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Social inequalities in new antidepressant treatment: a study at the individual and neighborhood levels

Antidepressants and social inequalities

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ABSTRACT:

PURPOSE: To determine whether social inequalities in new antidepressant treatment exist at the individual and/or neighborhood level; and their relation to access to prescribers and/or processes of care (treatment initiation and duration).

METHODS: We followed 316,412 inhabitants of Marseilles (aged 18-64 years) covered by the National Health Insurance Fund for 2.5 years. We analyzed new treatments (≥ 1 purchase of antidepressants and none in the 6 months before the first one), and new *long* treatments (≥ 4 within 6 months after the first purchase). We tested their associations with high individual disadvantage and census block deprivation in a multivariate multilevel logistic model adjusted for consultations with general practitioners and psychiatrists to control for access to care.

RESULTS: High individual disadvantage was not significantly associated with the probability of new treatments, but it was with lower odds of receiving new *long* treatments. Residing in deprived census blocks was associated with lower odds of receiving treatment for both dependent variables.

CONCLUSIONS: Our results suggest social inequalities at the individual and neighborhood levels in new antidepressant treatment occur in access to specialty care and in treatment initiation and affect its duration. Further research is warranted to improve our understanding of their mechanisms.

KEY-WORDS: Antidepressants; Access to Health care; Factors, Socioeconomic; Neighborhood; Multilevel Analysis.

Abbreviations and Acronyms

ALD = Chronic disease status

ATC = Anatomical-therapeutic-chemical

CI = Confidence interval

CUHI = Complementary universal health insurance

GP = General practitioner

ICD = International Classification of Diseases

INSEE = National Institute for Statistics and Economic Studies

MD = Major depression

MOR = Median odds ratio

NHIF = National Health Insurance Fund

OR = Odds ratio

SD = Standard deviation

SES = Socioeconomic status

INTRODUCTION

Compelling evidence indicates that low individual socioeconomic status (SES) slightly increases the risk of new episodes of major depression (MD) and moderately increases their duration [1-6]. Besides individual SES (compositional effects), SES encompasses community or neighborhood-level characteristics (contextual effects). These components may mediate or modify the relation between individual SES and health outcomes through their relations to health behaviors, access to care (availability and use of primary and specialty health-care services), processes of care (the technical and interpersonal care provided to the patient, e.g., diagnostic and therapeutic procedures, coordination and continuity of care, etc.) or any combination of these [7, 8]. Despite sometimes inconsistent results, observational evidence suggests that neighborhood deprivation plays a role in the development of MD and depressive symptoms [4-6].

If patients' needs are met, a higher risk of MD among individuals of low SES and/or residing in deprived neighborhoods should translate into higher antidepressant treatment rates for these groups than for subjects of higher SES [3]. The contrary would suggest that social inequalities exist in access to and/or processes of care [9-12]. All but one [10] of the studies investigating this hypothesis at the individual level [1, 13-15] reported higher rates of antidepressant treatment in low-SES (compared to high-SES) individuals. These studies suffer from several methodological limitations, however. None took health care seeking into account: they consequently do not allow access to care to be distinguished from processes of care. Most have focused on the prevalence of antidepressant treatment, thereby precluding any distinction between receiving a new antidepressant treatment and continued treatment. None took the duration of antidepressant treatment into account although growing evidence indicates high rates of antidepressant discontinuation during the first several weeks of treatment (usually 50-60% within 10 weeks) [9, 11, 12, 16]. Treatment of at least 6 months is

recommended to reduce the risk of relapse/recurrence of MD [17-20]. Studies have shown higher rates of antidepressant treatment discontinuation among people of low SES, despite sometimes inconsistent results [9, 11, 12, 21-23]. Finally, to our knowledge, little research has addressed the question of the potential role of neighborhood deprivation on receiving antidepressant treatment. We are aware of only one study, in Sweden: it suggests that neighborhood deprivation is associated with a limited but significant increasing rate of antidepressant prescriptions [24].

Our aim here was to examine social inequalities in new antidepressant treatment of any duration and in new *long-duration* treatment. We studied whether these inequalities 1) exist at the individual level (by comparing highly disadvantaged individuals to the others); and/or 2) exist at the neighborhood level; and 3) are related to access to care – measured by numbers of visits to general practitioners (GPs) and psychiatrists, who together write nearly all antidepressant prescriptions — or to processes of care (initiation and duration of antidepressant treatment) after contact with a GP or psychiatrist has begun.

