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Job Satisfaction Among Healthcare Workers in the Aftermath of the COVID-19 Pandemic[†]

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Abstract

Using a unique survey of more than 7,000 respondents conducted immediately after the first wave of the COVID-19 pandemic in Italy, we investigate potential drivers of the job satisfaction of healthcare workers. Relying on a representative sample of Italian physicians and nurses, we show that, besides personal characteristics (e.g., age, gender, health status), contextual factors (i.e., working conditions) play the leading role in explaining variation in the level of satisfaction (58%). In particular, working in a high-quality facility increases worker satisfaction and willingness to remain in the profession, and in the current medical specialization, while working in a province with a perceived shortage of medical personnel brings the opposite result. Direct experience with COVID-19 (e.g., having tested positive) is not significantly correlated with the level of job satisfaction, which is instead significantly reduced by changes in the working conditions caused by the health emergency.

Keywords: Healthcare workers, Job satisfaction, COVID-19 pandemic

JEL classification: I10, J28, Z12

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1 Introduction

Job satisfaction of healthcare personnel is a crucial factor in healthcare management, since it has been found to be directly linked to higher quality of care, greater patient adherence to treatments, and higher patient satisfaction (Scheepers et al., 2015; Williams and Skinner, 2003). The recent pandemic has escalated the problem of low job satisfaction among healthcare workers, further threatening the sustainability of healthcare systems. The US (Markit, 2021; Spetz et al., 2021) and the UK (Moberly, 2021) are experiencing a staffing crisis due to workers quitting or early retiring, exhausted by the health emergency, and soon other countries might also have to deal with the consequences of the exodus of healthcare workers triggered by the pandemic. For instance, according to a survey of the Italian Association of Executive Physicians (ASSOMED, 2021), almost half of the physicians currently working for the National Health System want to quit their position in the next two years. Similarly, 4% of Spanish doctors report their intention to leave the profession, while 30% admit considering this option (Foundation, 2020). These challenges, combined with the shortages of healthcare workers already experienced by some countries, might further compromise the quality and safety of patient care. Indeed, the pre-pandemic estimates of the European Commission indicate a gap in the supply of healthcare human resources of approximately one million workers in 2020, meaning that almost 15% of the health needs of the EU population was not adequately covered (Sermeus and Bruyneel, 2010).[1] Therefore, exploring the determinants of healthcare workers' professional satisfaction and vocation in the aftermath of the pandemic becomes crucial to defining the areas of intervention to support the sustainability of healthcare systems in the long-run.

We address this issue using a unique 50-question survey with more than 7,000 respondents (about 2,500 physicians and 4,500 nurses) conducted immediately after the first wave of the COVID-19 outbreak (February-May 2020) in Italy, one of the most affected countries by the pandemic. Our interest lies in understanding the main channels driving the overall level of job satisfaction among healthcare workers. We proxy job satisfaction with direct questions about it, as well as with questions on the respondents' willingness to leave the profession or to move to another specialization. This type of analysis is important because, while the literature on the consequences of the pandemic has addressed the mental and psychological hardships suffered by the healthcare workforce due to the COVID-19 emergency (Barili et al., 2021; Cabarkapa et al., 2020; Muller et al., 2020; Pappa et al., 2020; Preti et al., 2020; Quintana-Domeque et al., 2021; Vindegaard and Benros, 2020), there is scant evidence on the job satisfaction experienced.[2] In

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[1]Recent updates estimate the EU shortage of health workers to increase to about 4.1 million units by 2030: 0.6 million physicians, 2.3 million nurses and 1.3 million other health care professionals (Michel and Ecarnot, 2020).

[2]In particular, Alrawashdeh et al. (2021) find job satisfaction among Jordanian physicians to be positively associated with age and salaries, and negatively with working as a general practitioner, as a specialist or in high loaded hospitals. Zhang et al. (2021) show that the number of office days is an important determinant of job satisfaction, and that the turnover intentions vary with age among healthcare workers in Bolivia. Similarly, age and workload appear to be the main drivers of job satisfaction and of the willingness to leave the profession among Egyptian nurses (Said and El-Shafei, 2021); while Spanish nurses' job satisfaction is primarily affected by

addition, most of this evidence relies on small or selected samples, such as professionals (mostly nurses only) working in a specific hospital/region. Hence, the present study further contributes to the literature by increasing the representativeness of the recruited sample with respect to the general population of healthcare workers. In addition to having information on both physicians and nurses, our sample is also comparable to the full population of workers, both in terms of age distribution and gender composition, which are determinant factors in explaining job satisfaction.[3]

The literature identifies two groups of drivers for job satisfaction of healthcare workers (Archana and Deshpande, 2016; Domagała et al., 2018; Hoff et al., 2015; Lu et al., 2019; Scheurer et al., 2009): a traditional group of drivers, made up of personal and contextual factors (e.g., age, wages, and workload) and a COVID-19 group of drivers (e.g., being exposed to the virus). Consistently, our survey collects information on both groups. Personal and contextual factors include socio-economic measures and the characteristics of the workplace (e.g. type of hospital, type of employment contract). The COVID-19 controls include questions on personal experience with the pandemic, such as testing positive for the virus, working with COVID-19 patients, working overtime due to the health emergency, having infected colleagues, or losing colleagues due to the virus. Finally, we also include administrative data on the COVID-19 first wave mortality rate in the province of work (108 provinces) as an out-of-the-survey robustness measure.

Our results show how contextual factors explain a remarkable amount of the variation in the level of satisfaction (58%), the willingness to change profession (43%) and the willingness to change specialization (52%), while personal factors, however important, matter to a lesser extent (21% of satisfaction, 49% of changing profession, and 39% of changing specialization). In particular, working for a (perceived) high-quality facility and in a province where the worker perceives a lack of medical personnel are the two main components of job satisfaction and of the willingness to change profession or specialization. These findings hold for different types of professionals (e.g., nurses and physicians) and are robust to several checks. Our findings reinforce the previous evidence, particularly on the relevance of contextual factors related to the workplace in determining job satisfaction. Numerous studies highlight that, in non-emergency times, healthcare workers' satisfaction is significantly and negatively associated with workload and working shifts (Aalto et al., 2014; Dall'Ora et al., 2015; Ferri et al., 2016; Heponiemi et al., 2010; Visser et al., 2003) and access to resources (Janus et al., 2008; Van Beuzekom et al., 2013) but positively associated with economic incentives (French et al., 2007), quality (Heponiemi et al., 2010; Laubach and Fishbeck, 2007; Mache et al., 2009; Mascia et al., 2014; Stromgren et al., 2016; Van Beuzekom et al., 2013; Visser et al., 2003) and having a managerial role and coordination responsibilities (Bauer and Groneberg, 2013; Rosta et al., 2009).

their workload, access to resources and information (Giménez-Espert et al., 2020).

