

# BMJ Open Use of psychoactive substances by night-shift hospital healthcare workers during the first wave of the COVID-19 pandemic: a cross-sectional study based in Parisian public hospitals (ALADDIN)

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## ABSTRACT

**Objectives** This study aimed to estimate the prevalence of psychoactive substance (PAS) use in night-shift healthcare workers (NSHW) during France's first COVID-19 wave (March–May 2020).

**Design** Observational cross-sectional online survey.

**Setting** 39 public hospitals in the Assistance Publique des Hôpitaux de Paris (AP-HP) network in the Parisian area.

**Participants** A total of 1238 nurses, assistant nurses, X-ray technicians, managers, lab technicians, midwives and childcare assistants working at night or alternating between days and nights answered the questionnaire.

**Intervention** Online survey.

**Outcome measures** PAS use prevalence after weighting data for sex, age and profession using calibration on margins, in order to be representative of all AP-HP NSHW. We used the Fagerström scale and the Alcohol Use Disorders Identification Test Concise to assess PAS use.

**Results** The weighted estimated prevalences of daily smoking, alcohol drinking and tranquilliser use in participating NSHW were 21.4, 1.3 and 2.4%, respectively. Twelve per cent (11.7%) of our study sample used opioids. During the first COVID-19 wave, PAS use remained stable except for tobacco use, with 8.6% of participants reporting an increase. Previous 3-month prevalences of tranquilliser and opioid use were significantly higher than in the general population.

**Conclusion** Daily smoking (especially in younger men) and tranquilliser and opioid use were highly prevalent in NSHW in the AP-HP network during France's first COVID-19 wave. Specific interventions for quitting smoking and addressing determinants of tranquilliser and opioid use in NSHW need to be developed and evaluated to improve quality of life in these essential, underdiagnosed and undertreated health personnel.

## INTRODUCTION

The COVID-19 pandemic has led to serious upheavals in the organisation of healthcare systems, impacting not only patient care, but also health professionals' practices and

## Strengths and limitations of this study

- This is the first study on psychoactive substance consumption in night-shift healthcare workers (NSHW) to focus on different professions and different substances.
- The large study sample was representative of all Assistance Publique des Hôpitaux de Paris network NSHW in terms of age, sex and profession.
- As some professions were under-represented in our sample (eg, only 28 midwives out of 1200 participants), in-depth statistical analyses were not possible.

working conditions in hospitals.<sup>1</sup> Pandemics cause significant increases in stress in the whole population.<sup>2</sup> Increased anxiety and insomnia are also prevalent during health crises.<sup>3</sup> Hospital staff may be more vulnerable than others to these mental health problems during such periods, because of overwork and because they are front-line workers in the management of at-risk and exposed patients.<sup>4</sup> Among hospital staff, night-shift healthcare worker (NSHW) may be especially vulnerable to impaired health as they cumulate several risk exposures. One such exposure is alterations to circadian rhythms caused by working at night,<sup>5</sup> which has consequences on health<sup>6,7</sup> and social life.<sup>8</sup>

Some studies have suggested a dose-response relationship between substance use and stress.<sup>9</sup> Health professionals are at greater risk of psychoactive substances (PAS) overconsumption because of their easy access to certain drugs such as hypnotics, tranquillisers and opioids, and because of their preference to self-medicate<sup>10–12</sup> in order to manage overwork-related anxiety and other

mental health disorders. Furthermore, previous studies have shown that sleep disorders and social difficulties put night-shift workers at greater risk of developing addictive PAS behaviours.<sup>9 13 14</sup> PAS help to reduce anxiety, to induce faster sleep, to maintain a state of wakefulness when desired, and to increase performance.<sup>15</sup> These two points would suggest that NSHW have an even higher risk of developing PAS addiction than their daytime-working counterparts. However, there is no evidence for this in the literature, and despite several papers examining PAS use in night-shift workers (ie, not only NSHW), there is no compelling evidence that they have higher PAS use<sup>16 17</sup> than day workers.

Most studies to date exploring PAS use in healthcare professionals have focused exclusively on one healthcare professional category (nurses, anaesthetists, etc).<sup>10 18 19</sup> Moreover, papers in this area generally focus on a single PAS (specifically, tobacco, alcohol, tranquilisers or hypnotics),<sup>16 17</sup> in a monocentric context with a small sample size.<sup>20</sup> To the best of our knowledge, no study has explored multiple PAS use in different categories of NSHW.

Given hospital workers'—in particular NSHW—essential role in the context of the current COVID-19 pandemic, it is imperative to address PAS use and mental health disorders in this population.<sup>3</sup>

The objectives of the ALADDIN multicentre study were: (1) to evaluate the prevalence and level of consumption of several PAS in NSHW working in the 39 structures of the Assistance Publique-Hôpitaux de Paris (AP-HP) public hospital network, which are located in and around Paris, during the first wave of the COVID-19 pandemic in France; (2) to identify potential differences in consumption according to sex, age class and profession and (3) to describe self-reported changes in PAS use during the COVID-19 health crisis.

## METHODS

### Setting

ALADDIN is a cross-sectional, questionnaire-based, online survey of NSHW conducted between 17 June 2020 and 17 September 2020 in the 39 structures of the AP-HP public hospital network, which covers Paris and the surrounding area. The network has been very involved in combating the spread of COVID-19 and caring for those affected. Of the total 100 000 employees working in the structures, approximately 12 000 are NSHW.

The survey was created using Net-Survey with a mobile-friendly webpage. All NSHW could access the survey on their work PC or personal electronic devices. To promote the survey, the study investigators sent the survey link by email to AP-HP workers. Other communication channels were also used including posters and flyers. Reminders in the AP-HP weekly newsletter were sent by e-mail once a week during the first month of the survey and then once a month. Night staff managers (who do not necessarily work nights) also received the connection link by

email in order to encourage their teams' participation. In addition, medicine students were recruited to present the study to NSHW during their shift to facilitate study recruitment.

### Participants

Inclusion criteria were as follows: (1) AP-HP employee working only nights or alternating between days and nights, irrespective of length of experience; (2) full-time or part-time employee. Exclusion criteria were as follows: (1) daytime only worker; (2) working fewer than 3 hours at night at least twice a week (including on-call staff). In order to keep the study population homogeneous, physicians were excluded from the analyses as they constitute a subgroup with specific characteristics. Specifically, physicians in the AP-HP network primarily work during the day. When working nights, they work on an on-call basis only. Accordingly, the amount of night work they perform is lower and less regular than that for other workers who work nights.

### Patient and public involvement

The NSHW were involved in the development of the study in two different ways. First, the questionnaire was constructed following exploratory interviews with NSHW. Second, managers and some NSHWs were mobilised to distribute the questionnaire and enable efficient recruitment. To ensure that the results are properly disseminated to the NSHWs who participated in the study, an internal AP-HP communication campaign through emails and weekly news is planned.

### Data sources and study variable

The study investigators and the scientific committee (comprising addictologists, epidemiologists and occupational physicians) selected the questionnaire items to include. The addiction section of the questionnaire collected behavioural data on the following substances using validated scales, specifically the Fagerström test for tobacco,<sup>21</sup> and the Alcohol Use Disorders Identification Test Consumption (AUDIT-C) test for alcohol.<sup>22</sup>

The Fagerström test is a six-item questionnaire, which measures nicotine dependence, with a maximum possible score of 10. A score greater than two indicates dependence, and the higher the score the stronger the dependence. The three-item AUDIT-C identifies hazardous alcohol consumption and alcohol dependence during the previous 12 months. It has a maximum score of 16, and a score higher than 10 indicates dependence. We also used many items from France's national population-based 2018 Health Barometer<sup>23</sup> to assess PAS use and associated consumption habits. Finally, to assess frequency of use for tobacco, alcohol, and other substances, we asked the following question three times, adapting it according to the PAS in question: 'In the past 3 months, how often have you used tobacco/alcohol/cannabis, cocaine, amphetamine, inhalants, sedatives or sleeping pills,

hallucinogens, opioids, other?’ Response modalities were never, once or twice, monthly, weekly and daily.

