Published in final edited form as:

Psychiatr Serv. 2014 October 1; 65(10): 1218–1225. doi:10.1176/appi.ps.201300092.

Educational Gradients in Psychotropic Medication Use Among Older Adults in Costa Rica and the United States†

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Abstract

Objective—The relationship among education, psychiatric diagnoses and psychotropic medication use has been explored in the United States, but little is known about patterns in poorer countries, despite their high documented burden of mental illness. Educational gradients in diagnosis and psychotropic use were estimated in the United States and Costa Rica – a middle-income country with universal health insurance.

Methods—Analyses were conducted using data on older adults (ages 60+) in nationally representative surveys from each country: the 2005 U.S. Medical Expenditures Panel Survey (n=4788) and the 2005 Costa Rican Longevity and Healthy Aging Study (n=2827). Logistic regressions examined the effect of lower educational attainment, income and urban residence on diagnosis and on psychotropic medication use with and without an associated mental illness diagnosis.

Results—Rates of self-reported diagnoses were lower in the U.S. (12% U.S.; n=598) than in, Costa Rica (20%; n=526), but may reflect differences in survey wording. Measures of self-reported and screened depression decreased with education in both countries. Psychotropic medication use among those with diagnoses increased with education in Costa Rica only.

†The CRELES project (Costa Rica: study of longevity and healthy aging) is a longitudinal study of the University of Costa Rica, carried on by the Centro Centroamericano de Población in collaboration with the Instituto de Investigaciones en Salud, with the support of the Wellcome Trust Foundation (grant 072406). Principal Investigator: Luis Rosero-Bixby. Co-principal investigators: Xinia Fernández and William H. Dow. Collaborating investigators: Ericka Méndez, Guido Pinto, Hannia Campos, Kenia Barrantes, Floribeth Fallas, Gilbert Brenes, and Fernando Morales. Informatics and support staff: Daniel Antich, Aaron Ramírez, Jeisson Hidalgo, Juanita Araya, and Yamileth Hernández. Field workers: José Solano, Julio Palma, Jenny Méndez, Maritza Aráuz, Mabelyn Gómez, Marcela Rodríguez, Giovanni Salas, Jorge Vindas y Roberto Patiño. This research was supported in part by NIH grant 5R01AG031716.

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Disclosures: None for any author.

Conclusions—We find similar patterns of educational gradients in diagnosis and screening between the U.S. and Costa Rica, but different patterns of medication use by education. Differences in stigma and access to care may play an important role in explaining differences between the countries, though we did not find evidence that insurance affected educational gradients in the U.S. These analyses increase the evidence on the role of education in the use of the health care system.

Introduction

Major depressive disorder is the second leading cause of years lived with disability worldwide, in both high income and developing countries (1). This ranking remained constant between 1990 and 2010 despite improvements in psychotropic medicine availability. Descriptive information on the patterns of diagnosis and treatment of depression in a variety of contexts will promote a better understanding of these global phenomena. This study compares patterns of mental health diagnosis and psychotropic drug use between the U.S. and one middle-income country with near-universal health insurance—Costa Rica. We examine educational gradients within each country, to better characterize the use of available mental health treatments.

There has been little systematic documentation of psychotropic medicine use patterns in developing countries. Much more is known from the U.S., where psychotropic medications are estimated to be under-used among those with a mental health condition but overused among those without an appropriate diagnosis (2). The use of psychotropic medications in general populations continues to grow (3). Appropriate use of psychotropic medications has been shown to lead to improved symptom profiles, lower levels of disability, and greater productivity (4–6). While most use of psychotropic medications is for acute or maintenance therapy, as much as a fifth of these medications may be used by persons with no history of mental illness (2, 7). This may represent off-label innovations in treatment but most off-label use has been shown to have a low evidence base, may impart side effect risks, and may represent a waste of scarce resources (2, 8).

