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1 **Cervical cancer screening among homeless women in the Greater Paris Area (France): results of**
2 **the ENFAMS survey**

3

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23

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29

30 **ABSTRACT**

31 **Objectives**

32 Little is known about the prevalence of cervical cancer screening (CCS) and its correlates among
33 homeless women in France. The objectives of this study were to determine the prevalence of women who
34 had never been screened for cervical cancer and to identify the associated factors.

35 **Methods**

36 This cross-sectional study was based on data collected in the ENFAMS survey, which was conducted in
37 2013 among 764 sheltered homeless mothers in the Greater Paris Area. Robust Poisson regression models
38 were used to estimate the association between no lifetime CCS and certain sociodemographic and health-
39 related factors (selected from the Behavioral Model of Vulnerable Populations). Analyses were performed
40 separately for women with and without a regular gynaecological follow-up (RGF).

41 **Results**

42 The proportion of never-screeners was 33% among the women with an RGF versus 64% among those
43 without an RGF ($p < 0.001$). Among the latter, never having been screened for CCS was associated mainly
44 with socioeconomic conditions, the length of time lived in France, a history of delivery in France, and the
45 duration of homelessness. In those with an RGF, the factors were mainly poor health service utilisation
46 and language difficulties.

47 **Conclusion**

48 This first quantitative study of CCS among homeless women in the Greater Paris Area points to the need
49 for it to be proposed and performed more systematically in primary care. Every contact between this hard-
50 to-reach population and health services should be an opportunity to check their screening status and to
51 ensure that those in need actually undergo a Pap test.

52

53 **Keywords** : homelessness ; cervical cancer ; screening ; Behavioral Model of Vulnerable Populations

54

55 INTRODUCTION

56 Since the implementation of cytological screening tests in the 1970s, the incidence of and mortality rates
57 from cervical cancer have declined in most European countries (Mathew and George, 2009; Vaccarella et
58 al., 2013). A lack of cervical cancer screening (CCS) is strongly associated with the development of
59 invasive cervical cancer (Leyden et al., 2005). Many studies and reports have identified strong disparities
60 in CCS coverage in the general population. In France, there were an estimated 3,000 new cases and 1,000
61 deaths from cervical cancer in 2012. Although national recommendations have been issued since 1990
62 (which recommend a CCS test every 3 years after two normal tests one year apart) (Fédération des
63 Gynécologue et Obstétriciens de Langue Française, 1990), only 10% of women in the recommended age
64 range (25-65 years) have a Pap test at the recommended frequency, 50% have delayed screening or have
65 never been screened, and 40% are overscreened, resulting in a national coverage rate that has stagnated at
66 57% (from 2003 to 2008) (Haute Autorité de Santé (HAS), 2010). In the French-speaking general
67 population in the Greater Paris area 8% of concerned women had never been screened for cervical cancer
68 in 2010 (Rondet et al., 2014). Multiple factors associated with an increased risk of no lifetime screening
69 have been reported, such as socio-economic status and origin (Vallée et al., 2010; Grillo et al., 2012;
70 Rondet et al., 2014), but it has never been studied among homeless women in France.

71 Over the last decade, women with children have been the fastest growing segment of the homeless
72 population in France. This is due to the dramatic increase in the number of homeless families (Guyavarch
73 and Le Méner, 2010). Between 2001 (Brousse, 2006) and 2012 (Yaouancq et al., 2013), the absolute
74 number of French-speaking homeless adults increased by almost 50%, 25% of whom had young children
75 living with them. In the Greater Paris Area (a region of 849 km² with 7.0 million inhabitants), emergency
76 social services have sheltered more people with families than lone individuals.

77 Previous studies of health and healthcare in homeless families revealed that women's physical and mental
78 health status was cause for concern (Hwang et al., 2005). They are particularly more likely to have
79 HIV/AIDS, sexually transmitted infections or gynaecological problems (Beijer et al., 2012). Studies of
80 CCS in homeless women in the United States (Chau et al., 2002; Hogenmiller et al., 2007; Bharel et al.,
81 2009) indicate that they are at greater risk for infection by the human papilloma virus (HPV) and for
82 developing an invasive cancer (Long et al., 1998). In addition, homeless women encounter many barriers
83 to accessing health services (such as cost, language, transportation and discrimination) (Kushel et al.,

84 2001; Stein et al., 2007; Teruya et al., 2010). Compared to homeless men, women face an additional
85 problem: the services targeting the homeless population were designed mainly for men and may not be
86 properly suited to women's needs (Lewis et al., 2003).

87 Faced with this population's invisibility, both in the public space and in French routine health statistics
88 and health surveys, the *Observatoire du Samusocial de Paris* conducted a multipurpose health and social
89 survey among sheltered families in the Greater Paris Area in the winter of 2013 (Vandentorren et al.,
90 2015). Using those data, we sought to determine the proportion of homeless women who had undergone
91 CCS, the time since their last test, and the factors associated with no lifetime CCS.

92

93 **METHODS**

94 **Study sample**

95 This study was based on data collected during the ENFAMS (a French acronym for "homeless families
96 and children") survey, the first statistical survey of homeless families conducted in France (Vandentorren
97 et al., 2015). The reference population consisted of adults, accompanied by at least one child under 13
98 years of age, living in social hotels, emergency centres, centres for asylum-seekers and long-term
99 rehabilitation centres. The sampling design for the ENFAMS survey included three levels of sampling:
100 shelters, families (the single parent or one of the two parents was interviewed, who was a woman in
101 95.4% of the cases), and one child in every family.

102 The final sample consisted of 801 families, which were interviewed face-to-face in seventeen languages
103 by an interviewer and a psychologist. The interviewer collected a large array of data on their
104 demographics, socioeconomic status, living conditions, health conditions and health service utilisation.