In addition to the two validated scales, we asked questions, which collected data on NSHW self-reported changes in PAS use since the beginning of the COVID-19 pandemic. These questions were based on a previously conducted qualitative study of NSHW in the AP-HP network.<sup>24</sup> More specifically, for each substance, we asked whether a change in uses had occurred since the beginning of the pandemic; those who replied yes were then asked whether the change was an increase or a decrease and were asked to quantify the change.

In this paper, we chose to group health professionals into categories, as certain professions had too few numbers for statistical analysis. We created five categories, which mirror those used in previous French health barometers<sup>25</sup> as follow: ‘nurses and specialised nurses’ which included nurses, nurse anaesthetists, operating room nurses and child nurses, ‘nurse assistants and technicians’ which included nurse assistants, childcare assistants, and laboratory and X-ray technicians; ‘midwives’ which included only midwives; ‘managers’ which health managers, and finally an ‘other’ group. This group was heterogeneous and included, among others, administrative workers such as secretarial staff or pharmacists. These workers ticked ‘other’ to the questionnaire’s profession item.

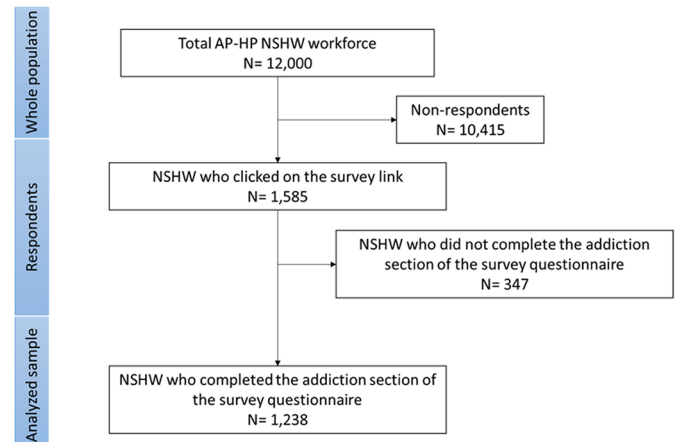
## STATISTICAL ANALYSES

Data were weighted to be representative all NSHW in the AP-HP network according to sex, age and profession. This weighting was performed using calibration on margins with the raking ratio technique,<sup>26</sup> which is a poststratification procedure for adjusting the sample weights in order to match the study sample’s characteristics in terms of sex, age and profession as closely as possible with the known distribution of the NSHW characteristics. We estimated the weighted prevalence of PAS use and the associated 95% CIs. The following age classes were used: 20–34, 35–49 and 50 years old or over. Differences between age classes, between professional groups and between both sexes were assessed using a  $\chi^2$  test, with a 5% p value threshold for statistical significance. Stata/SE V.14.2 software (StataCorp) was used for all the analyses.

## RESULTS

### Participants

At the time of the survey, there were approximately 12 000 NSHW working in the AP-HP network. Of the 1585 who clicked on the online link and started the survey, only 1238 (78%) actually completed it (ie, study sample) (figure 1). Our study sample comprised 1238 respondents. This made it possible to estimate the prevalence of PAS use with a marginal error of 3% and a confidence level of 95%. This allows us to consider that our sample is representative of the population of night hospital workers at APHP.



**Figure 1** Consumption of psychoactive substances in night-shift healthcare workers (NSHW) in Parisian hospitals during the COVID-19 pandemic—study flow chart (ALADDIN survey). AP-HP, Assistance Publique des Hôpitaux de Paris.

Median (IQR) age of all respondents (ie, n=1585) was 38 (29–49) years and 81% were women (n=1003). Nurses (including specialised nurses) were the professionals most represented (62.5% of the study sample, n=774). Characteristics of the study sample after calibration on margins and weighting are described in table 1.

### Main results

The four PAS used most were tobacco, alcohol, tranquilisers and opioids (tables 2 and 3).

In terms of daily use, tobacco was the most used PAS (21.4% (95% CI 19% to 23.8%)), followed by tranquilisers (2.4% (95% CI 1.6% to 3.3%)), alcohol (1.3% (95% CI 0.6% to 2.0%)) and cannabis (1% (95% CI 0.4% to 1.6%)) (figure 2).

### Tobacco

One in five participants reported daily tobacco use in the previous 3 months (table 2), with an average of 10 cigarettes a day. Four in five current smokers (82.7% (95% CI 78.4% to 86.9%)) consumed tobacco at work. The prevalence of e-cigarette use was 9.9% (95% CI 8.2% to 11.7%), and among these users 87.9% (95% CI 81.5% to 94.2%) smoked e-cigarettes with nicotine. Fifty-seven per cent of participants (51.5–62.5) had a Fagerström score under 3, meaning no nicotine dependence, while 6.2% (3.1–9.2) had a score of 7–10 (strong nicotine dependence).

Smoking status differed significantly according to profession, sex and age class (table 2). Specifically, the ‘other’ professional group (ie, not a nurse, specialised nurse, nurse assistant, X-ray technician, lab technician, childcare assistant or manager) had the highest proportion of smokers 40.2% (95% CI 18.4% to 61.9%) reporting daily use. Men were slightly, but significantly, more likely to report daily smoking than women (24.4% (95% CI 18.6% to 30.3%) vs 20.6% (95% CI 17.9% to 23.2%)). The youngest age class (20–34 years old) smoked the most, with a daily use prevalence of 23.7% (95% CI 19.8% to 27.6%). Workers alternating between

**Table 1** Study sample description (%)

Descriptive statistics after calibration on margins	Full sample	Nurse/specialised nurse	Nurse assistant/ technician	Midwife	Manager	Other
Effective (%)	1238 (100)	654 (53.5)	452 (37.0)	52 (4.3)	10 (0.8)	55 (4.5)
Age (years)						
20–34	42.1	53.9	22.7	64.1	7.2	46.5
35–49	31.6	29.3	36.4	32.6	14.8	21.4
50 and over	26.3	16.8	40.8	3.3	78.0	32.1
Sex						
Men	21.4	17.6	26.0	4.4	29.8	44.1
Women	78.6	82.5	74.0	95.7	70.2	55.9
Type of post n (%)						
Night-shift workers	76.1	76.6	85.5	0	85.9	63.1
Replacement staff	4.4	4.6	4.8	0	0	4.3
Alternating between day and night shifts	16.3	16.2	7.8	100	4.2	10.4
Working at night since the COVID-19 pandemic started	0.5	0.8	0.3	0	0	0
Other	2.6	1.8	1.5	0	9.9	22.2
Length of work shift						
12 hours	33.6	35.7	24.7	96.2	6.9	27.0
10 hours	62.8	62.1	73	0	83.5	44.1
Other	3.6	2.2	2.4	3.8	9.6	29.0
Employment type						
Full time	95.1	94.3	96.9	89.8	92.0	96.3
Part time	4.9	5.7	3.1	10.2	8.0	3.7

nights and days were significantly more likely to smoke once or twice weekly ( $\chi^2$ ,  $p=0.019$ ).