[3]According to the national report by the Italian Ministry of Health in 2019 (Ministero della Salute, 2019), among physicians, women represent 48% of the labor force in the public healthcare sector, and 78% among nurses. In our sample, about 50% of physician respondents and 79% of nurse respondents are female. Age-wise our sample is also consistent with the national trend of physicians being, on average, older than nurses (49 vs. 40, see Section 3) (Ministero della Salute, 2020)

However, in contrast to what is commonly expected, the intensity of the spread of the pandemic did not significantly affect workers' satisfaction or undermine their vocation, either when it is captured by the administrative measure (i.e., death rate at the provincial level), or by their personal experience with the virus (e.g., being infected). Rather, job satisfaction is significantly reduced by working overtime and by dealing with infected patients; that is, by changes in the working conditions caused by the health emergency.

Overall, our results have important policy implications. On the one hand, they highlight the commitment of healthcare workers whose vocation is not challenged by their own or their colleagues struggle with the virus. On the other hand, our results indicate that factors that can be affected by policy interventions, such as those related to the workplace, are the main drivers of job satisfaction. Health emergencies, like the COVID-19 outbreak, undermine workers' commitment, not necessarily for fear of contracting the virus, but as far as they worsen the working environment. Indeed, job satisfaction and commitment are preserved mainly by guaranteeing good conditions in the working environment, both in normal times and during an emergency. In particular, it appears crucial to foster the quality of facilities and to reduce shortages of medical personnel, since these interventions would improve the provision of care to patients while simultaneously supporting healthcare workforce satisfaction. For a one standard deviation increase in the healthcare facility quality, the level of job satisfaction increases by 0.40 p.p., which is equal to 7% of the mean value; whereas an increase by one standard deviation in the perceived lack of medical personnel, decreases job satisfaction by 0.06 p.p., which is equal to 1.1% of the mean.

This paper is organized as follows. Section 2 describes the timeline of the first wave of the COVID-19 pandemic in Italy and the response of the Italian healthcare system. Section 3 provides a description of the survey procedures and participants, while Section 4 presents our outcomes of interest, the potential drivers of workers' satisfaction during the pandemic, and related descriptive statistics. Section 5 illustrates and discusses the econometric specification, the related results, and the robustness checks. Section 6 concludes.

2 The First Wave of COVID-19 in Italy and the Healthcare System Response

Overall, Italy was heavily impacted by the first wave of the pandemic. Among EU countries, it was the first registering more than 20,000 deaths and it reached this threshold from the end of January 2020 to April 14, 2020. Italy was also the country with the second highest number of deaths (120,053 compared to 128,136 in the UK) by the end of April 2021, about a year after the start of the pandemic (Gallo et al., 2021). During the first wave, the COVID-19 mortality rate and contagiousness were extremely heterogeneous by region, with the northern region of Lombardy, where the outbreak was more severe, reporting a Crude Mortality Rate (CMR) of 167.6/100,000 compared to a CMR of 37.0/100,000 measured at the national level (Villani

et al., 2020).[4] The severity of the situation in Lombardy appears also from the comparison with the three EU countries reporting the highest CMR values: Belgium (86.3/100,000), UK (68.5/100,000), and Spain (62.1/100,000) - (Villani et al., 2020). In addition Lombardy, the outbreak was more severe in the Northern part of the country overall, with remarkable regional variations (Figure 1).

To control the rapid spread of the outbreak, uniform measures were taken at the national level (e.g., case-detection, contact-tracing, isolation, physical distancing, mobility restriction measures, supplement of healthcare infrastructure and equipment). However, each Italian region was in charge of the actual implementation of these interventions within its territory. As a result, the response to the pandemic differed substantially both in means and timing across the country.[5]

Starting from March 2020, enormous efforts were made to reorganize the available health care resources. These include the reallocation of health personnel from ordinary wards to the treatment of COVID-19 patients, the recruitment of extra health personnel, either retired staff or new workers,[6] the increase in the number of Intensive Care Units (ICUs) and beds by converting ordinary hospital wards to ICUs and creating temporary hospitals for the treatment of COVID-19 patients,[7] and the creation of new health units to handle the home-care of less severe cases (Special Unit for the Continuity of Care - USCA).[8] To control the intake of highly contagious patients to hospitals, and to reduce the risk of intra-hospital contagion, regional and local authorities also activated special emergency numbers for the public, and made agreements with the Red Cross and non-governmental organizations to recruit additional staff and emergency services. In addition, they allowed only urgent cases to directly access hospitals and organized a pre-triage pathway outside hospitals (De Filippo et al., 2020).

During the first wave, healthcare workers faced an unprecedented situation, and their work was undermined by continuous changes in the health procedures and by frequent shortages of protective equipment, which increased their risk of infection. Moreover, unlike the general public, healthcare workers were excluded from the preventive quarantine measures - prescribed after having a contact with COVID-19 positives - and they could stop working only in the event of experiencing respiratory symptoms, or if they tested positive. Finally, their greater risk of

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[4]Crude Mortality Rate (CMR) has been computed from the start of the pandemic to August 30, 2020 as the ratio between the daily number of deaths over 100,000 inhabitants (Villani et al., 2020).

[5]For instance, there were clear differences in the use of swab testing and in the contact-tracing of positives. Some regions (e.g., Lombardy) followed the national procedure, testing only symptomatic cases, while other regions (e.g., Veneto) took a more extensive approach.

[6]The government allocated extra funding to recruit 20,000 workers. Specifically, the government invested in hiring medical specialists, medical residents enrolled in the last two years of their specialization, medical graduates in their last months of internship, medical doctors without board certificates, and nurses. Further examples of the effort to acquire new personnel come from the Civil Protection and the Italian Defense Departments (Decreto-legge, 2020a,b).

[7]According to the WHO (2020), at the peak of the pandemic ICU beds in the country increased by 57% with respect to pre-pandemic levels (from 5,293 to 9,284 beds).

[8]USCAs, covering 50,000 inhabitants each, were staffed with volunteer physicians, nurses, and administrative staff. They were unevenly distributed across the country, with a coverage ranging between 16% and 56% of the local population at the end of April 2020 (Cicchetti, 2020).

contagion was disregarded for most of the first wave.[9]

3   Survey Procedure and Participants

We conducted an online survey using the Google Form platform, including 50 short questions (translation available in the companion paper (Barili et al., 2021)). As described by Figure 2, answers were collected between June 15 and August 31, 2020. We primarily contacted potential participants through individual email addresses recovering their contact information from various sources: provincial boards of physicians and nurses (108 Provinces), hospital websites, and representative associations, some of which also agreed to advertise and share our survey on their website, as reported in Table A1. Contacts received an initial invitation email, followed by two reminders, one and two weeks after the first invitation (Figure A1). The invitation email explained that participation was possible through the use of any electronic device (i.e., PC, tablet, or smartphone) and an internet connection. Potential participants were also informed that the expected completion time was about 15 minutes.