105 **Subsample analysis and outcomes**

106 Among the total number of women interviewed (N1=764), we performed an analysis of the subsample of
107 those aged 25 to 65 years, the target range in the French CCS recommendations (N2=641). They were
108 asked two questions: "Have you ever had a Pap test?" and, if the answer was 'yes', "When was your most
109 recent one?". For the multivariate analysis, our outcome was never having had a Pap test.

110 **Conceptual model**

111 We used the Behavioral Model of Vulnerable Populations (BMVP) as a conceptual framework to select a
112 set of relevant cofactors (Aday and Andersen, 1974; Gelberg et al., 2000; Stein et al., 2007). This model

113 includes traditional factors and specific vulnerabilities relating to homelessness. It hypothesises that
114 health service utilisation is a function of predisposing, enabling and need factors. Predisposing factors are
115 characteristics that predispose an individual to access health services, enabling factors are the factors that
116 enhance or limit the individual's ability use these services, should the need arise, and need factors include
117 the immediate cause of health service utilisation.

118 **Independent variables**

119 *Predisposing factors.* In this study, the general predisposing factors were demographics, such as age and
120 country of birth (in or outside of France), the level of education (none, primary, secondary or tertiary),
121 occupational status, couple status and the number of children. The specific vulnerable predisposing
122 factors concerned immigration (administrative status and the length of time lived in France),
123 homelessness (the duration of homelessness, the type of housing at the time of the study, and the number
124 of moves per year since the first period of homelessness), victimisation (a history of excision or physical
125 or sexual violence) and substance abuse (smoking and alcohol use).

126 *Enabling factors.* The enabling factors were financial resources and healthcare utilisation. Income was
127 divided into two categories: below or above the median value in the study population (i.e., 211 €/CU per
128 month). Social benefits included all types of financial assistance (for the unemployed, the disabled,
129 asylum-seekers and parents). As for the variables pertaining to healthcare utilisation, we used data on
130 health insurance (yes/no), a physician visit during the previous year (yes/no), contraception, and previous
131 breast cancer screening (yes/no). The vulnerable enabling factors concerned language (difficulties
132 understanding, speaking, reading or writing French), transportation (having or not having a car and
133 having or not having difficulties using public transportation), mobility out of the Paris area (had left the
134 area for more than a day at least once during the previous year) and having given birth in France (at least
135 once versus never). We also considered four variables pertaining to social networks: contact with family
136 and friends (contact with family or friends less or more than once by telephone, SMS, Internet or mail),
137 invitations from friends or family members to a party or a family celebration during the previous year (at
138 least once versus never), relatives living in the Paris area, and feelings of trust (towards at least one
139 person versus none).

140 *Need factors.* The traditional need factors were perceived general, physical and mental health status and
141 having reported a history of at least one serious health problem. The vulnerable need factors were

142 depression and food insecurity. The presence of depression was determined from the responses to the
143 CIDI (Composite International Diagnostic Interview) questionnaire (Kessler and Üstün, 2004). Food
144 insecurity was assessed by the French version of the Household Food Security Module questionnaire
145 (Radimer and Radimer, 2002).

146 **Statistical analyses**

147 All the descriptive prevalences and proportions were weighted inversely to each participant's inclusion
148 probability in accordance with the sampling design. The comparisons between proportions were
149 performed using the chi-square test with a p-threshold < 0.05 . We examined factors associated with no
150 lifetime CCS separately for women with and without a regular gynaecological follow-up (RGF) because
151 of a significant interaction ($p < 0.001$). First, we fitted a robust Poisson regression model to each group of
152 BMVP factors (traditional predisposing, vulnerable predisposing, traditional enabling, vulnerable
153 enabling, traditional need and vulnerable need). We then included all the variables previously selected at
154 $p = 0.20$ in a final model and backward-selected them manually.

155

156 **RESULTS**

157 **Population characteristics**

158 The total number of women in homeless families in the Greater Paris Area was estimated at 9,883
159 ($CI_{95\%}[9,560-10,207]$). These N1 women were 34 years old on average. Most of them had been born in
160 Africa (66.0%) and had at least a secondary level of education (76.0%). One-third of them were single,
161 and they had an average of two children living with them. Only 21.8% were employed, and their average
162 monthly income was 319 euros per consumption unit. On average, they had been homeless for 3 years
163 (range: 0-19), and they moved three times a year (range: 0-36). The rest of the analysis was performed for
164 $N3=508$ women with complete data (among the $N2=641$ in the target age range).

165 **Differences between the women with and without a regular gynaecological follow-up**

166 The characteristics of the women with and without an RGF were different. Those without an RGF were
167 less educated (25.3% had a primary or lower level of education vs. 12.3% of those with an RGF;
168 $p = 0.007$) and were less often living in a couple relationship (45.9% vs. 60.1%; $p = 0.017$) (Table 1). They
169 had been homeless for a shorter period of time (52.4% had been homeless for less than 2 years vs. 36.0%;
170 $p = 0.0146$) and more often were living in social hotels (77.6% vs. 61.4%; $p < 0.001$) and less often in long-

171 term rehabilitation shelters (11.7% vs. 27.3%; $p<0.001$). They more often had been victims of physical or
172 sexual assault (16.1% vs. 4.1%; $p<0.001$) and were more likely not to have health insurance (15.8% vs.
173 8.3%; $p=0.049$) and not to have had a medical visit (20.1% vs. 9.9%; $p=0.015$) or a mammogram (85.0%
174 vs. 68.4%; $p<0.001$) during the previous year (Table 2). Difficulties in French were also more prevalent
175 in this group (62.4% vs. 46.4%; $p=0.011$).