### Alcohol

Alcohol was the most used substance when not considering frequency; only 30.6% (95% CI 27.9% to 33.3%) of the study sample had not drunk any alcohol in the previous 3 months (table 2). The majority of persons who drank alcohol (80.6% (95% CI 77.8% to 83.3%)) reported usually drinking one or two glasses when they consumed alcohol. With regard to dependence, 42.5% (95% CI 39% to 45.9%) had hazardous alcohol use (AUDIT-C score  $\geq 3$  for women and four for men) but no participant was dependent (AUDIT-C score  $\geq 10$ ). Younger respondents were more likely to have hazardous use.

Alcohol use differed significantly according to profession and sex. Midwives consumed it more frequently (daily use=10.2% (0–21.7)), whereas nurse assistants reported the lowest consumption frequency (daily use=0.5 (0–1.4)). Furthermore, men were more likely

to drink than women. No age class drank more than the others.

### Tranquillisers

Tranquillisers were the third most consumed PAS with daily consumers representing 2.4% (95% CI 1.6% to 3.3%) of the study sample (table 2).

No significant difference was found between sexes or age classes (table 2). Midwives consumed fewer tranquilisers. Specifically, 96.4% (95% CI 89.1% to 100%) of this subpopulation reported not using them. Participants aged between 35 and 49 years were more likely to be daily users of tranquilisers (3.3% (95% CI 1.7% to 4.9%)).

### Opioids

For simplicity, the term ‘opioids’ in this study groups all synthetic or natural substances derived from the poppy (eg, opioids and opiates such as methadone, heroin or codeine). In our sample, 11.7% (95% CI 9.8% to 13.5%) of

**Table 2** Tobacco, alcohol and tranquilliser use in the study sample (%)

Statistics after calibration on margins	Tobacco					Alcohol					Tranquillisers					P value ( $\chi^2$ test)
	Never or negligible	Occasional*	Weekly	Daily	P value ( $\chi^2$ test)	Never or negligible	Occasional	Weekly	Daily	P value ( $\chi^2$ test)	Never or negligible	Occasional	Weekly	Daily		
Percentage (95% CI)	68.7 (66 to 71.4)	6.6 (5.1 to 8.1)	3.3 (2.3 to 4.3)	21.4 (19 to 23.8)	30.6 (27.9 to 33.3)	47.7 (44.8 to 50.6)	20.4 (18.1 to 22.7)	1.3 (0.6 to 2)	84.9 (82.9 to 86.9)	9.6 (8 to 11.3)	3 (2.1 to 3.9)	2.4 (1.6 to 3.3)				
<b>Profession</b>					<b>0.012</b>					<b>&lt;0.001</b>				<b>0.041</b>		
Nurse/specialised nurse (n=654)	69.3 (66.1–72.4)	6.7 (4.9–8.5)	4.2 (2.9–5.6)	19.8 (17.1–22.5)	25.5 (22.5–28.5)	49.6 (46.1–53)	23.7 (20.8–26.6)	1.2 (0.5–1.9)	82.8 (80.3–85.3)	10.8 (8.8–12.9)	4 (2.7–5.3)	2.4 (1.4–3.4)				
Nurse assistant/technician (n=452)	70 (65.2–74.8)	5.7 (3.2–8.3)	2.1 (0.6–3.6)	22.2 (17.9–26.5)	39.1 (33.9–44.3)	47.5 (42.2–52.7)	12.9 (9.3–16.4)	0.5 (0–1.4)	87.6 (84.2–91)	8.1 (5.3–10.9)	1.7 (0.4–2.9)	2.6 (0.9–4.3)				
Midwife (n=52)	69.8 (52.5–87.2)	7.1 (0–17.1)	6.5 (0–15.5)	16.6 (2.7–30.5)	25.7 (8.7–42.7)	20.7 (5.3–36.2)	43.4 (24.2–62.5)	10.2 (0–21.7)	96.4 (89.1–100)	0 (0–0)	0 (0–0)	3.6 (0–10.9)				
Manager (n=10)	85.1 (78.3–91.9)	3.8 (0–7.6)	0 (0–0)	11.1 (5.3–17)	34.8 (24.6–44.9)	50.5 (39.9–61)	9.1 (3.4–14.8)	5.6 (0–11.2)	86.4 (79.3–93.5)	6.8 (2–11.7)	5.2 (0.1–10.4)	1.5 (0–3.7)				
Other (n=55)	47.5 (25.5–69.5)	12.4 (0–26.3)	0 (0–0)	40.2 (18.4–61.9)	25.3 (6.2–44.3)	52.2 (30.1–74.2)	22.6 (3.9–41.2)	0 (0–0)	77.6 (59.2–96.1)	18.2 (0.9–35.4)	4.2 (0–12.7)	0 (0–0)				
<b>Sex</b>					<b>0.001</b>					<b>0.004</b>				<b>0.916</b>		
Men (n=262)	63.4 (56.9–70)	5.8 (2.5–9.1)	6.3 (3.3–9.3)	24.4 (18.6–30.3)	22.7 (16.7–28.7)	49.5 (42.7–56.4)	26.6 (20.7–32.4)	1.1 (0.1–2.2)	84.3 (79.3–89.3)	10.1 (5.9–14.3)	3.5 (1–5.9)	2.1 (0.1–4.1)				
Women (n=960)	70.1 (67.2–73.1)	6.8 (5.1–8.5)	2.5 (1.5–3.5)	20.6 (17.9–23.2)	32.8 (29.7–35.8)	47.2 (44–50.4)	18.7 (16.2–21.2)	1.4 (0.6–2.2)	85.1 (82.9–87.3)	9.5 (7.7–11.3)	2.8 (1.9–3.8)	2.5 (1.6–3.5)				
<b>Age (years)</b>					<b>&lt;0.001</b>					<b>&lt;0.001</b>				<b>0.662</b>		
20–34 (n=514)	62 (57.6–66.3)	9.2 (6.6–11.9)	5.1 (3.2–6.9)	23.7 (19.8–27.6)	25.7 (21.8–29.7)	48.7 (44.2–53.1)	24.2 (20.3–28.1)	1.4 (0.2–2.5)	85.9 (82.8–88.9)	8.9 (6.5–11.4)	3.2 (1.8–4.6)	2 (0.7–3.4)				
35–49 (n=386)	71.4 (67.1–75.6)	3.7 (1.8–5.6)	2.1 (0.8–3.5)	22.8 (18.8–26.7)	29.1 (24.9–33.3)	49.5 (44.9–54.1)	19.5 (15.9–23.2)	1.9 (0.5–3.3)	83 (79.7–86.4)	11.3 (8.5–14.1)	2.4 (1.1–3.7)	3.3 (1.7–4.9)				
50 and over (n=321)	76.3 (70.9–81.7)	5.8 (2.8–8.9)	1.9 (0.1–3.7)	16 (11.3–20.6)	40.3 (34–46.5)	44 (37.7–50.2)	15.2 (10.7–19.8)	0.5 (0–1.2)	85.8 (81.5–90.1)	8.8 (5.2–12.4)	3.4 (1.2–5.5)	2.1 (0.5–3.6)				

