

What is the financial state of medical students from rural backgrounds during tuition fee deregulation?

Wayne Woloschuk, PhD
Undergraduate Medical Education, Faculty of Medicine, University of Calgary, Calgary, Alta.

Jean-François Lemay, MD
Developmental Pediatrics, Alberta Children's Hospital, Calgary, Alta.

Bruce Wright, MD
Undergraduate Medical Education, Faculty of Medicine, University of Calgary, Calgary, Alta.

Correspondence to:
Dr. Wayne Woloschuk, Rm. G701B, 3330 Hospital Dr. NW, Health Sciences Centre, Faculty of Medicine, University of Calgary, Calgary AB T2N 4N1; woloschu@ucalgary.ca

This article has been peer reviewed.

Introduction: We sought to examine the financial state of medical students from rural backgrounds during a time of tuition fee deregulation.
Methods: We surveyed incoming classes from 2007 to 2011 at the University of Calgary. Community background, expected educational debt at graduation, educational debt at entry to medical school and parental income were collected for analysis. Data were analyzed using the χ^2 test, analysis of variance and the Newman–Keuls multiple comparison test.
Results: The overall response rate was 95.3%. Of the 571 (93.5%) respondents who supplied data on their background and debt, 94.4% expected to have educational debt at graduation. The mean projected educational debt at graduation by medical students from both rural ($107 226 [95% confidence interval (CI) $98 030–$116 423]) and regional ($99 456 [95% CI $91 905–$107 006]) backgrounds was significantly greater than the debt projected by students from metropolitan ($88 565 [95% CI $83 607–$93 524]) backgrounds. Medical students who came from rural backgrounds had the highest mean debt at entry to medical school ($33 053 [95% CI $25 715–$40 391]) compared with their peers from regional ($23 253 [95% CI $16 621–$29 885]) and metropolitan ($22 053 [95% CI $17 344–$26 762]) backgrounds. Students of rural origin also had parents whose mean income ($104 024 [95% CI $75 976–$132 173]) was significantly lower than the mean parental income of their peers who originated from regional ($143 167 [95% CI $119 898–$166 435]) and metropolitan ($150 339 [95% CI $135 241–165 438]) centres.
Conclusion: Rising tuition and subsequent debt may be affecting the diversity of medical students' backgrounds. Financial programs dedicated to rural-background students and their interest in medicine may become necessary.

Introduction : Nous voulions étudier la situation financière des étudiants en médecine provenant de milieux ruraux en période de déréglementation des frais de scolarité.
Méthodes : Nous avons sondé les groupes d'arrivée de 2007 à 2011 à l'Université de Calgary. Nous avons réuni pour l'analyse leur lieu d'origine, la dette d'études qu'ils prévoyaient avoir au moment de la graduation, leur dette d'études à leur arrivée à la Faculté de médecine et le revenu de leurs parents. Nous avons analysé les données au moyen du test de χ^2, de l'analyse des variations et du test de Newman–Keuls à comparaisons multiples.
Résultats : Le taux global de réponse s'est établi à 95,3 %. Sur les 571 répondants (93,5 %) qui ont fourni des données au sujet de leur origine et de leur dette, 94,4 % s'attendaient à avoir une dette d'études au moment de la graduation. La dette d'études moyenne, au moment de la graduation, des étudiants en médecine originaires des milieux ruraux (107 226 $ [intervalle de confiance à 95 % (IC), 98 030 $–116 423 $]) et régionaux (99 456 $ [IC à 95 %, 91 905 $–107 006 $]) était significativement plus élevée que la dette que les étudiants des régions métropolitaines prévoyaient avoir (88 565 $ [IC à 95 %, 83 607 $–93 524 $]). Les étudiants en médecine provenant de