Overall, we collected 7,681 answers distributed among 33.2% (2,549) physicians, 59.4% (4,561) nurses, and 7.4% (571) other health workers (e.g., technicians, biologists, safety inspectors, administrative personnel, and researchers).[10] Figure 3 (a) shows the geographical distribution of all survey responses, which include 2,549 physicians distributed as in Figure 3 (b) and 4,561 nurses, distributed as in Figure 3 (c). Our main focus was on the northern areas since they were the most affected, and at the same time, we encountered a general low response-rate of workers form southern areas, as in, for example, Albano et al. (2020); Mazzoleni et al. (2019); Simione and Gnagnarella (2020). Table 1 compares the distribution of our sample in terms of gender, profession, and region of work (Columns 1 and 3) with respect to the administrative data on the 2019 population of physicians and nurses (Columns 2 and 4). As it appears, we reached good representativeness along the gender composition dimension in the most pandemic affected areas (i.e., Piedmont, Lombardy, Veneto and Emilia-Romagna), both among physicians and nurses. Indeed, the average percentages of females in the North is equal to 50.1% among physicians and almost 80% among nurses, which are very much in line with the national averages (i.e., 50.8% and 84.5%, respectively). As for the age composition, our sample is slightly younger as physicians on average are 49 years old and nurses 40, while at the national level, the two groups recorded an average age of 52 and 47 in 2018 (last available year) (Ministero della Salute, 2020).

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[9]At that time, the hazard associated with both asymptomatic or pre-symptomatic cases was not yet generally recognized. At the end of the first wave, up to 10% of Italy's confirmed COVID-19 cases were healthcare workers, and between March 11 and May 8, 178 physicians died of COVID-19 (FNOMCeO, 2020).

[10]The inclusion of other health workers besides physicians and nurses was to capture the impact of COVID-19 also on these professionals, who were often re-assigned as contact-tracers, and to account more accurately for the regional disparities in the availability of healthcare personnel.

4 Data

4.1 Outcomes of Interest

Our main focus is on the determinants of job satisfaction, either directly captured as job satisfaction, or indirectly proxied as willingness to change job or medical specialization.[11] As described in Equation 1, $Satisfaction_i$ is an index that varies from 0 to 8 by summing up 8 dummies (D_{ci}) referring to the following aspects: *Profession*, *Job*, *Salary*, *Work-life balance*, *Relationships with the colleagues*, *Relationships with the administration*, *Work hours*, and *Career*. Each of these dummies takes value 1 if the respondent stated to be satisfied or very satisfied with the aspect recalled by the name of the related dummy.[12]

$$Satisfaction_i = \sum_{c=1}^{8} D_{ci} \quad \text{where} \quad D_{ci} = \begin{cases} 1 & \text{satisfied or very satisfied with dimension } c \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

The variable *Profession Change* (*Specialization Change*) is instead defined by the answer given to a unique statement: "If I could start over, I would not be in this profession" ("If I could start over, I would choose a different field of specialization"). Then, it is a dummy equal to 1 if the respondent agreed or strongly agreed with the statement.[13] Alternative ways to construct the outcomes of interest are discussed in Section 5.3.

Table 2 reports the cross-correlations between the outcomes. As expected, *Satisfaction* is strongly and negatively correlated with *Profession Change* and *Specialization Change*, which are in turn positively correlated with each other. The distribution of the outcome variables within professions is shown in Figure 4. Physicians experience a level of satisfaction that is higher than nurses but lower than that of other healthcare professionals. Consistently, nurses are more prone to change both profession and medical specialization than physicians, while other professionals place themselves in between nurses and physicians even if the confidence interval (95%) of the values across professions overlaps. This is consistent with the expectation that, since the training for a physician is significantly longer than that for a nurse or for a lab technician, physicians have a higher cost of switching to a different profession.

4.2 Determinants of Healthcare Workers' Satisfaction

In the following analysis, consistently with the literature Alrawashdeh et al. (2021), we grouped the possible determinants of job satisfaction in personal, contextual, and COVID-19 related

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[11]For a detailed definition of the outcome variables and the related dummies used to construct them, see Table A2 in Appendix A.

[12]The aspects along which satisfaction is evaluated are originally measured on a 5-item Likert scale. The questions referring to job satisfaction resemble the questions asked in the *Rilevazione sulle Forze Lavoro* (Labour Force Suvery) periodically performed by the Italian Institute of Statistics (ISTAT).

[13]The level of agreement is originally measured on a 5-items Likert scale.

factors as summarized in Table 3.

4.2.1 Personal Factors

The first group of covariates includes the socio-economic characteristics and basic attributes of healthcare workers, from their gender to a proxy for their household wealth as the dimension of their home.[14] As shown in Figure 5, female and male nurses almost do not differ along *Satisfaction*, while female physicians are more generally unsatisfied with their working conditions than their male colleagues. Differences persist also in the willingness to change profession and specialization. If physicians are less willing to change profession or specialization regardless of their gender than nurses, male nurses are more willing to change than female nurses.

In this group, we also define *ad hoc* variables that may capture difference nuances of the outcomes: the presence of healthcare workers in the family of origin and whether the respondent has always been employed in the facility where she is employed at the time of the survey. As for the professional background of the family of origin, the effect maybe twofold: on the one hand, sharing the same profession and challenges is a source of support to cope with similar problems; on the other hand, the experience of relatives could serve as a benchmark to evaluate one's own working conditions. Having changed workplaces proxies how well the respondent knows her working environment, but also indicates the variety of experience she has in terms of different working environments. Potentially this can have both a positive or a negative impact on job satisfaction.

4.2.2 Contextual Factors

With this group, we control for being a hospital worker, and for working in a private healthcare facility rather than in a teaching hospital. We also control if the employment contract includes work-shifts and if workers have a managerial/coordinating role. As it appears from Figure 6, professionals with managerial responsibilities tend to report a higher level of satisfaction and a lower willingness to change profession compared to those with no similar responsibilities. Physicians with managerial duties are additionally less willing to change specialization compared to physicians without managerial duties.

Respondents also provided information on their average working hours, on the number of years of employment, on whether they work in a COVID-19 related specialization (i.e, ICU, anesthesiology, emergency care, cardiology, pulmonary diseases, and infectious diseases) and on their monthly salary.[15] Within professions, hospital workers are less satisfied than their colleagues working outside hospitals, with physicians more willing to change profession if

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[14]We obtain an indirect measure of the household wealth asking respondents to report the square footage of their residence. Indeed, wealth is not necessarily fully captured by actual income since, for instance, an individual earning a low salary could belong to a wealthy family.

