Women sociodemographic characteristics, lifestyle habits and the use of medications during pregnancy: a cohort study

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Abstract

Purpose: Medication use during pregnancy has been associated with women´s socioeconomic status and lifestyle habits, but maternal health status has hardly been accounted for. We evaluated the association of prescription medication use with sociodemographic characteristics and lifestyle habits in a cohort of pregnant women, adjusting for comorbidities.

Methods: Pregnant women recruited in a prenatal clinic in Trieste, Italy, 2007 to 2009, filled a questionnaire. Prescription data were obtained from pharmacy database through record linkage. Adjusted unconditional logistic regression Odds Ratio (aOR), with 95% confidence interval (95%CI), of having ≥ 1 dispensing for (a) any medication, (b) folic acid and/or iron was calculated.

Results: Among 767 women, 70.5% had ≥ 1 dispensing for any medication, 46.1% of folic acid/iron. For any medication, the aOR (95%CI) was strongly associated with age (<25 years 2.08; 0.92-4.72, ≥40 years 2.30; 1.10-4.81, vs. 29-34 years). Women with lower education (high school 1.23; 0.76-2.00 vs. university) immigrant or with immigrant partner (1.48; 0.76-2.85 and 1.33; 0.63-2.78 vs. non-immigrant), unemployed (1.38; 0.74-2.57 vs. employed in maternity leave), with lowest or highest BMI (1.35; 0.70-2.63 and 1.20; 0.57-2.56 vs. normal) were more likely to use medications. Women with lower education were less likely to use folic acid/iron (high school 0.80; 0.56-1.15, <high school 0.65; 0.40-1.08 vs. university)

Conclusions: In this cohort, sociodemographic characteristics were independently associated with use of medication when comorbidities were adjusted for. Care providers should thus target women with low educational level in promoting folic and iron supplementation during pregnancy.

Background

Women frequently use medications during pregnancy. The prevalence of use of prescription medications ranged from 27% to 99% in developed countries [1] and it was about 67% for Over-the-Counter (OTC) agents [2]. The evidence on the risk–benefit profile in pregnant women is limited to few post-approval studies for most medications, as pregnant women are not included in clinical trials. Thus pregnant women often have concerns about using medicines [3] and their compliance with even needed pharmacologic treatments may be influenced by the perception of medication-related risk: about 70% of women reportedly avoided to take a medication for fear of foetal adverse effects [4]. Sociodemographic differences in risk perception have been reported: young maternal age, low educational level and being at first pregnancy have been associated with an increased perceived risk for both prescription and Over The Counter (OTC) medications [5].

Sociodemographic characteristics and lifestyle habits have indeed been associated with the use of medications during pregnancy, even though with some inconsistencies. A number of studies reported that use of medications increases with increasing maternal age [2,6,7], however younger pregnant women were more likely to report use of medications for acute/short-term illnesses [2] and anti-asthmatics [8], and of filling prescriptions of antibiotics [9]. Use of medications was inversely associated with maternal [2,8,10] and paternal [2,10] education in some studies, but in a large US cohort the use of prescription medication increased with maternal education [6]. Immigrant women in Western and Northern Europe were less

likely to report medications for chronic/long-term disorders than not immigrant women [2]. In Belgium, medication use has been positively associated with Western origin, being born in the country, high education and being employed [7]. Unemployed women were more likely to report use of medications with potential for fetal harm (vs. professional/manager) [11]. Welfare recipients and unemployed were more likely to use antibiotics (vs. white/blue collar workers) [9]. Smoking [2,8] and alcohol consumption during pregnancy [2,11] have been positively associated with medications use, and obesity with the use of anti-asthmatics [8].

Maternal health status is a strong determinant of medication use. Women reporting health problems during the pregnancy were more likely to use analgesics, anti-infectives and antihystamines than those who did not report problems [12]. Sociodemographic characteristics and lifestyle habits have a complex relation with maternal health status as well as with health care utilization during pregnancy, such as prenatal care visits and ultrasound evaluations. For instance, maternal education

has been inversely associated with hypertension and preterm delivery [13-16] as well as with obesity [17]. A social gradient in lifestyle habits, such as smoking during pregnancy [13,18] has been reported as well. Few prior studies, however, took into account maternal health status in assessing the relation between medication use and the characteristics of the women. This prospective cohort study evaluated the association of prescription medication use with sociodemographic characteristics and lifestyle habits, adjusting for comorbidities before and during pregnancy. Moreover we evaluated the relation between medication use and indicators of health care utilization during pregnancy.

Methods

Study cohort

The cohort included all pregnant women resident of Friuli Venezia Giulia (FVG) region, Northeast Italy, attending their prenatal visit between 20 and 22 weeks of gestation at the Institute for Maternal and Child Health IRCCS Burlo Garofolo, in Trieste, from April 3, 2007 to March 3, 2009. During the recruitment period, about 1,800 live births per year were recorded in Trieste and 9,000 in FVG [19]. Exclusion criteria were: age <18 years, Italian language not fluent, twin or complicated pregnancies defined as those with maternal abnormalities of the reproductive tract (such as uterine fibroids, pre-existing chronic illness such as cancer, AIDS, severe heart disease, severe kidney disease, severe Crohn's disease or ulcerative colitis) and those with foetal congenital defects.

All the women filled a self-administered questionnaire inquiring on: date of birth, marital status (woman cohabiting with the partner or living alone), house size (<50 m^2, 50-100 m^2, 100+ m^2), smoking, alcohol consumption, comorbidities before and during pregnancy (diabetes, asthma, allergy, epilepsy, hypertension, vomit, hypothyroidism, hyperthyroidism, lupus, rheumatic diseases, urinary infections, infections, fever, seizures, anemia, cardiovascular diseases, neurological diseases), prior pregnancies (gravidity), number of prenatal visits and ultrasound examinations, height and weight before and during pregnancy, gestational age at birth and date of delivery. For both the woman and her partner information on country of origin, level of education (degree achieved: less than high school, high school, university or higher) and occupational status (employed in maternity leave, employed, housewife, unemployed) was collected.

Prescription data

For each woman, through record linkage using an individual identifier, we extracted the records of all prescriptions redeemed between 2006 and 2012 from the outpatient prescription database of the FVG Region. This database records prescriptions at pharmacy redemption level. It captures all redeemed prescriptions for reimbursed medications dispensed to residents of the region. A unique personal identifier links anonymized individual records. Prescription medications are reimbursed to residents, including pregnant women. All residents are registered with the Regional Health System, providing universal access to health care.