© 2010 Society of Rural Physicians of Canada

milieux ruraux étaient les plus endettés en moyenne au moment de l'arrivée à la Faculté de médecine (33 053 $ [IC à 95 %, 25 715 $–40 391 $]) comparativement à leurs pairs provenant de milieux régionaux (23 253 $ [IC à 95 %, 16 621 $–29 885$]) et métropolitains (22 053 $ [IC à 95 %, 17 344 $–26 762 $]). Les étudiants d'origine rurale avaient aussi des parents dont le revenu moyen (104 024 $ [IC à 95 %, 75 976 $–132 173 $]) était significativement moins élevé que celui des parents de leurs pairs provenant de centres régionaux (143 167 $ [IC à 95 %, 119 898 $–166 435 $]) et métropolitains (150 339 $ [IC à 95 %, 135 241 $–165 438 $]).

Conclusion : La montée des frais de scolarité et l'endettement qui en découle peuvent avoir un effet sur la diversité de l'origine des étudiants en médecine. Il pourrait être nécessaire de créer des programmes financiers visant à appuyer les étudiants d'origine rurale et l'intérêt qu'ils portent à la médecine.

INTRODUCTION

The concern about insufficient numbers of rural physicians across Canada has been well-documented.[1–6] It has been shown that medical students from rural backgrounds are more likely to eventually practise in rural communities.[3,7–10] However, the proportion of students with rural backgrounds who apply to medical school is not reflective of the population that resides in rural Canada.[11,12] Getting more students from rural communities to apply to medical school has been a significant challenge. This is unfortunate because recent evidence suggests that once students of rural origin apply to medical school, they are as successful in gaining entry as other candidates.[13,14]

Across Canada, tuition fees for medical school have been on the rise. Although rising tuition fees have had an impact on the debt projected by first-year medical students in Ontario,[15] research surrounding the financial challenges faced by medical students from rural backgrounds is limited. In a study including students from 12 Canadian medical schools, Kwong and colleagues[12] found that a greater proportion of students from rural backgrounds not only came from families of lower socioeconomic status (parental income < $40 000) than their nonrural peers, but also entered medical school with debt and anticipated having debt at graduation. That study, however, which included students from the University of Calgary, was conducted in 2001 and before the wave of deregulation of tuition fees that swept across universities in western Canada. For example, the final year of tuition-fee control at the University of Calgary was in 2002 (class of 2005) when medical school tuition was $6992. Following the deregulation of tuition fees in 2003, fees increased to $9950 (class of 2006), then to $12 788 (classes of 2007, 2008 and 2009) and $13 210 (classes of 2010 and 2011).

The primary aim of this study was to examine the projected educational debt at graduation of rural-background medical students during the time of tuition fee deregulation. We also investigated the educational debt at entry to medical school of rural-background medical students and how the socioeconomic status of their parents compared with that of their nonrural peers.

METHOD

Incoming students (classes 2006–2011) to the 3-year medical program at the University of Calgary were surveyed using a paper–pencil questionnaire during orientation week, which occurs during the first week of medical school. All medical students registered in the respective incoming classes were eligible to complete the survey. Students were assured during the orientation that participation was voluntary and that the decision to participate or not participate would not affect their academic standing. To maintain confidentiality, a code number was assigned to each questionnaire. Students' decision to complete the questionnaire was accepted as indication of consent and willingness to participate.

To focus on financial measures collected during the time of greatest impact, data provided by the class of 2006 was not included, as these students didn't experience the full effect of tuition fee deregulation and were likely in the application pipeline when the deregulation was initiated. Data provided by international students were also excluded. Consequently, study participants in the group affected by tuition fee deregulation consisted of classes 2007–2011.

Demographic information collected included sex, age and community background. Financial information collected included projected educational debt at graduation, educational debt at entry and parental

income, which was used as a proxy for socioeconomic status. Educational debt was defined as "debt incurred due to educational costs that must be paid back." Student background designation was based on the population of the community where the student was primarily raised (rural < 10 000, regional 10 000–200 000, metropolitan > 200 000). In the analysis, financial figures were treated as interval data to better understand the magnitude of both educational debt and parental income. Data were analyzed using the χ^2 test, analysis of variance and the Newman–Keuls multiple comparison test.