METHODS

Study design, population, and period

We conducted a cohort study in Marseilles -- the second largest city in France -- among its inhabitants aged between 18 and 64 years and covered by the French National Health Insurance Fund (NHIF). This Fund covers most health-care expenses (e.g. consultations with GPs and psychiatrists, medication, hospitalizations); out-of-pocket costs remain, however; their amount depends on the specific kind of health-care service. The fund's beneficiaries are mainly salaried workers, including those unemployed (CNAM-TS, www.ecosante.fr). The information employed/unemployed is not registered in the fund; however unemployed people with the lowest income were captured in part by the

Complementary Universal Health Insurance (CUHI) variable (see below). We excluded from the cohort: 1) beneficiaries who left the NHIF (for example, because of a change in their professional status) and 2) those who died in 2008-2010. Follow up took place from 1 July, 2008, through the end of December, 2010.

Data sources and variables

Individual data

We obtained cohort members' individual data from the databases of the NHIF in southeastern France, after approval from the National Data Protection Authority (*Commission Nationale Informatique et Libertés*). The NHIF records all prescribed drugs purchased by the beneficiaries in community pharmacies, but not prescriptions dispensed by public or private hospital pharmacies during hospital stays. We collected information on antidepressants dispensed in 2008-2010 (N06A according to the anatomical-therapeutic-chemical (ATC) classification). For each medication purchase, we retrieved the dates it was prescribed and dispensed. We defined two dependent variables: 1) "new antidepressant treatment" (referred to hereafter as "new treatment") as the first purchase of antidepressant without any antidepressant purchase in the 6 previous months; 2) "new *long-duration* antidepressant treatment" ("new *long* treatment") as at least four further purchases of antidepressants within 6 months after the first purchase and none in the 6 months before it [25, 26]. Both the 6 months before and after the purchase had to fall within the study period; thus, we included treatments that began between 1 July, 2008, and 1 July, 2010 and excluded prevalent cases (individuals who had purchased antidepressants in the 6 months before 1 July 2008) [12, 26, 27].

We used beneficiaries' participation in the public CUHI program -- information obtained from the NHIF -- as an indicator of high individual disadvantage: this program exempts individuals younger than 65 years and with annual incomes below 9000 € from any

out-of-pocket costs [28]. Gender, age, and number of consultations with GPs (including house calls) and private psychiatrists in 2008-2010 were also available for all NHIF beneficiaries. For them we obtained chronic disease (ALD) status, recorded by expert physicians according to the International Classification of Diseases (ICD-10) [29]. We used it as a proxy for severe somatic (yes/no) or psychiatric chronic illnesses (yes/no) [27] as it is attributed to persons with specific and expensive chronic diseases (defined by NHIF) and makes them eligible for 100% reimbursement for treatment.

Neighborhood-level characteristics

Using a tool developed by the National Institute for Statistics and Economic Studies (INSEE) we matched each beneficiary's home address with his corresponding census block, the smallest geographic subdivision of the national census (average number of cohort members in the 336 blocks: 1,045; SD: 361). We assumed that the blocks were representative of their inhabitants' neighborhood environment [30, 31] and extracted for each of them 17 socioeconomic variables that reflect various dimensions of SES (2006 national population census, Table 1).

Using an INSEE database of medical equipment and services (*Base permanente des équipements*, INSEE, 2009), we constructed two variables of density of private GPs and private psychiatrists at the census block level expressing the density per 100,000 inhabitants [32].

Statistical analysis

A principal component analysis of the 17 socioeconomic variables mentioned above allowed us to construct a socioeconomic deprivation index at the census block level as the linear combination of these variables on the first axis of the analysis [33, 34]. This combination explained 57% of the total variance.

To test whether individual SES and neighborhood deprivation were associated with episodes of new treatment or with new *long* treatment, we used unadjusted logistic regressions and then a multivariate multilevel logistic regression [35] that allowed us to consider the hierarchical structure of the data. We first tested a null model (with no variables) to evaluate the significance of inter-census block variability and assess whether or not the multilevel approach was justified [36]; we used the median odds ratio (MOR) to quantify this variability [37].

To test whether inequalities were related to access to or processes of care, we adjusted the multivariate model for the number of visits each beneficiary had with GPs and with private psychiatrists.