For each redeemed prescription, the following information is recorded: date of redemption, active substance (description and Anatomical Therapeutic and Chemical ATC classification code) [20], brand, quantity, strength, dispensed form, number of units and number of refills. Information on the indication and the prescribed dosage regimen is not recorded.

All prescriptions redeemed from the estimated date of conception to the date of delivery were considered to have occurred during pregnancy. The estimated date of conception was obtained by subtracting gestational age at birth from the date of delivery.

Statistical analysis

Unconditional logistic regression Odds Ratio (OR), with 95% confidence interval (95%CI), of redeeming ≥ 1 prescription (a) of any medication, (b) of any medication excluding folic acid and iron and (c) of systemic antibiotics (ATC J01) was calculated. The following variables were evaluated through uni- and multi-variate analysis: age at delivery (5 classes), education of the women and partner, occupational status of the women and partner, prior pregnancies, smoking, alcohol consumption, BMI before pregnancy (underweight below 18.5; normal weight 18.5–24.9; overweight 25.0–29.9; obesity 30.0 and more) [21], comorbidities before and during pregnancy (none, 1, 2+), country of origin of the women and partner (Italy, other), marital status, number of visits and of ultrasound imaging, house size. The manual process of multivariate model building included entering individual terms and evaluating the likelihood ratio test for inclusion of each variable in the model. Variables with at least one modality had Wald p ≥ 0.20 were entered individually in multivariate models and only those with p$\geq$0.05 or explained the variability or modified the regression coefficient estimators were retained. Two final multivariate models were fitted: one adjusting for age, paternal education, ultrasound imaging and one adding comorbidities as well. Stratified analysis according to reported comorbidities (yes/no) were performed. The statistical analysis was performed with SAS© software, version 9.3 (SAS, Cary, NC, USA).

Ethics Committee review

The study protocol was reviewed by the Ethics Committees at the University Hospital of Udine and at the Institute for Maternal and Child Health of Trieste. Written informed consent for participation in the study was obtained.

Results

Out of 767 women included, 70.5% (N= 541) had at least one dispensing for any medication during pregnancy (Table 1). Folic acid (36.0%) and iron (26.2%) were the most common medications, followed by non-opioid analgesics (6.2%), thyroid hormones (4.3%), medications for acid related disorders (3.6%) and antithrombotics (3.2%).

When adjusting for age, partner education and house size, the OR of having at least one dispensing during pregnancy was directly associated with comorbidities (one 1.72; 95%CI 1.17-2.54; 2 or more 1.96; 95%CI 1.30-2.94), BMI in the lowest (1.27; 95%CI 0.68-2.37) and highest (1.28; 95%CI 0.60-2.73) category, immigrant status (of the woman 1.41; 95%CI 0.74-2.68; of the partner 1.42; 95%CI 0.67-3.01), being housewife (1.23; 95%CI 0.68-2.22) or unemployed (1.67; 95%CI 0.87-3.21), having an unemployed partner (1.20; 95%CI 0.54-2.65) (Table 2). Conversely, a decreased OR was associated with current employment (0.80; 95%CI 0.44-1.46) and being single (0.82; 95%CI 0.46-1.45).

The results did not change when prescription of folic acid and iron were excluded (Table 3). When only prescriptions for folic acid and iron were considered, an inverse association with obesity (0.67; 95%CI 0.35-1.32) and educational level of the women (< high school 0.61; 95%CI 0.37-0.99; high school 0.75; 95%CI 0.53-1.07), but not of the partner was found (Table 4).

Women immigrant status (3.12; 95%CI 0.77-12.75), lower educational level (< high school 2.11; 95%CI 0.82-5.44; high school 1.26; 95%CI 0.63-2.52) and BMI in the lowest (4.08; 95%CI 1.02-16.36)

Table 1. Number of women with at least one dispensing during pregnancy, by therapeutic class.

Therapeutic class	ATC[1]	Users (N=541)	
		N	%[2]
alimentary tract and metabolism			
medications for acid related disorders	A02	27	3.6
antacids	A02A	21	2.8
medications for peptic ulcer and gastro-esophageal reflux	A02B	7	0.9
medications for functional gastrointestinal disorders	A03	12	1.6
bile and liver therapy	A05	2	0.3
laxatives and antidiarrheals	A06	4	0.5
insulin	A10A	1	0.1
vitamins and mineral supplements	A11, A12	18	2.4
blood and blood forming organs			
antithrombotic agents	B01	24	3.2
heparins	B01AB	14	1.8
platelet aggregation inhibitors	B01AC	14	1.8
antihemorrhagics	B02	0	-
iron	B03A	199	26.2
folic acid	B03B	273	36.0
solutions	B05BB	0	-
cardiovascular system			
antihypertensive medications	C02, C07, C08, C09A	6	0.8
methyldopa	C02	0	-
beta-blocking agents	C07	3	0.4
calcium channel blockers	C08	5	0.7
ace inhibitors	C09A	0	-
lipid modifying agents	C10A	0	-
diuretics	C03	0	-
vasoprotectives	C05C	2	0.3
genito-urinary system and sex hormones			
gynecological antiinfectives - antiseptics	G01A	7	0.9
sympathomimetics, labour repressants	G02CA	10	1.3
prolactin inhibitors	G02CB	0	-
hormonal contraceptives	G03A	0	-
estrogens	G03C	0	-
progestogens	G03D	19	2.5
gonadotrophins	G03G	0	-
systemic hormonal preparations			
glucocorticoid, systemic	H02A	5	0.7
thyroid preparations	H03	35	4.6
thyroid hormones	H03A	33	4.3
antithyroid preparations	H03B	2	0.3
anti-infective agents			
antibiotics, systemic	J01	20	2.6
antimycotics, systemic	J02	1	0.1
antivirals, systemic	J05	1	0.1
immune sera and immunoglobulins	J06B	0	-
musculo-skeletal system			
non-steroidal anti-inflammatory drugs	M01A	2	0.3
bisphosphonates	M05B	0	-
nervous system			
non-opioid analgesics	N02BE	47	6.2
selective serotonin agonists	N02CC	1	0.1
antiepileptic medications	N03	1	0.1
antidepressants	N06A	0	-
methadone	N07B	0	-
antiparasitic products			
antiprotozoals and antinematodals	P01	0	-
respiratory system			
medications for obstructive airway disease	R03	7	0.9
adrenergic inhalants	R03A	5	0.7
other inhalants	R03B	1	0.1

adrenergics, systemic	R03CA	1	0.1
nasal decongestants and other topical	R01A	2	0.3
cough and cold preparations	R05	5	0.7
antihistamines for systemic use	R06A	3	0.4

[1] Anatomic and Therapeutic Classification.
[2] Percentage of the total number of cohort members.