The Conjoint Health Research Ethics Board at the University of Calgary granted ethical approval for this study.

RESULTS

Of the 582 (95.3%) medical students who returned a survey, 94, 143 and 344 students reported rural, regional and metropolitan backgrounds, respectively. One female student did not report the background in which she was primarily raised. The 3 groups varied slightly in the proportion of female students: rural (57.5%), regional (50.4%) and metropolitan (52.3%) ($p > 0.05$). The mean age of students from both rural (25.4 [standard deviation (SD) 4.3] yr) and regional (25.3 [SD 3.6] yr) backgrounds was significantly greater than the mean age of students from metropolitan (24.2 [SD 3.5] yr) backgrounds ($p < 0.05$).

Complete information on community background and expected educational debt at graduation was provided by 571 (93.5%) respondents. Nearly all (n = 539, 94.4%) of these students expected to have educational debt at graduation (97.9% rural, 97.1% regional, 92.3% metropolitan; $p > 0.05$). Using data supplied by the students who expected to have educational debt at graduation, a one-way (community background) analysis of variance on projected educational debt at graduation revealed significant differences ($F = 7.29$, $p < 0.001$). The mean projected educational debt at graduation (Table 1) was significantly greater for rural- and regional-background medical students compared with metropolitan-background medical students.

Of the 577 (94.4%) respondents who provided complete information about their background and educational debt at entry, 228 (39.5%) were in debt on entry to medical school. The proportion of rural-background medical students with educational debt at entry (52.1%) was significantly greater than the proportion of metropolitan-background medical students with educational debt at entry (34.8%) ($p < 0.05$). The proportion of regional-background medical students with educational debt at entry (42.6%) did not differ from their peers. Using data provided by 228 respondents with educational debt at entry, a one-way (community background) analysis of variance revealed significant differences ($F = 3.22$, $p < 0.05$). Rural-background medical students had significantly greater educational debt at entry than medical students from both regional and metropolitan backgrounds (Table 2).

A separate one-way (community background) analysis of variance on parental income using data provided by 487 (79.9%) respondents was significant ($F = 4.09$, $p < 0.02$). Mean parental income (Table 3) reported by students from regional and metropolitan backgrounds was significantly greater than parental income reported by students from rural backgrounds.

Of note, the median total family income of Albertans was $78 400 in 2006,[16] which is when the class of 2009 began, and is the midpoint of our 5-class cohort. When reviewing parental income, 32% of respondents in this study originated from families whose income was below the provincial median.

Table 1. Mean projected educational debt at graduation of 539 medical students, by community background

Community background	Projected debt, $	95% CI, $
Rural, n = 91	107 226	98 030–116 423
Regional, n = 135	99 456	91 905–107 006
Metropolitan, n = 313	88 565	83 607–93 524

CI = confidence interval.

Table 2. Mean educational debt of 228 students at entry to medical school, by community background

Community background	Debt at entry, $	95% CI, $
Rural, n = 49	33 053	25 715–40 391
Regional, n = 60	23 253	16 621–29 885
Metropolitan, n = 119	22 053	17 344–26 762

CI = confidence interval.

Table 3. Mean income of the parents of 487 medical students, by community background

Community background	Parental income, $	95% CI, $
Rural, n = 82	104 024	75 976–132 173
Regional, n = 120	143 167	119 898–166 435
Metropolitan, n = 285	150 339	135 241–165 438

CI = confidence interval.

DISCUSSION

Medical students from rural backgrounds projected high educational debt at graduation, and the income of their parents was the lowest of the 3 groups studied. Not only did a greater proportion of medical students from rural backgrounds report educational debt at entry compared with those from metropolitan backgrounds, but medical students from rural backgrounds also displayed the highest educational debt at entry of all groups. Living away from home to attain medical school entry requirements is probably the main reason why rural-background medical students have the highest educational debt at entry.[12] Interestingly, medical students from both rural and regional backgrounds were significantly older at entry to medical school than their peers from metropolitan backgrounds. This may suggest that it takes students from nonmetropolitan backgrounds longer to attain medical school entry requirements and the finances to proceed with medical training.