Educational gradients in health and access to care, defined as differences that are positively or negatively related to education level, have been widely documented for many conditions in the U.S. (9, 10) Self-reported general health in Costa Rica has been shown to improve with socioeconomic status, but the opposite is true for all-cause mortality, and there are no strong gradients in risk factors such as diabetes and high cholesterol (11). A comparison of cardiovascular risk factor gradients between Costa Rica and the U.S. found that educational gradients were generally stronger in the U.S., but differences varied by disease (12). One hypothesized mechanism underlying these gradients is that education may lead to higher income, improving the ability of people to buffer themselves against health risks and to purchase medical care and the most effective medications to treat disease. Other theories suggest the importance of improved cognition, relative social status, time preferences, or reverse causality in which early life disease lowers educational attainment (13). In the U.S., socioeconomic status is strongly and inversely related to mental illness across a number of studies, regardless of how mental illness is defined or measured (5). However, we have much less information on treatment patterns across more and less-developed countries, or on

educational patterns within less-developed countries, and in particular little is known within the Costa Rican context.

Costa Rica is a country of particular interest because of its historic emphasis on progressive social and health sector programs, including near-universal health insurance. The country invested heavily in public health initiatives, has strongly promoted primary care initiatives, and adopted near-universal government health insurance in the 1970s (14). Costa Rica's high overall life expectancy, higher even than the United States, has been linked to its social investments (15). The government health insurance program covers 90% of the population for care at public facilities; it pays full costs for most hospitalizations and outpatient care, though some individuals choose to pay out-of-pocket for private ambulatory care. The publicly-financed delivery system is organized into three main levels. The first consists of local outpatient clinics that deliver primary care and a restricted list of free medications, which includes selected tricyclic antidepressants, benzodiazepines, and first-generation antipsychotics. The second level consists of regional clinics and hospitals with basic specialized medicine, and the third level is composed of highly specialized hospitals in the capital, San Jose. In the higher levels, specialists can prescribe the basic list of medications plus two SSRI and antipsychotics at no cost to the patient if on-formulary. At private facilities, patients can pay out-of-pocket for a broader array of psychotropic medications, but only wealthier individuals can typically afford to do so.

The purpose of our study is to examine patterns of self-report, current screening, and treatment rates by education and demographics among adults aged 60 and over in Costa Rica in comparison to the U.S. We focus on the older population due to the availability of high quality data in Costa Rica, but also because of the strong association between depression and advanced age (16, 17). We use measures of both self-reported diagnosis as well as survey-based depression screeners in each population, since neither approach alone is ideal in identifying persons with current or prior history of mental illness. We examine whether use of the two largest classes of psychotropic medications, antipsychotics and antidepressants, vary by education level overall and in subgroups defined by diagnosis or depression screening. We hypothesize that within each country there will be a greater burden of mental illness among populations with lower education. We also hypothesize that we will observe few educational gradients in Costa Rica due to uniform insurance coverage and a generally strong social safety net. In the U.S., we hypothesize greater disparities by education in both depression and psychotropic medication use; this is due to both the substantial proportion of this population without prescription coverage in Medicare prior to Part D, along with gradients in non-medical social determinants of health that have been implicated in U.S. gradients in many other non-psychiatric conditions(18).

Methods

We used two large, nationally-representative data sources, from Costa Rica and the U.S: the Costa Rican Longevity and Healthy Aging Study (CRELES), a nationally representative, probabilistic sample of non-institutionalized adults aged 60 and over (11), from 2005 (n=2827) and the Medical Expenditure Panel Survey (MEPS), nationally representative of the U.S. non-institutionalized civilian population, from 2005. We included MEPS

respondents who were age 60 or greater during 2005 (n=5082), and relied on the first round of interviews rather than the full panel of data, to increase similarity with CRELES. Sampling weights are used from both data sources to increase generalizability to each country's elderly populations.