[15]From the declared monthly salary, we created a dummy which takes value 1 when the monthly salary is above the median of the distribution in our sample (i.e., above 2,000 euros per month).

working in a hospital (Figure 7). Surprisingly, working in a COVID-19 related specialization is not associated to any specific direction of satisfaction or the professionals' attitudes toward their profession/specialization Figure 8). If anything, physicians working in COVID-19 related specializations report a lower satisfaction and a higher willingness to change specialization.

Finally, we also measure the respondents' assessment of two dimensions of their work environment that are likely to affect their level of job satisfaction: the perceived lack of medical personnel and quality of the facilities where they work. The former is a dummy that takes value 1 if the respondent judges that there is a severe or a very severe lack of healthcare personnel in her province of work which might compromise patients' access to care. The latter is again a binary variable equal to 1 if the respondent defines the facility she works for as being of very good or excellent quality. As shown in Figure 9, health workers who perceived a lack in medical personnel tend to report a lower satisfaction and a higher propensity to declare profession or specialization change, with physicians driving the effect. Conversely, Figure 10 graphically describes how a perceived higher quality of the facility is associated with a higher level of satisfaction and a lower propensity to change profession or specialization. The effect is large and significant across all professions.

4.2.3 COVID-19 Related Factors

To take into account the links between the COVID-19 pandemic and the level of job satisfaction, we consider both administrative data and the personal experience with the pandemic. Figure 11 shows that the administrative mortality rate at the provincial level is associated with a small and not statistically significant difference in any of our outcomes of interest among both physicians and nurses exposed to different intensities of this measure (i.e., high/low mortality rate).[16] These unexpected results can be interpreted as a first signal that the spread of the pandemic per se might not be significantly correlated with the level of commitment of healthcare workers.

As measures of the COVID-19 personal experiences at the workplace, we asked respondents to judge the promptness and effectiveness of the policy response to the COVID-19 emergency in the facility where they work. Additionally, we include a set of variables measuring the exposure of the respondents to the COVID-19 infection based on their own experience and the experience of their colleagues: whether their colleagues were infected or lost their lives due to COVID-19, and whether respondents themselves were exposed or tested positive to the disease. Finally, we know if respondents directly worked with COVID-19 positives, if they were reassigned to a specialization or facility devoted to COVID-19 patients, and if they worked overtime due to the COVID-19 emergency.

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[16]The COVID-19 mortality rate is computed by the National Institute of Statistics (Istat) together with the Istituto Superiore di Sanitá (Iss) on administrative data (Istat and Iss, 2020) to proxy the intensity of the COVID-19 outbreak. The index, referring to the period January-May 2020, represents the mortality rate due to COVID-19, standardized by the demographic characteristics of the resident population in each province (values expressed per 100,000 inhabitants).

4.2.4 Descriptive Statistics

As shown in Tables 4, 5, and 6, nurses are significantly younger and have a high prevalence of female workers compared to physicians. Consistently, nurses are less likely to have children, to be married, to live in large dwellings, to cohabit, and to suffer from chronic diseases, while they are more likely to have changed workplace before, and to not have Italian citizenship. They are also more likely to work in a hospital (especially in a non-teaching hospital) and in the private sector than physicians, and to have shorter tenure. However, nurses are less likely to have managerial or coordination roles. Finally, nurses work around 38 hours per week compared to the 44 hours recorded among physicians, with fewer work-shifts, and they are less likely to judge their unit as being of high quality than physicians.

When analyzing the COVID-19 related factors, physicians had a higher chance of having colleagues who were infected/hospitalized or who died of COVID-19, and they also worked more overtime during the first wave than nurses. However, nurses are more likely to have been re-assigned to a different specialization or facility and to have tested positive for COVID-19.

5 Empirical Strategy and Results

5.1 Baseline Specification

For healthcare worker i working in region r, we estimate the links between each outcome of interest ($Outcome_{ir}$) and the three sets of controls (see Table 3) applying the model in Equation 2.[17]

$$Outcome_{ir} = \alpha Personal_i + \lambda Contextual_i + \sigma COVID\_19_i + \beta COVID\_19_p + \tau_r + \epsilon_{ir} \qquad (2)$$

This model captures the joint impact of workers' personal characteristics ($Personal_i$), contextual conditions ($Contextual_i$), and both personal ($COVID - 19_i$) and administrative ($COVID - 19_p$, with p being the province of work) COVID-19 related factors. In addition, we control for the working region fixed effects τ_r to account for of the time-invariant regional characteristics such as the organization of the regional health system, its performance in regular time, the macro characteristics of the region of work - like employment or population characteristics - or the cultural factors that might reflect differences in daily life attitudes and behaviors. Standard errors are clustered at the level of the working region of each respondent i.

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[17]See Tables A2 and A3 for a detailed description of the outcomes and the controls.

5.2 Results

Figure 12 shows the share of the explanatory power of personal, contextual and COVID-19 related factors separately as obtained by summing up the estimated partial η^2 for each of the related regressors. We observe a large relative importance of contextual factors with respect to personal and COVID-19 related factors in explaining the outcomes. Contextual factors explain 58% of the variation in *Satisfaction*, 42% in *Profession Change*, and 52% in *Specialization Change*. The remaining variation in *Satisfaction* is equally explained by personal (21%) and COVID-19 (21%) related, while the latter only account for a small amount of the variation in *Profession Change* (9%) and *Specialization Change* (9%).

Table 7 shows the regression results on the whole sample. We observe a U-shape reduction in *Satisfaction* with respect to age, with the lowest level of *Satisfaction* among middle-aged respondents (i.e., age 40-50). Workers who are married and in good health show a significantly higher level of satisfaction. Among the contextual factors, working in a high-quality facility is the most important determinant of workers' satisfaction. Those working in a high-quality facility enjoy greater satisfaction by around 0.827 percentage points, which is about 15.6% at the mean average (i.e., 5.3). Perceiving a higher salary and having a managerial/coordination role are positively correlated with *Satisfaction*. By contrast, factors reducing workers' satisfaction are the hours of work, having an employment contract with work-shifts, working in a hospital and in a province that is perceived to have a lack of medical personnel. As for the impact of COVID-19 related factors, when the response to the crisis was considered to be prompt and effective, workers are overall more satisfied - by about 0.6 and 0.4 p.p., respectively (corresponding to a magnitude of 11% and 8% at the mean value). At the same time, those workers who have worked more overtime, or who have been re-assigned to a different specialization or function are significantly less satisfied.