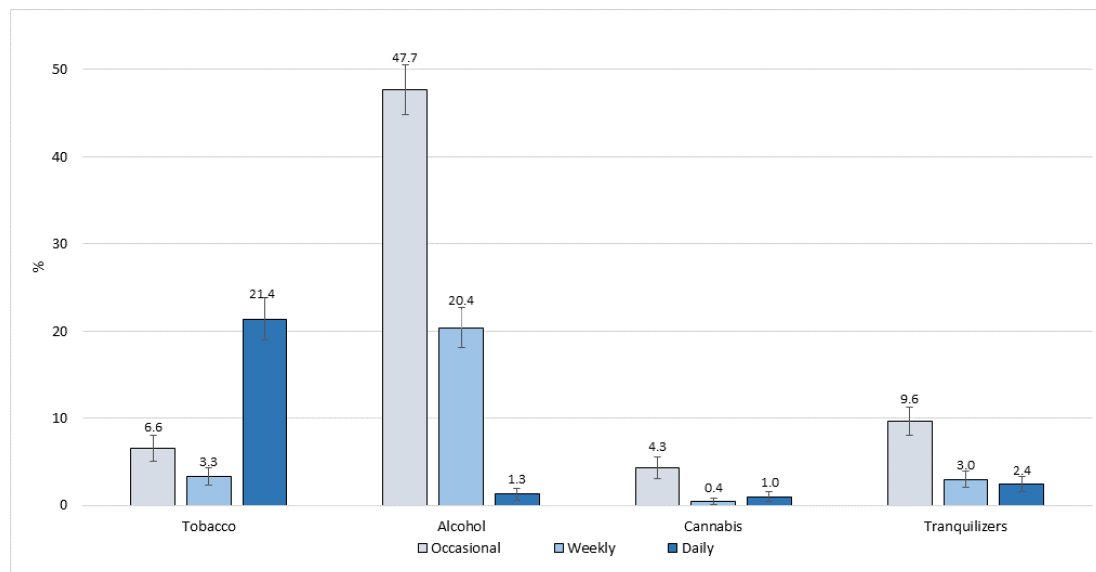
The significant values with a p value lower than 5% are in bold.

\*The subgroup 'occasional' grouped the 'monthly' and 'once or twice during the previous 3 months' categories.

**Table 3** Use of psychoactive substances during the previous 3 months in the study sample (% (95% CI))

	Cannabis		Cocaine		Amphetamines		Solvents		Hallucinogens		Opioids	
	Never	Daily	Already	P value (X <sup>2</sup> test)	Already	P value (X <sup>2</sup> test)	Already	P value (X <sup>2</sup> test)	Already	P value (X <sup>2</sup> test)	Already	P value (X <sup>2</sup> test)
Percentage (95% CI)	94.2 (92.8 to 95.7)	1.0 (0.4 to 1.6)	3.2 (2.1 to 4.2)	0.063	3.9 (2.7 to 5.1)	0.001	1.2 (0.6 to 1.9)	0.043	3.3 (2.2 to 4.4)	<0.001	11.7 (9.8 to 13.5)	<0.001
Profession												
Nurse/specialised nurse (n=654)	93.5 (91.7–95.2)	1.3 (0.5–2.1)	3.2 (2.0–4.4)	0.063	3.5 (2.3–4.8)	0.001	1.5 (0.6–2.3)	0.043	3.0 (1.8–4.2)	<0.001	12.9 (10.6–15.2)	<0.001
Nurse assistant/technician (n=452)	96.6 (94.7–98.5)	0.3 (0–0.9)	2.1 (0.6–3.7)	0.063	2.7 (0.9–4.5)	0.001	0.3 (0–0.8)	0.043	1.6 (0.3–2.9)	<0.001	9.3 (6.3–12.3)	<0.001
Midwife (n=52)	96.4 (89.1–100)	0 (0–0)	6.9 (0–16.6)	0.063	14.1 (0.8–27.4)	0.001	3.6 (0–10.9)	0.043	11.8 (0–24.8)	<0.001	0 (0–0)	<0.001
Manager (n=10)	98.1 (95.3–100)	0 (0–0)	0 (0–0)	0.063	3.6 (0–7.2)	0.001	2.2 (0–5.3)	0.043	2.2 (0–5.3)	<0.001	14.7 (7.7–21.8)	<0.001
Other (n=55)	81.4 (63.7–99)	4.3 (0–13.1)	8.3 (0–20.0)	0.063	8.3 (0–20.0)	0.001	4.1 (0–12.4)	0.043	12.9 (0–27.4)	<0.001	27.6 (7.6–47.6)	<0.001
Sex												
Men (n=262)	91.1 (87.5–94.7)	1.9 (0.3–3.5)	5.6 (2.4–8.8)	0.012	5.3 (2.3–8.3)	0.002	1.9 (0.3–3.4)	0.075	7.4 (3.7–11.1)	<0.001	13.1 (8.4–17.7)	<0.001
Women (n=960)	95.1 (93.6–96.6)	0.7 (0.1–1.4)	2.5 (1.5–3.5)	0.012	3.5 (2.3–4.8)	0.002	1.1 (0.3–1.8)	0.075	2.2 (1.1–3.2)	<0.001	11.3 (9.3–13.3)	<0.001
Age (years)												
20–34 (n=514)	89.3 (86.3–92.3)	2.0 (0.7–3.4)	5.1 (3.1–7.1)	0.006	6.0 (3.8–8.2)	0.002	2.1 (0.7–3.5)	0.075	6.3 (3.9–8.8)	<0.001	12.7 (9.5–15.8)	<0.001
35–49 (n=386)	97.9 (96.7–99.1)	0.2 (0–0.5)	1.8 (0.4–3.2)	0.006	1.5 (0.3–2.7)	0.002	0.6 (0–1.2)	0.075	0.8 (0–1.6)	<0.001	12.1 (9.1–15.0)	<0.001
50 and over (n=321)	97.7 (96–99.5)	0.2 (0–0.7)	1.8 (0.1–3.5)	0.006	3.4 (1.0–5.8)	0.002	0.7 (0–1.5)	0.075	1.4 (0–2.9)	<0.001	9.6 (5.9–13.2)	<0.001

The significant values with a p value lower than 5% are in bold.



**Figure 2** Prevalence and frequency of tobacco, alcohol, cannabis and tranquilliser use during the previous 3 months

respondents had consumed opioids in the previous 3 months (figure 3 and table 3).

A significant difference ( $\chi^2$  test  $p < 0.001$ ) was found in opioid use between professions, midwives being the only group where nobody reported using them. No significant difference was found in terms of age or sex.

#### All other PAS

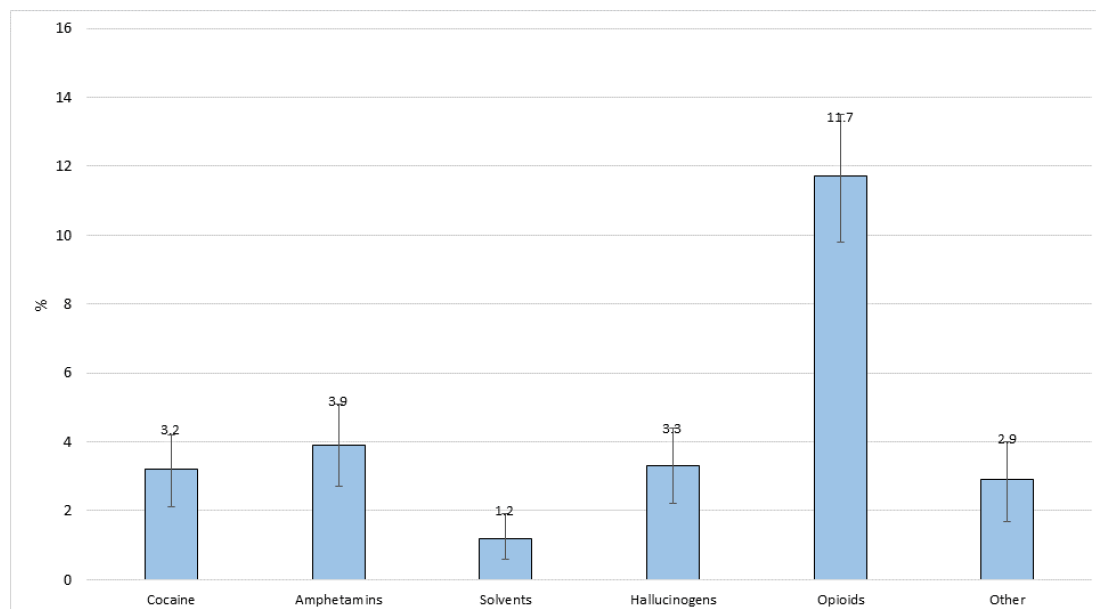
Less than 1% ( $n=12$ ) of the study sample reported consuming other PAS during the previous 3 months. For example, only 1% (95% CI 0.4% to 1.6%) reported daily cannabis use, and other PAS were used even less (table 3 and figure 3).

