to online questionnaires in general, as well as the fact that only a certain number of recipients had fallen pregnant during registrar time and were eligible to answer the questionnaire. This small sample size may affect the reliability of a survey, as it can reduce the power of the study and increase the margin of error, resulting in a higher variability in results, and subsequent bias. If participants had more than one pregnancy, each pregnancy was considered as a separate entity in the study. This may have skewed the data if these participants had a pre-existing medical condition that could have resulted in repeated adverse outcomes, such as multiple miscarriages. The lack of more details about the miscarriages is an additional limitation, as pre-existing medical conditions, such as cervical incompetence or autoimmune disease, which are unrelated to working hours and conditions, could have resulted in poor pregnancy outcomes. Another limitation is that the hours worked per week, sleeping, standing or in theatre may have been subject to recall bias. Recall bias may also exist because of the retrospective nature of the study and the fact that participates who had been pregnant in the previous 11 years were included. Respondents were also more likely to be interested in the topic, or to have experienced pregnancy complications personally, resulting in selection bias. The fact that the partners of male registrars were assumed to do few, or no night shifts is another limitation to this study. There was not enough

data collected with respect to working conditions of the partners or their underlying medical conditions. This may have elevated the complication rate and is another study limitation.

Conclusion

South African OBGYN registrars had similar pregnancy outcomes to both psychiatry registrars and the partners of male registrars. Psychiatry registrars had the best outcomes in terms of live birth rate, but the most complications, especially preterm birth. There was a high prevalence of pregnancy complications in all three groups, although the registrars had the most complications. Pregnant OBGYN and psychiatry registrars were exposed to numerous occupational hazards and infections which may have contributed to adverse pregnancy outcomes. Long hours and night calls were identified as the greatest contributors to stress whilst pregnant in registrar time. This study shows that registrars (both psychiatry and OBGYN) have an increased risk of a complicated pregnancy. It also shows that they are subjected to stressful conditions, long working hours and night calls. A larger, nationwide study focusing on the pregnancy outcomes and complications amongst registrars in all specialties of South Africa needs to be conducted, so that stricter policies can be implemented to regulate the working hours and improve support to pregnant colleagues.

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Table 1.1: General characteristics of study population comprised of Obstetrics and Gynaecology (OBGYN) registrars, Psychiatry (PSYCH) registrars and female partners (PARTNER) of male registrars.

	OBGYN		PSYCH		PARTNER	
	n	%	n	%	n	%
Total individuals	34	-	26	-	19	-
Total number of pregnancies	44	-	30	-	27	-
Marital status						
Single	0	0	1	3.8	0	0
Divorced	1	2.9	1	3.8	0	0
Partnered	2	5.9	0	0	0	0
Married	30	88.2	24	92.3	19	100
Widowed	1	2.9	0	0		0
Year of registrar training						
First	15	34	8	27	7	25.9
Second	12	28	9	30	5	18.5
Third	7	16	5	17	9	33.3
Fourth	10	23	8	27	5	18.5
Number of pregnancies during registrar time	1.3 ± 0.6		1.2 ± 0.4		1.4 ± 1.0	
One pregnancy	26	76.5	22	84.6	14	73.7
Two pregnancies	7	20.6	4	15.4	4	21.1
Three pregnancies	0	0	0	0	0	0
Four pregnancies	1	3.8	0	0	0	0
Five pregnancies	0	0	0	0	1	5.3

Data represented as sample size (n) and percentage (%) or mean ± standard deviation.

Table 1.2: Characteristics of pregnancies, pregnancy outcomes and pregnancy complications in Obstetrics and Gynaecology (OBGYN) registrars, Psychiatry (PSYCH) registrars and female partners (PARTNER) of male registrars.

	OBGYN		PSYCH		PARTNER		X^2	p value
	n	%	n	%	n	%		
Age at pregnancy (years)	30.7 ± 2.1		30.5 ± 2.3		31.2±3.4		-	0.38
Pregnancy planned	34.0	77.3	24.0	80.0	19.0	70.4	0.8	0.68
Mode of delivery							12.3	0.002*
Vaginal	16.0	41.0	2.0	7.0	10.0	47.6		
Caesarean section	23.0	59.0	27.0	93.0	11.0	52.4		
Elective	11.0	48.0	18.0	67.0	7.0	64.0	1.9[a]	0.379 [a]
Emergency	12.0	52.0	9.0	33.0	4.0	36.0		
Caesarean section reasons								
Elective								
Previous c/s	4.0	11.8	4.0	15.4	3.0	15.8		
Pregnancy complication	1.0	2.9	3.0	11.5	3.0	15.8		
Labour complication	0.0	0.0	5.0	19.2	0.0	0.0		
Preference	6.0	17.6	6.0	23.1	1.0	5.3		
Emergency								
Pregnancy complication	3.0	8.8	1.0	3.8	0.0	0.0		
Labour complication	9.0	26.5	8.0	30.8	4.0	21.1		
Pregnancy outcome							6.3	0.395
Live birth	38.0	86.4	29.0	96.7	21.0	77.8		
Singleton	37.0	97.4	28.0	96.6	21.0	100		
Multiple	1.0	2.6	1.0	3.4	0.0	0.0		
Miscarriage	4.0	9.1	1.0	3.3	5.0	18.5		
Still birth	1.0	2.3	0.0	0.0	0.0	0.0		
Termination	1.0	2.3	0.0	0.0	1.0	3.7		
Birth weight							2.2	0.903
Low birth weight (<2500g)^	3.0	7.9	4.0	13.8	2.0	9.5		
Between 2500g and 4000g^	33.0	86.8	24.0	82.8	17.0	81.0		
High birth weight (>4000g)^	2.0	5.3	1.0	3.5	2.0	9.5		

Preterm delivery (< 38 weeks)	2.0	4.6	5.0	16.7	1.0	3.7		
Gestational age (weeks)	38.6 ±1.6		36.9 ± 3.9		38.9 ± 1.4			0.005**
Complication in each pregnancy	21.0	48.0	15.0	50.0	10.0	37.0	1.7	0.436
Specific pregnancy complications								
Preterm labour	3.0	6.8	5.0	16.7	0.0	0.0		
Premature rupture of membranes	2.0	4.5	3.0	10.0	0.0	0.0		
Preterm birth	2.0	4.5	5.0	16.7	1.0	3.7		
Hyperemesis	2.0	4.5	3.0	10	0.0	0.0		
Antepartum hemorrhage	1.0	2.9	0.0	0.0	0.0	0.0		
Fetal growth restriction with normal dopplers	0.0	0.0	1.0	3.3	0.0	0.0		
Fetal growth restriction with abnormal dopplers	2.0	4.5	0.0	0.0	0.0	0.0		
Oligohydramnios	2.0	4.5	0.0	0.0	0.0	0.0		
Gestational hypertension	2.0	4.5	3.0	10.0	2.0	7.4		
Preeclampsia	3.0	6.8	2.0	6.7	0.0	0.0		

*Data represented as sample size (n) and percentage (%) or mean ± standard deviation. c/s: caesarean section. Pregnancy complications included: placenta previa, preeclampsia, gestational hypertension, poor fetal growth/growth restriction & breech at term. Labour complications included: poor progress, fetal distress, failed induction, previous c/s in labour, failed vbac, obstructed labour, preterm labour, ruptured membranes, delayed labour, & cephalopelvic disproportion. * P< 0.05 Caesarean section in OBGYN and PSYCH compared to partner group. ** P< 0.05 Psych vs. OBGYN and partner group .[a] comparing elective and emergency caesarean section frequency.*

Figure 1.1: The relative risk of adverse working conditions associated with pregnancy complications in Obstetrics and Gynaecology registrars.