176 **Screening participation rates**

177 We determined that 56.9% ($CI_{95\%}[52.4-61.4]$) of the homeless women were never-screeners, with a
178 significant difference between the women who reported having an RGF (33.3% ($CI_{95\%}[23.3-43.2]$) and
179 those who reported not having an RGF (64.2% ($CI_{95\%}[58.0-70.4]$). Of the screeners, 11.5% ($CI_{95\%}[5.8-$
180 17.2]) had their last Pap test more than 3 years before the survey (Figure 1).The proportions were also
181 significantly different according to their RGF status: 4.2% ($CI_{95\%}[0.1-8.3]$) and 15.5% ($CI_{95\%}[7.4-23.5]$),
182 respectively ($p=0.005$).

183 **Factors associated with no lifetime cervical cancer screening**

184 *Univariate analysis*

185 In the women without an RGF, no lifetime CCS was significantly associated with some predisposing
186 factors such as a low level of education, being unemployed and alcohol abuse(see Table 1) and some
187 enabling factors (no physician visit during the previous year, no invitation from friends or family during
188 the previous year, difficulties in French, and not having a car; see Table 2). No need factors were
189 associated with no lifetime cervical cancer screening (Table 3). The factors associated with a p -value $<$
190 0.20 for the multivariate analysis were age, the length of time lived in France, the duration of
191 homelessness, social benefits, health insurance, mobility out of the Paris area, and having given birth in
192 France. In the women with an RGF, the predisposing factors significantly associated with no lifetime
193 CCS were age and the country of birth (Table 1). The enabling factors associated with no lifetime CCS
194 were a low monthly income, not having health insurance, no physician visit during the previous year,
195 being a never-screener for breast cancer, and difficulties in French (Table 2). The need factors associated
196 with no lifetime CCS were poor (or very poor) mental health status and food insecurity (Table 3).

197 *Multivariate analysis*

198 After adjustment for age, among the women without an RGF, those who had never been screened for
199 cervical cancer had more often a low level of education (with a dose-response trend, although it was not

200 significant; $p=0.597$) and were more often unemployed or in one or more of the following situations: had
201 lived in France for less than a quarter of their lives, had been homeless for less than 2 years, or had a
202 history of excessive alcohol consumption (predisposing factors; see Table 4). They more often had not
203 seen a physician during the previous year (but also slightly more often had health insurance), more often
204 had not been invited by friends or family during the previous year and/or had never given birth in France
205 (enabling factors).

206 In the women with an RGF (Table 4), the predisposing factors associated with no lifetime CCS were age
207 > 45 years, not being a French citizen and a history of excessive alcohol consumption. The enabling
208 factors were not having health insurance, no physician visit during the previous year, never having been
209 screened for breast cancer and having difficulties in French. The only need factor associated with no
210 lifetime CCS was poor mental health status.

211

212 **DISCUSSION**

213 More than half of the homeless women in the Greater Paris Area who were interviewed in our study had
214 never been screened. Since only sheltered women with children had been sampled, our results cannot be
215 extrapolated to women living on the street and/or who do not have any children with them. Some studies
216 indicate that the absence of screening practices may even be higher in this population (Nyamathi et al.,
217 2000; Boxwala et al., 2010).

218 In comparison, in the French-speaking general population in the same area in 2010, only 8% of women
219 had never been screened for cervical cancer (Rondet et al., 2014). In 2013, a non-governmental medical
220 organisation, Doctors of the World, conducted a survey in France among 203 socially excluded women
221 who visited their free clinics and reported that 70% of them had never been screened (Médécins du
222 Monde, 2013). In the United States, studies on homeless women found that 10 to 50% of them had never
223 been screened (Weinreb et al., 2002; Chau et al., 2002; Lewis et al., 2003; Bharel et al., 2009).

224 Consistently with previous French studies, having or not having a regular gynaecological health follow-
225 up in primary care influences the risk of being a never-screener (Grillo et al., 2012). In our study, the
226 proportion of never-screeners was almost twice as high in women without an RGF. Clearly, although we
227 believe that “gynaecological health” refers to genital health for most women (and even those with the

228 poorest health literacy), we do not know exactly what “regular” means. However, improving access to
229 women’s healthcare is probably the best way to increase CCS coverage among these women.

230 In our study, the characteristics of the women with an RGF differed from those of women without an
231 RGF. A previous French qualitative study among homeless women in the Paris area in 2005 described
232 profiles of gynaecological healthcare (Brunet et al., 2005). It found that homeless women who did not
233 avail themselves of gynaecological health services used other health services less in general, that
234 pregnancy was often the only reason they had ever seen a gynaecologist, and that a history of sexual
235 violence was a strong barrier to gynaecological consultations. In this connection, in our study, the women
236 without an RGF reported a history of physical or sexual abuse four times more often than those with an
237 RGF. It is noteworthy that the women without an RGF had been homeless for a shorter period of time
238 than those with an RGF. It can be hypothesised that recently homeless women have other urgent priorities
239 than preventive care and that, over time, some of them re-engage in preventive behaviours.