Table 2. Odds Ratio (OR), with 95% Confidence Interval (95%CI), of having at least one dispensing for any medication during pregnancy, by socio-demographic characteristics.

	dispensing for any medication during pregnancy				univariate			multivariate[1]			multivariate[2]		
	none (N= 226)		at least one (N= 541)		OR	95%CI		OR	95%CI		OR	95%CI	
age category (years)	N	%	N	%									
<25	11	4.87	31	5.73	1.78	0.81	3.91	2.42	1.01	5.83	2.96	1.17	7.45
25-29[3]	43	19.03	68	12.57	1.00	-	-	1.00	-	-	1.00	-	-
30-34	89	39.38	238	43.99	1.69	1.08	2.66	1.85	1.16	2.93	2.01	1.25	3.24
35-39	70	30.97	159	29.39	1.44	0.89	2.31	1.58	0.97	2.58	1.72	1.04	2.84
40+	13	5.75	45	8.32	2.19	1.06	4.52	2.99	1.37	6.52	3.18	1.44	7.05
country of origin													
Italy[3]	211	93.36	490	90.57	1.00	-	-	1.00	-	-	1.00	-	-
Other	14	6.19	45	8.32	1.38	0.74	2.58	1.41	0.74	2.68	1.42	0.72	2.78
partner country of origin													
Italy[3]	207	91.59	480	88.72	1.00	-	-	1.00	-	-	1.00	-	-
Other	10	4.42	32	5.91	1.38	0.67	2.86	1.42	0.67	3.01	1.44	0.67	3.06
marital status													
married[3]	201	88.94	482	89.09	1.00	-	-	1.00	-	-	1.00	-	-
single	24	10.62	53	9.8	0.92	0.55	1.53	0.82	0.46	1.45	0.80	0.45	1.42
women level of education (degree achieved)													
less than high school	38	16.81	101	18.67	1.13	0.71	1.78	0.94	0.55	1.62	0.97	0.56	1.69
high school	110	48.67	254	46.95	0.98	0.69	1.38	0.89	0.6	1.31	0.96	0.64	1.42
university[3]	78	34.51	184	34.01	1.00	-	-	1.00	-	-	1.00	-	-
partner level of education (degree achieved)													
less than high school	69	30.53	155	28.65	1.24	0.82	1.88	1.22	0.79	1.88	1.26	0.81	1.96
high school	88	38.94	260	48.06	1.63	1.1	2.41	1.65	1.11	2.47	1.69	1.12	2.56
university[3]	64	28.32	116	21.44	1.00	-	-	1.00	-	-	1.00	-	-
occupational status													
employed in maternity leave[3]	169	74.78	399	73.75	1.00	-	-	1.00	-	-	1.00	-	-
employed	20	8.85	37	6.84	0.78	0.44	1.39	0.8	0.44	1.46	0.8	0.43	1.47
housewife	18	7.96	49	9.06	1.15	0.65	2.04	1.23	0.68	2.22	1.34	0.73	2.48
unemployed	15	6.64	48	8.87	1.36	0.74	2.49	1.67	0.87	3.21	1.66	0.86	3.21
partner occupational status													
employed[3]	209	92.48	502	92.79	1.00	-	-	1.00	-	-	1.00	-	-
unemployed	9	3.98	28	5.18	1.3	0.6	2.79	1.20	0.54	2.65	1.17	0.52	2.61
house size (m²)													
>100[3]	70	30.97	121	22.37	1.00	-	-	1.00	-	-	1.00	-	-
<=100	155	68.58	412	76.16	1.54	1.09	2.18	1.54	1.07	2.2	1.55	1.07	2.23
smoking													
never[3]	119	52.65	317	58.6	1.00	-	-	1.00	-	-	1.00	-	-
smoker	21	9.29	52	9.61	0.93	0.54	1.61	0.96	0.53	1.71	1.02	0.56	1.86
ex smoker	82	36.28	166	30.68	0.76	0.54	1.07	0.74	0.52	1.05	0.80	0.56	1.15
alcohol consumption (drinks/week)													
abstainer[3]	69	30.53	166	30.68	1.00	-	-	1.00	-	-	1.00	-	-
< 4	147	65.04	343	63.4	0.97	0.69	1.36	1.01	0.71	1.43	1.04	0.73	1.49
5 +	10	4.42	29	5.36	1.21	0.56	2.61	1.24	0.55	2.82	1.37	0.59	3.16
BMI (kg/m2)													
<18.50 underweight	15	6.64	44	8.13	1.23	0.67	2.28	1.27	0.68	2.37	1.42	0.73	2.78
18.50-24.99 normal[3]	164	72.57	390	72.09	1.00	-	-	1.00	-	-	1.00	-	-
25-<30 overweight	37	16.37	75	13.86	0.85	0.55	1.32	0.88	0.56	1.38	0.91	0.57	1.44
>=30 obese	10	4.42	32	5.91	1.35	0.65	2.8	1.28	0.6	2.73	1.14	0.53	2.46
prior pregnancies													
3	98	43.36	252	46.58	1.00	-	-	1.00	-	-	1.00	-	-
1 to 2	112	49.56	247	45.66	0.86	0.62	1.19	0.87	0.62	1.22	1.72	1.17	2.54

	N	%	N	%	OR	95%CI		OR	95%CI		OR	95%CI	
3 or more	16	7.08	42	7.76	1.02	0.55	1.9	1.00	0.52	1.9	1.98	1.31	2.99
comorbidities during pregnancy (number)													
none[3]	89	39.38	151	27.91	1.00	-	-	1.00	-	-	1.00	-	-
1	76	33.63	198	36.6	1.54	1.06	2.23	1.72	1.17	2.54	1.72	1.17	2.54
2+	57	25.22	180	33.27	1.86	1.25	2.77	1.96	1.3	2.94	1.96	1.3	2.94
prenatal care visits (number)													
<7[3]	33	14.6	68	12.57	1.00	-	-	1.00	-	-	1.00	-	-
7	35	15.49	80	14.79	1.11	0.62	1.97	1.21	0.67	2.19	1.09	0.59	2.01
8	58	25.66	104	19.22	0.87	0.52	1.47	0.98	0.57	1.7	0.86	0.49	1.51
9 or more	87	38.5	252	46.58	1.41	0.87	2.28	1.53	0.93	2.52	1.30	0.78	2.16
prenatal ultrasound imaging (number)													
<4[3]	59	26.11	108	19.96	1.00	-	-	1.00	-	-	1.00	-	-
4	36	15.93	98	18.11	1.49	0.91	2.44	1.49	0.9	2.48	1.40	0.83	2.35
5 to 7	62	27.43	158	29.21	1.39	0.9	2.15	1.44	0.93	2.25	1.37	0.87	2.16
8 or more	61	26.99	146	26.99	1.31	0.85	2.02	1.40	0.89	2.19	1.36	0.85	2.16