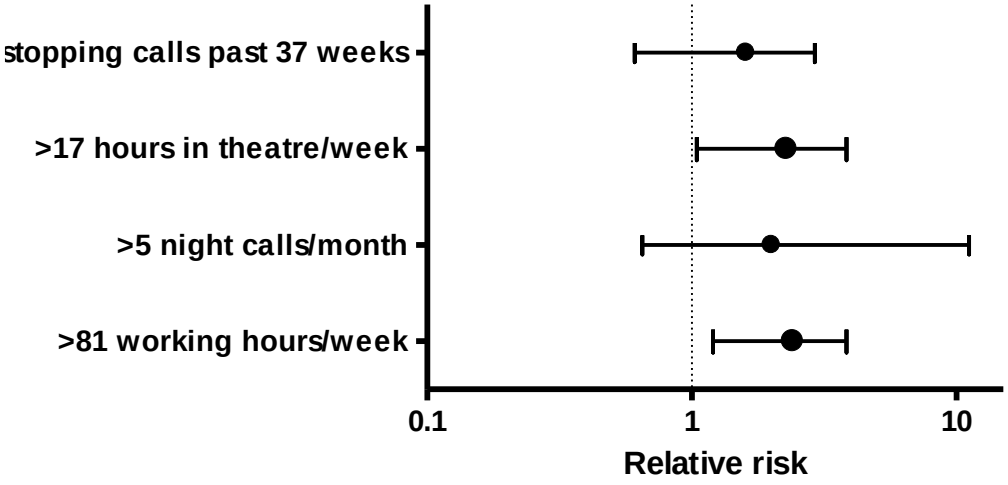


Figure 1.2: Frequency of exposure to occupational hazards and infections in Obstetrics and Gynaecology (OBGYN) registrars and Psychiatry (PSYCH) registrars.

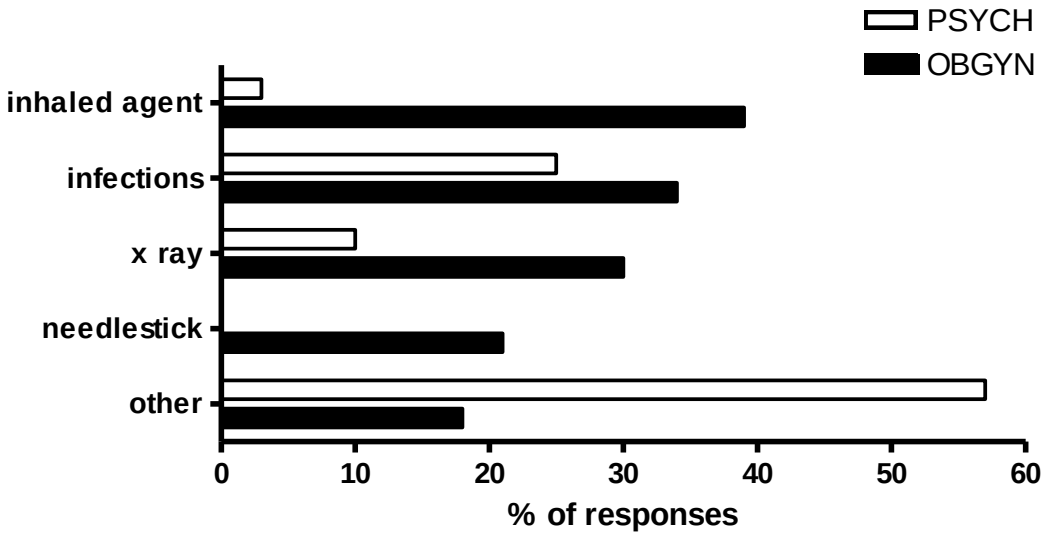
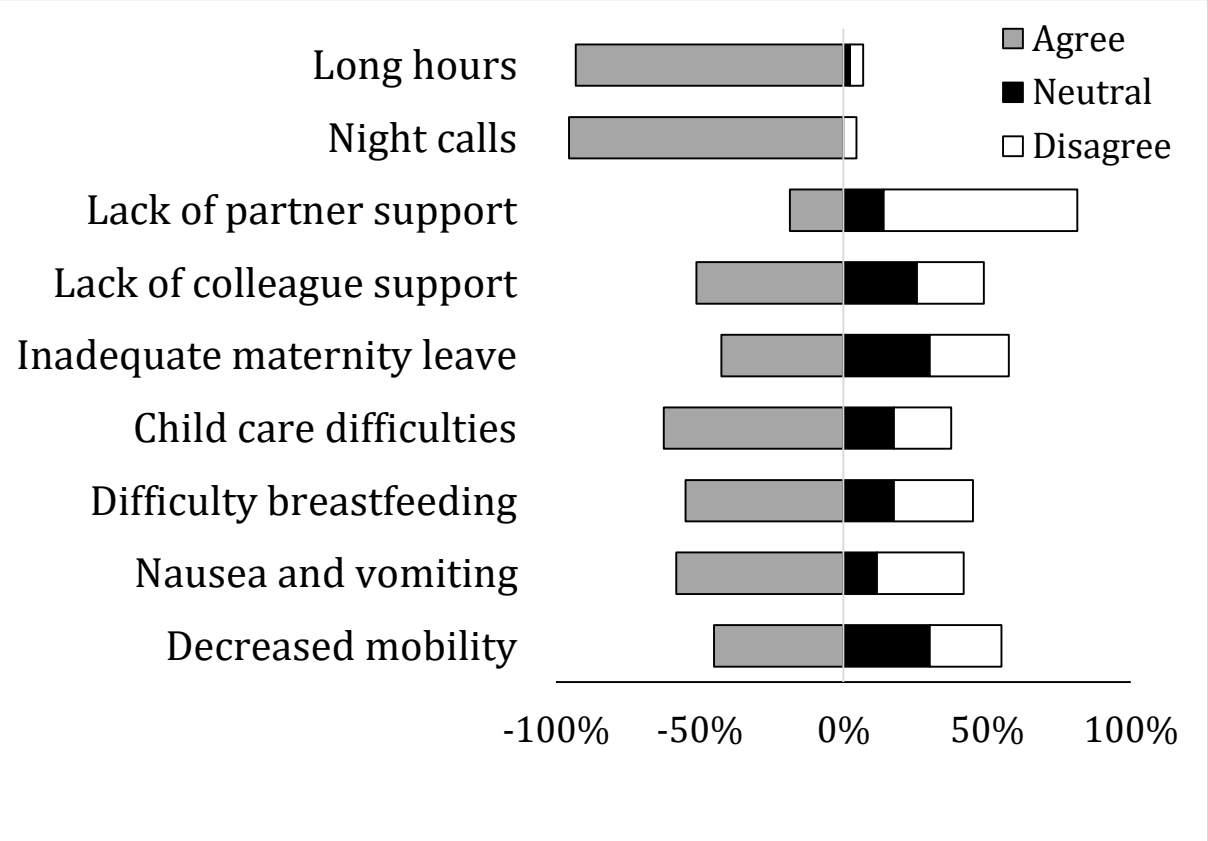