Column 2 of Table 7 shows the coefficients for the willingness to change profession. Quite in line with previous literature showing a strong correlation between risk aversion, age, and gender (Borghans et al., 2009; Dohmen et al., 2017; Hartog et al., 2002), younger workers and workers with chronic diseases show higher willingness to change profession, whereas female workers, even if overall less satisfied, are less willing to change. In addition, the lack of medical personnel in the province of work, or working more hours, increases the propensity to change profession. In contrast, working in a high-quality facility, receiving a high salary, or having managerial/coordination responsibilities are all employee retention factors. Surprisingly, the first wave of the COVID-19 pandemic has not threatened workers' vocation. In particular, workers who had more contact with COVID-19 patients have a significantly lower willingness to change profession (by 0.03 p.p.). Where there has been a more effective response to the emergency, workers are more willing to keep their job in healthcare, while the opposite is true only when workers were re-assigned to a different specialization or function due to COVID-19. We obtain very similar results when looking at *Change Specialization* (Column 3 of Table 7). Workers employed in COVID-19 related wards or who have been in contact with COVID-19

patients are less willing to change specialization, further signaling that the first wave of the pandemic did not affect their professional vocation.

The disjoint results for physicians (Columns 4, 5, 6 of Table 7) and nurses (Columns 7, 8, 9 of Table 7) are consistent with the whole sample estimates. Regarding the U-shaped effect driven by age, physicians report the lowest peak in the age group 50-60, while nurses record it among young-middle aged professionals (i.e., 30-40). The lack of medical personnel (i.e., lack of human resources or low number of co-workers) negatively impacts the level of satisfaction of physicians, which decreases by 8.8%, but not that of nurses. Managerial or coordination responsibilities also seem to be more important for physicians' satisfaction only. However, both types of professionals are less satisfied with longer working hours and work-shifts, while being assigned to a different specialization/function during the first wave of the pandemic decreases the satisfaction only for nurses. Regardless of the type of profession, both satisfaction and the willingness to change profession or specialization are driven by the perceived quality of the employing facility. Working in a perceived high-quality facility increases the level of satisfaction by +14.9% and +17.3% for physicians and nurses, respectively, while it decreases the willingness to move to another profession (specialization) by -22.6% (-22.3%) for physicians and by -24.3% (-31.1%) for nurses.

When we compare the determinants of the propensity to change profession or specialization, nurses' resilience stands out. In particular, nurses who work in a COVID-19 related ward are significantly less willing to change specialization, and nurses who have had direct contact with COVID-19 patients are less willing to change both profession and specialization. However, if nurses had infected colleagues, or had been re-assigned to a different ward or function, they are more likely to consider a change. Among physicians, none of the COVID-19 related factors have influenced their vocation in terms of either profession or specialization. The intensity of the breakout of the pandemic has mainly affected nurses, even though the effects are quite small in magnitude with respect to the other controls.

5.3   Robustness Checks

We check the robustness of our results along several dimensions. First, to better understand the impact of the COVID-19 specific factors on our outcomes of interest, we include separately the administrative variable on the provincial COVID-19 mortality rate and the *COVID-19 factors* derived from the survey data (Table A4). This robustness clarifies which type of phenomenon better captures the effects of the COVID-19 pandemic - either the recorded mortality in the province of work or the personal experience of the workers. As apparent from Table A4, the inclusion of the COVID-19 mortality rate does not affect the significance of the survey variables describing the workers' personal experience with the pandemic. This suggests that the administrative index and survey data provide different and complementary information. When only the COVID-19 mortality rate is included, we observe a positive effect on *Satisfaction*. As shown in Table 7, in those provinces hit more intensively by the first wave,

the level of job satisfaction is higher. This result might be driven by the fact that in the northern provinces, which were more heavily impacted, there is typically a higher level of satisfaction. Moreover, the positive effect of the COVID-19 mortality rate might also reflect both the resilience and the fulfillment that workers experienced during the first wave thanks to emotional support received by the general public. The media often referred to healthcare workers as "heroes" and many public figures, such as Pope Francis, openly thanked them for their heroic services and praised their dedication, while individuals undertook many private initiatives to show their gratitude (e.g., from individual messages to private donations). Overall, this unexpected public reaction might have given further meaning to the hardships of the exhausting work experienced by the healthcare workforce during the first wave of the pandemic.

Second, we verify the stability of the estimates of the baseline specification by including administrative information at the provincial level to capture the objective quality of the healthcare system within which the respondents operate. The measures of objective quality are four. The first measure proxies workforce availability and coincides with the rate of physicians registered in the provincial board of physicians over 10,000 inhabitants (correlated by -0.063 with the perceived lack of personnel). The other three measures are the 30days readmission rate for acute myocardial infarction (AMI), the 30days readmission rate for stroke and the 30days readmission rate for chronic obstructive pulmonary disease (COPD) as measured by the Ministry of Health in the "National Healthcare Outcomes Program" (correlated by -0.042, -0.091, and -0.073 with the perceived quality, respectively).[18] Notice that the inclusion of administrative proxies for objective quality does not affect the estimates of the self-perceived quality measures (Table A5), pointing out the relevance of the self-perception over objective factors.

Third, we consider alternative definitions of *Satisfaction*. Specifically, we work with its discrete version, *Satisfaction 2*, which ranges from 8 to 40 being the sum of the 8 categorical variables related to: *Profession*, *Job*, *Salary*, *Work-life balance*, *Relationship with the colleagues*, *Relationships with the administration*, *Work hours*, and *Career*. Each of these variables is measured on a 5-item Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). Alternatively, *Satisfaction 3* has been computed as the arithmetic mean of the same 8 categorical variables on which we also performed a Principal Component Analysis (PCA) obtaining *Satisfaction PCA*; that is, a continuous outcome varying from -5.42 to 4.69 (Table A2). As reported in Table A6, the coding of *Satisfaction* into a binary outcome does not drive our results as we find no significant difference in the explanatory power of each control group

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[18]The administrative information is updated as of 2019. Sources: Health-for-All Italy; "National Healthcare Outcomes Program" ("Piano Nazionale Esiti - PNE). The PNE is a national program run since 2012 by the Ministry of Health thanks to the support of the Italian National Agency for Regional Healthcare Services (AGENAS). Its aim is to develop and implement practical indexes to measure, analyze, evaluate and monitor the performances of healthcare facilities operating within the Italian healthcare system. 30day readmission rates are computed as the ratio between the number of re-admissions for the related disease within 30 days from discharge out of the total number of admissions due to the given disease (e.g., number of re-admissions due to stroke out of the overall admissions due to stroke).

(i.e., personal, contextual and COVID-19 related factors).

6   Conclusion

Immediately after the first wave of the COVID-19 pandemic, we performed a unique survey with Italian healthcare workers to explore the determinants of their professional satisfaction and vocation focusing on personal, contextual and COVID-19 related factors.

In addition to confirming the role of gender, age, good health and chronic diseases among the personal factors, the analysis shows that contextual factors are the strongest determinants of workers' satisfaction and propensity to change profession or medical specialization. In particular, we find that *working in a high-quality facility* has beneficial effects on workers, increasing work-related satisfaction and willingness to stay in the profession and in the medical specialization. At the same time, *working in a province with a serious shortage of medical personnel* brings the opposite result. Our findings have strong policy implications given that the main drivers of professional satisfaction turn out to be modifiable. Hence, policymakers should implement effective strategies to improve working conditions in the healthcare sector in general and further support workers under these dimensions in emergency times. This would directly impact the turnover of healthcare workers, while indirectly increasing the quality of care to patients. Although our analysis does not offer a one-size-fits-all policy to improve working conditions in the healthcare sector, in the specific case of Italy, policymakers should foster quality of facilities and invest in increasing the number of medical personnel.