Sensitivity analyses

We reassessed the full models 1) with an interval defining new treatments as 1 year without antidepressant treatment (vs 6 months); 2) at the district scale (aggregate of 3-4 census blocks) for the neighborhood environment. Analyses were performed with SAS version 9.2 (SAS Institute, Cary, NC), and the GLIMMIX procedure.

RESULTS

Study population

Among the 389,131 beneficiaries aged 18-64 years living in Marseilles in July 2008, 33,802 (8.7%) left the NHIF during the study period, 1,896 (0.5%) died, and 37,021 (9.5%) had purchased antidepressants in the 6 months before 1 July 2008 (prevalent cases). As expected because of the exclusion of prevalent cases, the percentages of women, highly disadvantaged individuals, and patients with chronic somatic or psychiatric illnesses were higher in the excluded population than in the cohort.

The cohort included 316,412 individuals. When the study began, their mean age was 40.6 years (SD: 12.3); 50.1% were men, and 15.3% highly disadvantaged; 9.9% had a severe chronic somatic illness and 1.8% a chronic psychiatric disorder (Table 2). Highly disadvantaged cohort members consulted GPs more frequently than those not in the CUHI program, and psychiatrists slightly less often (Table 2).

During the study period, 30,384 cohort members (9.6%) began at least one new antidepressant treatment, and 10,516 (3.3%) a new *long* treatment. GPs wrote the prescription that started most new treatments and new *long* treatments (Table 2).

Factors associated with new treatments

In unadjusted logistic regressions, the probability of receiving at least one new treatment was higher among highly disadvantaged individuals and lower among those residing in the most deprived neighborhoods (Table 3). The MOR of the null multilevel model was 1.12 ($p < 0.0001$) justifying the multilevel approach (Table 4). In the full multilevel model, the probability of new treatment was no longer associated with individual disadvantage; the association with neighborhood deprivation remained statistically significant (Table 3).

Factors associated with new *long* treatments

In unadjusted logistic regressions, the probability of receiving at least one new *long* treatment was not associated with individual high disadvantage and was lower among individuals residing in highly deprived neighborhoods (Table 5). The MOR of the null multilevel model, at 1.22 ($p < 0.0001$), justified the multilevel approach (Table 4). In the full multilevel model, the probability of new *long* treatment was far lower among highly disadvantaged individuals than among other individuals, and the negative association with neighborhood deprivation remained significant (Table 5).

Sensitivity analysis

For both dependent variables, enlarging the criterion defining new treatments to one year produced results similar to those obtained with the 6-month criterion; analyses at the district scale also showed results similar to those obtained at the census block level (results of sensitivity analyses are available on request from the corresponding author).

DISCUSSION

This cohort study of French NHIF beneficiaries residing in Marseilles is one of the first to examine inequalities in new antidepressant treatments at both the individual and neighborhood level. It found that the probability of new treatment did not vary significantly according to coverage by the CUHI program and was slightly lower in the most deprived neighborhoods (vs the most affluent ones). The probability of new *long* treatment was clearly lower among both highly disadvantaged individuals and those residing in the most deprived neighborhoods.

Limitations

First, our results cannot be extrapolated to population categories that are not covered by the NHIF (e.g., students, farmers, tradespeople, self-employed people...); nonetheless, the NHIF covers 87% of the adult population in southeastern France (CNAM-TS, www.ecosante.fr). Nor can results be extrapolated to rural areas.

Second, as in most observational studies of administrative databases [9, 10, 14, 15, 24, 27], information about diagnoses and disease severity was not available, except for a subset of patients with a chronic disease (ALD) status that captures only a portion of the severe cases of depression. However, we adjusted the multilevel model for consultations with psychiatrists, which are a good marker for psychiatric disease severity [12, 38]. Accordingly, management by psychiatrists increased the probability of receiving both new treatments (Table 3) and new *long* treatments (Table 5).

Third, household income or education level are not recorded in the NHIF database: we evaluated individual SES with the proxy variable “covered by CUHI”, which is a strong and reliable indicator of strong disadvantage in France [28, 39] but does not allow the analysis of socioeconomic gradients. Thus, residual confounding, that is, insufficient adjustment for individual SES — a frequent problem in neighborhood effects research — is possible in analyzing neighborhood deprivation effects [5]. However, adjusting the multilevel model for individual GP or psychiatrist visits (care seeking) should have limited this potential residual confounding, because SES influences these behaviors [40], which can thus be considered mediators between SES and access to care [7].

