

# Comparison of pharmacist knowledge, perceptions and training opportunities regarding maternal-fetal medicine in Canada, Qatar and Uganda

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SERENA BAINS

Patients may benefit from the involvement of pharmacists in prenatal care, with the potential to improve outcomes of pregnant women and infants around the world. The pharmacy profession may benefit from identification of future specialization opportunities, curriculum and continuing education development, and the role for international shared learning opportunities.

*Les patients pourraient trouver bénéfique que le pharmacien participe aux soins prénataux, ce qui pourrait d'ailleurs améliorer les résultats de soins pour les femmes enceintes et les nourrissons du monde entier. La profession pharmaceutique pourrait tirer avantage de futures occasions de spécialisation, de l'amélioration des programmes d'études et du perfectionnement professionnel et de rencontres internationales d'apprentissage partagé.*

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DOI: 10.1177/1715163514552558

## ABSTRACT



**Background:** Although pharmacists have great potential to modify and optimize drug therapy in pregnancy and lactation, current literature demonstrates that they do not routinely provide this care and often feel ill equipped to do so. The objective of this study was to determine pharmacists' knowledge and perceptions of maternal-fetal medicine in Canada, Uganda and Qatar. Secondary objectives were to determine factors associated with pharmacists' knowledge and to characterize training opportunities and resources available to practising pharmacists.

**Methods:** A cross-sectional survey using online software (SurveyMonkey) was sent to the e-mails of potential research participants. Practising pharmacists and resident pharmacists in British Columbia, Canada; the country of Qatar; and the

country of Uganda were eligible for inclusion. The survey was designed to assess knowledge and perceptions, and to create a baseline inventory of current practice and information resources used in practice.

**Results:** The mean knowledge assessment scores of pharmacists in Canada, Qatar and Uganda were 62.9%, 53.3%, and 57.7%, respectively ( $p < 0.05$ ). Pharmacists in British Columbia scored higher on knowledge assessment than pharmacists in Qatar ( $p < 0.05$ ), but other country comparisons were not significant. No predefined factors (gender, years of experience, practice area or parental status) were found to be significant in determining the knowledge score. More than two-thirds of pharmacists expressed interest in participating in continuing education opportunities in maternal-fetal medicine.

**Conclusion:** Pharmacists have differing levels of knowledge in the area of maternal-fetal medicine. Continuing education and degree curricula should be reviewed and developed to fill the knowledge gaps of student pharmacists and practising pharmacists in maternal-fetal medicine. *Can Pharm J (Ott)* 2014;147:345–351.

## Introduction

Maternal, infant and child health are growing priorities worldwide. The World Health Organization reports that more than 350,000

women die from preventable complications (e.g., hemorrhage, hypertension and sepsis) related to pregnancy and childbirth each year.<sup>1,2</sup> In 2000, the United Nations Millennium

## KNOWLEDGE INTO PRACTICE



- Pharmacists in Canada, Uganda and Qatar have varying gaps in knowledge regarding maternal-fetal medicine.
- There is an urgent need for curriculum refinement and continuing education to ensure that pharmacists are prepared to provide care to maternal-fetal medicine patients.
- There is a need for international initiatives to increase access to high-quality drug information resources, especially for low-income countries.

Declaration included “to reduce child mortality” and “improve maternal health” among its goals to accomplish by 2015.<sup>3</sup> Although pharmacists have not traditionally provided specialty services in obstetrics, many pregnant and breastfeeding women suffer from chronic disease states that need to be managed during pregnancy.<sup>1-4</sup> As well, pregnant and breastfeeding women may become ill and require initiation or modification of drug therapy.<sup>1,2</sup> Pharmacists have the ability to make a positive impact with this patient population by ensuring that drug therapy is used appropriately by working with women to maintain control of their disease states during pregnancy, postpartum and lactation.<sup>1,5,6</sup>