Measures

Diagnosis was measured in two ways. First, self-reported diagnosis was measured in CRELES by responses to the question: "Has a physician ever told you that you have a nervous or psychiatric problem such as depression?" The MEPS does not contain a similarly worded question, but rather asks respondents to list medical and mental health conditions with current symptoms, as the cause of disability days, or associated with health services used during the reference period; only conditions identified as occurring prior to or during the first round of interviews in 2005 were retained for this analysis. We refer to both of these as "self-reported diagnosis" for the sake of brevity, but note the substantial differences in wording. Second, we use measures of depression screening to identify respondents with current symptoms of depression. In CRELES, the Geriatric Depression Scale (19) was used to indicate current symptoms of depression, using thresholds of 6 to indicate potential depression, and 11 to indicate severe depression. In MEPS, probable depression was defined as a score of 3 or greater on the PHQ2 (20), which has been validated as a depression screening tool in the elderly (21). In CRELES, the Geriatric Depression Scale was not obtained from proxy respondents (25% of the sample), while in the MEPS, the PHQ-2 was obtained from proxies (13%). In sensitivity analyses, we excluded proxy responses and found very minor changes in results, so the full sample is retained for the reported analyses. Depression screeners and self-reported diagnoses have notable differences and thus both are retained for this analysis. Persons with a prior history of depression or other psychiatric illnesses but without current depression symptomatology may self-report a diagnosis but not meet current criteria for depression. Persons with undetected illness or greater stigma may meet current clinical criteria but not self-report a diagnosis.

Psychotropic medication use was measured by either self-reporting current use or bringing in prescription medication bottles during the interview, regardless of the level of use or the use of other treatment modalities. In the MEPS, we include only medications begun prior to the first round of interviews, again to retain consistency with CRELES. We examined the use of the two largest classes of psychotropic medications, antidepressants and antipsychotics. Medication names were coded into drug classes by the survey teams and didn't require recognition as psychotropic medications by respondents.

Education level was coded into three categories. In the U.S., individuals were classified as having low education (25%; n=1566; all ns reported in the text are unweighted; multivariate analyses use complex sampling weights) if less than high school, medium if a high school graduate (34%; n=1535), and high education if they reported post-secondary education (41%; n=1687). In Costa Rica, education was coded as low for persons with two or fewer years of formal education, medium if the respondent completed primary education, and high for education beyond primary. Urban status was included because education and access to

care may vary by urbanicity. It was defined in Costa Rica based on census block and in the U.S. as residence in a Metropolitan Statistical Area.

Analysis Methods

Logistic regression models were run on measures of self-reported diagnosis, screened depression, and antidepressant or antipsychotic medication use. Survey-weighted models examined the association between each of these outcome variables and education, demographics, and urban location separately by country, overall and stratified by diagnostic status. Both under-reporting of psychiatric diagnoses and off-label use would contribute to psychotropic medication use in the undiagnosed population, and thus this measure is not intended to indicate quality. Persons with low and medium education levels were compared with those with high education, who served as the referent population. Odds ratios are reported in tables.

Exploratory Analysis—Because of the heterogeneity of insurance sources in the U.S. and the potential for racial disparities, we ran additional models including insurance status (Medicaid, Medicare, and private insurance as well as prescription drug coverage), race, and Latino ethnicity.

We also undertook exploratory analyses on whether education affected the receipt of any psychotropic medications listed on Costa Rica's national formulary that general practitioners (GP) can prescribe, and then on the receipt of medications that require prescriptions from mental health specialists or self-pay private physicians, again stratified by self-reported diagnosis.

Results

Unadjusted Analyses

18% (n=387) of elderly adults in Costa Rica screened positive for depression and 4% (n=84) were estimated to have severe depression (Table 1). In the U.S., the rate of probable depression was just over 10% (n=560). The rate of self-reported psychiatric diagnosis in Costa Rica was almost 20% (n=526). Just over 12% (n=598) of the U.S. sample reported a mental health condition in the U.S. Although the self-reported diagnosis includes a broader set of behavioral health conditions than the screeners available in the data, we found substantial discordance between screened and self-reported diagnoses. In Costa Rica, 39% (n=125) of those with current mild depression and 49% (n=37) of those with severe depression self-reported a mental health diagnosis, while 33% (n=177) of those with probable depression in the U.S. self-reported a diagnosis. A variety of reasons could explain these differences, including stigma, lack of access to care, and false positives in the screeners.

Almost 7% (n=179) of the elderly Costa Rican population and almost 8% (n=378) in the U.S. reported using an antidepressant during the study year. Only 23% (n=110) of elderly Costa Ricans but 41% (n=249) of Americans with a self-reported diagnosis reported using antidepressants. Among those without a self-reported diagnosis, the rate of antidepressant

use among elderly Americans was 3.2% (n=129) and 2.7% (n=69) in Costa Rica. Antipsychotics had a greater use rate in Costa Rica (2%; n=66) than in the U.S. (.7%; n=31).