Rising tuition may not only serve as a deterrent to qualified candidates,[17,18] but also may limit the diversity[18] (i.e., background) of medical students, which ultimately has implications for the profession's ability to understand and solve major health issues.[19] In particular, 32% of respondents in this study reported parental income below the provincial median, suggesting that most students in this study originated from families of higher socio-economic status. As tuition fees rise, a threshold may eventually be reached whereby some students may consider the financial realities of entering medical school to be overwhelming. It is reasonable to presume that for students of lower income families, this may have already occurred. Rising tuition may be especially detrimental to students from rural backgrounds, as financial support from parents may not be as readily available to these students as it is to their nonrural peers. With regard to exit from medical school, the level of perceived debt may also prove to be a disincentive for some potential applicants. However, the actual amount of debt that may dissuade students from applying to medical school remains somewhat elusive. This may be due, in part, to tuition fee increases that, so far, have had limited impact on higher income families.[15]

Of particular note is that the mean projected educational debt at graduation of rural-background medical students is above $100 000. Earlier research[12] found that the impact of financial stress on rural and nonrural students regarding specialty choice and practice location is similar and relatively minor. Whether the impact of financial stress on career-related decisions will change as debt soars is an important question and worthy of future study.

Limitations

These results reflect the financial state of students at one medical school and therefore may not generalize to students attending other schools across Canada. For example, the medical program at the University of Calgary is 3 years in duration. Medical students training in other programs, which are typically 4 years in length, will presumably assume larger debt by the time they graduate. On the other hand, students in a 4-year medical program have much more vacation time than students in a 3-year program, which allows them to earn income to cover the cost of attending medical school. How these factors interact to have an impact on educational debt of medical students training in programs of different duration is unknown.

It is also possible that students from lower income families tend to select 3-year medical programs. Examining the proportion of students from families whose income is below the median and who are attending other Canadian medical schools would clarify this and whether the projected debt reported in this study was inflated because of the students (32%) from lower income families.

Although students from rural backgrounds reported greater debt, gaining insight into the reasons for their indebtedness was beyond the scope of this study. Reported debt at graduation reflected a projected or anticipated debt that may prove to be somewhat inaccurate at the time of graduation. Additionally, several students did not report parental income, presumably because they did not know the information. This reduced the number of participants in the analysis of parental socio-economic status. It is possible that students who did not report parental income represented a particular socio-economic group (upper or lower) and simply chose not to disclose the information, thereby biasing the results. On the other hand, those who did report parental income may have done so without truly knowing the income of their parents. That is, the income they reported may be an approximation.

CONCLUSION

The anticipated educational debt at graduation of medical students from rural backgrounds, who

come from families less affluent than those of their peers, remains high. As tuition fees increase, financial programs to support rural-background students and their interest in medicine may become necessary. In fact, several strategies to assist students from rural backgrounds have been proposed.[5] There is an urgent need for rural general practitioners and it is therefore important that the financial state of rural-background students maintains a prominent position on the rural human resources radar screen.