In examining the intensity of COVID-19 exposure, we find that work accidents, such as being infected or losing colleagues to the virus, do not play a relevant role in affecting the vocation of healthcare workers. Rather, we find they are more affected by changes in working conditions caused by the pandemic, such as having to work overtime or being re-assigned to a different ward/function. Healthcare professionals are devoted to helping others and supporting them through difficult times such that the severity of the pandemic in the province of work plays a marginal role and, more importantly, it contradicts the common expectation. Indeed, healthcare workers and, especially, nurses turn out to be even more satisfied with their job and less prone to change profession or specialization in the most affected provinces following the first wave of the pandemic, further showing the resilience of their vocation.

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7 Tables and Figures

Figure 1: **Severity of the COVID-19 First-wave by Region**

(a) Deaths Rates   (b) Share of COVID-19 deaths
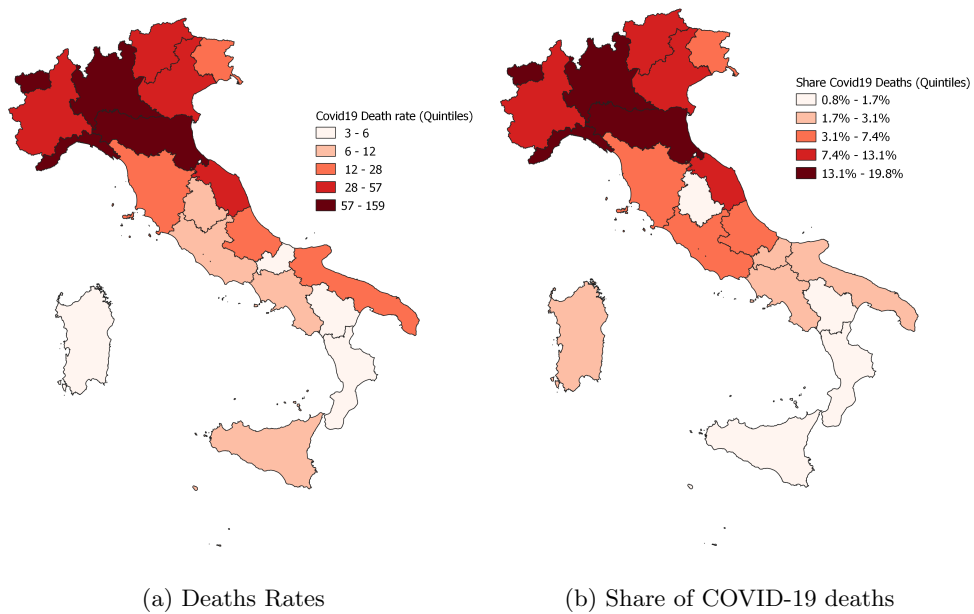
Notes: *Death Rates* and *Share of COVID-19 deaths* are measures computed by the National Institute of Statistics (Istat) together with the Istituto Superiore di Sanitá (Iss) on administrative data (Istat and Iss, 2020). The index *Death Rates*, referring to the period January-May 2020, represents the mortality rate due to COVID-19 standardized by the demographic characteristics of the resident population in each province (values expressed per 100,000 inhabitants). The *Share of COVID-19 deaths* is the proportion of deaths by COVID-19 cases over the total number of deaths in the relevant time and location.

Figure 2: **Survey Participation**
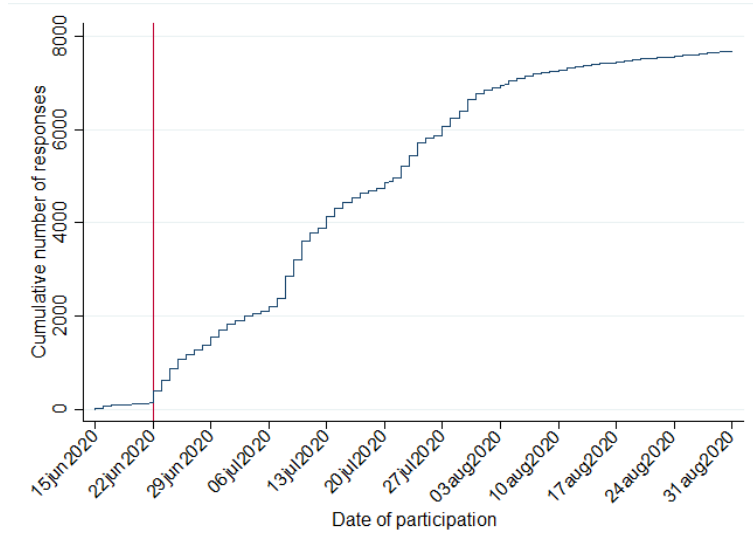
Notes: The graph shows the cumulative number of responses to the online survey by day of participation (i.e., day when the completed survey was submitted and the response was registered by the Google Form platform). The vertical line identifies the end of the pilot run during the first week (June 15*th* to June 22, 2020) to verify the clarity of the questionnaire. No issue arose during the pilot, and therefore we proceed using all responses collected in the analysis.

Table 1: Sample Composition and National Population Statistics

Region	%Women Physicians Sample	%Women Physicians National Level	%Women Nurses Sample	%Women Nurses National Level
Northern Regions				
Piedmont	47.7	50.9	77.3	84.3
Valle d'Aosta	33.3	47.5	100.0	89.4
Lombardy	53.4	52.3	77.4	83.0
Prov. Autonome Trento-Bolzano	59.4	48.5	74.9	87.1
Veneto	53.8	48.9	73.1	83.1
Friuli Venezia Giulia	37.5	53.1	80.0	85.0
Liguria	61.5	50.2	75.8	82.5
Emilia Romagna	54.0	54.7	74.3	81.3
Central Regions				
Tuscany	49.9	51.8	72.5	81.3
Umbria	59.3	50.1	63.2	77.5
Marche	55.5	50.4	74.1	80.8
Lazio	45.7	47.7	68.9	76.4
Southern Regions and Islands				
Abruzzo	37.0	49.6	66.9	77.8
Molise	75.0	40.8	46.2	76.9
Campania	28.6	36.2	53.9	62.0
Puglia	33.3	43.0	54.2	71.4
Basilicata	25.0	38.9	42.9	73.9
Calabria	23.1	40.1	45.8	64.3
Sicily	24.6	40.9	48.0	60.4
Sardinia	38.2	57.5	67.7	81.0
Average	44.8	47.6	66.8	77.9
Average (North only)	50.1	50.5	79.1	84.7

