

# Rural practice and the personal and educational characteristics of medical students

## Survey of 1269 graduates of the University of Manitoba

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### Abstract

**Objective** To describe the relationships between rural practice and the personal and medical education characteristics of medical students and residents.

**Design** Cross-sectional, mailed survey.

**Setting** Manitoba.

**Participants** Of 2578 physician graduates of the University of Manitoba from 1965 to 2000 who were surveyed, 1269 (49%) responded.

**Main outcome measures** Whether physicians had ever practised in rural settings, and their demographic characteristics and adolescent, medical school, and residency training experiences. Multivariate logistic regression models were used to determine variables jointly and independently associated with rural practice.

**Results** Of 1269 respondents, 39% had practised in rural settings, including 58% of the 362 respondents who identified family practice as their primary career activity, and 32% of the 907 respondents whose primary activities were other than family practice. For all graduates, being male ( $P=.0289$ ), having lived in a rural community ( $P<.0001$ ), having attended a rural high school ( $P<.0001$ ), and having rural educational experiences during medical school ( $P=.0068$ ) or during postgraduate training ( $P<.0001$ ) were significantly related to a greater likelihood of rural practice. In the final multivariate model, graduates of rural high schools, compared with those from urban public schools, were 1.57 times (95% CI 1.09 to 2.26) more likely to have practised in rural settings. Graduates who undertook part of their undergraduate training in rural settings were 1.34 times (95% CI 1.09 to 1.75) more likely to practise in rural locations. For both undergraduates and residents, the distance of their rural education experiences from Winnipeg and the likelihood of rural practice were directly related. For both FPs and non-FPs, being male and undertaking rural education during residency training were associated with a greater likelihood of rural practice, as was the distance of the training experience from the urban setting. For non-FPs a similar association was observed with undergraduate rural experiences.

**Conclusion** This large survey of graduates from a Canadian medical school demonstrated that attending a rural high school ( $P<.0001$ ) and having rural educational exposure during medical school and residency training ( $P=.0068$ ) were significantly associated with a physician practising in a rural location. That is, rural educational experiences on the continuum from high school through residency training appeared to be associated with rural practice.

#### EDITOR'S KEY POINTS

- This study of physician graduates from the University of Manitoba demonstrated that attending a rural high school ( $P<.0001$ ) and having a rural educational exposure during medical school and residency training ( $P=.0068$ ) were all significantly and independently associated with a physician ever practising in a rural location. Rural experience during residency training was a key factor.
- Increasing time spent in rural training and increasing distance of the rural training site from Winnipeg were related to an increased likelihood of rural practice. Distance was the more important variable. Family physicians who had training experiences more than 100 km from the urban setting during residency were 4.22 times more likely to practise in rural settings after graduation, compared with those with no rural residency experience. The same effect of rural residency experience was apparent for non-FPs, with an odds ratio of 4.70.

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# La pratique en milieu rural et les caractéristiques des étudiants en médecine sur le plan personnel et de l'éducation

Enquête auprès de 1269 diplômés de l'Université du Manitoba

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## Résumé

**Objectif** Décrire les liens qui existent entre la pratique rurale et les caractéristiques étudiants en médecine et des résidents sur le plan personnel et de la formation médicale.

**Type d'étude** Enquête postale transversale.

**Contexte** Le Manitoba.

**Participants** Sur 2578 médecins diplômés de l'Université du Manitoba entre 1965 et 2000 qui ont été sondés, 1269 (49%) ont répondu.

**Principaux paramètres à l'étude** Pratique antérieure en milieu rural; caractéristiques démographiques; et expérience éducationnelle au cours de l'adolescence, des études médicales et de la résidence. On s'est servi de modèles d'analyse de régression multiple logistique pour déterminer les variables qui présentent des associations dépendantes ou indépendantes avec la pratique en région.