Pharmacists are medication specialists who have a broad knowledge of pharmacology, pharmacokinetics, clinical application of therapeutic evidence and assessment of adverse events.<sup>7</sup> They are equipped with the tools to counsel patients on the risks and benefits of prescription, herbal and over-the-counter medications.<sup>5-9</sup> Pharmacists are accessible to the public and can screen patients for therapeutic interventions.<sup>5</sup> In addition, they are in an ideal position to modify drug therapy in breastfeeding mothers to avoid compromising therapeutic efficacy and to maintain the safety of the infant.<sup>5,10</sup>

Although pharmacists have great potential, they do not appear to be optimally fulfilling these roles for pregnant and breastfeeding women. In 2 studies conducted in the United States, it was found that pharmacists did not feel comfortable providing direct patient care to pregnant patients.<sup>5,11</sup> Even pharmacists who felt qualified to make over-the-counter medication recommendations to pregnant and lactating women did not feel comfortable providing advice. A similar trend was found when pharmacists were assessed regarding routine immunizations

for pregnant women.<sup>5,11</sup> These pharmacists indicated that their formal education did not provide them with enough training within the area of maternal-fetal medicine to provide this type of care.<sup>5</sup> Another study in the United States by McAuley et al. cites an educational gap among pharmacists, specifically in regard to breastfeeding and epilepsy.<sup>12</sup>

The objective of this study was to determine pharmacists’ knowledge of the therapeutics of medications in pregnancy and lactation in Canada, Qatar and Uganda. It aimed to determine factors associated with pharmacists’ knowledge of maternal-fetal medicine and to characterize available training opportunities and the resources that pharmacists use when encountering drug information requests.

## Methods

Ethics approval for this study was obtained from the Fraser Health Ethics Research Board, the Institutional Review Board at Qatar University and the Institutional Review Board at the School of Health Sciences at Makerere University in Kampala, Uganda. The study was also approved by the Uganda National Council for Science and Technology.

The study was conducted as a cross-sectional survey. A questionnaire tool was developed; the details of this tool and field test by pharmacists in each region were previously published.<sup>13</sup> The study was conducted in the province of British Columbia, Canada and the country of Qatar in November and December 2012, as well as in the country of Uganda in March and April 2013. These 3 locations were specifically chosen to provide cross-national comparisons and assess the need for international continuing education programming.

All pharmacists actively involved in providing clinical care to patients in each region were eligible to participate. Responses from subjects were included if they held an active pharmacy license in British Columbia, Canada; were a trained pharmacist currently practising in Qatar; or were a trained pharmacist currently practising in Uganda. Responses were excluded if participants did not meet the inclusion criteria or did not complete the entire survey. Participants were allowed to skip questions throughout the survey if desired; however, it was deemed to be withdrawal of consent if they exited the survey without reaching the last page.

The questionnaire was distributed to all eligible pharmacists via the online survey platform SurveyMonkey. A link to SurveyMonkey was sent to work e-mail addresses and/or through local pharmacy organizational newsletters. If pharmacists were unable to access the survey via a computer, paper copies of the survey were provided and results inputted online. Informed consent was obtained. The survey was expected to take each participant no more than 15 minutes to complete. Participants were allowed to skip any question they did not wish to answer. Each question also held the option of *I don't know* for the purpose of minimizing guessing. The final portion of the survey contained questions designed to assess perceptions regarding maternal-fetal medicine, including current practice considerations and use of information resources. The survey remained open for 8 weeks in each respective region with weekly reminder e-mails throughout this time period.

A sample size of 384 participants was chosen based on a margin of error of 5% and a confidence interval of 95%. Estimated effect size was extrapolated from previously published studies.<sup>14</sup> We assumed our population to be fewer than 10,000 pharmacists. This resulted in a sample size of 370 for a 95% confidence interval. We increased this, however, due to the likelihood of dropouts and incomplete surveys. Data were collected using SurveyMonkey and analysed using SPSS version 20. Descriptive statistics in the form of means, medians and interquartile ranges were used to report baseline characteristics and to characterize the results of the questionnaire. Inferential statistics (Kruskal-Wallis and Mann-Whitney U test) were used to describe the associations of geographical region, availability of training opportunities, practice site, practice experience or parental status on overall knowledge. Statistical significance was predefined as  $p < 0.05$ .