Figure 3: **Survey Participation by Region**
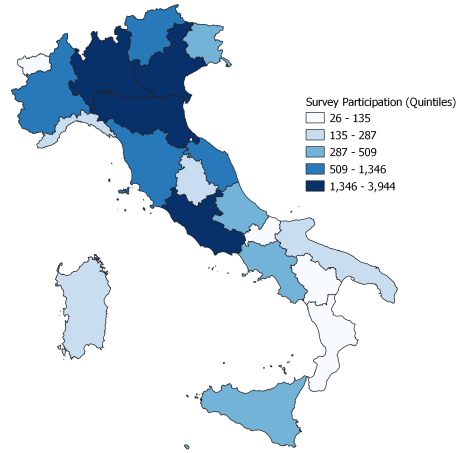
(a) All
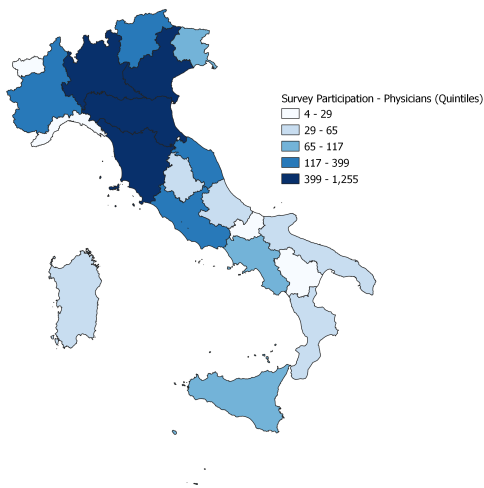
(b) Physicians
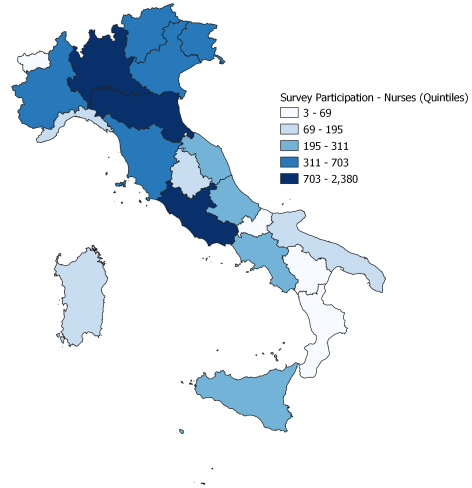
(c) Nurses

Notes: The maps present the absolute numbers of participants by region and professional category (i.e., all -healthcare workers-, physicians, nurses). Data reported by quintiles of the professional category considered.

Table 2: **Cross-correlations Between Outcomes of Interest, Alternative Outcomes and Single components**

	Satisf	Prof Change	Spec Change	Satisf 2	Satisf 3	Satisf PCA	S: Prof	S: Job	S: Salary	S: Balanec	S: Colleagues	S: Admin	S: Work hours	S: Career
Outcomes of interest:														
Satisfaction	1.000													
Profession Change	-0.321	1.000												
Specialization Change	-0.281	0.483	1.000											
Alternative outcomes:														
Satisfaction 2	0.909	-0.369	-0.328	1.000										
Satisfaction 3	0.909	-0.369	-0.328	1.000	1.000									
Satisfaction PCA	0.907	-0.372	-0.332	1.000	1.000	1.000								
Individual components:														
Satisf: Profession	0.517	-0.454	-0.369	0.617	0.617	0.626	1.000							
Satisf: Job	0.636	-0.324	-0.318	0.724	0.724	0.736	0.564	1.000						
Satisf: Salary	0.603	-0.226	-0.179	0.641	0.641	0.624	0.340	0.384	1.000					
Satisf: Work-life balance	0.637	-0.205	-0.173	0.673	0.673	0.671	0.276	0.346	0.348	1.000				
Satisf: Colleagues	0.559	-0.181	-0.179	0.634	0.634	0.627	0.276	0.415	0.223	0.305	1.000			
Satisf: Administration	0.616	-0.177	-0.155	0.676	0.676	0.677	0.276	0.386	0.323	0.338	0.498	1.000		
Satisf: Work hours	0.621	-0.175	-0.172	0.667	0.667	0.670	0.258	0.341	0.289	0.626	0.311	0.385	1.000	
Satisf: Career	0.666	-0.257	-0.233	0.720	0.720	0.720	0.385	0.462	0.466	0.356	0.359	0.417	0.373	1.000

Notes: Correlation coefficients between outcomes of interest, alternative outcomes and single components. See Table A2 for the variable definition.

Table 3: **Controls**

Personal factors	Contextual factors	COVID-19 related factors
Children	Hospital worker	COVID-19 Death rate
Age	Teaching hospital	Prompt response
Female	Private	Effective response
Italian	Managerial role	Infected colleagues
Married	Contract with work-shifts	Dead colleagues
Home sq. meter > 100	Average hours worked	COVID-19 overtime
Good health	Tenure	Exposed to COVID-19
Living alone	COVID-19 related specialization	Positive to COVID-19
Never changed workplace	High quality facility	Work with COVID-19 positives
Health workers in the family	Lack of medical personnel	COVID-19: change of specialization/function
Chronic diseases	High salary	
	Nurse	

Notes: When we refer to the COVID-19 crisis, we refer to the first wave that took place in Italy from the end of February 2020 to the beginning of June 2020.

Figure 4: **Outcomes of interest among professions**
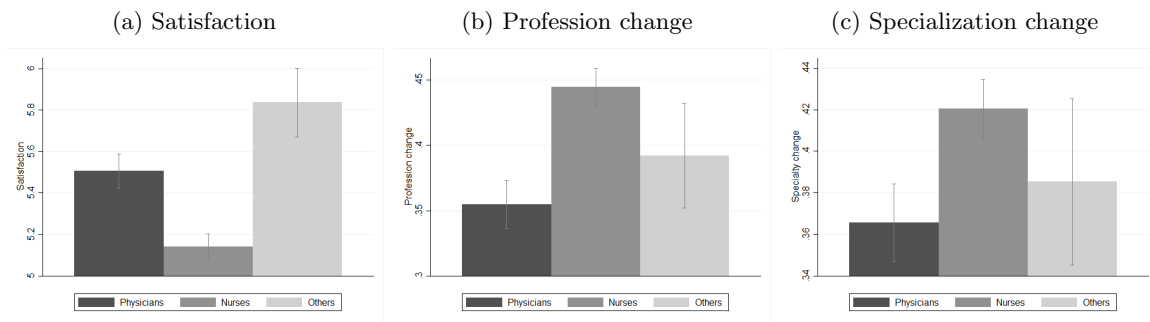
(a) Satisfaction (b) Profession change (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. For a detailed description of these variables, see Table A2.