Figure 1.3: Sources of stressors and support during pregnancy based on responses to five-point (condensed to three-point) Likert scale questions in Obstetrics and Gynaecology (OBGYN) registrars



Appendix A: Approved Research Protocol

Title: Pregnancy Outcomes, Complications and Experiences in Obstetrics and Gynaecology Registrars

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1 Introduction

1.1 Background literature analysis and critique

The number of female medical students, doctors and specialists is increasing steadily worldwide, with the percentage of female registrars increasing from 36,4% in 1998 to 48% in 2009 in the United States of America (USA)[1]. In South Africa, women have outnumbered men in Bachelor of Medicine and Bachelor of Surgery (MBBC) enrolments nationally since 2000, with figures ranging between 52 and 63% in 2005 (university dependent)[2]. An increasing number of South African women are specialising further once qualified as doctors, as shown by the fact that the female postgraduate Masters of Medicine (MMed) enrolments at the University of Cape Town (UCT) had increased from 28% in 1999 to 42% in 2005[2]. Specialties of choice for South African females according to MMed enrolments include psychiatry, paediatrics, anaesthesiology and obstetrics and gynaecology[2]. Despite the high stress load and potential impact during childbearing years, obstetrics and gynaecology was the third most popular specialty choice for females in 2005[2]. In 2015, 65% of registrars enrolled for a MMed in Obstetrics and Gynaecology at the University of the Witwatersrand were female[3]. Statistics from the Colleges of Medicine South Africa (CMSA) show similar results nationally, with the number of female registrars passing the Part 2 final exams for obstetrics and gynaecology increasing from 46% in 2013, to 58% in 2017[4].

In the USA, a countrywide questionnaire distributed in 2001 showed that more than two thirds of registrars in obstetrics and gynaecology were women[5]. Due to the duration of medical training, especially if a specialty is embarked on, and the fact that this training spans a number of reproductive years, a significant number of female doctors may fall pregnant during this time[6]. A 2014 American study spanning nine surgical specialties, including obstetrics and gynaecology, showed a mean age of 33.1 years at first birth[1]. In South Africa, the average age for female registrars enrolling for an MMed at the University of the Witwatersrand between 2011 and 2015 was 32 years old, with 34% of these females being married[3].

There are numerous factors that may complicate a healthy pregnancy and influence the outcome of registrars who fall pregnant while specializing. These include physical factors such as long working hours, prolonged standing, strenuous physical activity and psychological stress[6]. There is also potential exposure to harmful substances, such as infectious, cytotoxic and chemical agents, anaesthetic gases, and the possibility of needlestick injuries and radiation exposure, depending on the choice of specialization[7].

An American study done on pregnancy and duty hours among obstetrics and gynaecology registrars in 2005 showed that the majority of pregnant women worked more than 80 hours a week, with 15% working more than 100 hours per week[5]. Evidence indicates that there are increased rates of preterm labour and delivery, low birth weight babies, preeclampsia, stillbirth and abruptio placentae in women who have physically strenuous jobs and prolonged hours[6]. This is possibly due to decreased uterine blood flow mediated by catecholamines that increase in circulation during times of physical and psychological stress, and the postural effect due to prolonged standing[6,8]. The decreased plasma volume due to prolonged standing may stimulate the increased production of oxytocin, which may contribute to preterm labour[8]. Although a definitive prospective study is lacking, a literature review of pregnancy during residency from 2003 by Fitch showed on average an increased risk of complications in pregnant physicians, with a reported peripartum complication rate varying from 33 to 57%[6.] Almost ten years later, a nationwide study amongst general surgical residents in Canada in 2012 showed similar results, with a peripartum complication rate of 35% among female residents, compared with a 19% complication rate in partners of male residents[9]. Reported complications included an increased incidence of preterm labour, increased incidence of preterm delivery for residents working more than 100 hours per week, an increased incidence

of low birth weight and intrauterine growth restricted (IUGR) infants, increased miscarriage and stillbirth rates, increased rates of gestational hypertension, preeclampsia, abruptio placentae and increased caesarian section rates[6]. A study focusing on pregnancy complications specifically in obstetrics and gynaecology registrars yielded similar results, with significant increases in the rates of preterm labour (but not preterm delivery), preeclampsia and fetal growth restriction, but not stillbirths, when compared to the rates experienced by spouses or partners of male residents[5]. In contrast, an earlier study by Phelan (1988) focusing on registrars in obstetrics, surgery and psychiatry showed no difference in the rate of medical and obstetric complications in registrars compared to the general population, except for a 7% increased incidence of pregnancy induced hypertension compared to the general population[10]. The author postulated that because the incidence of pregnancy induced hypertension was uniformly raised in all three registrar groups, regardless of hours or physical exertion, this may have been due to the confounding variable of an older maternal age in these registrars compared to the general population[10]. In South Africa, the average work hours per week are similar to those in the American studies, however there have been no studies done in this population describing the pregnancy complications in registrars. In Australia, a study done in pregnant physicians found no increase in pregnancy complications in comparison to the general population[11]. The author postulated that this finding may differ from the American studies due to a difference of employment conditions, less working hours a week, and the choice to work part time if pregnant[11]. Similarly, a study done in Finland showed no difference in pregnancy complications between physicians and other "upper white-collar" workers, possibly due to improved working hours[12].

A review of 4674 obstetrics and gynaecology registrars from 2003 showed that although the risk of pregnancy complications in registrars was increased, the overall pregnancy outcome, defined by a singleton live birth, was still favorable, with a singleton live birth occurring in 92,1% of obstetrics and gynaecology registrars, when compared to 93,8% of spouses or partners, resulting in no statistical association between hours worked and adverse pregnancy outcomes[5]. However, a retrospective chart review comparing pregnancies of physicians and non-physicians of similar socioeconomic status found that physicians had a 1.86 relative risk of an adverse pregnancy outcome, and suggested that physicians should be treated as a high risk obstetric group[6,8].

The review by Fitch also analyzed pregnancy experiences and sources of stress and support during residency[6]. Stressful factors included long unpredictable hours and frequency of calls

resulting in sleep deprivation and fatigue, the emotional strain of residency, guilt about work ethic, inadequate time spent with a partner, inadequate maternity leave, work expectations during maternity leave, child care difficulties, breastfeeding problems and lack of support from partner, faculty and other residents[6]. A Canadian study in 2005 identified additional stressors, such as nausea and vomiting in the first trimester, and decreased mobility in the third trimester[13]. Balancing pregnancy with motherhood and preparing for examinations whilst having missed rotations during leave were also identified as special stressors[13]. Another source of stress for the pregnant registrar was due to the unstated expectation that an absent registrars workload would be shouldered by other registrars[6].

Fitch postulated that feelings of inadequacy and guilt due to the normal physical and emotional limitations of pregnancy might lead to a resident trying to compensate for these limitations by increasing their workload and hours[6]. Examples of this included working right up to delivery, doing extra night calls to compensate for calls missed during maternity leave, and taking shorter maternity leave than desired[6]. This premise is supported by a nationwide American study describing duty hours in pregnant obstetrics and gynaecology registrars in 2003, which found that pregnant registrars were increasing their work hours during pregnancy, and that more than three quarters (76,5%) were taking no days off before delivery, whereas 10,3% missed one to three days of work before birth[5]. In contrast, a Canadian study among general surgery registrars in 2012 showed that 70% stopped overnight calls by 35 weeks, and 65% stopped daytime clinical duties between 36 and 40 weeks[9]. Although 70% of pregnant registrars in the study reported working as much as when they were not pregnant, 26% still felt that their pregnancy had increased their colleague's workloads[9]. Of note, 74% of the women believed their pregnancies did not result in less operative experience than their non-pregnant counterparts[9].