Statistical differences between profession, sex and age classes were not significant for any substance. The ‘other’ professional group consumed more substances than

other professions. Specifically, they had the highest use of cocaine (8.3% (95% CI 0% to 20%)), solvents (4.1% (95% CI 0% to 12.4%)), hallucinogens (12.9% (95% CI 0% to 27.4%)), opioids (27.6% (95% CI 7.6% to 47.6%)) and other substances (20.7% (95% CI 1.6% to 39.895% CI)). Nurse assistants were the professional category least likely to declare consuming other PAS. The youngest age class (20–34 years) were the most likely to report consuming other PAS, and men consumed more than women, although no significant difference was found in either stratification.

#### All PAS combined

Overall, the ‘other’ profession category had higher rates of PAS use than all the other categories.



**Figure 3** Prevalence of psychoactive substance use at least once during the previous 3 months.

## COVID-19

Changes in PAS use since the beginning of the COVID-19 are shown in [table 4](#).

Tobacco use was more impacted than other PAS. Most of those who reported a change in tobacco use indicated an increase (8.6% (95% CI 6.3% to 10.8%)). With regard to alcohol use, most of those who drank (83.5% (95% CI 80.4% to 86.5%)) had not changed their pre-COVID-19 patterns. Furthermore, 83.4% of the total sample (95% CI 80.8% to 86.1%) reported no change in their consumption of other PAS since the beginning of the pandemic.

## DISCUSSION

To our knowledge, this multicentre analysis is the first study to explore addictive behaviours in NSHW in France. Conducted during the country's first COVID-19 wave in March–May 2020, it is representative of the whole population of NSHW in 39 public hospitals in the Paris area.

There were two main results. The first was the high prevalence of daily smoking (especially in younger men), tranquilliser use and opioid use in the sample. The second was the large number of NSHW who reported no change with respect to pre-COVID-19 PAS patterns. We identified differences in PAS use according to profession, sex, and age. The youngest participants, men and the 'other' professional category were more likely to use PAS than their relative counterparts (ie, older participants, women, and professionals from the listed categories in the questionnaire, respectively).

NSHW are exposed to several health risk factors, which can facilitate specific substance use behaviours. Just as their daytime counterparts, they work in close contact with the public.<sup>27</sup> Furthermore, they can have irregular day-night work and life rhythms, and have easier access to non-prescribed psychoactive drugs.<sup>12</sup>

Although access to medications is increasingly regulated in hospitals in France, hospital workers can still obtain medications which are generally only available on prescription. In this study, we hypothesised that because hospital workers had easier access to medications, they were more likely to self-medicate using tranquillisers and opioids than the general population. This hypothesis is reinforced in the literature.<sup>11 28</sup> Self-medication is widespread in medical and paramedical staff,<sup>29</sup> mainly because these professionals feel they are both saving time (ie, not having to consult, have a medicine dispensed, etc) and are familiar enough with medications to be able to safely take care of themselves, especially when they believe their illness is benign.<sup>24</sup> Our other hypothesis was that NSHW self-medicated mostly to self-manage the negative consequences of their work on their health, such as anxiety and sleep disorders, which are frequent in this subpopulation.<sup>30–32</sup> Such uses are found in the literature, in particular for alcohol and cannabis. Although we did not have a comparative sample of day workers, we hypothesise that the prevalence of sleep disorders, and therefore PAS use, is lower in the latter population.

The COVID-19 health crisis has impacted healthcare stakeholders differently depending on their profession, their work site, and medical department. Depending on their occupation, hospital-based professionals have different work rhythms, responsibilities, and personal ways of working. For example, midwives strictly work by alternating between day and night shifts, whereas nurses can choose to work night shifts only or mixed day and night shifts. As we found in our study, NSHW alternating between days and nights may be at greater risk of PAS use.<sup>33–36</sup> The differences in PAS use between the various professions in our study can therefore be explained, at least partly, by different work rhythms and different levels of responsibility which depend on the status of one's work and position.

## Comparisons with the French general population

We compared our data with those of several editions of Santé Publique France's (SPF) (French Public Health Agency) Health Barometer. These surveys are conducted on a representative sample of the French general population almost every year. For tobacco use, we focused on the 2019 and 2020 editions.<sup>23 37</sup> For alcohol use, even though the tools used to assess PAS use were different, we compared our findings with those from the 2017 French Barometer.<sup>38</sup> We also compared our data with the 2004 editions<sup>25</sup> which explored healthcare professionals' PAS use, to assess differences in prevalence of substance use depending on profession.

NSHW in our study had lower self-reported tobacco and alcohol use than the French general population, yet the difference was small,<sup>39</sup> and mostly concerned daily smokers and the proportion of male smokers. More specifically, one in five persons (21.4% (19–23.8)) in our study sample were daily smokers, as opposed to one in four (25.5%) for the general population according to the 2021 Health Barometer.<sup>23 37 39</sup> Just as in the 2019 and 2020 Barometer studies, women in our study sample smoked less than men.

With regard to alcohol consumption, overall alcohol use prevalence was much lower in our NSHW (69.4% vs 81% in the general population). The proportion of daily consumers was also much lower (1.3% vs 7.1%).<sup>38 39</sup>

When comparing specific professions between our sample and those in the general population, we found that the prevalence of daily smokers<sup>25</sup> in our 'nurse assistants and technicians' category was much lower than that for nurse assistants in the 2004 Barometer Survey (22.2% (5% CI 17.9% to 26.5%) vs 43%). A difference was also observed for nurses but this was much smaller (19.8% (95% CI 17.1% to 22.5) vs 23%).