240 The barriers to CCS identified in this study among the women without a regular gynaecological follow-up
241 were consistent with the literature on homeless women (Weinreb et al., 1998; Long et al., 1998; Weinreb
242 et al., 2002; Chau et al., 2002; Bharel et al., 2009) and were mainly associated with socioeconomic
243 conditions (education level and occupational status) (Lewis et al., 2003). Interestingly, we observed that
244 the homeless women who had never given birth in France were also more likely to be never-screeners,
245 since a Pap test is part of the first routine, mandatory and free prenatal check-up, if one was not
246 performed recently. Two factors were associated in an unexpected direction: excessive alcohol
247 consumption and not having health insurance seemed to “protect” women from being never-screeners.
248 We attempted to explain these unexpected findings by testing certain interactions (e.g., with immigration
249 status or the duration of homelessness), but none of them was significant, probably because of the small
250 size (N=383) of this subsample of women without an RGF. We cannot explain these results, but we did
251 note that, inversely, associations were observed in the expected direction in the other stratum (women
252 with an RGF).

253 Although the screening rate was higher among the women with a RGF, a third of them were never-
254 screeners. Reporting biases are possible in such declarative data, but the investigators systematically
255 explained the Pap test in lay terms ("A pap is a small sample taken by scraping at the back of the vagina
256 during a gynaecological exam"). The factors associated with never-screening might enable us to

257 understand why these women with a RGF had never been screened for cervical cancer. The barriers were
258 mainly migration origin, exclusion from the healthcare system and health-related behaviours. These
259 barriers are consistent with the literature concerning the general population (Akers et al., 2007; Grillo et
260 al., 2012).

261 Our study has some limitations apart from the recall and reporting biases mentioned above in connection
262 with self-reported data. First, we did not collect any information about the women's knowledge and
263 attitudes about CCS. Such information would have provided explanations for the never-screening.
264 Second, because of the small sample size and the vast heterogeneity of the women's origins (more than
265 60 countries of birth were reported), we were unable to investigate these origins or cultural factors much
266 further. Lastly, the causal ordering between predisposing, enabling and need factors cannot be
267 demonstrated in this study because of its cross-sectional design. On the other hand, the main strengths of
268 the ENFAMS survey were its sampling design, which guaranteed its representativeness, its
269 multilingualism, which made it possible – for the first time in France – to collect data from non-French-
270 speaking homeless women, the large set of data collected, and the use of a conceptual model to help in the
271 modeling strategy.

272 Our results argue for a more systematic proposal and performance of CCS in primary care. Indeed, 82%
273 of the women in the target age range had visited a physician at least once during the previous year, yet
274 53% of them were still never-screeners, not to mention, once again, the fact that a third of the women
275 with an RGF were never-screeners as well. This means that there had been many lost opportunities during
276 these women's primary care visits and it reveals the failure of the primary health care system to offer
277 proper medical preventive care to the homeless women population. Since homeless women are regularly
278 relocated from shelter to shelter (depending on the facilities' availability and on homeless flow
279 management in a chronically underresourced region), primary care professionals must be more informed
280 and aware that every contact with health services should be an opportunity to check their screening status
281 and to ensure that those due for one actually have a Pap test.

282 Of course, providing a Pap test is not the end of the story. Many studies have documented that low-
283 income women do not understand the results and consequently do not obtain the necessary follow-up and
284 treatment for their abnormal Pap test (Engelstad et al., 2001; Quinlivan et al., 2004; Coker et al., 2006).
285 However, to our knowledge, none of those studies specifically considered homeless women. Further

286 studies on the linkage to care among homeless women with detected abnormalities are needed to ensure
287 that they enjoy equal access to care, even in countries like France, where financial barriers are not an
288 issue (at least theoretically) in cancer healthcare.

289

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298

299 **Table 1 - Predisposing factors and no lifetime cervical cancer screening among homeless women with or without**
 300 **a regular gynaecological follow-up in the Greater Paris Area, France, 2013.**