Colleagues' reactions towards the pregnant registrar differ between studies, and have shown a trend of being more tolerant of and supportive towards pregnancy in residency in more recent years[6]. Two consecutive studies from the Medical College of Ohio surveyed attitudes towards pregnancy in physicians almost ten years apart (1983 and 1990) [6,14]. In the initial study, respondents felt that a pregnant colleague was an inconvenience to themselves (80%) and their departments (30%). Generally men were less supportive than women towards pregnant colleagues[6]. Although the follow up study showed a positive attitude shift and increased acceptance and tolerance of pregnancy amongst colleagues, there was still a gender bias, with female colleagues showing more support and assistance[6,14]. More recently, a survey done

amongst General Surgery Residency Program Directors in 2016 found that although only 15% stated that they would advise a trainee not to fall pregnant during residency, 61% felt that pregnancy negatively affected a female registrar's work, and 33% felt that an increased burden was placed on their colleagues, highlighting that negative attitudes towards pregnancy whilst specializing still prevail[15]. Studies about attitudes towards pregnant registrars in South Africa are lacking.

In terms of maternity leave, studies from America, Canada and Israel showed that the leave varied greatly from 0 to 36 weeks[6]. In a study of duty hours in pregnant Obstetrics and Gynaecology registrars across America in 2003, most residencies had both maternity and paternity leave policies, with maternity leave usually paid and spanning four to eight weeks[5]. Nearly one quarter of residents were required to make up time missed during maternity leave[5]. In contrast, Canadian studies of general surgeons showed that 57% took at least six to 12 months of maternity leave[13]. Residents that took less than six months maternity leave felt that it was inadequate[13]. In South Africa, the Health Professions Council of South Africa (HPCSA) does not specify the amount of maternity leave that can be taken during registrar time, but stipulates that the training time will be lengthened by the amount of leave taken[16]. The University of Witwatersrand registrar contract for Obstetrics and Gynaecology allocates four months in total of paid maternity leave, five days of paternity leave, and stipulates that unpaid leave may not be taken. This is in keeping with Basic Conditions of Employment Act of 1997 in South Africa that states that "an employee is entitled to at least four consecutive months of maternity leave" and that "no employee may work for six weeks after the birth of a child unless a medical practitioner or midwife certifies that she is fit to"[17]. The South African Medical association also recommends four months of maternity leave in accordance with the law[18]. The recently adopted Labour Laws Amendment Bill, which was passed by the South African National Assembly on 28 November 2017 and entitles fathers to ten consecutive days of paternity leave, is awaiting approval by the National Council of Provinces and may become law in 2018[19].

One important source of stress elicited from Fitch's literature review of pregnancy during residency was the inability to breastfeed adequately after returning to work[6].
The World Health Organisation (WHO) recommends exclusive breastfeeding up to six months of age, with continued breastfeeding along with appropriate complementary foods up to two years of age[20]. Studies have shown that although resident mothers have high rates of initiating breastfeeding,[6,9] many discontinue on return to work, primarily due to the work

schedule[6]. One study of North American female physicians stated that although 80 percent initiated breastfeeding and continued during maternity leave, half discontinued when returning to work, and only 15% had adhered to the WHO goal of exclusive breastfeeding for six months[6]. Difficulties in continuing breastfeeding included insufficient time and no appropriate private area to pump at work, reduced milk supply due to heavy workloads and sleep deprivation, and mixed support from staff and colleagues[6,13].

The literature regarding pregnancy outcomes, complications and experiences during residency has mainly been generated in North America. Relatively few studies have focused on Obstetrics and Gynaecology Registrars and no research has been generated in the resource restricted, high stress hospital environments in South Africa.

1.2 Aim

The aim of this study is to evaluate maternal and perinatal outcomes and complications of women who fell pregnant during their obstetrics and gynaecology registrar time in a South African setting. Then to compare the findings to registrars in psychiatry and to spouses or partners of male obstetrics and gynaecology and psychiatry registrars. The secondary aim is to describe the registrar's experiences during this time, including sources of stress and support, maternity leave policies and issues around breastfeeding.

2 Objectives

1. To describe the socio-demographic variables, pregnancy complications and risk for adverse pregnancy outcomes in women who fell pregnant during their obstetrics and gynaecology registrar time.
2. To compare the live birth rate and pregnancy complications among obstetrics and gynaecology registrars to those experienced by registrars in psychiatry, as well as to those experienced by the female partners of male obstetrics and gynaecology and psychiatry registrars.
3. To describe the experiences of pregnant obstetrics and gynaecology registrars in the South African setting.

3 Method

3.1 Study Design

A case control study will be used.

3.2 Study Sample

3.2.1 Study population

The study sample will consist of previous and current obstetrics and gynaecology registrars who have rotated through an obstetrics and gynaecology registrar program in South Africa, and fell pregnant whilst a registrar, within the last ten years. There will be two groups of controls: one group consisting of past or present psychiatric registrars who have rotated through a psychiatry registrar program in South Africa and fell pregnant during this time, and the second group consisting of spouses or partners of male registrars who fell pregnant whilst their partner was specializing in either obstetrics and gynaecology or psychiatry. The male registrars and specialists will be asked to fill out a specific and limited set of questions relating only to their partner's pregnancy, complications experienced and breastfeeding practices. Psychiatry registrars will be used as a control group because they are of comparable age, socioeconomic status and education background as obstetric registrars, also largely comprised of females, and have frequent night calls but no operating time, less periods of standing and physical exertion, and less potential exposure to needlestick injuries and anaesthetic agents[21]. The use of partners of male obstetrics and gynaecology and psychiatry registrars as a control group will yield an easily obtainable sample with similar age and socioeconomic status to obstetric registrars, but without the stressors associated with night shifts and long working hours. Partners who are also doctors will be excluded. The spouses and partners of male registrars were used as a control group comparing the rate of obstetric complications between doctors and non-doctors in studies done internationally by Gabbe et al[5], Merchant et al[9], and two other studies described in a literature review by Finch[6]. Thus using this control group to perform a similar study in a South African setting will make my study comparable to research done internationally.

3.2.2 Sample size

In order to calculate an appropriate minimum sample size for this case control study, a formula by Kelsey was utilized using the Epi info version 7 sample size calculator[22]. A pregnancy complication rate of 35% in the registrar (case) group, and 19% in the control group was used based on figures obtained in a study by Merchant et al[9], done in British Columbia, and published in 2012. This study compared pregnancy complications in general surgical residents to partners of male residents, and was chosen as it is the most recent available study with comparable figures. There are unfortunately no such statistics currently available stating pregnancy complications in registrars in South Africa, Africa or a comparable third world country. When using a power of 80%, and a confidence interval of 95%, as well as the pregnancy complication rates above, a minimum sample size of 85 cases, as well as 85 participants in each of the control groups was calculated to be necessary. Therefore the aim would be to obtain at least 85 filled questionnaires from past or current obstetric registrars who fell pregnant whilst specializing, and 85 questionnaires from each of the control groups.