The lower self-reported tobacco prevalence in our study than in the general population contrasts with findings for tobacco use in night-shift workers elsewhere, especially regarding the risk of starting to smoke tobacco for the first time when working at night.<sup>40</sup> Unlike our study, previous work found that alcohol use was higher in night-shift workers than in their daytime counterparts.<sup>16</sup> The



**Table 4** Changes in PAS use since the beginning of the COVID-19 health crisis

Statistics with calibration on margins	Tobacco			Alcohol			Other substances		
	No change	Increase	Decrease	No change	Increase	Decrease	No change	Increase	Decrease
Percentage (95% CI)	64.7 (59.5 to 70)	26.9 (22 to 31.8)	8.4 (5.4 to 11.3)	83.5 (80.4 to 86.5)	8.6 (6.3 to 10.8)	7.9 (5.7 to 10.2)	83.4 (80.8 to 86.1)	9.6 (7.4 to 11.7)	7 (5.2 to 8.8)
<b>Profession</b>									
Nurse/specialised nurse (n=654)	61.8 (55.6–68.1)	30 (24.1–35.9)	8.2 (4.7–11.7)	83.9 (81–86.8)	8.1 (6–10.2)	8.1 (5.9–10.3)	82.8 (79.3–86.4)	9.2 (6.5–12)	7.9 (5.4–10.5)
Nurse assistant/technician (n=452)	72.3 (63.7–80.9)	19.1 (11.7–26.5)	8.6 (3.2–14.1)	89.2 (85–93.3)	7.5 (4–11.1)	3.3 (1.1–5.6)	83.3 (77.1–89.6)	8.7 (4.1–13.4)	8 (3.3–12.6)
Midwife (n=52)	28 (0–71.5)	42.4 (0–90.5)	29.5 (0–74.4)	52.4 (30.8–74)	29.2 (9.8–48.6)	18.4 (1.3–35.5)	90.6 (70.9–100)	0 (0–0)	9.4 (0–29.1)
Manager (n=10)	75.1 (48.8–100)	24.9 (0–51.2)	0 (0–0)	84.2 (74.5–93.9)	10.5 (2.1–18.8)	5.4 (0–10.9)	85.1 (74.8–95.5)	6.4 (0–13)	8.4 (0–16.9)
Other (n=55)	62.6 (29.8–95.5)	37.4 (4.5–70.2)	0 (0–0)	67.9 (38.3–97.4)	24 (0–51.1)	8.2 (0–25.5)	86 (65.3–100)	7.2 (0–22.7)	6.8 (0–21.5)
<b>Sex</b>									
Men (n=262)	68.2 (57.1–79.2)	21 (11.4–30.7)	10.8 (3.6–17.9)	84.4 (78.3–90.6)	8.2 (3.4–13)	7.4 (3.1–11.7)	80 (72.7–87.3)	7.3 (3–11.6)	12.7 (6.4–19.1)
Women (n=960)	63.6 (58.4–68.7)	28.9 (24.1–33.7)	7.5 (4.8–10.3)	83.1 (80.6–85.7)	10 (7.9–12.1)	6.9 (5.2–8.5)	84.7 (81.8–87.5)	9 (6.7–11.3)	6.3 (4.4–8.2)
<b>Age (years)</b>									
20–34 (n=528)	64.9 (57.5–72.4)	28.7 (21.6–35.8)	6.3 (2.6–10.1)	79.3 (74.9–83.7)	10.6 (7.2–14)	10.1 (6.8–13.4)	80.8 (76–85.7)	9.2 (5.7–12.6)	10 (6.2–13.9)
35–49 (n=385)	59.5 (50.4–68.7)	31.3 (22.6–40)	9.1 (3.7–14.5)	82.5 (78.1–86.8)	11.6 (7.8–15.4)	5.9 (3.4–8.5)	84.8 (80.2–89.4)	7.9 (4.5–11.4)	7.3 (3.9–10.6)
50 and over (n=326)	71.4 (59–83.7)	16.7 (6–27.4)	11.9 (3.7–20.2)	92.8 (88.4–97.3)	4.8 (0.9–8.7)	2.4 (0.2–4.6)	87.8 (81.3–94.2)	8.2 (2.8–13.6)	4.1 (0.3–7.9)

PAS, psychoactive substance.

differences we found compared with the general population and to the figures for hospital workers in 2004, can be explained by greater attention by health professionals to the issues surrounding addiction, as well as to stronger public policy campaigns in France over the past 20 years.<sup>20 41–43</sup>

We also compared our results with data from the European drug report (EDR) The prevalence of cannabis use was 7.5 times lower in our sample (5.8% vs 44.8%), whereas amphetamine and cocaine use prevalences were similar (3.9% vs 2.2%, and 3.2% vs 5.6%, respectively). The very low level of use of cannabis in our sample may be explained by increased use of tranquillisers, which have a similar effect to cannabis in reducing sleep disorders and are more easily accessible to hospital workers. Comparison of opioid use with the EDR<sup>44</sup> was not possible because of differing definitions. Nevertheless, the prevalence of opioid use in our sample was high; this could be partly related to increased physical pain arising from the greater workload during the current COVID-19 health crisis<sup>45</sup> or to the use of opioids as sleeping pills not necessarily related to COVID-19.<sup>46</sup> However, this hypothesis must be interpreted with caution, as NSHW in our study declared that they changed their PAS use very little from their pre-pandemic pattern.

With regard to tranquilliser use, it is difficult to compare our sample with findings for the general population in the literature for two reasons: (1) despite the fact that the use of benzodiazepines and hypnotics are monitored in France, available prevalence figures are relatively old and are pre-COVID;<sup>47</sup> (2) the use of sleeping pills in France is higher than in other countries.<sup>48</sup> The only information on tranquilliser use in the general French population which we found came from a study by Weil *et al* which showed an increase in the initiation and dispensing of prescribed tranquillisers (hypnotics, anxiolytics and other substances) in the French population during the pandemic compared with the same period (March to September 2019).<sup>49</sup>

With regard to the impact of the first wave of the COVID-19 pandemic, we found trends in increased smoking and alcohol consistent with those found by SPF, France's national public health agency, for the general population<sup>50</sup> (27% SPF vs 26.7% and 11% SPF vs 9.5%, respectively). The increase in alcohol and tobacco consumption for some NSHW is linked to a deterioration in their working environment as well as to changes and modifications in work schedules and organisation.<sup>51</sup> The trends in both groups underline how stressful and difficult the first wave of the pandemic was for people in France.<sup>52</sup> Moreover, the motivations reported by both NSHW and the general population for increasing PAS use during lockdown were universal (boredom, lack of social contact and exchanges, upheaval of one's life, loneliness).<sup>53</sup> Our alcohol use results were also comparable with those of the Global Drug Survey<sup>54</sup> (23% vs 16.5% in our sample), although the 14 000 participants in their study were not representative of the general population.

## Strengths and limitations

This study is the first to focus solely on NSHW in France and their use of PAS during the COVID-19 pandemic. Moreover, it is innovative in that we quantified the use of a number of PAS in several healthcare professions (nurses, midwives, managers, etc.) as opposed to just one. Specifically, it provides novel results on the prevalences of cannabis, opioid, amphetamine and cocaine use in NSHW in France. Similar data on this population are scarce. The large sample is also representative of the whole population of NSHW in the 39 hospitals of the AP-HP network in and around Paris, in terms of profession, sex and age.

Our study has limitations. First, some professions were underrepresented which prevented in-depth statistical analysis. This lack of statistical power may have resulted in some results not appearing significant when the reality may be different. Second, the low prevalence of certain PAS use, such as cocaine or amphetamines, prevented subgroup analyses. Third, the study used a self-administered questionnaire, so social desirability bias is possible. Fourth, we only asked three questions to investigate pre-pandemic PAS use, so the impact of COVID-19 on consumption could not be estimated. Finally, despite performing a multiple correspondence analysis to identify consumer profiles, no significant results emerged, and we were not able to characterise a profile for NSHW PAS users.

## CONCLUSION

This study provides new data on the use of PAS in NSHW in France. It underlines that daily smoking (especially in younger men) and use of tranquillisers and opioids are highly prevalent in this subpopulation. Interventions for quitting smoking and addressing determinants of tranquilliser and opioid use in NSHW need to be developed and evaluated to improve quality of life in these essential underdiagnosed and undertreated health personnel. Tailored interventions for NSHW are necessary to reduce PAS use. Such interventions must take into account the specific work-related health risk factors this subpopulation faces. Furthermore, they must be multilevel and combine a holistic personalised approach which focuses on mental health, sleep, nutrition and all the PAS they use.