Fourth, we used a 6-month interval without any antidepressant purchases to distinguish between new and prevalent antidepressant treatments [12, 25-27]; this criterion is commonly considered to distinguish between a relapse (same episode) of MD and a new episode. Some authors have nonetheless used longer intervals [9, 14]. The choice of this interval is critical for it might imply misclassification of prevalent cases into new cases [27]. However, the sensitivity analysis with an interval of one year instead of 6 months yielded similar results.

Fifth, antidepressant treatments received during public or private hospital stays are not recorded in the NHIF database. However, if treatment began during such a stay, it would normally be continued after discharge and lead to dispensing in community pharmacies, and we would have captured it, unless the patients stopped taking their treatment after discharge.

Finally, despite the cohort study design and adjustment of the multilevel model for important confounding factors (gender, age, severe or chronic physical comorbidity), we must remain careful in drawing any causal inference from our results because reverse causality cannot be excluded [3]. A history of severe chronic mental disorders might, for example, have

hindered social mobility (or induced downward mobility). We did however adjust for this history.

Individual SES and new antidepressant treatment

Our finding contrasts with the results of most prior studies on antidepressant prevalence and incidence [1, 13-15], except that of Kivimaki in Finland [10]. It is, however, in line with previous studies that have suggested social inequalities in antidepressant treatment duration [9, 11, 12]. Comparisons are nonetheless difficult because these studies concerned countries with differing health systems and applied different methods and measures. Results for the other independent variables were consistent with the existing literature [14, 41].

Social inequalities may exist both for access to care and during the processes of care. Our results suggest some inequalities in access to psychiatrists as highly disadvantaged individuals visited them the least (Table 2) although they are at higher risk of psychiatric disorders [3].

Using a model adjusted for the number of appointments with private GPs and psychiatrists, we were able to focus separately on the processes of care, an important feature of our study. If prescriptions matched patients' needs, we would expect a higher probability of both new treatments and new *long* treatments among disadvantaged people because incidence and duration of MD is higher in people of low SES [1-6, 42, 43]; but we did not observe such an association for new treatments and we observed the contrary for new *long* treatments. Adjustment for consultations with psychiatrists reduced the strength of the association with the CUHI variable (results not shown), which nonetheless remained substantially and significantly inferior to 1 for *long* treatments (Table 5). These results suggest slight social inequities in receiving new antidepressant treatments and more marked ones in treatment

duration. These results cannot be explained by greater use of psychotherapy than medication in highly disadvantaged people with MD, for they use less psychotherapy in France [44].

The CUHI program eliminates out-of-pocket costs both for consulting health professionals who set their fees according to the Health Insurance Administration's scale (most GPs) and filling prescriptions from dispensing pharmacies. However, 30% of French private psychiatrists freely set their own fees (www.ecosante.fr). Together with specific help-seeking patterns among low SES people [45], this may contribute to inequalities in access to specialty care. On the contrary, inability to pay for medications does not convincingly explain our findings on inequalities in processes of care. Knowledge and perceptual and attitudinal factors on the part of both patients and physicians might, however, explain our results. Stigma, limited knowledge of psychiatric disorders and their treatments, poor treatment adherence, and competing demands during a brief clinical encounter might disproportionately affect patients of low SES [46]. Physicians communicate and treat their patients differently according to their SES [47, 48]. Difficulties in diagnosing MD in a context of social difficulties may lead them to postpone antidepressant prescriptions [49].

Neighborhood deprivation and new antidepressant treatment

We are aware of only one study that considered the association between neighborhood deprivation and antidepressant treatment prevalence, and it found higher prescription rates in the most deprived areas [24]. This result contrary to ours might be due to differences in health care and social support systems, or attitudes of both physicians and patients. The mechanisms through which neighborhood deprivation might influence the processes of care deserve further research. First, neighborhoods or communities may influence health through the availability of and access to health care-services [50]. Nonetheless, we did not find any effect of neighborhood density of private psychiatrists or GPs on these treatment rates in either unadjusted or multivariate multilevel regressions. Second, the attitudes of people residing in

deprived areas towards mental health and mental health care and lack of social support might explain lower acceptance of both psychiatric diagnoses and antidepressant treatment, as suggested for other chronic diseases [7]. Moreover, physicians might adapt their practices according to characteristics of patients' living area – especially deprived areas; they might specifically anticipate life styles, attitudes, and social difficulties [49].