[1] Multivariate model adjusted for: age, partner education, house
[2] Multivariate model adjusted for: age, partner education, house, comorbidities
[3] Reference category

Table 3. Odds Ratio (OR), with 95% Confidence Interval (95%CI), of redeeming at least one prescription of any medication excluding folic acid and iron during pregnancy, by socio-demographic characteristics.

	prescription redemption				univariate			age-adjusted			multivariate[1]			multivariate[2]		
	no (N= 226)		yes (N= 359)													
	N	%	N	%	OR	95%CI		OR	95%CI		OR	95%CI		OR	95%CI	
age category (years)																
<25	11	4.87	20	5.57	1.96	0.83	4.58	-	-	-	2.57	1.00	6.61	2.93	1.08	7.94
25-29[3]	43	19.03	40	11.14	1.00	-	-	-	-	-	1.00	-	-	1.00	-	-
30-34	89	39.38	151	42.06	1.82	1.10	3.02	-	-	-	2.02	1.21	3.37	2.25	1.32	3.84
35-39	70	30.97	115	32.03	1.77	1.05	2.98	-	-	-	1.94	1.13	3.32	2.19	1.25	3.82
40+	13	5.75	33	9.19	2.73	1.26	5.91	-	-	-	3.83	1.67	8.80	4.15	1.76	9.78
Country of origin																
Italy[3]	211	93.36	329	91.64	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
Other	14	6.19	25	6.96	1.15	0.58	2.25	1.18	0.59	2.36	1.24	0.61	2.51	1.21	0.57	2.53
partner Country of origin																
Italy[3]	207	91.59	316	88.02	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
Other	10	4.42	22	6.13	1.44	0.67	3.11	1.37	0.63	2.97	1.57	0.71	3.45	1.51	0.67	3.40
marital status																
married[3]	201	88.94	318	88.58	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
single	24	10.62	37	10.31	0.97	0.57	1.68	0.88	0.51	1.54	0.92	0.50	1.67	0.86	0.46	1.60
women level of education (degree achieved)																
less than high school	38	16.81	67	18.66	1.10	0.68	1.79	1.21	0.73	2.02	1.06	0.59	1.91	1.11	0.61	2.03
high school	110	48.67	165	45.96	0.94	0.65	1.36	1.00	0.68	1.46	0.89	0.59	1.34	0.92	0.60	1.41
university[3]	78	34.51	125	34.82	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
partner level of education (degree achieved)																
less than high school	69	30.53	103	28.69	1.11	0.71	1.73	1.21	0.77	1.91	1.14	0.72	1.80	1.21	0.75	1.95
high school	88	38.94	165	45.96	1.40	0.92	2.11	1.57	1.02	2.39	1.48	0.96	2.27	1.51	0.97	2.35
university[3]	64	28.32	86	23.96	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
occupational status																
employed in maternity leave[3]	169	74.78	274	76.32	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
employed	20	8.85	23	6.41	0.71	0.38	1.33	0.70	0.37	1.33	0.77	0.40	1.49	0.79	0.40	1.55
housewife	18	7.96	26	7.24	0.89	0.47	1.67	0.96	0.50	1.83	0.96	0.49	1.85	1.04	0.52	2.06
unemployed	15	6.64	31	8.64	1.28	0.67	2.43	1.35	0.70	2.60	1.63	0.81	3.26	1.47	0.72	2.98
partner occupational status																
employed[3]	209	92.48	336	93.59	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
unemployed	9	3.98	18	5.01	1.24	0.55	2.82	1.22	0.53	2.80	1.14	0.48	2.66	1.02	0.43	2.45
house size (m²)																
>100[3]	70	30.97	85	23.68	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
<=100	155	68.58	270	75.21	1.44	0.99	2.08	1.56	1.06	2.28	1.52	1.03	2.24	1.51	1.02	2.25
smoking																
never[3]	119	52.65	209	58.22	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
smoker	21	9.29	38	10.58	1.03	0.58	1.84	1.06	0.59	1.90	1.11	0.60	2.06	1.25	0.65	2.40
ex smoker	82	36.28	107	29.81	0.74	0.52	1.07	0.76	0.52	1.09	0.74	0.51	1.09	0.81	0.55	1.21

alcohol consumption (drinks/week)																
abstainer³	69	30.53	112	31.20	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
< 4	147	65.04	226	62.95	0.95	0.66	1.36	0.90	0.62	1.31	0.92	0.63	1.35	1.92	1.25	2.95
5 +	10	4.42	18	5.01	1.11	0.48	2.54	0.97	0.42	2.25	1.06	0.44	2.56	2.78	1.78	4.34
BMI (kg/m2)																
<18.50 underweight	15	6.64	31	8.64	1.32	0.69	2.52	1.37	0.71	2.64	1.38	0.71	2.68	1.68	0.82	3.44
18.50-24.99 normal³	164	72.57	257	71.59	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
25-<30 overweight	37	16.37	46	12.81	0.79	0.49	1.28	0.79	0.49	1.27	0.81	0.49	1.34	0.83	0.49	1.39
>=30 obese	10	4.42	25	6.96	1.60	0.75	3.41	1.68	0.78	3.63	1.60	0.74	3.50	1.33	0.59	2.99
prior pregnancies																
0³	98	43.36	167	46.52	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
1-2	112	49.56	165	45.96	0.87	0.61	1.22	0.78	0.55	1.12	0.82	0.57	1.18	0.78	0.54	1.14
3 or more	16	7.08	27	7.52	0.99	0.51	1.93	0.86	0.43	1.70	0.86	0.43	1.73	0.80	0.39	1.67
comorbidities during pregnancy (number)																
none³	89	39.38	85	23.68	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
1	76	33.63	125	34.82	1.72	1.14	2.60	1.80	1.19	2.73	1.92	1.25	2.95	1.92	1.25	2.95
2+	57	25.22	141	39.28	2.59	1.69	3.97	2.69	1.74	4.15	2.74	1.76	4.27	2.74	1.76	4.27
prenatal care visits (number)																
<7³	33	14.60	39	10.86	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
7	35	15.49	50	13.93	1.21	0.64	2.28	1.24	0.65	2.35	1.35	0.70	2.62	1.15	0.58	2.28
8	58	25.66	69	19.22	1.01	0.56	1.80	1.01	0.56	1.82	1.11	0.61	2.03	0.93	0.50	1.73
9 or more	87	38.50	175	48.75	1.70	1.00	2.89	1.77	1.04	3.03	1.89	1.09	3.27	1.56	0.88	2.76
prenatal ultrasound imaging (number)																
<4³	59	26.11	56	15.60	1.00	-	-	1.00	-	-	1.00	-	-	1.00	-	-
4	36	15.93	60	16.71	1.76	1.01	3.05	1.78	1.02	3.10	1.82	1.03	3.21	1.73	0.96	3.11
5-7	62	27.43	109	30.36	1.85	1.15	3.00	1.90	1.17	3.09	1.96	1.19	3.21	1.89	1.13	3.16
8 or more	61	26.99	116	32.31	2.00	1.24	3.24	2.05	1.26	3.32	2.26	1.37	3.72	2.28	1.36	3.81