3.2.3 Inclusion Criteria

- Past or current female registrars in obstetrics and gynaecology who specialized or are specializing in South Africa and fell pregnant during registrar time, regardless of outcome.
- Past or current female registrars in psychiatry who specialized or are specializing in South Africa and fell pregnant during registrar time.
- Past or current male registrars in obstetrics and gynaecology or psychiatry who specialized or are specializing in South Africa and who's spouses or partners fell pregnant while they were specializing.
- This study is limited to registrars and consultants in obstetrics, gynaecology and psychiatry who are currently specializing or have completed their specialization and have registered their specialization with the HPCSA on or after the first of January 2007 (within the last 10 years).

3.2.4 Exclusion Criteria

- Male registrars in obstetrics and gynaecology and psychiatry whose partners are also doctors.
- Male and female registrars in obstetrics and gynaecology and psychiatry who registered their specialization with the HPCSA before 1 January 2007.
- Pregnancy outside of registrar time

3.3 Data Collection

A semi-structured, anonymous self administered questionnaire including both five point Likert Scale type questions as well as open ended questions has been prepared. This will be distributed as an online questionnaire by the South African Society of Obstetricians and Gynaecologists (SASOG), the South African Association of Trainees of Obstetrics and Gynaecology (SAATOG) and the South African Society of Psychiatrists (SASOP). Consent to agree to distribute the questionnaire will be sought from these organisations. The questionnaire will be done in REDCap (Research Electronic Data Capture)[23], and distributed as a single link and questionnaire, with branching logic, thus tailoring the questions for female and male respondents as appropriate (Appendix C and D). For example, once a registrar has entered that they are male, they will be automatically directed to the spousal questionnaire where only questions relevant to them will be asked. Another example of the branching logic is if a patient has a miscarriage, only relevant questions will be asked.

The following variables will be included in the questionnaire: Demographic data such as age, population group, sex, marital status and type of specialty. Pregnancy specific questions will be asked, such as: number of pregnancies during registrar time, year of specialization while pregnant, and age at each pregnancy, occurrence of complications, pregnancy outcome, mode of delivery, and presence of preexisting health issues. Work related questions will include average hours worked a week including overtime while pregnant, number of hours in theatre or standing while pregnant and number of calls. Other questions will include sources of stressors and support, duration of maternity leave and breastfeeding practices (Appendix C and D).

3.4 Endpoints

Questionnaires will be distributed as stated above, until at least 85 suitable obstetrics and gynaecology registrars, and 170 suitable controls (85 in each control group) have been found. If the number is not initially achieved, I will send reminder emails to the respective universities, and distribute further questionnaires, until a suitable sample size is attained, within a cut-off time of 3 months.

3.5 Bias

Because participants will answer questions about their previous pregnancies retrospectively, the possibility of recall bias exists, especially if the event in question occurred a long time ago.

Selection bias is another possibility, as those that complete the questionnaire are more likely to be interested in the topic.

Response bias, and the pressure to give socially acceptable and perhaps less truthful answers is also a possibility in this type of questionnaire.

3.6 Limitations

The limitations of this study include the fact that a large sample of both cases and controls is needed to achieve statistically significant results. The study design is contextual, and is limited to South African obstetrics and gynaecology registrars, and may thus not be generalizable to a wider population. The questionnaires are self- administered and thus dependent on a subjective report by the respondents and the quality of their submitted data.

4 Data analysis

Data will be captured using Excel and collected and managed using REDcap electronic data capture tools hosted at the University of the Witwatersrand. Data will then be imported from the excel spreadsheet to Stata version 14 (stata corp USA) for further analysis.

The socio-demographic and pregnancy outcome of the respondents will be described. Categorical variables will be presented as frequency, percentages or charts. Continuous variables will be presented as mean ± standard deviation (SD) if they are normally distributed. If the data is not normally distributed, the median (interquartile range) will be presented.

Categorical variables such as the presence of an adverse pregnancy outcome will be compared among the female obstetrics and gynaecology registrars and the female psychiatry registrars using Pearson's Chi-Square Test. Continuous variables such as age, birth weight and gestational age at delivery will be compared among female obstetrics and gynaecology residents and female psychiatry registrars using the Student's T-Test if the data is normally distributed, and the Mann Whitney U Test to compare medians if not normally distributed.

Variable and multivariable logistic regression will be conducted to determine the model of predictors of adverse pregnancy outcome. The adverse outcome/ dependent variable will be defined as any pregnancy that does not result in a term (37 weeks) live baby.

Experiences of registrars during pregnancy will be described using median (interquartile ranges). A five point Likert score will be used for this purpose. These scores will be compared among the obstetrics and gynaecology registrars and psychiatry registrars using the Mann Whitney U test. The open-ended responses will be thematically analysed based on the literature to obtain emerging themes.

Similar analyses described above will be conducted comparing the outcomes of obstetrics and gynaecology registrars and the spouses of male obstetrics and gynaecology and psychiatry registrars.

A statistically significant level will be set at a P-value of <0.05 and a 95% confidence interval. A two-tailed test of hypothesis will be assumed.

The services of the biostatisticians at Wits University will be employed in the analysis of the data.

5 Ethics

An application to the Human Research Ethics Committee of the University of the Witwatersrand will be made after the protocol has been reviewed. The questionnaires are anonymous and no personal identifiable information will be recorded. The study will be registered with the National Health Research Database once ethics approval has been achieved. Permission to distribute the questionnaire will be sought from Professor Lombaard, the Academic Head of Obstetrics and Gynaecology at the University of the Witwatersrand, as well as the heads of department of Obstetrics and Gynaecology at the University of Pretoria and the University of Cape Town. Permission to distribute the questionnaire will also be sought from the heads of department of Psychiatry from the universities listed above. Additional permission to distribute the questionnaire will also be sought from SAATOG, SASOG and any other relevant parties.

6 Timing

	Jan ‘18	Febt ‘17	Mar ‘18	Apr ‘18	May ‘18	Jun ‘18	Jul ‘18	Aug ‘18	Sep ‘18	Oct ‘18	Nov ‘18	Dec ‘18	Jan ‘19	Feb ‘19	Mar ‘19
Protocol	X	X													
Submission			X												
Correction			X												
Ethics			X	X											
Data Collection					X	X	X								
Analysis								X	X						
Write up										X	X	X			
Marking													X	X	
Corrections															X

7 Funding

The financing of the study will be provided by the researcher, and primarily includes printing costs.

8 Problems

The main issue predicted is to get enough respondents to participate in the study.

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Appendix B: Study Information Sheet

Dear Colleague,

My name is Dr. Catherine Tew and I am a registrar in the department of Obstetrics and Gynaecology at the University of the Witwatersrand. I am also registered as an MMed student at the University of the Witwatersrand.

I am working on a research project which compares the pregnancy outcomes, complications and experiences of obstetrics and gynaecology registrars in South Africa, to those of psychiatry registrars in South Africa, as well as to those of spouses or partners of male obstetrics and gynaecology or psychiatry registrars (to be used as a control group).

I am inviting any obstetrics and gynaecology registrar or psychiatry registrar who fell pregnant whilst doing registrar time, or who had a spouse or partner who was pregnant whilst you were specializing, to participate in this study.

The study involves completing a questionnaire regarding you/your partners experience and outcome of pregnancy during registrar time. The questionnaire should take approximately 20 minutes. By completing the survey, you are giving consent for your answers to be used as part of this research. You may stop participating in this study at any point. If at any time, before completion of the survey, you decide to withdraw, your answers will not be used and it will be an indication of withholding consent.