Conclusion

Our results suggest social inequalities at both the individual and neighborhood levels in receiving new antidepressant treatment. They suggest that these inequalities may occur in access to specialty care and in the processes of care, while the CUHI program is designed to reduce inequalities mainly in access to care. Inequalities in new *long* treatment appeared to be due mainly to not receiving or not renewing antidepressant prescriptions for the recommended duration rather than to not receiving them at all. A reduced likelihood of receiving antidepressant treatment when needed and of adequate duration may in turn have implications for the risks of relapse or recurrence of MD [17-19]. Further research is warranted to improve both our understanding of the mechanisms of these inequalities, especially those associated with the neighborhood environment, and the care for depression and associated disorders available for people of low SES.

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TABLE 1. Variables used to construct the deprivation index at the census block level and their mean values according to deprivation level (Marseilles, France, n=336 census blocks)

Variables ^a	Mean values according to census block deprivation level		
	Low (n=84)	Intermediate (n=168)	High (n=84)
Blue-collar workers in the labor force	10.1	17.9	31.0
People with insecure jobs in the labor force	8.4	11.8	14.4
People with stable jobs in the labor force	69.0	64.5	48.2
Unemployed people in the labor force	9.2	16.3	32.9
People in the labor force unemployed for more than 1 year	2.0	3.3	5.8
Median income/consumption unit (in Euros/yr)	22918.3	16224.5	7905.6
People aged ≥15 yrs with at least a lower postsecondary education	20.8	13.3	5.6
People aged ≥15 yrs with general or vocational maturity certificates	18.0	15.6	11.4
People aged ≥15 yrs with no more than a completed elementary education	13.4	22.4	44.9
Primary residences that are houses or farms	37.8	16.3	5.3
Primary residences that are multiple dwelling units	61.3	82.9	92.2
Households without a car	14.8	30.3	48.3
Households with ≥2 cars	34.3	18.0	9.1
Nonowner-occupied primary residences	27.1	51.2	79.6
Subsidized housing among all primary residences	3.3	15.0	41.5
Single-parent families	13.7	22.0	30.7
Foreigners in the population	2.0	5.1	17.0

^a All variables are percentages (%) unless otherwise stated.

TABLE 2. Individual characteristics of the cohort members at inclusion (Marseilles, France – n=316,412 individuals)

	No CUHI program ^a (n=268,137, 84.7 %)	CUHI program ^a , (n=48,275, 15.3 %)	All (n=316,412)	
	%	%	<i>n</i>	%
Gender				
<i>Female</i>	48.8	57.9	158,681	49.9
<i>Male</i>	51.3	42.1	157,731	50.1
Age (years)				
<i>18-34</i>	34.7	40.3	112,616	35.6
<i>35-44</i>	25.8	27.8	82,699	26.1
<i>45-54</i>	21.5	20.0	67,232	21.3
<i>55-64</i>	18.0	11.9	53,865	17.0
Chronic somatic illness^b				
<i>No</i>	90.0	90.4	284,934	90.1
<i>Yes</i>	10.0	9.6	31,478	9.9
Severe chronic psychiatric illness^b				
<i>No</i>	98.2	98.2	310,744	98.2
<i>Yes</i>	1.8	1.8	5668	1.8
Number of consultations of general practitioner during the study period				
<i>0</i>	20.2	6.1	57,182	18.1
<i>1-5</i>	36.8	20.2	108,427	34.3
<i>6-11</i>	23.7	21.4	73,838	23.3
<i>>11</i>	19.3	52.3	76,965	24.3
Number of consultations of private psychiatrist during the study period				
<i>0</i>	92.5	93.1	292,918	92.6
<i>1-2</i>	2.3	2.5	7,368	2.3
<i>>2</i>	5.2	4.4	16,126	5.1
Specialty of the physician who wrote the prescription starting for new treatments^c				
<i>General practitioner</i>	74.3	78.6	22,821	75.1
<i>Psychiatrist</i>	20.9	16.5	6,095	20.1
<i>Other specialty</i>	4.8	4.9	1,468	4.8
Specialty of the physician who wrote the prescription starting for new <i>long</i> treatments^c				
<i>General practitioner</i>	67.0	69.1	7,081	67.3
<i>Psychiatrist</i>	29.0	26.7	3,011	28.6
<i>Other specialty</i>	4.0	4.2	424	4.0

^a Complementary Universal Health Insurance program: program for persons with low income.