## Results

Of the 447 survey attempts, 273 (61%) of participants completed the questionnaire and were included in the final analysis. Baseline characteristics of included participants are summarized in Table 1.

Overall mean score on the knowledge assessment was 53.7%. Pharmacists in Canada achieved a mean knowledge assessment score of 62.9% and a median score of 65.4% (interquartile range [IQR] 53.8–72.1%) versus

## MISE EN PRATIQUE DES CONNAISSANCES



- Les pharmaciens du Canada, de l'Ouganda et du Qatar affichent, à des degrés variables, un manque de connaissances en médecine materno-fœtale.
- Il est urgent d'améliorer les programmes d'études et le perfectionnement professionnel de manière à ce que les pharmaciens soient prêts à offrir des soins durant la grossesse.
- Il faut créer des initiatives internationales qui amélioreront l'accès à des ressources documentaires de haute qualité sur les médicaments, en particulier dans les pays pauvres.

Qatar pharmacists, who scored a mean score of 53.3% and a median score of 53.8% (IQR 45.1–65.3%), and pharmacists in Uganda, who scored a mean score of 57.1% and median score of 57.7% (IQR 50.0–69.2%). There was a statistically significant difference in knowledge assessment scores among all 3 countries ( $p < 0.001$ ). Cross-wise comparisons showed significant differences between Canada and Qatar ( $p < 0.001$ ). The comparisons of knowledge assessment for Canada versus Uganda ( $p = 0.057$ ) and Qatar versus Uganda ( $p = 0.357$ ) were not significant (Table 2). When participants were asked if they had obtained instruction or training in maternal-fetal medicine throughout their undergraduate coursework, 71% from Canada, 48% from Qatar and 56% from Uganda indicated they had. When asked if they felt their entry-to-practice degree provided sufficient training to respond to drug information requests and to care for patients with issues related to maternal-fetal medicine, 27% of respondents from Canada, 52% from Qatar and 33% from Uganda agreed or strongly agreed with the statement, whereas 12% from Canada, 6% from Qatar and 4% from Uganda strongly disagreed with the statement. The effects of training opportunities, practice site, years of practice and parental status on overall knowledge were all not significant.

Maternal-fetal medicine was deemed to be a highly relevant area, and differences among regions were found regarding preferred information resources. Thirty-six percent of pharmacists indicated they are asked questions related to maternal-fetal medicine in their practice on a daily to weekly basis, and more than 65% of pharmacists reported being asked a question at least monthly. To answer these questions, pharmacists reported using a wide

**TABLE 1** Baseline characteristics

Characteristic	n = 259* (%)
<b>Gender</b>	
Male	96 (37)
<b>Highest level of education obtained†</b>	
Bachelor's degree in pharmacy	163 (63)
Post-bachelor degree residency	51 (20)
Entry-level PharmD	3 (1)
Postgraduate PharmD	23 (9)
Master's degree in pharmacy	10 (4)
PhD	2 (1)
<b>Years of experience</b>	
0–5	114 (44)
<b>Area of primary practice‡</b>	
Hospital or institutional	160 (62)
Community	87 (34)
Primary care	12 (5)
Academia	11 (4)
Other	5 (2)
<b>Parental status</b>	
Yes	114 (44)
No	136 (53)
Prefer not to say	9 (3)

PhD, doctor of philosophy; PharmD, doctor of pharmacy.

\* Only 259 out of 273 respondents filled out the Baseline Characteristics section of the survey.

† Seven respondents did not choose any of the following options or provided listings of other credentials (e.g., *student*).