You are not obliged to participate in this study and it is purely voluntary. There will be no payment, or direct personal benefit from participating in the study, as well as no penalty for refusing to take part, or for subsequent withdrawal from the study or from completing the questionnaire. I aim to use the findings of this study to benefit subsequent registrars and improve registrar working conditions in pregnancy if possible.

This is an anonymous questionnaire and none of your personal identifying information will be included. No one will be able to see or access your answers other than me, my supervisors, and a statistician. The results of this study may be published, however, none of your personal details will be known. Your confidentiality will be protected at all times.

If any distress or emotions are brought up by answering my survey, Elsabe Jordan, a psychologist at Rahima Moosa Hospital, has agreed to give counselling and psychological support free of charge (please see contact details below).

Name of Training Institution/Organization:	Rahima Moosa Mother and Child Hospital – Psychology Department
Address	Cnr Fuel and Outshoorn Rds, Coronationville
Contact number:	011 470 9253
Head of Psychology Department, co-ordinator of counselling interventions for above research project:	Dr Elsabe Jordaan (Clinical Psychologist)

Should you have any questions with regard to this study, you are welcome to contact me via email: cath.tew@tshani.com.

Kind Regards,

Cathy Tew

Appendix C: Female Part of Questionnaire from REDCap

Confidential

Demographic Data

Please answer the following questions...

Gender	◯ Female ◯ Male
Age	_____
Marital Status	◯ Married ◯ Partnered ◯ Single ◯ Divorced ◯ Widowed
University where registrar time done	◯ University of Witwatersrand ◯ University of Pretoria ◯ University of Cape Town ◯ University of the Free State ◯ University of Kwazulu Natal ◯ Stellenbosch University ◯ Walter Sisulu University ◯ Sefako Makgatho Health Sciences University
Date of specialist registration with HPCSA	◯ Currently specialising ◯ After 1st January 2007 ◯ Before 1st January 2007
Type of registrar	◯ Obstetrics and Gynaecology ◯ Psychiatry
Did you fall pregnant during registrar time	◯ Yes ◯ No
Do you have any underlying medical or surgical conditions that were present at the time of pregnancy?	◯ Yes ◯ No
If yes, please specify:	_____
How many times did you fall pregnant during registrar time?	◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5

In the following section please provide pregnancy information for the number of pregnancies answered in the above question...

Your Pregnancy Information

Please complete information about your pregnancy/pregnancies during registrar time.

Please record information for each time you fell pregnant.

Pregnancy 1 - General Pregnancy Questions	
Was the pregnancy planned	◯ Yes ◯ No
How old were you when you fell pregnant?	_____
In which year of training did you fall pregnant?	◯ 1st Year ◯ 2nd Year ◯ 3rd Year ◯ 4th Year
What was the outcome of the pregnancy?	◯ Live Birth ◯ Miscarriage ◯ Termination ◯ Stillbirth
When did the miscarriage occur?	◯ < 12 Weeks ◯ 12 - 24 Weeks ◯ > 24 Weeks ◯ Ectopic
What was the gestational age at delivery?	_____ (XX in weeks)
What was the weight of the baby at delivery?	◯ 500 - 749 g ◯ 750 - 999 g ◯ 1000 - 1499 g ◯ 1500 - 1999 g ◯ 2000 - 2499 g ◯ 2500 - 3999 g ◯ >= 4000 g
What was the mode of delivery?	◯ Caesarean Section ◯ Vaginal Delivery
Was the C/S elective or emergency?	◯ Elective ◯ Emergency
Reason for [cesarean_type_1] C/S?	_____
Did you have any pregnancy complications?	◯ Yes ◯ No

If yes please indicate:	☐ Stillbirth ☐ Preterm labour ☐ Premature rupture of membranes ☐ Preterm birth ☐ Hyperemesis ☐ Abruptio Placentae ☐ Fetal growth restriction with normal dopplers ☐ Fetal growth restriction with abnormal dopplers ☐ Oligohydramnios ☐ Gestational hypertension ☐ Preeclampsia ☐ Other (please specify)
Other complications:	_____
How many night calls were you doing per month during pregnancy?	◯ Nil ◯ 1 - 2 ◯ 3 - 4 ◯ 5 - 6 ◯ 7 - 8 ◯ > 8
Approximately how many hours on average did you SLEEP per call?	◯ Nil ◯ 1 - 2 ◯ 3 - 4 ◯ 5 - 6 ◯ 7 - 8 ◯ > 8
Approximately how many hours on average did you STAND per call?	◯ Nil ◯ 1 - 2 ◯ 3 - 4 ◯ 5 - 6 ◯ 7 - 8 ◯ > 8
Approximately how many hours did you spend in theatre per WEEK?	◯ Nil ◯ 1 - 8 ◯ 9 - 16 ◯ 17 - 24 ◯ 25 - 32 ◯ 33 - 40 ◯ > 40
Approximately how many hours were you working per WEEK whilst pregnant?	◯ Nil ◯ 1 - 40 ◯ 41 - 80 ◯ 81 - 100 ◯ > 100
When did you stop calls?	◯ 0 - 12 weeks ◯ 13 - 24 weeks ◯ 25 - 32 weeks ◯ 33 - 36 weeks ◯ 37 - 38 weeks ◯ 39 weeks ◯ 40 weeks

Were you exposed to any occupational hazards while pregnant?	☐ Inhalation agents ☐ X-Rays ☐ Needlestick Injury ☐ Infections ☐ Other (please specify)
Did you take antiretrovirals?	◯ Yes ◯ No
Specify infections:	_____
Other occupational hazards:	_____

Pregnancy 1 - Leave Data

The following questions relate to sick/maternity leave

How many days sick leave did you take during pregnancy?	◯ 0 - 5 ◯ 6 - 10 ◯ 11 - 15 ◯ > 15
How many weeks off did you have before you delivered?	◯ Nil ◯ < 1 ◯ 1 - 2 ◯ 2 - 3 ◯ > 3
How many months maternity leave did you get?	◯ Nil ◯ 1 - 2 ◯ 3 - 4 ◯ 5 - 6 ◯ 7 - 8 ◯ 9 - 10 ◯ 11 - 12
Was it paid?	◯ Yes ◯ No
Was it full pay?	◯ Basic salary only ◯ Basic salary and overtime
Are there any special policies in place regarding maternity leave in your department?	◯ No ◯ Yes ◯ Other (please specify)
If yes, please specify:	_____
Other:	_____

Pregnancy 1 - Causes of Stress

The following factors were causes of stress whilst pregnant and post-delivery:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Long hours	◯	◯	◯	◯	◯
Night calls	◯	◯	◯	◯	◯
Lack of partner support	◯	◯	◯	◯	◯
Lack of colleague support	◯	◯	◯	◯	◯
Inadequate maternity leave	◯	◯	◯	◯	◯
Child care difficulties	◯	◯	◯	◯	◯
Difficulty breastfeeding	◯	◯	◯	◯	◯
Nausea and vomiting	◯	◯	◯	◯	◯
Decreased mobility	◯	◯	◯	◯	◯

Pregnancy 1 - Breastfeeding Data

Did you breastfeed?
- ◯ Yes
- ◯ No

For how long did you breastfeed?
- ◯ 0 - 2 months
- ◯ 3 - 4 months
- ◯ 5 - 6 months
- ◯ 7 - 9 months
- ◯ 10 - 12 months
- ◯ 13 - 18 months
- ◯ 19 - 24 months
- ◯ > 24 months

Why did you stop breastfeeding?
- ☐ Decreased milk supply
- ☐ Lack of support
- ☐ No appropriate area to pump
- ☐ No appropriate area to store milk
- ☐ Time constraints
- ☐ Other (please specify)

Other reasons for stopping to breastfeed:

_____

In retrospect would you still choose to fall pregnant during registrar time?
- ◯ Yes
- ◯ No

Additional comments or recommendations

_____

Appendix D: Male part of Questionnaire from REDCap

Confidential

Demographic Data

Please answer the following questions...