	Freq. N=508 (%)	Regular Gynaecological Follow-up								<i>p</i> - value for no RGF versus RGF	
		No (N=383)				Yes (N=125)					
		Freq (%)	No CCS (%)	PR	95% CI	Freq. (%)	No CCS (%)	PR	95% CI		
Traditional Predisposing Factors											
Age					0.062					<0.001	0.804
25-29	27.1	28.2	73.5	1.10	[1.02-1.17]	23.4	59.8	1.21	[1.03-1.42]		
30-34	30.3	29.5	59.2	Ref.		33.0	37.9	Ref.			
35-44	37.5	37.5	61.1	1.02	[0.94-1.11]	37.5	18.1	0.87	[0.75-1.02]		
45 or older	5.1	4.8	65.5	1.03	[0.89-1.20]	6.1	0.0	0.77	[0.66-0.90]		
Country of birth					0.509					<0.001	0.801
Outside of France	94.6	94.7	65.0	1.03	[0.94-1.14]	94.2	35.3	1.25	[1.10-1.42]		
France	5.4	5.3	50.5	Ref.		5.8	0.0	Ref.			
Level of education					<0.001					0.157	0.014
None	8.9	10.2	92.0	1.43	[1.29-1.58]	4.6	54.2	1.28	[0.95-1.74]		
Primary	13.4	15.1	79.8	1.33	[1.19-1.48]	7.7	53.5	1.26	[0.97-1.63]		
Secondary	60.4	56.5	64.0	1.20	[1.09-1.33]	73.5	32.6	1.06	[0.90-1.25]		
Tertiary	17.2	18.1	36.2	Ref.		14.2	18.9	Ref.			
Occupational status					0.015					0.710	0.797
Employed	21.9	22.9	48.4	Ref.		18.7	18.0	Ref.			
Unemployed	32.1	31.5	73.9	1.16	[1.05-1.28]	34.2	30.0	1.07	[0.91-1.26]		
Student or retiree	46.0	45.6	65.5	1.09	[0.99-1.20]	47.1	41.7	1.04	[0.86-1.22]		
Couple status					0.368					0.910	0.049
Living in a couple relationship	49.1	45.9	67.9	Ref.		60.1	35.8	Ref.			
In a couple relationship but not living together	16.3	17.8	62.1	0.98	[0.90-1.06]	11.4	41.1	1.02	[0.84-1.23]		
Not in a couple relationship	34.6	36.4	60.6	0.95	[0.89-1.02]	28.5	24.8	0.97	[0.85-1.11]		
Number of children											
Fewer than 3	75.8	76.6	62.8	Ref.	0.553	73.2	31.5	Ref.	0.557		0.548
3 or more	24.2	23.4	69.0	1.03	[0.95-1.12]	26.8	38.0	1.05	[0.89-1.23]		
Vulnerable Predisposing Factors											
Administrative status					0.503					0.107	0.663
French citizen	8.4	8.5	58.6	Ref.		7.9	0.0	Ref.			
Legal resident status	57.6	58.5	60.3	0.95	[0.81-1.11]	37.9	36.0	1.27	[1-1.61]		
Undocumented	34.0	32.9	72.6	0.99	[0.84-1.17]	54.3	36.3	1.26	[1-1.58]		
Length of time lived in France					0.052					0.692	0.561
A quarter of life or less	73.7	74.4	69.5	1.10	[1.00-1.22]	71.3	38.6	1.04	[0.85-1.27]		
More than a quarter of life	26.3	25.6	48.8	Ref.		28.7	20.1	Ref.			
Duration of homelessness					0.151					0.922	0.015
2 years or less	48.6	52.4	71.0	1.06	[0.98-1.15]	36.0	28.0	1.01	[0.83-1.23]		
More than 2 years	51.4	47.6	56.8	Ref.		64.0	36.3	Ref.			
Type of housing					0.939					0.289	<0.001
Social hotel	73.9	77.6	65.1	1.02	[0.88-1.18]	61.4	39.3	1.13	[0.95-1.34]		
Centre for asylum-seekers	4.7	5.0	65.5	1.03	[0.88-1.21]	3.7	13.5	0.97	[0.75-1.26]		
Emergency housing centre	6.1	5.6	66.5	1.00	[0.84-1.18]	7.7	39.8	1.17	[0.96-1.44]		
Long-term rehabilitation centre	15.3	11.7	56.6	Ref.		27.3	20.7	Ref.			
Number of moves per year					0.493					0.375	0.390
Less than 4	79.7	78.7	61.2	Ref.		83.2	34.8	Ref.			
4 or more	20.3	21.3	75.6	1.03	[0.95-1.11]	16.8	25.6	0.91	[0.74-1.12]		
History of excision					0.433					0.279	0.052
Yes	21.5	19.2	66.5	1.03	[0.95-1.13]	29.1	45.9	1.10	[0.93-1.3]		
No	78.5	80.8	63.7	Ref.		70.9	28.1	Ref.			
History of physical or sexual violence					0.747					0.081	<0.001
Yes	13.4	16.1	63.3	0.99	[0.90-1.08]	4.1	19.5	0.80	[0.63-1.03]		
No	86.6	83.9	64.4	Ref.		95.9	33.9	Ref.			
Smoking status					0.578					0.111	0.405

Smoker	9.5	10.2	49.4	0.96	[0.82-1.11]	7.1	10.8	0.82	[0.64-1.05]	
Nonsmoker	90.5	89.8	65.9	Ref.		92.9	35.0	Ref.		
History of excessive alcohol consumption					0.015				0.118	0.406
Yes	6.0	6.5	34.6	0.84	[0.72-0.97]	4.3	30.0	1.20	[0.96-1.50]	
No	94.0	93.5	66.3	Ref.		95.7	33.4	Ref.		

301

302 Table 2 - Enabling factors and no lifetime cervical cancer screening among homeless women with or without a
 303 regular gynaecological follow-up in the Greater Paris Area, France, 2013.