**Résultats** Sur les 1269 répondants, 39% avaient déjà pratiqué en milieu rural, incluant 58% des 362 répondants qui avaient indiqué que la médecine familiale était leur principale activité professionnelle et 32% des 907 répondants dont les activités principales n'étaient pas la médecine familiale. Pour l'ensemble des diplômés, il y avait une association significative entre une probabilité élevée de pratique rurale et le fait d'être un homme ( $P = ,289$ ), d'avoir vécu en milieu rural ( $P < ,0001$ ), d'avoir fait ses études secondaires en milieu rural ( $P < ,0001$ ) et d'avoir eu une expérience rurale durant le premier cycle ( $P < ,0068$ ) ou le deuxième cycle ( $P < ,0001$ ) des études médicales. D'après le modèle final de l'analyse de variance multiple, les diplômés des écoles secondaires rurales étaient 1,57 (IC à 95% 1,09 à 2,26) fois plus susceptibles d'avoir pratiqué en milieu rural que ceux qui avaient fréquenté des écoles publiques urbaines. Les diplômés qui avaient fait une partie de leur formation de premier cycle en milieu rural étaient 1,34 (IC à 95% 1,09 à 1,75) fois plus susceptibles de pratiquer en milieu rural. Pour les étudiants du premier cycle comme pour les résidents, il y avait une relation directe entre la distance entre Winnipeg et le lieu de leur expérience de formation rurale, et la probabilité d'une pratique rurale. Pour les MF comme pour les non MF, le fait d'être un homme et d'avoir eu une formation en milieu rural durant la résidence était associé à une probabilité plus élevée de pratique rurale, et cela était aussi vrai pour la distance entre ce lieu de formation et un milieu urbain. On observait une association semblable pour les non MF qui avaient une expérience rurale au cours du premier cycle.

**Conclusion** Cette grande étude auprès de diplômés d'une école de médecine canadienne a révélé une association significative entre le choix de pratiquer en milieu rural et celui d'avoir fréquenté une école secondaire rurale ( $P < ,0001$ ) et d'avoir fait une partie de sa formation en milieu rural durant les études médicales et la résidence ( $P < ,0068$ ). Autrement dit, le fait d'avoir eu une expérience éducationnelle rurale au cours de la période de formation s'étendant de l'école secondaire à la résidence favoriserait une pratique rurale.

### POINTS DE REPÈRE DU RÉDACTEUR

• Cette enquête auprès de diplômés de l'Université du Manitoba a révélé que le fait d'avoir fréquenté une école secondaire rurale ( $P < ,0001$ ) et d'avoir eu une expérience de formation rurale durant les études médicales et la résidence ( $P < ,0068$ ) était associé de façon indépendante et significative à la probabilité de pratiquer en milieu rural à un moment ou un autre. Une expérience rurale durant la résidence constituait un facteur clé.

• La probabilité d'une pratique rurale augmentait avec la durée de la formation rurale et avec la distance entre le lieu de formation et Winnipeg, la principale variable étant la distance. Par rapport à ceux qui n'avaient pas eu d'expérience rurale durant la résidence, les médecins de famille qui avaient eu une telle formation à plus de 100 km d'un milieu urbain étaient 4,22 fois plus susceptibles de pratiquer en milieu rural une fois diplômés. On observait un effet semblable pour les non MF qui avaient eu une expérience rurale en cours de résidence, le rapport de cote étant de 4,70.

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Pre-medical school, medical school, and residency training factors have been found to have statistically significant associations with the recruitment and retention of physicians in rural areas in the United States.<sup>1</sup> Among pre-medical school factors, rural upbringing was the most important and most consistently positively associated with physicians' practising in rural areas. Of medical school factors, the commitment of a medical school's educational and training curriculum to a focus on rural and community medical care was associated with a greater likelihood of recruitment of their graduates to rural areas. Rural and community postgraduate residency experience was also important to the recruitment and retention of practitioners in rural areas.