‡ If pharmacists checked off more than one area of practice, they were included in both categories; therefore, the total number of respondents in this section exceeds 259.

range of information references—68% of pharmacists in all 3 countries reported using textbooks, 50% used drug information databases, 43% used websites and 23% evaluated primary literature. Pharmacists from Canada preferred Briggs et al.'s *Drugs in Pregnancy and Lactation* and the Motherisk website and/or hotline (97% and 73%, respectively), whereas pharmacists in Qatar preferred online point-of-reference sources Lexicomp and UpToDate (57% and 50%, respectively).<sup>15–18</sup> Ugandan pharmacists preferred consulting with other health care workers (48%).

Regarding training opportunities in maternal-fetal medicine, 52% of pharmacists in Canada and Qatar disagreed or strongly disagreed that their entry-to-practice degree provided sufficient training versus 35% of pharmacists in Uganda. The 3 highest ranked education opportunities

in maternal-fetal medicine were undergraduate coursework (68.6%), self-study (29.3%) and conference seminars or workshops (22.2%). Less than 10% of pharmacists received training through certified and noncertified continuing education programs. In addition, 86% of pharmacists in all 3 countries agreed or strongly agreed that if continuing education opportunities were available for maternal-fetal medicine therapeutics, they would be interested in participating.

## Discussion

This study assessed the knowledge of the therapeutics of maternal-fetal medicine by pharmacists in Canada, Qatar and Uganda. The major findings of this study suggest that overall knowledge regarding maternal-fetal medicine in the 3 centers studied is low. It was also found

**TABLE 2** Summary of results

Factors affecting knowledge	N	Score*	p-value
<b>Primary outcome</b>			
<b>Country</b>			
Canada	147	62.9	<0.001†
Qatar	100	53.3	
Uganda	26	57.1	
<b>Secondary outcomes</b>			
<b>Gender</b>			
Male	96	37.1	NS
Female	161	62.2	
<b>Years of practice</b>			
Up to 5 years	114	44.0	NS
> 5 years	145	55.9	
<b>Practice area</b>			
Hospital	155	59.8	NS
Community	76	29.3	
Primary care	4	1.5	
Academia	10	3.9	
Combination	3	1.2	
Multiple areas	14	5.4	
<b>Parental status</b>			
No children	135	54.0	NS
Children	115	46.0	
<b>Level of education</b>			
Bachelor degree in pharmacy	163	62.9	NS
Post-bachelor degree residency	51	19.6	
Entry-level PharmD	3	1.2	
Postgraduate PharmD	23	8.9	
Master's degree in pharmacy	10	3.9	
PhD	2	0.8	

PharmD, doctor of pharmacy; PhD, doctor of philosophy; NS, nonsignificant.

\* Score refers to knowledge assessment score.

† Canada versus Qatar  $p < 0.001$ ; Canada versus Uganda  $p = 0.057$ ; Qatar versus Uganda  $p = 0.357$ .

that pharmacists use different learning resources to answer drug information requests in different regions and that pharmacists have a desire to participate in continuing education regarding maternal-fetal medicine, but do not have a wide variety of programs to choose from. These findings allow us to draw many conclusions and call for future projects and programming in this therapeutic area.

The survey response rate of pharmacists in this study (61%) was close to what was anticipated

and in line with that of other health care surveys; a systematic review published in 2003 that determined the response rates of Internet surveys filled out by health care professionals found that 9–94% of surveys are completed and rates were increased when multiple reminders were sent.<sup>19</sup>

Overall, pharmacists in British Columbia, Canada, scored significantly higher on the knowledge assessment portion when compared to pharmacists in Qatar. This discrepancy may reflect differences in education and training

opportunities in the 2 different countries. Seventy-one percent of pharmacists in Canada versus 41% in Qatar indicated they had training in maternal-fetal medicine within their undergraduate courses. Given that the majority of participants in the survey held a bachelor's degree in pharmacy as their highest obtained degree, the undergraduate curriculum could provide a platform for improving knowledge in this area. No significant differences in knowledge assessment were found between Canada and Uganda or between Qatar and Uganda. This is likely attributed to the small sample size from Uganda; however, approximately 60% of pharmacists in Uganda did report training opportunities in maternal-fetal medicine within their undergraduate coursework.