	Freq. N=508 (%)	Regular Gynaecological Follow-up								<i>p</i> - value for no RGF versus RGF
		No (N=383)				Yes (N=125)				
		Freq. (%)	No CCS (%)	PR	95% CI	Freq. (%)	No CCS (%)	PR	95% CI	
Traditional Enabling Factors										
Monthly income per consumption unit					0.338				0.042	0.480
Less than 211 euros	46.6	45.6	72.0	1.05	[0.95-1.15]	49.7	39.5	1.17	[1.01-1.37]	
More than 211 euros	53.4	54.4	57.7	Ref.		50.3	27.1	Ref.		
Social benefits during the previous year					0.059				0.168	0.627
None	64.0	63.3	75.1	1.08	[1.00-1.18]	66.2	36.0	0.89	[0.76-1.05]	
One or more	36.0	36.7	57.9	Ref.		33.8	31.9	Ref.		
Health insurance					0.081				0.015	0.049
No	15.8	18.0	67.2	0.93	[0.85-1.01]	8.3	72.1	1.28	[1.05-1.57]	
Yes	84.2	82.0	63.6	Ref.		91.7	29.8	Ref.		
Physician visit during the previous year					<0.001				0.005	0.015
Yes	82.2	79.9	59.9	Ref.		90.1	30.1	Ref.		
No	17.8	20.1	81.5	1.13	[1.06-1.21]	9.9	61.8	1.31	[1.08-1.57]	
Contraception					0.430				0.550	0.203
Yes	41.1	60.8	61.3	Ref.		47.7	34.3	Ref.		
No	58.9	39.2	66.1	1.03	[0.96-1.11]	52.3	32.4	0.96	[0.85-1.09]	
Mammogram					0.246				<0.001	<0.001
Yes	18.8	15.0	54.3	Ref.		31.6	16.6	Ref.		
No	81.2	85.0	66.0	1.06	[0.96-1.16]	68.4	41.0	1.24	[1.09-1.40]	
Vulnerable Enabling Factors										
Difficulties in French					<0.001				0.005	0.011
Yes	58.8	62.4	72.5	1.11	[1.04-1.19]	46.4	47.5	1.21	[1.06-1.38]	
No	41.2	37.6	50.5	Ref.		53.6	20.9	Ref.		
Had a car					0.050				0.547	0.460
Yes	11.4	11.9	42.1	Ref.		9.4	19.7	Ref.		
No	88.6	88.1	67.2	1.15	[1.00-1.33]	90.6	34.7	1.06	[0.87-1.29]	
Difficulties with public transportation					0.313				0.113	0.577
Yes	37.6	36.6	71.2	1.03	[0.97-1.09]	40.7	39.2	1.11	[0.97-1.27]	
No	62.4	63.4	60.2	Ref.		59.3	29.2	Ref.		
Mobility out of the Paris area					0.088				0.082	0.980
Yes	21.7	21.5	47.2	Ref.		21.7	42.2	Ref.		
No	78.4	78.5	68.9	1.08	[0.99-1.18]	78.3	30.8	0.88	[0.76-1.02]	
History of delivery in France					0.122				0.153	0.985
At least 1 delivery in France	74.5	74.5	60.2	Ref.		74.4	34.6	Ref.		
No deliveries in France	25.5	25.5	76.0	1.05	[0.99-1.11]	25.6	29.5	0.91	[0.80-1.04]	
Contact with family and friends					0.952				0.089	0.978
Less than 1 contact in a 3-day period	73.6	73.6	66.0	1.00	[0.93-1.07]	73.7	40.2	1.14	[0.98-1.32]	
More than 1 contact in a 3-day period	26.4	26.4	59.3	Ref.		26.3	13.7	Ref.		
Invited by friends or family to a party or a family celebration during the previous year					0.040				0.493	0.481
No	40.9	41.9	77.4	1.08	[1.00-1.17]	37.3	35.6	0.96	[0.85-1.08]	
At least once	59.1	58.1	54.7	Ref.		62.7	31.9	Ref.		
Family living in the Paris area					0.454				0.120	0.693
Yes	45.8	46.3	58.7	Ref.		44.0	21.5	Ref.		
No	54.2	53.7	69.0	1.03	[0.96-1.10]	56.0	42.5	1.10	[0.98-1.24]	
Trust in at least one person					0.294				0.061	0.102
Yes	69.0	66.7	61.0	Ref.		77.0	30.2	Ref.		
No	31.0	33.3	70.7	1.04	[0.97-1.11]	23.0	43.7	1.15	[0.99-1.34]	

304 **Table 3 - Need factors and no lifetime cervical cancer screening among homeless women with or without a**
 305 **regular gynaecological follow-up in the Greater Paris Area, France, 2013.**

	Freq. N=508 (%)	Regular Gynaecological Follow-up								<i>p-value for no RGF versus RGF</i>
		No (N=383)				Yes (N=125)				
		Freq (%)	No CCS (%)	PR	95% CI	Freq (%)	no CCS (%)	PR	95% CI	
Traditional Need Factors										
History of at least one serious health problem					0.362				0.355	0.268
Yes	31.6	30.0	61.1	0.96	[0.88-1.05]	36.9	27.2	0.93	[0.79-1.09]	
No	68.4	70.0	65.6	Ref.		63.1	36.8	Ref.		
General health status					0.215				0.416	0.979
Very good, good or average	88.1	88.1	63.3	Ref.		88.2	30.4	Ref.		
Poor or very Poor	11.9	11.9	71.2	1.08	[0.96-1.23]	11.8	54.9	0.87	[0.63-1.21]	
Physical health status					0.605				0.127	0.608
Very good, good or average	89.7	90.1	64.3	Ref.		88.3	29.8	Ref.		
Poor or very poor	10.3	9.9	63.5	0.96	[0.82-1.12]	11.7	59.2	1.23	[0.94-1.59]	
Mental health status					0.863				0.006	0.269
Very good, good or average	76.8	78.1	63.8	Ref.		72.2	24.5	Ref.		
Poor or very poor	23.2	21.9	65.9	1.01	[0.92-1.11]	27.8	56.2	1.25	[1.07-1.47]	
Vulnerable Need Factors										
Food insecurity					0.873				0.012	0.367
Security or low insecurity	52.4	53.6	64.1	Ref.		51.7	21.1	Ref.		
Medium or severe insecurity	47.6	46.4	64.3	1.01	[0.94-1.07]	48.3	46.3	1.21	[1.04-1.40]	
Depression					0.479				0.698	0.412
Yes	29.3	30.5	61.2	0.97	[0.90-1.05]	25.4	30.9	0.97	[0.81-1.15]	
No	70.7	69.5	65.5	Ref.		74.6	34.1	Ref.		

306

307

308 **Table 4 – Multivariate analysis of the predisposing, enabling and need factors associated with no lifetime cervical**
 309 **cancer screening among homeless women with or without a regular gynaecological follow-up in the Greater Paris**
 310 **Area, France, 2013.**