Canadian studies have demonstrated similar results. In 1987, Carter reported that among graduates of the University of Manitoba then practising in the province, a non-urban high school education was most strongly associated with practice in a non-urban location,<sup>2</sup> presaging more recent Canadian studies reporting a similar finding.<sup>3-5</sup> Rural family physicians were significantly more likely than urban family physicians to have undertaken clinical training in a rural setting during medical school ( $P < .001$ ).<sup>5</sup> Residency training in family medicine in rural areas has been shown to be related to the recruitment and retention of rural practitioners.<sup>6</sup> Finally, Hogenbirk et al described a significant association between rural residency training and rural practice location in Canada among non-family medicine specialists ( $P < .01$ ).<sup>7</sup> However, in one study there was no association between exposure to rural practice during undergraduate or postgraduate training and choosing to practise in a rural community.<sup>4</sup>

The objective of this study was to explore the characteristics of University of Manitoba medical school graduates over a 36-year period in relation to career choices with respect to rural practice. This objective was examined for all graduates and, more specifically, among graduates who chose careers in family medicine and those who did not choose family medicine careers.

## METHODS

During the period of the study, 1965 to 2005, the population of Manitoba has remained fairly stable at about 1 million persons. There is 1 main urban centre in Manitoba, its provincial capital, Winnipeg. Approximately two-thirds of Manitobans live in Winnipeg or within a few kilometres of the Winnipeg city limits. Thus, concepts of urban and rural for Manitobans are fairly clear and were therefore not explicitly defined in this study.

The University of Manitoba, in Winnipeg, has the only Faculty of Medicine in the province. Thus, for this study,

the names and addresses of medical school graduates from 1965 through to 2005 were obtained from Faculty of Medicine and alumni mailing lists. A 2-page questionnaire was mailed to everyone on the list. Information about different stages of each physician's career was sought with respect to demographic characteristics, adolescent and high school activities and interests, medical school experiences and choices, postgraduate education (residency program) experiences and choices, and career activities and choices. Questions were constructed so as to be able to quantify the extent of rural training experience in terms of distance or time spent away from an urban centre in each phase of the respondent's academic and career experience.

The key dependent variable for analysis was the response to the question "Have you ever practised in a rural setting?" A yes answer to this question will be referred to as *rural practice*. We did not impose a definition of *rural setting* for practice either in Manitoba or elsewhere, but left this to the discretion of the respondent.

The population of respondents was characterized with descriptive statistics of frequencies within categories of independent variables tabulated against rural practice. We calculated  $\chi^2$  statistics to test associations between rural practice and each variable within the set of stage-specific questions. For all respondents, and for the subsets of respondents who identified their career as family practice or not family practice, multivariate logistic regression models were used to determine the set of variables jointly and independently associated with rural practice. Differences with  $P \leq .05$  for 2-tailed tests were considered significant.

## RESULTS

The survey was sent to 3003 physicians in June 2006, with 1 reminder sent 3 months later. There were 1426 (47%) survey forms returned. Because the question about whether they had ever practised in a rural setting would be irrelevant to recent graduates who might still be completing residency training, it was decided to exclude 157 respondents from among 425 students who graduated from 2001 through 2005. This left data from 1269 graduates for analysis from among 2578 graduates sent questionnaires (49% response rate), spanning the 36 years from 1965 through 2000 (**Table 1**). Among these, 39% (499 of 1269) reported having practised in rural settings. Among the 1269 respondents, 362 graduates identified family practice as their primary career activity in medicine, among whom 210 (58%) reported having practised in rural settings. Among the 907 respondents who identified their primary career activity in medicine as other than family practice, 289 (32%) reported having practised in rural settings (**Table 2**).

**Table 1. Demographic characteristics, adolescent experiences, and medical school training and residency experiences for 1269 University of Manitoba medical school graduates**