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#### REFERENCES

- Wu P, Fang Y, Guan Z, *et al*. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry* 2009;54:302–11.
- Stress and psychological impact on SARS patients during the outbreak - Siew E Chua, Vinci Cheung, Grainne M McAlonan, Charlton Cheung, Josephine WS Wong, Erik PT Cheung, Marco TY Chan, Teresa KW Wong, Khai M Choy, Chung M Chu, Peter WH Lee, Kenneth WT Tsang, 2004 [online]. Available: <https://journals.sagepub.com/doi/abs/10.1177/070674370404900607> [Accessed 14 Apr 2020].
- Fiksenbaum L, Marjanovic Z, Greenglass ER, *et al*. Emotional exhaustion and state anger in nurses who worked during the SARS outbreak: the role of perceived threat and organizational support. *Can J Commun Ment Health* 2006;25:89–103.
- Zhou C, Shi L, Gao L, *et al*. Determinate factors of mental health status in Chinese medical staff. *Medicine* 2018;97:e0113.
- Gumenyuk V, Howard R, Roth T, *et al*. Sleep loss, circadian mismatch, and abnormalities in reorienting of attention in night workers with shift work disorder. *Sleep* 2014;37:545–56.
- Nena E, Katsaouni M, Steiropoulos P, *et al*. Effect of shift work on sleep, health, and quality of life of health-care workers. *Indian J Occup Environ Med* 2018;22:29–34.
- Akerstedt T. Psychological and psychophysiological effects of shift work. *Scand J Work Environ Health* 1990;16:67–73.
- Iskra-Golec I, Barnes-Farrell J, Bohle P, eds. *Social and family issues in shift work and non standard working hours [online]*. Springer International Publishing, 2016. <https://www.springer.com/gp/book/9783319422848>
- Sinha R. Chronic stress, drug use, and vulnerability to addiction. *Ann N Y Acad Sci* 2008;1141:105–30.
- Beaujouan L, Czernichow S, Pourriat J-L, *et al*. Prévalence et facteurs de risque de l'addiction aux substances psychoactives en milieu anesthésique : résultats de l'enquête nationale [online]. Available: <https://www.em-consulte.com/en/article/33629> [Accessed 17 Jun 2019].
- Ehigiator O, Azodo CC, Ehizele AO, *et al*. Self-medication practices among dental, midwifery and nursing students. *Eur J Gen Dent* 2013;2:54–7.
- Barros ARR, Griep RH, Rotenberg L. Self-medication among nursing workers from public hospitals. *Rev Lat Am Enfermagem* 2009;17:1015–22.
- Brower KJ, Perron BE. Sleep disturbance as a universal risk factor for relapse in addictions to psychoactive substances. *Med Hypotheses* 2010;74:928–33.
- Goeders NE. The impact of stress on addiction. *Eur Neuropsychopharmacol* 2003;13:435–41.
- Mancuso G, Lejeune M, Anseau M. Cigarette smoking and attention: processing speed or specific effects? *Psychopharmacology* 2001;155:372–8.
- Richter K, Peter L, Rodenbeck A, *et al*. Shiftwork and alcohol consumption: a systematic review of the literature. *Eur Addict Res* 2021;27:1–7.
- Drorian J, Heath G, Sargent C, *et al*. Alcohol use in shiftworkers. *Accid Anal Prev* 2017;99:395–400.
- Samaha E, Lal S, Samaha N, *et al*. Psychological, lifestyle and coping contributors to chronic fatigue in shift-worker nurses. *J Adv Nurs* 2007;59:221–32.
- Patterns and correlates of benzodiazepine use in nurses: A nationwide, population-based study - PubMed [online]. Available: <https://pubmed.ncbi.nlm.nih.gov/28374978/> [Accessed 3 May 2021].
- Orset C, Sarazin M, Grataloup S. Les conduites addictives parmi le personnel hospitalier : enquête de prévalence par questionnaire chez 366 agents du centre hospitalier universitaire de Saint-Étienne. *Arch Mal Prof Environ* 2011;72:173–80.
- Heatherton TF, Kozlowski LT, Frecker RC, *et al*. The Fagerström test for nicotine dependence: a revision of the Fagerström tolerance questionnaire. *Br J Addict* 1991;86:1119–27.
- Bush K, Kivlahan DR, McDonell MB, *et al*. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. ambulatory care quality improvement project (ACQUIP). alcohol use disorders identification test. *Arch Intern Med* 1998;158:1789–95.
- Andler R. Baisse de la prévalence du tabagisme quotidien parmi les adultes : résultats du baromètre de santé publique france 2018 / Reduction of daily smoking rate among adults: results from the 2018 santé publique france health barometer. *Baromètre Santé Publique Fr* 2018;2019:7.
- Cousin L, Rousset Torrente O, Baumann L, *et al*. I tried melatonin and some plants, but now, I'm on zopiclone: how night shift work influence hospital night shift workers' psychoactive substances consumption, mental health and quality of working life 2020.
- Chièze F, Dautzenberg B, Deberdt J-P. Résultats du Baromètre tabac personnel hospitalier, 2003. *BEH* 2004;92–6.
- Deville J-C, Särndal C-E, Sautory O. Generalized Raking procedures in survey sampling. *J Am Stat Assoc* 1993;88:1013–20.
- Airagnes G, Lemogne C, Goldberg M, *et al*. Job exposure to the public in relation with alcohol, tobacco and cannabis use: findings from the CONSTANCES cohort study. *PLoS One* 2018;13:e0196330.
- Babatunde OA, Fadare JO, Ojo OJ. Self-medication among health workers in a tertiary institution in South-West Nigeria. *Pan Afr Med J* 2016;24.
- Altman BR, Mian MN, Slavin M, *et al*. Cannabis expectancies for sleep. *J Psychoactive Drugs* 2019;51:405–12.
- Boivin DB, Boudreau P. Impacts of shift work on sleep and circadian rhythms. *Pathol Biol* 2014;62:292–301.
- Roehrs T, Roth T. Sleep, sleepiness, sleep disorders and alcohol use and abuse. *Sleep Med Rev* 2001;5:287–97.
- Smith LL, Yan F, Charles M, *et al*. Exploring the link between substance use and mental health status: what can we learn from the self-medication theory? *J Health Care Poor Underserved* 2017;28:113–31.
- Korsiak J, Tranmer J, Leung M, *et al*. Actigraph measures of sleep among female hospital employees working day or alternating day and night shifts. *J Sleep Res* 2018;27:e12579.