Gender	◯ Female ◯ Male
Age	_____
Marital Status	◯ Married ◯ Partnered ◯ Single ◯ Divorced ◯ Widowed
University where registrar time done	◯ University of Witwatersrand ◯ University of Pretoria ◯ University of Cape Town ◯ University of the Free State ◯ University of Kwazulu Natal ◯ Stellenbosch University ◯ Walter Sisulu University ◯ Sefako Makgatho Health Sciences University
Date of specialist registration with HPCSA	◯ Currently specialising ◯ After 1st January 2007 ◯ Before 1st January 2007
Type of registrar	◯ Obstetrics and Gynaecology ◯ Psychiatry
Did your spouse/partner fall pregnant during your registrar time?	◯ Yes ◯ No
Did your spouse/partner have any underlying medical or surgical conditions that were present at the time of pregnancy?	◯ Yes ◯ No
If yes, please specify:	_____
How many times did your spouse/partner fall pregnant during registrar time?	◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5

In the following section please provide pregnancy information for the number of pregnancies answered in the above question...

Your Spouse/Partners Pregnancy Information

Please complete information about your spouse/partners pregnancy/pregnancies.

Please record information for each time your spouse/partner fell pregnant during registrar time.

Pregnancy 1	
What is your spouse/partners occupation?	_____
How many hours did your spouse/partner work per WEEK whilst pregnant?	◯ Nil ◯ 1 - 40 ◯ 41 - 80 ◯ 81 - 100 ◯ > 100
Was the pregnancy planned	◯ Yes ◯ No
How old was your spouse/partner when they fell pregnant?	_____
In which year of training were you when your spouse/partner fell pregnant?	◯ 1st Year ◯ 2nd Year ◯ 3rd Year ◯ 4th Year
What was the outcome of the pregnancy?	◯ Live Birth ◯ Miscarriage ◯ Termination ◯ Stillbirth
When did the miscarriage occur?	◯ < 12 Weeks ◯ 12 - 24 Weeks ◯ > 24 Weeks ◯ Ectopic
What was the gestational age at delivery?	_____ (XX in weeks)
What was the weight of the baby at delivery?	◯ 500 - 749 g ◯ 750 - 999 g ◯ 1000 - 1499 g ◯ 1500 - 1999 g ◯ 2000 - 2499 g ◯ 2500 - 3999 g ◯ >= 4000 g
What was the mode of delivery?	◯ Caesarean Section ◯ Vaginal Delivery
Was the C/S elective or emergency?	◯ Elective ◯ Emergency

Reason for [cesarean_type_1] C/S?	_____
Were there any pregnancy complications?	◯ Yes ◯ No
If yes please indicate:	☐ Stillbirth ☐ Preterm labour ☐ Premature rupture of membranes ☐ Preterm birth ☐ Hyperemesis ☐ Abruptio Placentae ☐ Fetal growth restriction with normal dopplers ☐ Fetal growth restriction with abnormal dopplers ☐ Oligohydramnios ☐ Gestational hypertension ☐ Preeclampsia ☐ Other (please specify)
Other complications:	_____
Did you take paternity/family responsibility leave?	◯ Yes ◯ No
If yes, how many days?	◯ 1 - 3 ◯ 4 - 5 ◯ 6 - 7 ◯ > 7
Did your spouse/partner breastfeed?	◯ Yes ◯ No
If yes, for how long?	◯ 0 - 2 months ◯ 3 - 4 months ◯ 5 - 6 months ◯ 7 - 9 months ◯ 10 - 12 months ◯ 13 - 18 months ◯ 19 - 24 months ◯ > 24 months
Questions will be repeated for each pregnancy...	

Appendix E: Acceptance Letters

SASOG
South African Society of Obstetricians & Gynaecologists

Unit 16, Northcliff Office Park, 203 Beyers Naude Drive
Northcliff, Johannesburg, 2115, South Africa
Tel: (+27)(11) 340 9000, Fax: (+27)(11) 782 0270
Email: info@sasog.co.za
PO Box 2127, Cresta, Johannesburg, 2118, South Africa

10 June 2018

Dear Dr Catherine Tew

Re: Study entitled "Pregnancy Outcomes, Complications and Experiences in Obstetrics and Gynaecology Registrars".

Thank you for submitting your research funding request to SASOG for the above project. SASOG's Academic Liaison Sub-Committee has carefully considered your application. The Sub-Committee is of the opinion that this study has merit and should be supported.

Permission is thus being granted to utilize the SASOG database to conduct your research. However, as the committee has only received a provisional ethics approval, a full ethics approval letter should be forwarded to SASOG prior to initiation of your research. Furthermore a full report of your research findings should be forwarded to SASOG after completion of your research and SASOG should be acknowledged in any publication relating to this research.

The Protection of Personal Information Act prevents sharing of address lists with outside parties and hence your questionnaire will need to be adapted to enable protected distribution by SASOG's official office. Under normal circumstances, a fee is chargeable for the distribution of questionnaires or links related to research however this fee will be waivered as funding support for your project.

The sub-committee looks forward to receiving your full ethics approval and wishes you all the best with your future research endeavours.

Executive Council
Prof Greta Dreyer (President), Prof Priya Soma-Pillay (Honorary Secretary), Dr Haynes van der Merwe (Honorary Treasurer)
Dr Johannes van Waart (Past President), Dr Sagie Naidu (Past Secretary), Dr Beth Pheiffer (Past Treasurer)

With sincere regards,



A/Prof Mushi Matjila

Chair: SASOG Academic Liaison Subcommittee

SAATOG

The South African Association of Trainees in Obstetrics & Gynaecology
NPO177-855
email: secretary@saatog.co.za

03 April 2018

To the Human Research Ethics Committee, University of the Witwatersrand

RE: DR TEW RESEARCH PROJECT

SAATOG is the South African Association of Trainees in Obstetrics and Gynaecology. We are an organization that represents trainees in obstetrics and gynaecology all over South Africa and we have representatives in most of the registrar circuits in South Africa.

This letter serves to confirm that we as the SAATOG council have agreed to distribute Dr Tew's Mmed questionnaire regarding the pregnancy outcomes, complications and experiences of obstetrics and gynecology registrars to our database of registrar members.

Thank you.

Kind regards

Dr Bongi Rubushe

SAATOG chairperson



South African Society of Psychiatrists

Unit 16, Northcliff Office Park, 203 Beyers Naude Drive, Northcliff, 2115
Tel: (+27)(11) 340 9000; Fax: (+27)(11) 782 0270; Email: info@healthman.co.za
PO Box 2127, Cresta, 2118
Registration No.: 2007/012757/08

8 June 2018

Dr Catherine Tew
Department of Obstetrics and Gynaecology
University of Witwatersrand

Dear Dr Tew

Request for SASOP to distribute questionnaires for the MMED proposal : Pregnancy Outcomes, Complications and Experiences in Obstetrics and Gynaecology Registrars

The proposed study has been submitted to and discussed with the SASOP Board of Directors

This note serves to confirm that the request for the use of the SASOP data, as specified per draft protocol, has been approved in principle by the SASOP Board. The Board requests that you submit the recruitment pamphlet with the questionnaires for us to distribute on your behalf to our members that meet the criteria.