Multivariate Analyses: Diagnosis

We found no evidence of educational gradients in self-reported diagnosis in either country, but do find an educational gradient in screened depression (Table 2). In Costa Rica, the odds of screening positive for depression among persons with lower education were almost double those with higher education (OR 1.96; $p<.01$). In the U.S., we see an even stronger educational gradient: those with less than high school education had more than three times the odds of probable depression than those with higher education (OR 3.43, $p<.01$), and those with only high school education having almost twice the odds of probable depression (OR 1.88; $p<.01$). In the U.S., the odds of self-reporting depression among those with probable depression and low education were less than half the odds of self-reporting among those with higher levels of education (OR=.36; $p<.01$).

Multivariate Analyses: Psychotropic Medication Use

Among the full elderly population, we did not find strong evidence of an educational gradient in antidepressant use in either country (Table 3). Odds of antidepressant use were similar in the U.S. population across education categories; differences in the odds of antidepressant use were lower in less educated Costa Ricans, but these differences were not statistically significant. However, educational gradients began to emerge in Costa Rica only as we conducted separate analyses by persons with and without a self-reported history of psychiatric illness. Among persons with a self-reported diagnosis, the odds of using antidepressants for the less educated in Costa Rica were only 34% of the odds of use among the highest educated ($p<.01$), and the odds among those in the middle level of education were half (OR .57, $p<.05$) of the more educated. Among those without a self-reported diagnosis, the odds of antidepressant use among those with lower education in Costa Rica was more than 50% greater than those with higher education, but not statistically significant. Among those without a self-reported diagnosis in the U.S., we saw lower odds of using antidepressants among those with lower education, but again, the difference was not statistically significant.

We found evidence of a positive gradient in antipsychotic medication use in Costa Rica, with persons with lower levels of education having a substantially lower odds of using these medications than the more educated, although the difference is only statistically significant for the comparison between medium and high education (OR .31, $p<.01$). The educational gradient in the U.S. is negative, but not significant (low education OR 1.9, $p>.05$). Among those reporting a history of psychiatric diagnosis, the positive gradient in Costa Rica was even steeper than in the general population, while the positive gradient in the U.S. was similar to the general population and again not significant. Among those without a self-reported condition, we again see a positive educational gradient in Costa Rica, but a negative gradient in the U.S., although these results are not statistically significant.

Exploratory Analysis

Including insurance, race, and ethnicity in the U.S. models did not affect the results on educational gradients, but were each generally associated with diagnosis and medication use.

In the exploratory analysis of access to psychotropic medications through the general and specialty sectors in Costa Rica, we found little evidence of an educational gradient in the receipt of any psychotropic medications from the GP national formulary, but saw a significant positive gradient in the receipt of specialty medications (Table 5). Among those with self-reported diagnoses, however, a large positive gradient in access to psychotropic medications on the GP formulary appeared, with the lower educated having less than half the odds ($OR=.45$; $p<.05$) of receiving a psychotropic medication covered by the country's GP formulary than those with high education; the gradient in specialty prescriptions became much steeper as well. Finally, among those without self-reported diagnoses, we did not find strong evidence of educational gradients, although the results are suggestive of greater access to medications on the GP formulary by the lower educated, and lower access to restricted medications.

Discussion

The greater prevalence of depression among the less educated in both Costa Rica and the U.S. is consistent with other studies (e.g., 522). Among those with probable (screened) depression in the U.S., the lower level of self-reporting among the less educated is consistent with other literature (18).

Overall, we did not find strong evidence of educational gradients in antidepressant use in either country. In subsample analyses, however, we found evidence that greater education is associated with greater treated prevalence among those with diagnoses in Costa Rica, whereas in the U.S., we saw no such trends by education.

In the U.S., broad Medicaid coverage for persons with low SES may effectively counterbalance greater access by persons with higher education, thus resulting in fairly equal access across education groups. In Costa Rica, because of the presence of a national formulary, use of psychotropics may reflect better access to public specialty care providers or to private providers by persons with higher education. Further research should explore whether persons with higher education experience lower stigma or have better knowledge about mental health care treatment.