More than 65% of pharmacists stated that they face questions or clinical problems regarding maternal-fetal medicine at least monthly. This result demonstrates the relevance of maternal-fetal medicine as an important area for pharmacy practice and one that requires continual competence. What is concerning, however, is that self-study was highly ranked as a method for continuing education, which suggests a lack of structured education programs. With more than 86% of pharmacists stating a desire for structured continuing education opportunities, it can be concluded that a major need exists for program development. In addition to program development, entry-to-practice curricula can be reviewed to ensure graduates are given the necessary knowledge and skills to competently provide care in this area. Specific changes may be a greater emphasis on conditions related to maternal-fetal medicine, specialized workshops to address common therapeutic controversies and/or specialized experiential training rotations to increase awareness and knowledge of this important practice area.

Interesting results were also found with respect to the use of information resources. Canadian pharmacists more frequently reported using textbooks and other endorsed references when faced with drug information requests. Pharmacists in Qatar reported point-of-care references more commonly, whereas pharmacists in Uganda reported collaboration with colleagues as the preferred source of information. This finding raises important points about global access to high-quality drug information resources. This is especially

important for specialized areas such as maternal-fetal medicine, in which decisions regarding care can significantly affect maternal and child health. Increasing access to these resources could help improve quality of care for maternal-fetal medicine patients worldwide. Pharmacy curricula could also benefit by providing students with training regarding free, open-access resources accessible in their home region.

Although this study was designed as a pilot, 2 limitations can be noted. First, the sample size obtained from Uganda was lower than that from Qatar and Canada, and due to the risk of being underpowered, it is difficult to make any firm conclusions about differences between Uganda and the other centres. We deem the small sample size to be due to a smaller number of pharmacists involved with direct patient care and to the inaccessibility of our online survey platform, because Internet access is not as freely available in Uganda. Another limitation is the inability to benchmark knowledge scores obtained at this time. This was the first time the questionnaire was used, and it is not known what a passing score should be. Therefore, conclusions are limited to relative generalizations among centres, as well as results from assessing pharmacists' perceptions regarding this area.

Because similar results were found in each of the 3 regions, they are likely comparable elsewhere. One must be careful not to generalize to all regions, however, due to differences in training, the prevalence of maternal-fetal medicine patients and the ability to subspecialize. This therapeutic area has not traditionally been a focus of pharmacist training, and the results of this study show that continuing education may be needed (and desired) in multiple locations. The results obtained for training opportunities and use of resources are specific to each region, but generalizations can be made regarding the desire for learning opportunities. Any developed program could consider international adaptations to have greater impact by reaching a larger target audience.

## Conclusion

This study has provided a baseline assessment of pharmacists' knowledge and training opportunities in maternal-fetal medicine within Canada, Qatar and Uganda, and it contributes to the limited amount of existing literature. The results call for curriculum assessment, the enhancement

of entry-to-practice degrees and the development of continuing education programs for practising pharmacists. Future interventional studies are needed to evaluate the updated knowledge of pharmacists in maternal-fetal medicine and assess if this change in knowledge has led to more clinical

interventions and involvement of pharmacists in this medical specialty. With the increasing amount of knowledge and literature regarding medical specialties, continuing education of health care professionals must be emphasized in the years to come. ■

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**Author Contributions:** Ms. Bains was responsible for data collection in Canada, as well as analysis of all data and drafting, editing and approval of the final manuscript. Ms. Rahhal and Mrs. Abu Samaha were responsible for data collection and analysis in Qatar, and they edited and approved the final manuscript. Mr. Kitutu was responsible for data collection and analysis in Uganda, and he edited and approved the final manuscript. Dr. Rowe and Dr. Wilby conceived the project idea, were responsible for student-resident supervision and study design, and edited and approved the final manuscript.