Factors	Regular Gynaecological Follow-up			
	No (N=383)		Yes (N=125)	
	PR	95% CI	PR	95% CI
Traditional Predisposing				
Age		0.140		<0.001
25-29	1.09	[1.01-1.17]	1.09	[0.96-1.25]
30-34	Ref.		Ref.	
35-44	1.03	[0.96-1.10]	0.91	[0.82-1.02]
45 or older	1.09	[0.95-1.26]	0.78	[0.69-0.87]
Level of education		<0.001		
None	1.44	[1.30-1.61]		
Primary	1.31	[1.17-1.47]		
Secondary	1.20	[1.08-1.32]		
Tertiary	Ref.			
Occupational status		0.011		
Employed	Ref.			
Unemployed	1.12	[1.02-1.23]		
Student or retiree	1.01	[0.92-1.10]		
Vulnerable Predisposing				
Administrative status				<0.001
French citizen			Ref.	
Legal resident status			1.34	[1.17-1.52]
Undocumented			1.26	[1.09-1.45]
Length of time lived in France		0.026		
A quarter of life or less	1.09	[1.01-1.18]		
More than a quarter of life	Ref.			
Duration of homelessness		0.019		
2 years or less	1.07	[1.01-1.13]		
More than 2 years	Ref.			
Lifetime history of excessive alcohol consumption		0.002		0.015
Yes	0.86	[0.78-0.95]	1.38	[1.07-1.80]
No	Ref.		Ref.	
Traditional Enabling				
Health insurance		0.016		<0.001
No	0.91	[0.84-0.98]	1.27	[1.10-1.45]
Yes	Ref.		Ref.	
Physician visit during the previous year		0.002		0.035
Yes	Ref.		Ref.	
No	1.10	[1.04-1.17]	1.21	[1.01-1.45]
Mammogram				0.002
Yes				
No			1.19	[1.07-1.33]
Vulnerable Enabling				
Invited by friends or family to a party or a family celebration during the previous year		0.015		
No	1.09	[1.02-1.17]		
At least once	Ref.			
Trust in at least one person				0.006
Yes			Ref.	
No			1.18	[1.05-1.33]
Difficulties in French				0.009
Yes			Ref.	
No			1.13	[1.03-1.23]
History of delivery in France		0.004		
At least 1 delivery in France	Ref.			
No deliveries in France	1.09	[1.03-1.16]		

<i>Traditional Need</i>		
Mental health status		<0.001
Very good, good or average	Ref.	
Poor or very poor	1.27	[1.13-1.41]

311

312 **Figure 1. Time since the last cervical cancer screen as at the day of the survey (among screeners).**

313

314 REFERENCES

- 315 Aday LA, Andersen R (1974) A framework for the study of access to medical care.
316 *Health Serv Res* 9:208–220.
- 317 Akers AY, Newmann SJ, Smith JS (2007) Factors underlying disparities in cervical
318 cancer incidence, screening, and treatment in the United States. *Curr Probl*
319 *Cancer* 31:157–181. doi: 10.1016/j.currproblcancer.2007.01.001
- 320 Beijer U, Wolf A, Fazel S (2012) Prevalence of tuberculosis, hepatitis C virus, and HIV
321 in homeless people: a systematic review and meta-analysis. *Lancet Infect Dis*
322 12:859–870. doi: 10.1016/S1473-3099(12)70177-9
- 323 Bharel M, Casey C, Wittenberg E (2009) Disparities in cancer screening: acceptance of
324 Pap smears among homeless women. *J Womens Health* 2002 18:2011–2016.
325 doi: 10.1089/jwh.2008.1111
- 326 Boxwala FI, Bridgemohan A, Griffith DM, Soliman AS (2010) Factors associated with
327 breast cancer screening in Asian Indian women in metro-Detroit. *J Immigr*
328 *Minor Health Cent Minor Public Health* 12:534–543. doi: 10.1007/s10903-009-
329 9277-0
- 330 Brousse C (2006) Enquête sans domicile 2001, 1ère partie : Définition de la population
331 sans-domicile et choix de ma méthode d'enquête.
- 332 Brunet L, Carpentier S, Laporte A, Pourette D, Guillon B (2005) Féminité, accès aux
333 soins, maternité, et risques vécus par les femmes en grande précarité. Une
334 contribution à l'amélioration de leur santé gynécologique. Observatoire du
335 samusocial de Paris
- 336 Chau S, Chin M, Chang J, Luecha A, Cheng E, Schlesinger J, Rao V, et al (2002)
337 Cancer Risk Behaviors and Screening Rates Among Homeless Adults in Los
338 Angeles County. *Cancer Epidemiol Biomarkers Prev* 11:431–438.
- 339 Coker AL, Bond SM, Pirisi LA (2006) Life stressors are an important reason for women
340 discontinuing follow-up care for cervical neoplasia. *Cancer Epidemiol Biomark*
341 *Prev Publ Am Assoc Cancer Res Cosponsored Am Soc Prev Oncol* 15:321–325.
342 doi: 10.1158/1055-9965.EPI-05-0148
- 343 Engelstad LP, Stewart SL, Nguyen BH, Bedeian KL, Rubin MM, Pasick RJ, Hiatt RA
344 (2001) Abnormal Pap Smear Follow-Up in a High-Risk Population. *Cancer*
345 *Epidemiol Biomarkers Prev* 10:1015–1020.
- 346 Fédération des Gynécologue et Obstétriciens de Langue Française (1990) Conférence de
347 consensus sur le dépistage du cancer du col utérin. Lille, pp 1–16
- 348 Gelberg L, Andersen RM, Leake BD (2000) The Behavioral Model for Vulnerable
349 Populations: application to medical care use and outcomes for homeless people.
350 *Health Serv Res* 34:1273–1302.