CHARACTERISTIC OR EXPERIENCE	N (%)
<b>Demographic characteristic</b>	
• Sex	
-Male	889 (70)
-Female	380 (30)
• Have you ever lived in a rural community?	
-Yes	568 (45)
-No	696 (55)
-Left blank	5 (<1)
• Either parent a medical doctor	
-Yes	174 (14)
-No	1095 (86)
<b>Adolescent experience</b>	
• Type of high school	
-Rural Manitoba	216 (17)
-Winnipeg public school	710 (56)
-Winnipeg private school	184 (14)
-Out of Manitoba	128 (10)
-Left blank	31 (2)
• Size of high school	
-Fewer than 200 students	181 (14)
-200 to 500 students	508 (40)
-More than 500 students	566 (45)
-Left blank	14 (1)
• Lived on farm more than 1 mo in summer	
-Yes	391 (31)
-No	878 (69)
<b>Medical school experience</b>	
• Year of graduation	
-1965 to 1976	345 (27)
-1977 to 1988	548 (43)
-1989 to 2000	376 (30)
• Rural experience during medical school	
-No rural experience	475 (37)
-Any rural experience	794 (63)
-Rural, less than 100 km from Winnipeg	171 (13)
-Rural, more than 100 km from Winnipeg	230 (18)
-Northern Manitoba	123 (10)
-Out of Manitoba	49 (4)
-Rural, location not stated	221 (17)
<b>Residency training experience</b>	
• No residency training (rotating internship only)	237 (19)
• No rural residency experience	690 (54)
• Any rural residency experience	342 (27)
• Distance from Winnipeg	
-Rural, less than 100 km from Winnipeg	76 (6)
-Rural, more than 100 km from Winnipeg	67 (5)
-Northern Manitoba	41 (3)
-Out of Manitoba	77 (6)
-Rural, location not stated	81 (6)
• Duration	
-Rural less than 2 wk	37 (3)
-Rural 2 to 4 wk	93 (7)
-Rural 4 to 8 wk	77 (6)
-Rural more than 8 wk	139 (11)

The proportions of respondents indicating that they had practised in rural settings are presented in **Table 2** by demographic characteristics, adolescent experiences, medical school training, and residency training experience. Rural practice was more likely to be reported by male respondents, with 41% of men compared with 35% of women having practised in rural settings (odds ratio [OR] 1.32, 95% CI 1.03 to 1.70). Further, those who lived in rural communities as children (OR 8.37, 95% CI 6.45 to 10.84), those who attended rural high schools, and in general those who had more experience training in rural locations during their undergraduate medical school training or their postgraduate medical training were all more likely to have practised in rural settings. Parental occupation (having a parent who was a physician) had no relationship to rural practice. Further, specific adolescent activity and involvement, such as serving on a high school student council, playing in a band, being on a sports team, or being active in a community club, were not related to subsequent rural practice (data not shown). Seventeen percent of graduates went to high school in rural Manitoba. Of these, 58% went on to rural practice, a significantly greater proportion than the 35% who had practised in rural settings but who went to high school in Winnipeg ( $P < .0001$ ). The further from Winnipeg a rural experience during medical school was, the more likely a graduate would be to practise in a rural setting. Similarly, both distance from Winnipeg and duration of a rural rotation during residency training were related to a greater likelihood of practising in rural areas. Similar findings were apparent for the 2 subgroups of FPs and non-FPs: being male, having lived in a rural community, attending a rural high school, and rural experience during medical school and during postgraduate medical education were all related to a greater likelihood of rural practice after graduation.

Multivariate models considered 9 variables: age at the time of entering medical school, year of graduation, and 7 variables that were statistically significant ( $P < .05$ ) in univariate analysis. Six jointly significant variables remained in the final model with only age at entering medical school and a high school experience on student councils not remaining in the multivariate model for all respondents, as presented in **Table 3**. Factors describing high school location, rural training during medical school, and rural residency experience were all statistically significant ( $P < .05$ ) and retained in the final logistic regression model. Graduates attending high school in rural Manitoba compared with those graduating from urban public schools were 1.57 times more likely (95% CI 1.09 to 2.26) to have practised in rural settings. Approximately one-third (34%) of graduates had no rural experience during medical school. The graduates who did have part of their medical school training in rural settings were 1.34 times (95% CI 1.09 to 1.75)

**Table 2.** Distribution of a positive response to “Have you ever practised in a rural setting?” by demographic characteristics, adolescent experiences, and medical school and residency training experiences for all respondents, FPs, and non-FPs