[1] Multivariate model adjusted for: age, partner education, house
[2] Multivariate model adjusted for: age, partner education, house, comorbidities
[3] Reference category

Table 4. Odds Ratio (OR), with 95% Confidence Interval (95%CI), of having at least one dispensing for folic acid and/or iron during pregnancy, by socio-demographic characteristics.

	dispensing for folic acid and/or iron during pregnancy				univariate			multivariate¹			multivariate²		
	none (N= 413)		at least one (N= 354)		OR	95%CI		OR	95%CI		OR	95%CI	
age category (years)	N	%	N	%									
<25	20	4.8	22	6.2	1.50	0.73	3.06	1.64	0.77	3.48	1.79	0.83	3.85
25-29³	64	15.5	47	13.3	1.00	-	-	1.00	-	-	1.00	-	-
30-34	171	41.4	156	44.1	1.24	0.80	1.92	1.27	0.82	1.97	1.33	0.85	2.09
35-39	129	31.2	100	28.2	1.06	0.67	1.67	1.09	0.69	1.75	1.15	0.71	1.86
40+	29	7.0	29	8.2	1.36	0.72	2.58	1.57	0.81	3.04	1.70	0.86	3.34
country of origin													
Italy³	384	93.0	317	89.5	1.00	-	-	1.00	-	-	1.00	-	-
Other	24	5.8	35	9.9	1.77	1.03	3.03	1.64	0.94	2.86	1.57	0.88	2.80
partner country of origin													
Italy³	371	89.8	316	89.3	1.00	-	-	1.00	-	-	1.00	-	-
Other	19	4.6	23	6.5	1.42	0.76	2.66	1.35	0.71	2.57	1.35	0.71	2.59
marital status													
married³	367	88.9	316	89.3	1.00	-	-	1.00	-	-	1.00	-	-
single	41	9.9	36	10.2	1.02	0.64	1.63	0.95	0.56	1.59	0.89	0.52	1.51
women level of education (degree achieved)													
less than high school	78	18.9	61	17.2	0.79	0.52	1.20	0.62	0.37	0.99	0.65	0.40	1.08
high school	202	48.9	162	45.8	0.81	0.59	1.12	0.75	0.53	1.07	0.80	0.56	1.15
university³	132	32.0	130	36.7	1.00	-	-	1.00	-	-	1.00	-	-
partner level of education (degree achieved)													
less than high school	124	30.0	100	28.2	1.03	0.70	1.53	0.98	0.65	1.47	1.04	0.69	1.57
high school	181	43.8	167	47.2	1.18	0.82	1.69	1.14	0.78	1.65	1.17	0.80	1.71
university³	101	24.5	79	22.3	1.00	-	-	1.00	-	-	1.00	-	-
occupational status													
employed in maternity leave³	308	74.6	260	73.4	1.00	-	-	1.00	-	-	1.00	-	-
employed	31	7.5	26	7.3	0.99	0.57	1.72	1.01	0.57	1.78	0.98	0.55	1.75

housewife	36	8.7	31	8.8	1.02	0.61	1.69	1.03	0.61	1.75	1.03	0.60	1.76
unemployed	29	7.0	34	9.6	1.39	0.82	2.34	1.49	0.87	2.57	1.44	0.83	2.50
partner occupational status													
employed[3]	386	93.5	325	91.8	1.00	-	-	1.00	-	-	1.00	-	-
unemployed	16	3.9	21	5.9	1.56	0.80	3.04	1.66	0.83	3.32	1.62	0.81	3.24
house size (m²)													
>100[3]	113	27.4	78	22.0	1.00	-	-	1.00	-	-	1.00	-	-
<=100	296	71.7	271	76.6	1.33	0.95	1.85	1.32	0.94	1.86	1.36	0.97	1.92
smoking													
never[3]	221	53.5	215	60.7	1.00	-	-	1.00	-	-	1.00	-	-
smoker	42	10.2	31	8.8	0.76	0.46	1.25	0.78	0.46	1.32	0.80	0.47	1.37
ex smoker	140	33.9	108	30.5	0.79	0.58	1.08	0.77	0.56	1.07	0.79	0.57	1.09
alcohol consumption (drinks/week)													
abstainer[3]	126	30.5	109	30.8	1.00	-	-	1.00	-	-	1.00	-	-
< 4	265	64.2	225	63.6	0.98	0.72	1.34	1.03	0.75	1.42	0.99	0.72	1.38
5 +	19	4.6	20	5.6	1.22	0.62	2.34	1.38	0.68	2.79	1.35	0.66	2.78
BMI (kg/m2)				0.0									
<18.50 underweight	33	8.0	26	7.3	0.87	0.51	1.50	0.91	0.52	1.57	0.989	0.562	1.740
18.50-24.99 normal[3]	291	70.5	263	74.3	1.00	-	-	1.00	-	-	1.00	-	-
25-<30 overweight	64	15.5	48	13.6	0.83	0.55	1.25	0.84	0.55	1.28	0.87	0.57	1.34
>=30 obese	25	6.1	17	4.8	0.75	0.40	1.42	0.67	0.34	1.32	0.62	0.31	1.25
prior pregnancies													
0[3]	175	42.4	175	49.4	1.00	-	-	1.00	-	-	1.00	-	-
1 to 2	207	50.1	152	42.9	0.73	0.55	0.99	0.77	0.57	1.05	0.76	0.55	1.04
3 or more	31	7.5	27	7.6	0.87	0.50	1.52	0.95	0.54	1.70	0.93	0.52	1.68
comorbidities during pregnancy (number)													
none[3]	143	34.6	97	27.4	1.00	-	-	1.00	-	-	1.00	-	-
1	145	35.1	129	36.4	1.31	0.92	1.86	1.32	0.92	1.90	1.32	0.92	1.90
2+	115	27.8	122	34.5	1.56	1.09	2.25	1.49	1.03	2.15	1.49	1.03	2.15
prenatal care visits (number)													
<7[3]	59	14.3	42	11.9	1.00	-	-	1.00	-	-	1.00	-	-
7	57	13.8	58	16.4	1.43	0.83	2.45	1.55	0.89	2.71	1.47	0.84	2.58
8	91	22.0	71	20.1	1.10	0.66	1.81	1.22	0.73	2.05	1.14	0.68	1.93
9 or more	182	44.1	157	44.4	1.21	0.77	1.90	1.27	0.80	2.02	1.16	0.72	1.86
prenatal ultrasound imaging (number)													
<4[3]	87	21.1	80	22.6	1.00	-	-	1.00	-	-	1.00	-	-
4	64	15.5	70	19.8	1.19	0.75	1.87	1.14	0.72	1.82	1.18	0.73	1.89
5 to 7	120	29.1	100	28.2	0.91	0.61	1.36	0.91	0.61	1.37	0.90	0.60	1.37
8 or more	126	4.8	81	22.9	0.70	0.46	1.06	0.71	0.47	1.08	0.70	0.46	1.08