- 351 Grillo F, Vallée J, Chauvin P (2012) Inequalities in cervical cancer screening for
352 women with or without a regular consulting in primary care for gynaecological
353 health, in Paris, France. *Prev Med* 54:259–265. doi:
354 10.1016/j.ypmed.2012.01.013
- 355 Guyavarch E, Le Méner E (2010) A Paris, de plus en plus de familles sans domicile.
356 *Mag Feansea* (Automne):19–21.
- 357 Haute Autorité de Santé (HAS) (2010) État des lieux et recommandations pour le
358 dépistage du cancer du col de l’utérus en France - Argumentaire. HAS
- 359 Hogenmiller JR, Atwood JR, Lindsey AM, Johnson DR, Hertzog M, Scott JC Jr (2007)
360 Self-efficacy scale for Pap smear screening participation in sheltered women.
361 *Nurs Res* 56:369–377. doi: 10.1097/01.NNR.0000299848.21935.8d
- 362 Hwang SW, Tolomiczenko G, Kouyoumdjian FG, Garner RE (2005) Interventions to
363 Improve the Health of the Homeless: A Systematic Review. *Am J Prev Med*
364 29:311–311.e75. doi: 10.1016/j.amepre.2005.06.017
- 365 Kessler RC, Üstün TB (2004) The World Mental Health (WMH) Survey Initiative
366 Version of the World Health Organization (WHO) Composite International
367 Diagnostic Interview (CIDI). *Int J Methods Psychiatr Res* 13:93–121.
- 368 Kushel MB, Vittinghoff E, Haas JS (2001) Factors associated with the health care
369 utilization of homeless persons. *JAMA J Am Med Assoc* 285:200–206.
- 370 Lewis JH, Andersen RM, Gelberg L (2003) Health care for homeless women. *J Gen*
371 *Intern Med* 18:921–928.
- 372 Leyden WA, Manos MM, Geiger AM, Weinmann S, Mouchawar J, Bischoff K, Yood
373 MU, et al (2005) Cervical cancer in women with comprehensive health care
374 access: attributable factors in the screening process. *J Natl Cancer Inst* 97:675–
375 683. doi: 10.1093/jnci/dji115
- 376 Long HL, Tulskey JP, Chambers DB, Alpers LS, Robertson MJ, Moss AR, Chesney MA
377 (1998) Cancer screening in homeless women: attitudes and behaviors. *J Health*
378 *Care Poor Underserved* 9:276–292.
- 379 Mathew A, George PS (2009) Trends in incidence and mortality rates of squamous cell
380 carcinoma and adenocarcinoma of cervix--worldwide. *Asian Pac J Cancer Prev*
381 *APJCP* 10:645–650.
- 382 Médecins du Monde (2013) Enquête “Contraception et prévention des cancers féminins
383 chez les femmes en situation de précarité, en France.” Médecins du monde
- 384 Nyamathi AM, Leake B, Gelberg L (2000) Sheltered versus nonsheltered homeless
385 women differences in health, behavior, victimization, and utilization of care. *J*
386 *Gen Intern Med* 15:565–572.

- 387 Quinlivan JA, Petersen RW, Davy M, Evans SF (2004) Abnormal pap smears in
388 teenage mothers and the association with domestic violence, homelessness, and
389 Chlamydia. *J Low Genit Tract Dis* 8:112–117.
- 390 Radimer KL, Radimer KL (2002) Measurement of household food security in the USA
391 and other industrialised countries. *Public Health Nutr* 5:859–864. doi:
392 10.1079/PHN2002385
- 393 Rondet C, Lapostolle A, Soler M, Grillo F, Parizot I, Chauvin P (2014) Are Immigrants
394 and Nationals Born to Immigrants at Higher Risk for Delayed or No Lifetime
395 Breast and Cervical Cancer Screening? The Results from a Population-Based
396 Survey in Paris Metropolitan Area in 2010. *PLoS ONE* 9:e87046. doi:
397 10.1371/journal.pone.0087046
- 398 Stein JA, Andersen R, Gelberg L (2007) Applying the Gelberg-Andersen behavioral
399 model for vulnerable populations to health services utilization in homeless
400 women. *J Health Psychol* 12:791–804. doi: 10.1177/1359105307080612
- 401 Teruya C, Longshore D, Andersen RM, Arangua L, Nyamathi A, Leake B, Gelberg L
402 (2010) Health and health care disparities among homeless women. *Women
403 Health* 50:719–736. doi: 10.1080/03630242.2010.532754
- 404 Vaccarella S, Lortet-Tieulent J, Plummer M, Franceschi S, Bray F (2013) Worldwide
405 trends in cervical cancer incidence: impact of screening against changes in
406 disease risk factors. *Eur J Cancer Oxf Engl 1990* 49:3262–3273. doi:
407 10.1016/j.ejca.2013.04.024
- 408 Vallée J, Cadot E, Grillo F, Parizot I, Chauvin P (2010) The combined effects of
409 activity space and neighbourhood of residence on participation in preventive
410 health-care activities: The case of cervical screening in the Paris metropolitan
411 area (France). *Health Place* 16:838–852. doi: 10.1016/j.healthplace.2010.04.009
- 412 Vandentorren S, Le Méner E, Oppenheim N, Arnaud A, Jangal C, Caum C,
413 Vuillermoz C, et al (2015) Characteristics and health of homeless Families: the
414 ENFAMS survey in the Paris region, France 2013. *Eur J Public Health*. doi:
415 10.1093/eurpub/ckv187
- 416 Weinreb L, Goldberg R, Lessard D (2002) Pap smear testing among homeless and very
417 low-income housed mothers. *J Health Care Poor Underserved* 13:141–150.
- 418 Weinreb L, Goldberg R, Perloff J (1998) Health characteristics and medical service use
419 patterns of sheltered homeless and low-income housed mothers. *J Gen Intern
420 Med* 13:389–397.
- 421 Yaouancq F, Lebrère A, Marpsat M, Régnier V, Legleye S, Quaglia M (2013)
422 L'hébergement des sans-domicile en 2012. Des modes d'hébergement différents
423 selon les situations familiales.
- 424