CHARACTERISTIC OR EXPERIENCE	HAVE YOU EVER PRACTISED IN A RURAL SETTING?					
	ALL RESPONDENTS (N = 1269)		FPs (N = 362)		NON-FPs (N = 907)	
	PERCENT RESPONDING YES	P VALUE	PERCENT RESPONDING YES	P VALUE	PERCENT RESPONDING YES	P VALUE
Overall	39		58		32	
<b>Demographic characteristics</b>						
• Sex		.0289		.0341		.0250
-Male	41		62		34	
-Female	35		51		26	
• Have you ever lived in a rural community?		<.0001		<.0001		<.0001
-Yes	65		80		56	
-No	18		28		16	
• Either parent a medical doctor		.3651		.9877		.6413
-Yes	36		58		30	
-No	40		58		32	
<b>Adolescent experiences</b>						
• Type of high school		<.0001		<.0001		<.0001
-Rural Manitoba	58		70		52	
-Winnipeg public school	35		55		28	
-Winnipeg private school	34		51		28	
-Out of Manitoba	44		62		35	
-Left blank	19		33		14	
• Size of high school		.0826		.8896		.1113
-Fewer than 200 students	46		57		40	
-200 to 500 students	40		60		33	
-More than 500 students	37		58		29	
• Lived on farm more than 1 mo in summer		<.0001		<.0010		<.0001
-Yes	54		70		46	
-No	33		52		26	
<b>Medical school experience</b>						
• Year of graduation		<.0792		.0190		.0182
-1965 to 1976	44		59		38	
-1977 to 1988	36		50		31	
-1989 to 2000	39		67		27	
• Rural experience during medical school		.0068		.0318		.2670
-Rural, less than 100 km from Winnipeg	38		57		29	
-Rural, more than 100 km from Winnipeg	43		68		37*	
-Northern Manitoba	54		73			
-Out of Manitoba	39		47		33	
-Rural, location not stated	39		61		32	
-No rural experience	34		50		29	
-Any rural experience	42	<.0068	63	.0137	34	.1067
<b>Residency training experience</b>						
• Rural experience during residency training		<.0001		<.0003		<.0001
-No residency training	41		46		32	
-Rural, less than 100 km from Winnipeg	60		5		64	
-Rural, more than 100 km from Winnipeg	72		80		55*	
-Northern Manitoba	58		100			
-Out of Manitoba	53		73		40	
-Rural, location not stated	56		58		54	
-No rural residency experience	29		61		26	
-Any rural experience	59	<.0001	68	<.0007	52	<.0001
• Time in rural area during residency training		<.0001		<.0001		<.0001
-No residency training	41		46		32	
-No rural experience	29		61		26	
-Less than 2 wk	35		100		36†	
-2 to 4 wk	46		53			
-4 to 8 wk	54		49		61	
-More than 8 wk	76		83		68	

\*Rural, more than 100 km from Winnipeg, and Northern Manitoba combined.

†Rural less than 2 wk and rural 2 to 4 wk combined.

more likely to practise in rural settings after graduation. There was a direct relationship between distance of the rural undergraduate training experience from Winnipeg and the likelihood of rural practice. Similarly, rural experience during residency training was significantly related to rural practice ( $P < .0001$ ), as was the relationship between the distance of the rural residency training experience from Winnipeg and the likelihood of rural practice ( $P < .001$ ).

As presented in **Tables 4** and **5**, after adjustment for demographic characteristics, similar findings were apparent for FPs and non-FPs: FPs who had training

**Table 3. Multivariate logistic regression modeling of factors related to having ever practised in a rural setting:  $N = 1269$ .**

VARIABLE IN LOGISTIC REGRESSION MODEL	ODDS RATIO (95% CI)
<b>Demographic characteristics</b>	
• Graduated 1965 to 1976 vs 1989 to 2000	3.19 (2.08-4.89)
• Graduated 1977 to 1988 vs 1989 to 2000	1.45 (1.05-2.01)
• Age at time of entering medical school	1.05 (1.01-1.10)
• Lived on farm more than 1 mo in summer	2.13 (1.59-2.84)
<b>Type of high school</b>	
• Rural Manitoba	1.57 (1.09-2.26)
• Winnipeg public school	Reference
• Winnipeg private school	1.01 (0.69-1.47)
• Out of Manitoba	1.27 (0.83-1.95)
• Left blank	0.42 (0.16-1.16)
<b>Medical school experience in a rural setting</b>	
• Rural, less than 100 km from Winnipeg	1.34 (0.86-2.08)
• Rural, more than 100 km from Winnipeg	1.73 (1.15-2.61)
• Northern Manitoba	2.58 (1.60-4.16)
• Out of Manitoba	1.14 (0.58-2.24)
• Rural, location not stated	1.72 (1.13-2.61)
• No rural experience	Reference
<b>Residency experience</b>	
• No residency training	1.75 (1.26-2.42)
• Rural, less than 100 km from Winnipeg	3.91 (2.34-6.52)
• Rural, more than 100 km from Winnipeg	6.77 (3.72-12.32)
• Northern Manitoba	3.84 (1.98-7.45)
• Out of Manitoba	2.87 (1.74-4.73)
• Rural, location not stated	3.31 (2.04-5.38)
• No rural residency experience	Reference