[1] Multivariate model adjusted for: age, partner education, house
[2] Multivariate model adjusted for: age, partner education, house, comorbidities
[3] Reference category

and highest (1.20; 95%CI 0.25-5.81) category were associated with increased OR only in women not reporting comorbidities, however several strata included a small number of subjects (Table 5).

Discussion

In this cohort 70% of women was dispensed at least one medication during pregnancy, in the range of a recent systematic review [1]. Iron and folic acid were the most common agents. Women younger than 25 and above 30 years were more likely to have at least one prescription medication dispensed during pregnancy. This result is in line with prior studies showing higher use of medication in the oldest and youngest age categories compared to the intermediate age [2,6,7,22,23]. In FVG the mean maternal age at delivery in 2008 was 31.2 years [24], suggesting that health care personnel should pose even more attention to supervising medication use in pregnancy, as many of their patients would use at least one medication.

We found that women with education lower education were less likely to use folic acid and iron but not other medications, compared

with women with university degree. Prior studies reported inconsistent results. In two Danish studies women in the lowest educational category were 30% and 40% more likely of filling prescriptions for any medication and for antibiotics, respectively, than those with intermediate education [10]; low education, obesity and young maternal age were positively associated with filling prescriptions of antibiotics [25]. In a large international survey, an inverse association between maternal and paternal education and the use of medications for chronic conditions has been reported [2]. Medication use was conversely higher in more educated women in a large cohort in the USA [6] and in a cross-sectional study in Belgium [7].

In our cohort, immigrant women and those with immigrant partner were more likely to use medications as well as iron and folic acid than those born in Italy and with Italian native partners, respectively. Conversely, in prior studies, immigrant women were less likely to use medications than not immigrant women [2,8]. In Belgium, maternal self-reported medication use was positively associated with Western origin, being born in Belgium, and employment status

Table 5. Odds Ratio (OR), with 95% Confidence Interval (95%CI), of redeeming at least one prescription of any medication during pregnancy according to comorbidities, by sociodemographic characteristics.

	comorbidities during pregnancy															
	at least one								none							
	prescription redemption		univariate		age adjusted		multivariate[1]		prescription redemption		univariate		age adjusted		multivariate[1]	
	none (N=133)	at least one (N=378)	OR	95%CI	OR	95%CI	OR	95%CI	none (N=89)	at least one (N=151)	OR	95%CI	OR	95%CI	OR	95%CI
	N	N														
age category (years)																
<25	8 (6.02)	21 (5.56)	1.36	0.53-3.46	-	--	1.61	0.57-4.53	2 (2.25)	10 (6.62)	6.36	1.15-35.23	-	--	12.22	1.31-13.89
25-29[2]	28 (21.05)	54 (14.29)	1.00	--	-	--	1.00	--	14 (15.73)	11 (7.28)	1.00	--	-	--	1.00	--
30-34	52 (39.10)	167 (44.18)	1.66	0.96-2.89	-	--	1.75	1.00-3.07	36 (40.45)	69 (45.70)	2.44	1.01-5.92	-	--	2.54	0.99-6.50
35-39	38 (28.57)	105 (27.78)	1.43	0.80-2.58	-	--	1.53	0.83-2.79	31 (34.83)	48 (31.79)	1.97	0.79-4.89	-	--	2.02	0.77-5.31
40+	7 (5.26)	31 (8.20)	2.30	0.90-5.87	-	--	3.66	1.25-10.68	6 (6.74)	13 (8.61)	2.76	0.79-9.61	-	--	3.16	0.85-11.82
country of origin																
Italy[2]	123 (92.48)	345 (91.27)	1.00	- -	1.00	- -	1.00	- -	85 (95.51)	135 (89.40)	1.00	- -	1.00	- -	1.00	- -
Other	10 (7.52)	28 (7.41)	0.99	0.47-2.11	1.03	0.48-2.21	1.00	0.46-2.17	3 (3.37)	15 (9.93)	3.15	0.89-11.20	3.54	0.94-13.26	3.12	0.77-12.75
partner country of origin																
Italy[2]	120 (90.23)	331 (87.57)	1.00	- -	1.00	- -	1.00	- -	83 (93.26)	137 (90.73)	1.00	- -	1.00	- -	1.00	- -
Other	5 (3.76)	24 (6.35)	1.74	0.65-4.66	1.69	0.62-4.55	1.73	0.63-4.74	5 (5.62)	8 (5.30)	0.97	0.31-3.06	0.68	0.20-2.32	0.84	0.23-3.09
marital status																
married[2]	117 (87.97)	339 (89.68)	1.00	- -	1.00	- -	1.00	- -	80 (89.89)	132 (87.42)	1.00	- -	1.00	- -	1.00	- -
single	16 (12.03)	37 (9.79)	0.80	0.43-1.49	0.73	0.38-1.39	0.66	0.32-1.34	8 (8.99)	15 (9.93)	1.22	0.45-3.32	1.15	0.41-3.20	1.16	0.43-3.14
women level of education (degree achieved)																
less than high school	23 (17.29)	59 (15.61)	0.84	0.47-1.51	0.90	0.49-1.65	0.58	0.29-1.16	15 (16.85)	36 (23.84)	1.86	0.87-3.99	2.01	0.90-4.50	2.11	0.82-5.44
high school	64 (48.12)	177 (46.83)	0.91	0.59-1.41	0.96	0.61-1.49	0.81	0.50-1.33	43 (48.31)	75 (49.67)	1.35	0.74-2.46	1.48	0.80-2.73	1.26	0.63-2.52
university[2]	46 (34.59)	140 (37.04)	1.00	- -	1.00	- -	1.00	- -	31 (34.83)	40 (26.49)	1.00	- -	1.00	- -	1.00	- -
partner level of education (degree achieved)																
less than high school	33 (24.81)	111 (29.37)	1.38	0.80-2.38	1.50	0.85-2.63	1.40	0.80-2.48	35 (39.33)	40 (26.49)	1.14	0.56-2.32	1.23	0.59-2.55	1.16	0.55-2.44
high school	60 (45.11)	170 (44.97)	1.16	0.71-1.89	1.27	0.77-2.10	1.19	0.72-1.98	27 (30.34)	84 (55.63)	3.11	1.55-6.24	3.28	1.61-6.68	3.17	1.54-6.53
university[2]	36 (27.07)	88 (23.28)	1.00	- -	1.00	- -	1.00	- -	26 (29.21)	26 (17.22)	1.00	- -	1.00	- -	1.00	- -
occupational status																
employed in maternity leave[2]	99 (74.44)	285 (75.40)	1.00	- -	1.00	- -	1.00	- -	67 (75.28)	106 (70.20)	1.00	- -	1.00	- -	1.00	- -
employed	11 (8.27)	24 (6.35)	0.76	0.36-1.60	0.77	0.36-1.65	0.89	0.40-1.97	9 (10.11)	12 (7.95)	0.84	0.34-2.11	0.82	0.32-2.07	0.72	0.27-1.93
housewife	8 (6.02)	33 (8.73)	1.43	0.64-3.21	1.59	0.70-3.60	1.49	0.65-3.42	9 (10.11)	15 (9.93)	1.05	0.44-2.54	1.08	0.43-2.67	1.23	0.47-3.27
unemployed	11 (8.27)	32 (8.47)	1.01	0.49-2.08	1.09	0.52-2.27	1.36	0.61-3.03	4 (4.49)	15 (9.93)	2.37	0.76-7.45	2.27	0.71-7.24	2.51	0.75-8.46