REFERENCES

1. Carter R. Training for rural practice: What's needed? *Can Fam Physician* 1987;33:1713-5.
2. Rourke JTB. Rural medical care in Ontario: problems and possible solutions in the next decade. *Can Fam Physician* 1989;35:1225-8.
3. Easterbrook M, Godwin M, Wilson R, et al. Rural background and clinical rural rotations during medical training: effect on practice location. *CMAJ* 1999;160:1159-63.
4. Topps D, Rourke J, Newbery P. Wanted: trainees for rural practice. *Aust J Rural Health* 2003;11:96-8.
5. Rourke J, Dewar D, Harris K, et al. Strategies to increase the enrolment of students of rural origin in medical schools: recommendations from the Society of Rural Physicians of Canada. *CMAJ* 2005;172:62-5.
6. Rourke J. Increasing the number of rural physicians. *CMAJ* 2008; 178:322-5.
7. Rolfe IE, O'Connell DL, Pearson SA, et al. Finding solutions to the rural doctor shortage: the roles of selection versus undergraduate medical education at Newcastle. *Aust N Z J Med* 1995;25:512-7.
8. Woloschuk W, Tarrant M. Does a rural educational experience influence students' likelihood of rural practice? Impact of student background and gender. *Med Educ* 2002;36:241-7.
9. Rourke JTB, Incitti F, Rourke LL, et al. Relationship between practice location of Ontario family physicians and their rural background or amount of rural medical education experience. *Can J Rural Med* 2005;10: 231-9.
10. Chan BTB, Degani N, Crichton T, et al. Factors influencing family physicians to enter rural practice. *Can Fam Physician* 2005;51:1246-7.
11. Dhalla IA, Kwong JC, Streiner DL, et al. Characteristics of first-year students in Canadian medical schools. *CMAJ* 2002;166:1029-35.
12. Kwong JC, Dhalla IA, Streiner DL, et al. A comparison of Canadian medical students from rural and non-rural backgrounds. *Can J Rural Med* 2005;10:36-42.
13. Wright B, Woloschuk W. Have rural background students been disadvantaged by the medical school admission process? *Med Educ* 2008; 42:476-9.
14. Hutten-Czapski P, Pitblado R, Rourke J. Who gets into medical school? *Can Fam Physician* 2005;51:1240-1.
15. Kwong JC, Dhalla IA, Streiner DL, et al. Effects of rising tuition fees on medical school class composition and financial outlook. *CMAJ* 2002; 166:1023-8.
16. Statistics Canada. Median total income, by family type, by province and territory. 2009. Available: www40.statcan.gc.ca/l01/cst01/famil108a-eng.htm (accessed 2009 Nov. 18).
17. Theodorou ME. The soaring cost of medical education in Ontario: stress, poverty and debt among medical students. *Ont Med Rev* 1996;63: 50-2.
18. Jolly P. Medical school tuition and young physicians' indebtedness. *Health Aff (Millwood)* 2005;24:527-35.
19. Duffin J. What goes around comes around: a history of medical tuition. *CMAJ* 2001;164:50-6.