^b "Expensive chronic disease" status, for which treatment is completely free of charge (see text).

^c For individuals with more than one new treatment during the study period, only the specialty of the physician who wrote the prescription starting the first new treatment is considered.

Significant differences at $p=10^{-4}$ for all variables except for psychiatric chronic illnesses ($p=0.45$) and specialty of the physician who wrote the prescription for the prescription starting new long treatment ($p=0.20$).

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TABLE 3. Individual and census block-level socioeconomic factors associated with new antidepressant treatment started between 1 July 2008 and 1 July 2010: results of unadjusted and multivariate multilevel logistic regression analyses (Marseilles, France – n=316,412 individuals; n=336 census blocks)

	<i>n</i>	Unadjusted OR [95% CI] ^a	Adjusted OR [95% CI] ^b
Adjustment variables			
Individual level	Gender		
	<i>Female</i>	Ref.	Ref.
	<i>Male</i>	0.52 [0.51;0.53]	0.70 [0.68;0.72]
	Age (years)		
	<i>18-34</i>	Ref.	Ref.
	<i>35-44</i>	1.49 [1.45;1.54]	1.35 [1.30;1.40]
	<i>45-54</i>	1.75 [1.70;1.81]	1.53 [1.48;1.59]
	<i>55-64</i>	1.59 [1.53;1.65]	1.31 [1.25;1.36]
	Somatic chronic illness^c		
	<i>No</i>	Ref.	Ref.
	<i>Yes</i>	1.72 [1.66;1.78]	1.10 [1.06;1.14]
	Psychiatric chronic illness^c		
	<i>No</i>	Ref.	Ref.
	<i>Yes</i>	4.57 [4.31;4.83]	1.57 [1.46;1.68]
	Number of consultations of private general practitioner during the study period		
	<i>0</i>	Ref.	Ref.
	<i>1-5</i>	2.48 [2.33;2.64]	2.04 [1.91;2.18]
	<i>6-11</i>	5.46 [5.13;5.80]	3.91 [3.67;4.17]
	<i>>11</i>	12.06 [11.36;12.80]	8.12 [7.63;8.65]
	Number of consultations of private psychiatrist during the study period		
	<i>0</i>	Ref.	Ref.
	<i>1-2</i>	8.09 [7.70;8.51]	6.53 [6.20;6.89]
	<i>>2</i>	15.46 [14.94;16.00]	12.40 [11.95;12.87]
Variable of interest			
CUHI program^d			
	<i>No</i>	Ref.	Ref.
	<i>Yes</i>	1.39 [1.34;1.43]	0.97 [0.93;1.00]

Adjustment variables				
Census block level	Density of private general practitioners (/100.000 inhabitants) ^e			
	<76	74765	Ref.	Ref.
	76-209	159405	0.95 [0.92;0.98]	0.97 [0.93;1.02]
	>209	82242	0.96 [0.93;1.00]	0.98 [0.93;1.03]
	Density of private psychiatrists (/100.000 inhabitants) ^e			
	0	174004	Ref.	Ref.
]0;36]	57984	1.02 [0.99;1.06]	1.00 [0.95;1.05]
	>36	84424	0.94 [0.92;0.97]	0.92 [0.88;0.97]
	Variable of interest			
Deprivation level				
Low	67779	Ref.	Ref.	
Intermediate	160210	1.04 [1.00;1.07]	1.04 [0.99;1.09]	
High	88423	0.92 [0.89;0.95]	0.94 [0.89;0.99]	

^a Bivariate logistic regression analysis. Unadjusted odds ratio and 95% confidence intervals.

^b Multivariate multilevel logistic regression analysis. Adjusted odds ratios and 95% confidence intervals.

^c "Expensive chronic disease" status, for which treatment is completely free of charge (see text).

^d Complementary Universal Health Insurance program: program for persons with low income.

^e Number of physicians in the census blocks and all physicians associated with any neighboring census block with a barycenter at 500 m (as the crow flies) or less from the barycenter of the block considered, divided by the census block population (INSEE 2006).