partner occupational status																
employed[2]	121 (90.98)	348 (92.06)	1.00	- -	1.00	- -	1.00	- -	84 (94.38)	142 (94.04)	1.00	- -	1.00	- -	1.00	- -
unemployed	6 (4.51)	20 (5.29)	1.16	0.45-2.95	1.18	0.46-3.05	1.09	0.42-2.83	3 (3.37)	8 (5.30)	1.58	0.41-6.11	1.49	0.35-6.27	1.65	0.35-7.84
house size (m²)																
>100[2]	41 (30.83)	87 (23.02)	1.00	- -	1.00	- -	1.00	- -	28 (31.46)	32 (21.19)	1.00	- -	1.00	- -	1.00	- -
<=100	91 (68.42)	287 (75.93)	1.49	0.96-2.31	1.57	1.00-2.45	1.54	0.98-2.42	61 (68.54)	116 (76.82)	1.66	0.92-3.02	1.73	0.94-3.18	1.50	0.79-2.82
smoking																
never[2]	77 (57.89)	228 (60.32)	1.00	- -	1.00	- -	1.00	- -	41 (46.07)	82 (54.30)	1.00	- -	1.00	- -	1.00	- -
smoker	12 (9.02)	35 (9.26)	0.99	0.49-1.99	1.00	0.49-2.04	0.94	0.44-2.00	8 (8.99)	15 (9.93)	0.94	0.37-2.39	1.00	0.39-2.61	1.02	0.37-2.81
ex smoker	41 (30.83)	110 (29.10)	0.91	0.58-1.41	0.92	0.59-1.43	0.84	0.53-1.33	39 (43.82)	54 (35.76)	0.69	0.40-1.21	0.67	0.38-1.18	0.75	0.40-1.39
alcohol consumption (drinks/week)																
abstainer[2]	44 (33.08)	117 (30.95)	1.00	- -	1.00	- -	1.00	- -	24 (26.97)	44 (29.14)	1.00	- -	1.00	- -	1.00	- -
< 4	86 (64.66)	242 (64.02)	1.06	0.69-1.62	1.05	0.68-1.61	1.12	0.72-1.73	58 (65.17)	96 (63.58)	0.90	0.50-1.64	0.82	0.45-1.52	0.89	0.47-1.69
5 +	3 (2.26)	17 (4.50)	2.13	0.60-7.63	1.86	0.51-6.76	2.90	0.63-13.30	7 (7.87)	10 (6.62)	0.78	0.26-2.31	0.66	0.22-2.00	0.73	0.23-2.36
BMI (kg/m2)																
<18.50 underweight	10 (7.52)	29 (7.67)	1.05	0.49-2.23	1.06	0.49-2.26	1.05	0.49-2.26	3 (3.37)	13 (8.61)	2.51	0.69-9.13	3.01	0.78-11.65	4.08	1.02-16.36
18.50-24.99 normal[2]	97 (72.93)	269 (71.16)	1.00	- -	1.00	- -	1.00	- -	66 (74.16)	114 (75.50)	1.00	- -	1.00	- -	1.00	- -
25-<30 overweight	19 (14.29)	56 (14.81)	1.06	0.60-1.88	1.08	0.61-1.92	1.23	0.67-2.27	17 (19.10)	18 (11.92)	0.61	0.30-1.27	0.55	0.26-1.17	0.53	0.24-1.19
>=30 obese	7 (5.26)	24 (6.35)	1.24	0.52-2.96	1.22	0.51-2.93	1.06	0.43-2.61	3 (3.37)	6 (3.97)	1.16	0.28-4.78	1.38	0.32-5.97	1.20	0.25-5.81
prior pregnancies																
0[2]	57 (42.86)	173 (45.77)	1.00	- -	1.00	- -	1.00	- -	38 (42.70)	73 (48.34)	1.00	- -	1.00	- -	1.00	- -
1-2	67 (50.38)	176 (46.56)	0.87	0.57-1.31	0.79	0.51-1.21	0.81	0.53-1.26	44 (49.44)	67 (44.37)	0.79	0.46-1.37	0.79	0.45-1.37	0.92	0.51-1.66
3 or more	9 (6.77)	29 (7.67)	1.06	0.47-2.38	0.93	0.41-2.11	0.91	0.39-2.10	7 (7.87)	11 (7.28)	0.82	0.29-2.28	0.89	0.30-2.62	1.30	0.42-4.02
prenatal care visits (number)																
<7[2]	12 (9.02)	44 (11.64)	1.00	- -	1.00	- -	1.00	- -	20 (22.47)	23 (15.23)	1.00	- -	1.00	- -	1.00	- -
7	23 (17.29)	56 (14.81)	0.66	0.30-1.48	0.66	0.29-1.48	0.72	0.31-1.65	11 (12.36)	24 (15.89)	1.90	0.75-4.82	1.86	0.72-4.82	1.72	0.63-4.64
8	39 (29.32)	72 (19.05)	0.50	0.24-1.06	0.49	0.23-1.03	0.56	0.26-1.21	19 (21.35)	32 (21.19)	1.47	0.64-3.34	1.48	0.64-3.42	1.37	0.56-3.36
9 or more	49 (36.84)	180 (47.62)	1.00	0.49-2.04	1.00	0.49-2.05	1.15	0.55-2.40	37 (41.57)	63 (41.72)	1.48	0.72-3.05	1.39	0.72-2.90	1.14	0.53-2.48
prenatal ultrasound imaging (number)																
<4[2]	33 (24.81)	66 (17.46)	1.00	- -	1.00	- -	1.00	- -	25 (28.09)	39 (25.83)	1.00	- -	1.00	- -	1.00	- -
4	21 (15.79)	73 (19.31)	1.74	0.92-3.30	1.79	0.94-3.43	1.82	0.94-3.53	15 (16.85)	23 (15.23)	0.98	0.43-2.24	0.96	0.42-2.22	0.93	0.39-2.22
5-7	33 (24.81)	110 (29.10)	1.67	0.94-2.95	1.69	0.95-3.00	1.83	1.02-3.30	29 (32.58)	44 (29.14)	0.97	0.49-1.93	0.95	0.47-1.91	0.82	0.39-1.73
8 or more	40 (30.08)	107 (28.31)	1.34	0.77-2.33	1.35	0.77-2.35	1.51	0.85-2.68	19 (21.35)	38 (25.17)	1.28	0.61-2.70	1.13	0.53-2.43	1.15	0.51-2.57