**Table 4. Multivariate logistic regression modeling of factors related to ever having practised in a rural setting for FPs:  $N = 362$ .**

VARIABLE IN LOGISTIC REGRESSION MODEL	ODDS RATIO (95% CI)
<b>Demographic characteristic</b>	
• Graduated 1965 to 1976 vs 1989 to 2000	0.79 (0.39-1.62)
• Graduated 1977 to 1988 vs 1989 to 2000	0.63 (0.35-1.13)
• Male vs female	1.80 (1.08-2.99)
• Age at time of entering medical school	0.97 (0.91-1.04)
• Lived on farm more than 1 mo in summer	1.88 (1.15-3.06)
<b>Residency experience</b>	
• No residency training	0.63 (0.33-1.20)
• Rural, less than 100 km from Winnipeg	0.98 (0.43-2.25)
• Northern or rural, more than 100 km from Winnipeg	4.22 (1.45-12.30)
• Out of Manitoba	1.83 (0.65-5.13)
• Rural, location not stated	0.96 (0.37-2.51)
• No rural residency experience	Reference

**Table 5. Multivariate logistic regression modeling of factors related to having ever practised in a rural setting for non-FPs:  $N = 907$ .**

VARIABLE IN LOGISTIC REGRESSION MODEL	ODDS RATIO (95% CI)
<b>Demographic characteristics</b>	
• Graduated 1965 to 1976 vs 1989 to 2000	4.93 (2.82-8.60)
• Graduated 1977 to 1988 vs 1989 to 2000	2.12 (1.41-3.19)
• Age at time of entering medical school	1.11 (1.05-1.18)
• Male vs female	1.34 (0.92-1.93)
• Lived on farm more than 1 mo in summer	2.88 (2.07-4.01)
<b>Medical school experience in a rural setting</b>	
• Rural, less than 100 km from Winnipeg	1.38 (0.78-2.44)
• Northern or rural, more than 100 km from Winnipeg	2.38 (1.48-3.82)
• Out of Manitoba	1.44 (0.60-3.43)
• Rural, location not stated	1.81 (1.08-3.03)
• No rural experience	Reference
<b>Residency experience</b>	
• No residency training	1.30 (0.75-2.24)
• Rural, less than 100 km from Winnipeg	6.76 (2.92-15.6)
• Northern or rural, more than 100 km from Winnipeg	4.70 (2.63-8.40)
• Out of Manitoba	2.33 (1.20-4.52)
• Rural, location not stated	4.40 (2.30-8.40)
• No rural residency experience	Reference

experiences more than 100 km from the urban setting during residency were 4.22 (95% CI 1.45 to 12.30) times more likely to practise in rural settings after graduation, compared with those with no rural residency experience. The same effect of rural residency experience was apparent for non-FPs, with an OR of 4.70 (95% CI 2.63 to 8.40).

## DISCUSSION

This large study analyzed responses from 1269 physicians who graduated from the Faculty of Medicine at the University of Manitoba between 1965 and 2000. Our study demonstrated that attending a rural high school and having a rural educational exposure during medical school and residency training were all significantly and independently associated with a physician ever practising in a rural location. Among both FPs and non-FPs, rural experience during residency training was a key factor significantly associated with rural practice. There were 2 gradients evident: increasing time spent in rural training and increasing distance of rural training from Winnipeg were related to an increased likelihood of rural practice in all 3 models. Of distance and time, distance was the more important variable in the multivariate analysis, with distance of rural training from Winnipeg or a rural location predicting rural practice.