**Declaration of Conflicting Interests:** The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

**Funding:** This project was funded by an internal grant from Qatar University.

## References

- International Pharmaceutical Federation (FIP). FIP reference paper on the effective utilization of pharmacists in improving maternal, newborn and child health (MNCH). FIP; 2011. Available: [www.fip.org/www/uploads/database\\_file.php?id=325&table\\_id](http://www.fip.org/www/uploads/database_file.php?id=325&table_id) (accessed June 21, 2012).
- Roberts CL, Algert CS, Morris JM, et al. Hypertensive disorders in pregnancy: a population-based study. *Med J Aust* 2005;182:332–5.
- United Nations. The Millennium Development Goals Report. United Nations Department of Economic and Social Affairs (DESA); 2010. Available: [www.un.org/en/mdg/summit2010/pdf/MDG%20Report%202010%20En%20r15%20-low%20res%2020100615%20-.pdf](http://www.un.org/en/mdg/summit2010/pdf/MDG%20Report%202010%20En%20r15%20-low%20res%2020100615%20-.pdf) (accessed June 24, 2013).
- Hunt KJ, Schuller KL. The increasing prevalence of diabetes in pregnancy. *Obstet Gynecol Clin North Am* 2007;34:173–99, vii.
- Schrempp S, Ryan-Haddad A, Gait KA. Pharmacist counseling of pregnant or lactating women. *J Am Pharm Assoc* 2001;41:887–90.
- Tan MP, Koren G. Teratogen information service for pharmacists: a pilot study. *J Popul Ther Clin Pharmacol* 2011;18:e377–89.
- World Health Organization (WHO). The role of a pharmacist in the health care system. WHO; 1994. Available: <http://apps.who.int/medicinedocs/en/d/jh2995e/> (accessed May 27, 2013).
- Luo AC. Medications and breast-feeding: current concepts. *J Am Pharm Assoc* 2012;52:86.
- Ronai C, Taylor JS, Dugan E, et al. The identifying and counseling of breastfeeding women by pharmacists. *Breastfeed Med* 2009;4:91–5.
- Cox S. Pharmacists' knowledge, attitudes and practices regarding influenza vaccination and treatment of pregnant women. *J Am Pharm Assoc* 2012;52:43.
- Dolan SM, Cox S, Tepper N, et al. Pharmacists' knowledge, attitudes and practices regarding influenza vaccine and treatment of pregnant women. *J Am Pharm Assoc* 2012;52:43–51.
- McAuley JW, Casey J, Long L. An evaluation of pharmacists' knowledge of women's issues in epilepsy. *Epilepsy Behav* 2009;14:243–6.
- Bains S, Rowe H, Wilby K. Pharmacists and maternal-fetal medicine: development of a tool to characterize knowledge and current clinical practice. *J Matern Fetal Neonat Med* 2014;27:753–5.
- Hayyawi AH, Al-Marayati AY, Salman WS, et al. HIV/AIDS knowledge, attitudes and beliefs among a group of Iraqis. *East Med Health J* 2010;16:18–23.
- Briggs GG, Freeman RK, Yaffe SJ. *Drugs in pregnancy and lactation*. 9th ed. Philadelphia (PA): Lippincott Williams & Wilkins; 2011.
- Motherisk. Toronto (ON): Hospital for Sick Children. Available: <http://www.motherisk.org/women/index.jsp> (accessed August 12, 2013).
- Lexicomp Database. Wolters Kluwer Health, Lexi-Comp, Inc.; 2013. Available: <http://www.lexi.com> (accessed August 12, 2013).
- UpToDate Database. Wolters Kluwer Health, UpToDate Inc.; 2013. Available: <http://www.uptodate.com> (accessed August 12, 2013).
- Braithwaite D, Emery J, de Lusignan S, Sutton S. Using the internet to conduct surveys of health professionals: a valid alternative? *Family Pract* 2003;20:545–51.