CHAMPIX is indicated for smoking cessation treatment in adults in conjunction with smoking cessation counselling. For patients who have successfully stopped smoking at the end of 12 weeks, an additional course of 12 weeks treatment with CHAMPIX may be considered. In general, onset of adverse events occurred in the first few weeks of therapy and severity was generally mild to moderate. The most commonly observed adverse events associated with CHAMPIX (>5% and twice the rate seen in placebo-treated patients) were nausea (30%), abnormal dreams (13%), constipation (8%), flatulence (6%), and vomiting (5%). Nausea, for some subjects, persisted over several months. The incidence of nausea was dose-dependent. Initial dose-titration was beneficial in reducing the occurrence of nausea. For patients with intolerable nausea, dose reduction should be considered. CHAMPIX is contraindicated in patients who are hypersensitive to varenicline or to any ingredient in the formulation or component of the container. There have been post-marketing reports of serious neuropsychiatric symptoms in patients being treated with CHAMPIX, including anxiety, psychosis, mood swings, depressed mood, agitation, aggression, hostility, changes in behaviour or thinking, suicidal ideation, suicidal behaviour and suicide, as well as worsening of pre-existing psychiatric disorder (previously diagnosed or not). There are a number of confounding factors which may have contributed, including effects of nicotine withdrawal due to partial or complete smoking discontinuation; concomitant, or history of psychiatric conditions; and the concomitant use of other CNS drugs and/or alcohol. However, there are cases for which these confounding factors did not appear to be present, including cases where symptoms occurred within the first week of initiating CHAMPIX, prior to initiating smoking cessation. There have been other cases where symptoms developed following cessation of CHAMPIX therapy. It is not known whether these events are occurring at a rate and severity which is different from the background rate for smoking cessation in the general population or in the psychiatric population (treated or untreated), or different from the rates for other drugs in the class of smoking cessation. **Patients with concomitant psychiatric conditions, even if well controlled, or with a history of psychiatric symptoms, should be diligently monitored by a healthcare professional for new or worsened psychiatric events.** There have been post-marketing reports of hypersensitivity reactions including angioedema in patients treated with CHAMPIX. Clinical signs included swelling of the face, mouth (tongue, lips and gums), neck (pharynx and larynx) and extremities. There were rare reports of life-threatening angioedema requiring urgent medical attention due to respiratory compromise. Patients experiencing these symptoms should be instructed to discontinue treatment with CHAMPIX and contact a healthcare provider immediately. There have also been post-marketing reports of rare but severe cutaneous reactions, including Stevens-Johnson syndrome and erythema multiforme, in patients using CHAMPIX. As these skin reactions can be life-threatening, patients should be instructed to discontinue treatment at the first sign of rash or skin reaction and contact a healthcare provider immediately. **The concomitant use of NRT with CHAMPIX may result in an increase in adverse reactions. The safety and efficacy of the combination treatment with CHAMPIX and NRT have not been studied.** There have been post-marketing reports of traffic accidents, near-miss incidents in traffic, and other accidental injuries in patients taking CHAMPIX. In some cases, the patients reported somnolence, dizziness, loss of consciousness (blackouts), seizures or difficulty concentrating. Therefore, patients should be advised not to engage in potentially hazardous activities, such as driving a car or operating dangerous machines, until they know how CHAMPIX may affect them. Safety and efficacy of CHAMPIX in pediatric patients have not been established; therefore, CHAMPIX is not recommended for use in patients under 18 years of age. CHAMPIX is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function. CHAMPIX is not recommended in patients with end-stage renal disease (ESRD).

Serious Warnings and Precautions

Psychiatric symptoms:

There have been post-marketing reports of serious neuropsychiatric symptoms with CHAMPIX, including depressed mood, agitation, aggression, hostility, changes in behaviour, suicide-related events, ncluding ideation, behaviour, attempted suicide and suicide, as well as worsening of pre-existing psychiatric disorder. **These events have occurred in patients with and without pre-existing psychiatric disorders**.

Some reported cases may have been complicated by the symptoms of nicotine withdrawal in patients who stopped smoking. Depressed mood may be a symptom of nicotine withdrawal. Depression, rarely including suicidal ideation, has been reported in smokers undergoing a smoking cessation attempt without medication. However, some of these symptoms have occurred in patients taking CHAMPIX who continued to smoke. All patients being treated with CHAMPIX should be observed for neuropsychiatric symptoms.

Important recommendations regarding psychiatric symptoms:

- The benefits and risks of all options for quitting smoking should be discussed with the patient before initiating treatment
- All patients attempting to quit smoking with CHAMPIX, as well as their families and caregivers, should be alerted about the need to monitor for depressed mood, agitation, aggression, hostility, suicidal ideation or behaviour, or changes in behaviour or thinking that are not typical for the patient
- Patients should be instructed to stop taking CHAMPIX immediately and contact their doctor if they experience, or if others observe these symptoms. In many post-marketing cases, resolution of symptoms after discontinuation of CHAMPIX was reported, although in some cases the symptoms persisted; therefore, ongoing monitoring and supportive care should be provided until symptoms resolve
- **Regarding alcohol intake:** Patients should be advised that alcohol intake may increase the risk of experiencing psychiatric adverse events during treatment with CHAMPIX
- **Regarding patients with psychiatric history:** Patients with concomitant psychiatric conditions, even if well controlled, or with a history of psychiatric symptoms, should be diligently monitored by a healthcare professional for new or worsened psychiatric events