It is unlikely that our survey was confounded by misunderstanding of whether the question "Have you ever practised in a rural setting?" pertained to practice during undergraduate medical training or residency training as opposed to practice during one's career subsequent to completion of training. The questionnaire was organized such that this question was contained in the section entitled "Your Career in Medicine," which followed the "Your Medical School Experience" section that had all the questions pertaining to undergraduate medical education and residency training.

The importance of exposure to rural practice during training at the University of Manitoba might be underestimated by the fact that while all FPs had the opportunity for rural practice, at least some non-FPs did not, such as graduates whose specialty expertise (eg, neurosurgery) would not have provided the opportunity to engage in rural practice. However, Hogenbirk et al recently reported that even among non-family medicine specialists, postgraduate specialty training in rural areas was significantly associated with subsequent rural practice ( $P < .01$ ).<sup>7</sup> It appears that rural exposure during training is a remarkably robust predictor of choice of rural practice on graduation among FPs and it might be relevant to practitioners in other specialties as well. Rural high school location was also an important factor among University of Manitoba medical graduates, but it

was not statistically significant within either strata of FPs or non-FPs. Of relevance to non-FPs, but not FPs, rural educational experience during medical school was also a predictor of rural practice location.

The results of other published studies of non-urban practitioners in Canada reveal some similarities to the results of our survey.<sup>2-4</sup> Rural upbringing was associated with ORs of 2.3<sup>4</sup> to 4.6<sup>2</sup> for non-urban practice. Our survey also demonstrated an association between rural educational experience during the undergraduate years (for non-FPs) and during residency training (for both FPs and non-FPs). In 1987, Carter reported that non-urban practitioners were 1.87 times more likely to have had non-urban preceptorships during medical school than urban practitioners were.<sup>2</sup> With respect to determinants of rural practice among American primary care physicians, Brooks et al found that rural upbringing was related to recruitment of physicians to rural areas, while training factors such as commitment to rural curricula and rotations, particularly during residency training, correlated with retention in rural areas but not recruitment.<sup>1</sup> In Australia, a rural background was found to be an important predictor of both rural general and specialist practice, as in our study.<sup>8</sup>


Our study, consistent with studies of other Canadian,<sup>2-5</sup> American,<sup>9</sup> and Australian<sup>8</sup> practitioners, confirmed the predictive value of a rural upbringing with respect to rural practice after graduation. Perhaps of greatest interest, our study showed uniquely the value of rural educational experience during the continuum of education from high school to the end of residency training, as predictors of rural medical practice. Moreover, our study demonstrated that rural residency training is consistently associated with rural practice, among both FPs and non-FPs. This is important to note because this component of the formal medical education process has the greatest proximity to career choice. Thus, it is noteworthy to see the consistency, timeliness, and relevance of this association.

## Limitations

Our study was limited by a response rate of 49%. However, the large number of respondents, including FPs and non-FPs over a long duration, spread out relatively evenly across almost 3 decades, comprised a substantial body of data for analysis. Our cross-sectional design and inability to distinguish between those practitioners who had been in brief, compared with long-term, rural practice was also a limiting factor, as well as whether such practice was current or not. Accordingly, we are unable to distinguish between factors that predicted recruitment to rural practice as opposed to retention. We are mindful that our study demonstrated associations among factors that might not have been causally related. Distinguishing between associations

and determinants might be aided by examination of the intentions of undergraduate students and evaluation of the role of interventions to sustain those intentions.

## Conclusion

Our study demonstrated that exposure to training in rural areas is an important factor in determining subsequent choice of rural medical practice. Our results add to the existing literature by examining rural experience through the continuum of high school, undergraduate, and postgraduate education. We found that any rural experience throughout this lengthy education period was related to an increased likelihood of rural medical career choice. Both the duration of time in a rural setting and the physical distance from an urban centre of the rural location were important considerations during training. Of the 2, location was more important. More remote rural exposures had a stronger association with a subsequent career choice of rural practice. 

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## Contributors

Both authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

## Competing interests

None declared

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