Please submit the HREC approval for your study once received.

With best regards

A. Lachman

Dr Anusha Lachman
Honorary Secretary on behalf of SASOP BOD

SASOP Board of Directors: ` SASOP Board of Directors: Prof ABR Janse van Rensburg *(President),* Prof B Chiliza *(President-Elect),* Dr M Talatala *(Past-President)*, Dr A Lachman *(Hon. Secretary),* Dr I Chetty *(Hon. Treasurer),* Dr S Seape *(National Convener Private Sector Group),* Dr L Robertson *(National Convener Public Sector Group)*





Department of Psychology and Psychiatry
Rahima Moosa Mother & Child Hospital
Coronationville
(011) 470 9253

29/06/2018

To Whom It May Concern

Dr Catherine Tew: MMed Research Counselling Support

I confirm that the Rahima Moosa Mother & Child Psychology Department is available to provide free of charge psychological counselling/support to participants who present with psychological/emotional sequelae as a result of their participation in the following research project:

Title: Pregnancy Outcomes, Complications and Experiences in Obstetrics and Gynaecology Registrars

Candidate: Dr Catherine Tew
Degree: MMED Obstetrics and Gynaecology
Student no: 0302620F
Supervisor: Dr Amy Wise
Qualification: MBBCh(WITS), FCOG(SA), MMED(O&G)(WITS), Dip HIV Man(SA), ACHM (FPD)
Secondary Supervisor: Dr Samantha Kerr
Qualification: BSc(Honours), PhD(WITS)

Identifying Details of Psychology Department

Name of Training Institution/Organization:	Rahima Moosa Mother and Child Hospital – Psychology Department
Address	Cnr Fuel and Outshoorn Rds, Coronationville
Contact number:	011 470 9253
Head of Psychology Department, co-ordinator of counselling interventions for above research project:	Dr Elsabe Jordaan (Clinical Psychologist)

The above counselling services will be rendered on an appointment basis.

Please do not hesitate to contact me in case of queries.

Kind regards



Dr Elsabe Jordaan
Clinical Psychologist (PS0057452)
HOD: Psychology Department
Rahima Moosa Mother & Child Hospital

Appendix F: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Dr C Tew

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M180373

NAME: (Principal Investigator)	Dr C Tew
DEPARTMENT:	School of Clinical Medicine Department of Obstetrics and Gynaecology Chris Hani Baragwanath Academic Hospital
PROJECT TITLE:	Pregnancy Outcome, Complications and Experience in Obstetrics and Gynaecology Registrars
DATE CONSIDERED:	06/04/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr A Wise
APPROVED BY:	Professor CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	15/08/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in **March** and will therefore be due in the month of **March** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date 30/10/2018

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix G: Author Guidelines from the South African Medical Journal

Research

Guideline word limit: 4 000 words

Research articles describe the background, methods, results and conclusions of an original research study. The article should contain the following sections: introduction, methods, results, discussion and conclusion, and should include a structured abstract (see below). The introduction should be concise – no more than three paragraphs – on the background to the research question, and must include references to other relevant published studies that clearly lay out the rationale for conducting the study. Some common reasons for conducting a study are: to fill a gap in the literature, a logical extension of previous work, or to answer an important clinical question. If other papers related to the same study have been published previously, please make sure to refer to them specifically. Describe the study methods in as much detail as possible so that others would be able to replicate the study should they need to. Results should describe the study sample as well as the findings from the study itself, but all interpretation of findings must be kept in the discussion section, which should consider primary outcomes first before any secondary or tertiary findings or post-hoc analyses. The conclusion should briefly summarise the main message of the paper and provide recommendations for further study.

Select figures and tables for your paper carefully and sparingly. Use only those figures that provided added value to the paper, over and above what is written in the text.

Do not replicate data in tables and in text.

Structured abstract

This should be 250-400 words, with the following recommended headings:
Background: why the study is being done and how it relates to other published work.
Objectives: what the study intends to find out
Methods: must include study design, number of participants, description of the intervention, primary and secondary outcomes, any specific analyses that were done on the data.
Results: first sentence must be brief population and sample description; outline the results according to the methods described. Primary outcomes must be described first, even if they are not the most significant findings of the study.
Conclusion: must be supported by the data, include recommendations for further study/actions.
Please ensure that the structured abstract is complete, accurate and clear and has been approved by all authors.
Do not include any references in the abstracts.

Main article

All articles are to include the following main sections: Introduction/Background, Methods, Results, Discussion, Conclusions.

The following are additional heading or section options that may appear within these:

Objectives (within Introduction/Background): a clear statement of the main aim of the study and the major hypothesis tested or research question posed

Design (within Methods): including factors such as prospective, randomisation, blinding, placebo control, case control, crossover, criterion standards for diagnostic tests, etc.
Setting (within Methods): level of care, e.g. primary, secondary, number of participating centres.
Participants (instead of patients or subjects; within Methods): numbers entering and completing the study, sex, age and any other biological, behavioural, social or cultural factors (e.g. smoking status, socioeconomic group, educational attainment, co-existing disease indicators, etc)that may have an impact on the study results. Clearly define how participants were enrolled, and describe selection and exclusion criteria.
Interventions (within Methods): what, how, when and for how long. Typically for randomised controlled trials, crossover trials, and before and after studies.
Main outcome measures (within Methods): those as planned in the protocol, and those ultimately measured. Explain differences, if any.

Results

Start with description of the population and sample. Include key characteristics of comparison groups.
Main results with (for quantitative studies) 95% confidence intervals and, where appropriate, the exact level of statistical significance and the number need to treat/harm. Whenever possible, state absolute rather than relative risks.
Do not replicate data in tables and in text.
If presenting mean and standard deviations, specify this clearly. Our house style is to present this as follows:
E.g.: The mean (SD) birth weight was 2 500 (1 210) g. Do not use the ± symbol for mean (SD).
Leave interpretation to the Discussion section. The Results section should just report the findings as per the Methods section.

Discussion

Please ensure that the discussion is concise and follows this overall structure – sub-headings are not needed:

Statement of principal findings
Strengths and weaknesses of the study
Contribution to the body of knowledge
Strengths and weaknesses in relation to other studies
The meaning of the study – e.g. what this study means to clinicians and policymakers
Unanswered questions and recommendations for future research

Conclusions

This may be the only section readers look at, therefore write it carefully. Include primary conclusions and their implications, suggesting areas for further research if appropriate. Do not go beyond the data in the article.

Appendix H: Turnitin plagiarism report

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ORIGINALITY REPORT

5%	3%	1%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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4	papyrus.bib.umontreal.ca Internet Source	1%
5	Chenxi Cai, Ben Vandermeer, Rshmi Khurana, Kara Nerenberg, Robin Featherstone, Meghan Sebastianski, Margie H. Davenport. "The impact of occupational shift work and working hours during pregnancy on health outcomes: a systematic review and meta-analysis", American Journal of Obstetrics and Gynecology, 2019 Publication	1%
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Appendix I: Plagiarism declaration

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Catherine Tew (Student number: 0302620F) am a student registered for the degree of MMed Obstetrics & Gynaecology in the academic year 2020.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature:  Date: 24/01/2020

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