TABLE 4. Inter-census block variability at the different steps of the multilevel regression analyses^a (Marseilles, France – n=316,412 individuals; n=336 census blocks)

	Variance (standard error)	MOR ^b	p value	Variation of the inter- census blocks variance ^c
Dependent variable : New antidepressant treatment				
'Null' model	0.01 (0.002)	1.12	<0.0001	--
Individual variables only	0.02 (0.002)	1.13	<0.0001	+7.2%
'Full' model (individual and census block level variables)	0.01 (0.002)	1.12	<0.0001	-14.1%
Dependent variable : New <i>long</i> antidepressant treatment				
'Null' model	0.04 (0.006)	1.22	<0.0001	--
Individual variables only	0.02 (0.005)	1.16	<0.0001	-46.7 %
'Full' model (individual and census block level variables)	0.02 (0.004)	1.14	<0.0001	-21.9 %

^a We followed three steps to implement the multilevel models: 1) test of a null model (with no variables); 2) test of individual variables only; 3) test of the full hierarchical model, including all variables from individual and census block level.

^b Median odds ratio

^c Variation between each model and the previous one

TABLE 5 Individual and census block-level socioeconomic factors associated with new *long* antidepressant treatment started between 1 July 2008 and 1 July 2010: results of unadjusted and multivariate multilevel logistic regression analyses (Marseilles, France – n=316,412 individuals; n=336 census blocks)

	<i>n</i>	Unadjusted OR [95% CI] ^a	Adjusted OR [95% CI] ^b
Adjustment variables			
Gender			
<i>Female</i>	158681	Ref.	Ref.
<i>Male</i>	157731	0.55 [0.53;0.57]	0,77 [0,74;0,81]
Age (years)			
<i>18-34</i>	112616	Ref.	Ref.
<i>35-44</i>	82699	1.80 [1.70;1.90]	1,53 [1,44;1,63]
<i>45-54</i>	67232	2.26 [2.14;3.39]	1,88 [1,77;2,00]
<i>55-64</i>	53865	2.08 [1.96;2.20]	1,69 [1,58;1,80]
Somatic chronic illness^c			
<i>No</i>	284934	Ref.	Ref.
<i>Yes</i>	31478	1.80 [1.70;1.90]	1,23 [1,15;1,30]
Psychiatric chronic illness^c			
<i>No</i>	310744	Ref.	Ref.
<i>Yes</i>	5668	6.96 [6.49;7.47]	1,68 [1,54;1,83]
Number of consultations of private general practitioner during the study period			
<i>0</i>	57182	Ref.	Ref.
<i>1-5</i>	108427	2.30 [2.06;2.59]	1,74 [1,55;1,96]
<i>6-11</i>	73838	5.65 [5.06;6.31]	3,42 [3,06;3,84]
<i>>11</i>	76965	13.04 [11.73;14.50]	7,11 [6,37;7,94]
Number of consultations of private psychiatrist during the study period			
<i>0</i>	292918	Ref.	Ref.
<i>1-2</i>	7368	6.87 [6.34;7,45]	5,14 [4,73;5,59]
<i>>2</i>	16126	26.93 [25.78;28.15]	19,88 [18,95;20,86]
Variable of interest			
CUHI program^d			
<i>No</i>	268137	Ref.	Ref.
<i>Yes</i>	48275	0.95 [1.90;1.00]	0,74 [0,69;0,79]

Adjustment variables				
Census block level	Density of private general practitioners (/100.000 inhabitants)^e			
	<76	74765	Ref.	Ref.
	76-209	159405	1.00 [0.96;1.05]	0,99 [0,93;1,06]
	>209	82242	1.02 [0.96;1.07]	0,95 [0,88;1,03]
	Density of private psychiatrists (/100.000 inhabitants)^e			
	0	174004	Ref.	Ref.
]0;36]	57984	1.04 [0.99;1.09]	0,96 [0,89;1,03]
	>36	84424	1.02 [0.98;1.07]	0,94 [0,88;1,00]
	Variable of interest			
	Deprivation level			
	Low	67779	Ref.	Ref.
	Intermediate	160210	0.96 [0.91;1.00]	0,99 [0,93;1,06]
	High	88423	0.67 [0.64;0.71]	0,82 [0,75;0,88]

^a Bivariate logistic regression analysis. Unadjusted odds ratio and 95% confidence intervals.

^b Multivariate multilevel logistic regression analysis. Adjusted odds ratios and 95% confidence intervals.

^c "Expensive chronic disease" status, for which treatment is completely free of charge (see text).

^d Complementary Universal Health Insurance program: program for persons with low income.

^e Number of physicians in the census blocks and all physicians associated with any neighboring census block with a barycenter at 500 m (as the crow flies) or less from the barycenter of the block considered, divided by the census block population (INSEE 2006).