- 34 Parkes KR. Shift rotation, overtime, age, and anxiety as predictors of offshore sleep patterns. *J Occup Health Psychol* 2015;20:27–39.
- 35 Sonati J, De Martino M, Vilarta R, *et al.* Quality of life, health, and sleep of air traffic controllers with different shift systems. *Aerosp Med Hum Perform* 2015;86:895–900.
- 36 Lin P-C, Chen C-H, Pan S-M, *et al.* The association between rotating shift work and increased occupational stress in nurses. *J Occup Health* 2015;57:307–15.
- 37 SPF. Bulletin épidémiologique hebdomadaire, 26 mai 2020, n°14 Journée mondiale sans tabac 2020 [online]. Available: /import/bulletin-epidemiologique-hebdomadaire-26-mai-2020-n-14-journee-mondiale-sans-tabac-2020 [Accessed 26 May 2020].
- 38 Andler R, Richard J-B. Nouveau repère de consommation d'alcool et usage : résultats du baromètre de santé publique France [online], 2017. Available: [http://beh.santepubliquefrance.fr/beh/2019/10-11/pdf/2019\\_10-11\\_2.pdf](http://beh.santepubliquefrance.fr/beh/2019/10-11/pdf/2019_10-11_2.pdf) [Accessed 7 Sep 2020].
- 39 Pasquereau A, Andler R, Guignard R. La consommation de tabac en France : Premiers résultats du Baromètre Santé. *Bull Epidémiologique Hebd* 2017:265–74.
- 40 van Amelsvoort LGPM, Jansen NWH, Kant I. Smoking among shift workers: more than a confounding factor. *Chronobiol Int* 2006;23:1105–13.
- 41 Thomas T. Prise en charge des addictions en milieu professionnel, l'expérience du CHU de Bordeaux [online], 2013. Available: <https://www.chu-bordeaux.fr/Espace-m%C3%A9dia/Archives/Le-CHU-de-Bordeaux-prim%C3%A9-trois-fois/Prise-en-charge-des-addictions-CHU-de-Bordeaux.pdf> [Accessed 5 Nov 2021].
- 42 Conduites addictives en milieu professionnel [online], 2018. Available: <https://www.infirmiers.com/votre-carriere/votre-carriere/addictions-milieu-professionnel-hopital-aussi.html> [Accessed 5 Nov 2021].
- 43 Bonnet N, Beauvillier E, Michels D. Guide- Hôpital sans tabac [online], 2017. Available: [https://solidarites-sante.gouv.fr/IMG/pdf/guide\\_hst\\_bat.pdf](https://solidarites-sante.gouv.fr/IMG/pdf/guide_hst_bat.pdf) [Accessed 5 Nov 2021].
- 44 European Monitoring Centre for Drugs and Drug Addiction. European drug report 2020: key issues [online]. LU: Publications Office, 2020. Available: <https://data.europa.eu/doi/10.2810/759563> [Accessed 18 Jan 2021].
- 45 Rezaee M, Ghasemi M. Prevalence of low back pain among nurses: predisposing factors and role of work place violence. *Trauma Mon* 2014;19:e17926.
- 46 Benyamin R, Trescot A, Sukdeb D. Opioid complications and side effects. Pain physician [online]. Opioid special issue, 2008. Available: [https://d1wqtxts1xzle7.cloudfront.net/39105100/0046351a0ec5a9b18e000000-with-cover-page.pdf?Expires=1620407132&Signature=dpczlgf94egNgU-xY7jHL-y3zp9LowqUdTW-VFXSX5e-WyzOeEcR5ibVQ1VINLjB-EcY8iq7D4ercBV2nEJ0nTSUvwX6M2iZuJpYBfa0qCORxJeRyLV7eZn0Y5H0rSBaLJLR9vLwC4ML0VCNdOA2tqWCoD22LXo-jhtF-nVX7ENRdbXOJQeRkRjWQNNa12OP4oH7gKMqXlmuplwd8-ioQbyUJeGu-s3laFR4pmQ7pjXgZsMAiE0VB-1xs0M36vBkdO4R7qynj9CxCxVizEdVVN5RBZgQYxLqF-4bYhOANyk2uJNOKp0b6WGF631SFawM0CM~xb14rf7rVfFef784Q\\_\\_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA](https://d1wqtxts1xzle7.cloudfront.net/39105100/0046351a0ec5a9b18e000000-with-cover-page.pdf?Expires=1620407132&Signature=dpczlgf94egNgU-xY7jHL-y3zp9LowqUdTW-VFXSX5e-WyzOeEcR5ibVQ1VINLjB-EcY8iq7D4ercBV2nEJ0nTSUvwX6M2iZuJpYBfa0qCORxJeRyLV7eZn0Y5H0rSBaLJLR9vLwC4ML0VCNdOA2tqWCoD22LXo-jhtF-nVX7ENRdbXOJQeRkRjWQNNa12OP4oH7gKMqXlmuplwd8-ioQbyUJeGu-s3laFR4pmQ7pjXgZsMAiE0VB-1xs0M36vBkdO4R7qynj9CxCxVizEdVVN5RBZgQYxLqF-4bYhOANyk2uJNOKp0b6WGF631SFawM0CM~xb14rf7rVfFef784Q__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA) [Accessed 7 May 2021].
- 47 Etat des lieux de la consommation des benzodiazépines - Point d'Information - ANSM : Agence nationale de sécurité du médicament et des produits de santé [online]. Available: <https://ansm.sante.fr/S-informer/Points-d-information-Points-d-information/Etat-des-lieux-de-la-consommation-des-benzodiazepines-Point-d-Information> [Accessed 8 Mar 2021].
- 48 Airagnes G, Lemogne C, Renuy A, *et al.* Prevalence of prescribed benzodiazepine long-term use in the French general population according to sociodemographic and clinical factors: findings from the CONSTANCES cohort. *BMC Public Health* 2019;19:566.
- 49 Weill A, Drouin J, Desplas D, *et al.* Usage des médicaments de ville en France durant l'épidémie de la COVID-19 - Point de situation jusqu'au 13 septembre 2020 [online]. EPI-PHARE - GIS ANSM-CNAM, 2020. Available: [https://www.ameli.fr/fileadmin/user\\_upload/documents/EPI-PHARE\\_rapport\\_4\\_medicaments\\_Covid.pdf](https://www.ameli.fr/fileadmin/user_upload/documents/EPI-PHARE_rapport_4_medicaments_Covid.pdf) [Accessed 8 Mar 2021].
- 50 Tabac, alcool : quel impact du confinement sur la consommation des Français ? [online]. Available: /presse/2020/tabac-alcool-quel-impact-du-confinement-sur-la-consommation-des-francais [Accessed 27 May 2020].
- 51 Duracinsky M, Cousin L, Coscas S. Vécu et gestion de la crise sanitaire liée la Covid-19: le point de vue du personnel hospitalier de nuit de l'Assistance publique -Hôpitaux de Paris durant la première vague épidémique (enquête AP-HP Aladdin, 15 juin-15 septembre 2020). Covid-19 N°6 [online], 2021. Available: [http://beh.santepubliquefrance.fr/beh/2021/Cov\\_6/2021\\_Cov\\_6\\_1.html](http://beh.santepubliquefrance.fr/beh/2021/Cov_6/2021_Cov_6_1.html) [Accessed 19 May 2021].
- 52 SPF. La santé mentale des Français face au Covid-19 : prévalences, évolutions et déterminants de l'anxiété au cours des deux premières semaines de confinement (Enquête CoviPrev, 23-25 mars et 30 mars-1er avril 2020) [online]. Available: /import/la-sante-mentale-des-francais-face-au-covid-19-prevalences-evolutions-et-determinants-de-l-anxiete-au-cours-des-deux-premieres-semaines-de-confi [Accessed 17 Jun 2021].
- 53 Vanderbruggen N, Matthys F, Van Laere S, *et al.* Self-reported alcohol, tobacco, and cannabis use during COVID-19 Lockdown measures: results from a web-based survey. *Eur Addict Res* 2020;26:309–15.
- 54 Jauffret-Roustide M, Barratt M, de Dinechin S, *et al.* Consommation d'alcool et d'autres produits psychoactifs pendant la pandémie de Covid-19 dans la Global Drug Survey : une perspective française. *Psychotropes* 2020;26:209–19.