We also saw very different patterns for antipsychotic users. In Costa Rica, elderly persons with greater education had substantially greater use of antipsychotics overall, and in both diagnosed and undiagnosed samples. In the U.S., the trend was exactly the opposite, with higher educated respondents less likely to use antipsychotic medications, and a much weaker association between education and use. The cause of this difference in Costa Rica may be due to the limitations on prescribing antipsychotic medications in primary care. Although the national formulary in Costa Rica should preserve access to psychotropic medications for persons at all education levels, because of the limited number of psychotropic medications

available through generalists, we found evidence that the lower educated experienced access barriers to treatment.

These results should be interpreted in light of a number of limitations. Self-reported psychiatric diagnoses were elicited differently in the two surveys, and the reliance on the reporting of specific conditions in the MEPS data may create a diagnosed sample that has experienced symptoms more recently. However, institutionalization rates are lower in Costa Rica than the US, thus potentially yielding a more acutely ill sample in Costa Rica. Appropriateness of medication use cannot be determined in these data. Finally, the concordance between depression diagnosis and antidepressant use may be stronger than the link between psychiatric diagnosis and antipsychotic medication use, since appropriate screeners for other psychiatric disorders were not available in either data source.

More fundamentally, better understanding is needed of the underlying cultural factors that may mediate and moderate education effects in different settings. A review of psychotropic adherence in the United States documented extensive evidence of substantially lower adherence among Latinos compared to Euro-Americans (23), but the reasons for this are still poorly understood. We are not aware of any specific research to date on cultural factors that vary across education groups in Costa Rica and that could influence psychotropic medication patterns. Better understanding of such sociocultural factors will be important for informing culturally-appropriate clinical interventions to address any inappropriate care that may be substantiated by future work.

Conclusions

We find similar patterns of educational gradients in diagnosis and screening between the U.S. and Costa Rica, but very different patterns of medication use by education in these two countries. Differences in stigma and access to care may play an important role in explaining differences between the countries, though we did not find evidence that insurance affected educational gradients in the U.S. These analyses increase the evidence on the role of education in the use of the health care system and health status. Future research should examine the appropriateness of medication use by education and the influence of greater health insurance coverage to the elderly and near-elderly in the U.S. from Medicare Part D and the Affordable Care Act.

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Table 1

Summary statistics from CRELES and MEPS samples

Variable	CRELES			MEPS		
	N [§] / means	%	linearized standard errors	N [§] / means	%	linearized standard errors
Survey Depression Measure						
Screening depression – Mild	387	17.6	1.0		NA	
Screening depression – Severe	84	4.0	.5		NA	
Probable depression (PHQ-2≥3)		NA		560	10.4	.6
Self-reported mental health diagnosis	526	19.6	.9	598	12.3	.6
Among those screening for mild depression	125	38.7	3.0		NA	
Among those screening for severe depression	37	48.8	6.2		NA	
Among those screening for probable depression		NA		177	33.0	2.4
Antidepressant drug use	179	6.6	.5	378	7.8	.4
Among those with self-reported mental health diagnosis	110	22.9	2.2	249	41.3	2.1
Among those without self-reported mental health diagnosis	69	2.7	.4	129	3.2	.3
Antipsychotic drug use	66	2.0	.3	31	0.7	.1
Among those with self-reported mental health diagnosis	43	7.9	1.5	20	3.1	.7
Among those without self-reported mental health diagnosis	21	0.57	.15	11	0.32	.11
Education Level⁺⁺						
Low	1068	27.5	.9	1566	25.1	1.0
Medium	1384	50.9	1.2	1535	34.2	.9
High	375	21.5	1.1	1687	40.7	1.1
Age	70.5±8.1		.2	71.4±7.4		.2
Male	1293	47.5	1.2	2038	44.2	.6
Urban/MSA+	1701	62.6	1.1	3762	80.1	2.3
Unweighted sample size	2827			4788		

[§] N is unweighted sample size. + In MEPS, “urban” is distinguished by whether a respondent lives in a Metropolitan Statistical Area.