[1]Multivariate model adjusted for: age, partner education, house
[2]Reference category

[7]. This discrepancy can be partially explained by differences in the method of collecting information. The referenced studies used respectively a self-completion web-based questionnaire [2], midwife interview and prescriptions issued after the first prenatal visit [8], questionnaire in four languages [7], while in our study medication use was assessed through prescriptions redemption recorded in a health database. Maternal recall accuracy of medication use during pregnancy may be affected by the immigrant status of the women, speaking a mother language different from that of the country of residence and likely with a specific cultural attitude regarding health care practices and medication use during pregnancy. Recall accuracy of medications taken during the pregnancy has been associated positively to maternal education [26,27]. Moreover, the accuracy of recall has been shown to vary by therapeutic class [28], type of use (chronic vs. occasional) [27] and to depend on data collection methods and questionnaire design [29-31].

Housewives, unemployed women (vs. employed in maternity leave) as well as women with unemployed partner (vs. with employed partner) were more likely of using medications during pregnancy. Conversely, women in manual occupations or unemployed were more likely to report medications with potential foetal harm, but not any medication, compared to professional women [11]. Women welfare recipients and unemployed were more likely to fill prescriptions for antibiotics than those in white-blue collar occupations [9].

Of note, women currently employed during pregnancy had a lower likelihood of redeeming prescriptions of any medication and of antibiotics than those employed in maternity leave. The 'healthy worker effect' may partially explain this result. Women experiencing less health problems, and thus using less frequently medications, may remain employed during pregnancy.

Prior parity was inversely associated with prescriptions of any medication, and of antibiotics. In some prior studies, nulliparity was associated with a 40% increased likelihood of reporting medications with potential for fetal harm, but not any medication [11] and with a 66% increased likelihood of reporting OTCs [32]. Conversely, in another study nulliparous women were 40% less likely of reporting medication use than parous women [7]. Having had previous children has been associated with an increased likelihood of reporting the use of medications for acute/short-term illnesses and of OTCs, but not of medications for chronic or long-term conditions [2].

In our study, women underweight and obese were more likely to use medications in o Consistently, higher BMI has been associated with higher OTC use [32] and prescription medication [22] use during pregnancy. Obese women tended to fill more prescriptions of antibiotics than women in normal weight category [25]. However, we found that obese women were less likely to take folic acid and iron. As expected, we found that women experiencing comorbidities were also more likely to use medications. Consistently, maternal chronic illnesses increased the likelihood of using prescription medications [22] and specific therapeutic classes such as analgesics/antipyretics, anti-infectives and antihistamines [12]. In our cohort, women with more than 4 prenatal ultrasound examinations and those with the highest number of prenatal care visits were more likely to use medications than women in the respective reference categories. Similarly, in a Dutch cohort the number of General Practitioner visits was a strong predictor for OTC medications use [32].

Limits

Prescription filling or redemption data is a proxy for actual medication consumption. It has been estimated that 6% of dispensed medications were not used [33]. Noncompliance and medication borrowing or sharing [34] are amidst causes for overestimation of use as well.

Information on the indication is not recorded in the prescription database. Therefore, we could not evaluate the appropriateness of prescriptions.

We collected information on education and occupational status as measures of socio-economic status, but not on household income. However, education as a measure of socioeconomic status captures both the dimension of knowledge and earning capacity, through professional position.

Strengths

This study takes into account the health status of the women, a strong determinant of medication use during pregnancy, through adjustment for comorbidities.

Moreover, the study evaluates also the effect of characteristics of the partner, such as educational level, occupational and immigration status.

The prescription database covers the entire resident population, without any exclusion according to occupational or socioeconomic status. All women in the cohort were linked to dispensing records, without omissions of population subgroups (e.g. unemployed or immigrant women). The potential for information bias is thus reduced.

Conclusion

Adjusting for maternal age and comorbidities, sociodemographic characteristics remained associated with the use of prescription medication during pregnancy. Use of any medication was associated with lower education, immigrant status and unemployment. However, less educated women were less likely to use folic acid and iron. Care providers should thus target women with low educational level in promoting folic and iron supplementation during pregnancy. Detecting differences in medication use during pregnancy according to sociodemographic and lifestyle variables is useful for planning interventions promoting safe medication use during pregnancy and to tailor such interventions to the specific characteristics of women. Future studies should evaluate if the inappropriate use of medications during pregnancy has sociodemographic differential.

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