⁺⁺ In the U.S., education is coded as low=less than high school, medium = high school graduate, high=some college or post-secondary education. In CRELES, education is coded as low=two or fewer years of primary education; medium = completed primary education, and high is some post primary education

Table 2

Logistic Regressions on diagnostic measures (odds ratios reported)

Dependent Variable	Self-reported diagnosis		Current depression		Probable depression		Self-reported diagnosis among those with:			
	Costa Rica (CRELES) (n=2812)	S.E.	U.S. (MEPS) (n=4788)	Costa Rica (CRELES) (n=2144)	Severe	PHQ-2≥3	mild or severe depression	severe depression	probable depression	
Country (Data) (unweighted sample size)										
	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.
Education level (reference: high education)										
Low	1.26	.24	1.22	.16	1.96**	.45	1.41	.62	3.43**	.48
Medium	1.10	.20	.99	.12	1.57*	.34	1.21	.49	1.88**	.28
Male	.43**	.06	.42**	.04	.50**	.07	.62	.17	1.03	.12
Age	1.03	.10	1.00	.14	.74*	.10	1.16	.34	.78	.11
Age ²	1.00	<.01	1.00	<.01	1.00*	<.01	1.00	<.01	1.00	<.01
Urban/MSA	1.05	.14	.98	.13	.69*	.10	.84	.24	.90	.14
							1.50	.43	1.32	.71
									1.00	<.01
									.67	.19
									.48	.45**
									.63	.18
									.82	.36**
									.82	.36**
									.85	.48
									.82	.44
									1.00	<.01
									1.32	.71
									1.00	<.01
									1.29	.29

** =p<0.01;

* =p<0.05

Logistic regressions on antidepressant use (odds ratios reported)

***
=p<0.01;
*
=p<0.05

Table 4

Logistic regressions on antipsychotic use (odds ratios reported)

Variable	Antipsychotic Use			Antipsychotic Use Among those with self-reported mh diagnosis			Antipsychotic Use Among those with no self-reported psychiatric diagnosis			
Country (Data unweighted sample size)	Costa Rica (CRELES) (2827)	U.S. (MEPS) (4788)		Costa Rica (CRELES) (526)	U.S. (MEPS) (598)		Costa Rica (CRELES) (2286)	U.S. (MEPS) (4190)		
	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.
Education level (reference: high education)										
Low	.40	.19	1.90	1.02	.27*	.16	0.46	.27	1.68	1.60
Medium	.31**	.13	1.26	.71	.23***	.12	.42	.30	1.55	1.53
Male	.83	.27	.61	.28	1.71	.71	.82	.47	.42	.30
Age	1.25	.32	2.27	1.25	1.10	.33	1.78	.63	1.54	1.35
Age ²	1.00	<.01	.99	<.01	1.00	<.01	1.00	<.01	1.00	<.01
Urban/MSA	.74	.30	.72	.34	.48	.23	2.46	1.30	2.17	2.01

** =p<0.01;

* =p<0.05

Table 5

Logistic regressions on the use of on and off-formulary psychotropic medications in Costa Rica (odds ratios reported)

Variable	The use of medications on GP (n=2827)		The use of medications requiring specialty prescription (n=2827)		The use of medications on GP formulary among those with self-reported diagnosis (n=526)		Specialty prescriptions among those with self-reported diagnosis (n=526)		The use of medications on GP formulary among those with no self-reported diagnosis (n=2286)		Specialty prescriptions among those with no self-reported diagnosis (n=2286)	
	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.	O.R.	S.E.
Education level (reference: high education)												
Low	.86	.24	.29**	.14	.45*	.18	.17**	.10	1.48	.68	.32	.25
Medium	.78	.19	.31**	.13	.68	.24	.19**	.094	.77	.32	.66	.52
Male	.387**	.078	.73	.26	.52*	.16	1.50	.65	.52*	.15	.77	.53
Age	1.73**	.34	1.05	.28	2.79**	.98	.84	.24	1.25	.26	2.06	.94
Age ²	1.00**	<.01	1.00	<.01	.99**	<.01	1.00	<.01	1.00	<.01	1.00	<.01
Urban/MSA	1.26	.25	.76	.33	1.03	.28	.48	.23	1.62	.56	5.60*	4.19

Note: Columns 1, 3, and 5 analyze use of drugs which public sector general practitioners are able to prescribe. Columns, 2, 4, and 6 analyze use of drugs which require access to a specialist or private physician.

** =p<0.01;

* =p<0.05