Figure 5: **Outcomes of Interest Among Professions and by Gender**
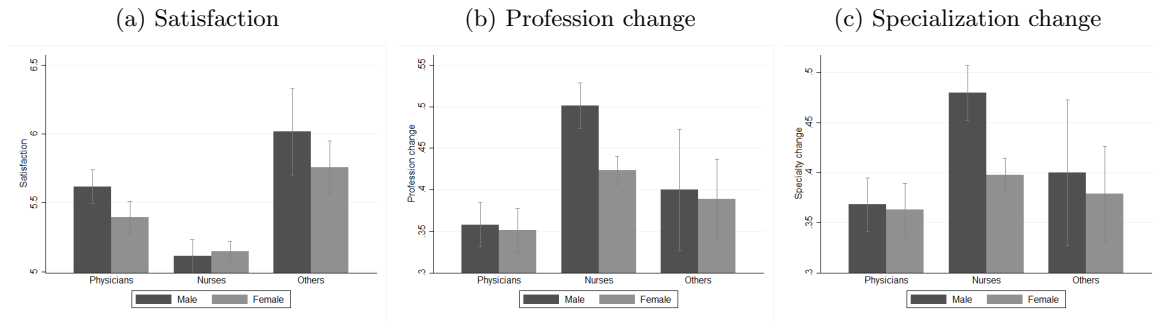
(a) Satisfaction   (b) Profession change   (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *Gender* is a dummy assuming value 1 if the respondent is female, 0 if male. For a detailed description of these variables, see Tables A2 and A3.

Figure 6: **Outcomes of Interest Among Professions and by Role**

(a) Satisfaction   (b) Profession change   (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *Role* is a dummy assuming value 1 IF the respondent has a managerial role, 0 otherwise. For a detailed description of these variables, see Tables A2 and A3.

Figure 7: **Outcomes of Interest Among Professions and by Type of Workplace**

(a) Satisfaction   (b) Profession change   (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *Workplace* is a dummy assuming value 1 if the respondent is a hospital worker, 0 otherwise. For a detailed description of these variables, see Tables A2 and A3.

Figure 8: **Outcomes of Interest Among Professions and by Specialization**

(a) Satisfaction   (b) Profession change   (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *COVID-19 specialization* refers to COVID-19 related medical specializations, that is, ICU, anesthesiology, emergency care, cardiology, pulmonary diseases and infectious diseases; *No COVID-19 specialization* refers to all other medical specializations. For a detailed description of these variables, see Tables A2 and A3.

Figure 9: **Outcomes of Interest Among Professions and by Lack of Personnel**

(a) Satisfaction   (b) Profession change   (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *Lack of personnel* is a dummy equal 1 for a medium to high lack of the medical personnel in the province of work, 0 otherwise. For a detailed description of these variables, see Tables A2 and A3.

Figure 10: **Outcomes of Interest Among Professions and by Quality**
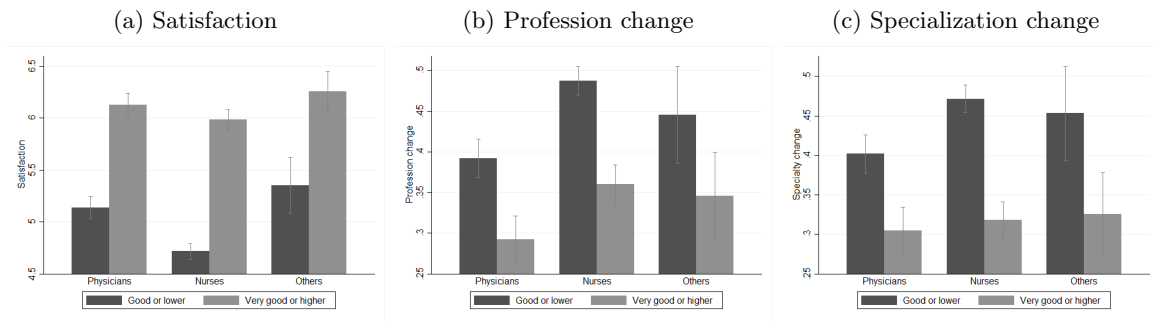
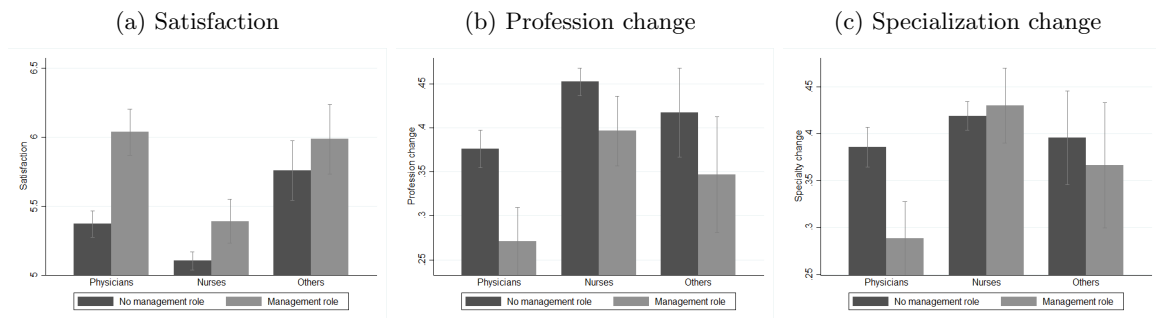(a) Satisfaction   (b) Profession change   (c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *Quality* is a dummy equal 1 for workplaces with very good or higher quality, 0 otherwise. For a detailed description of these variables, see Tables A2 and A3.

Figure 11: **Outcomes of Interest Among Professions and by COVID-19 Death Rate**

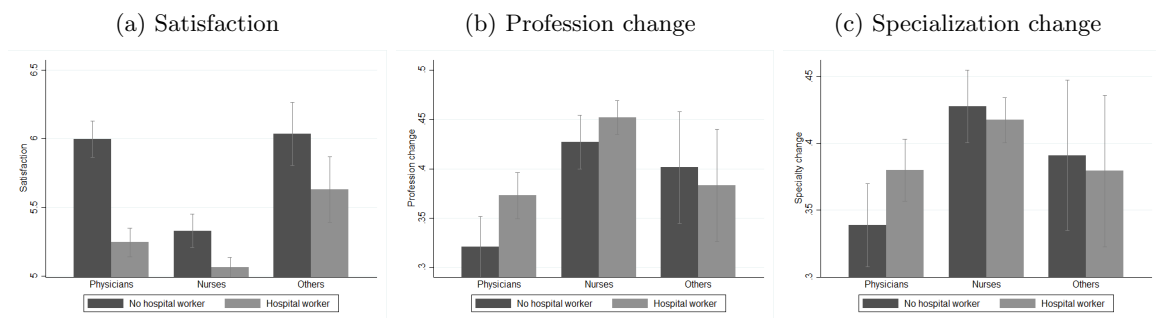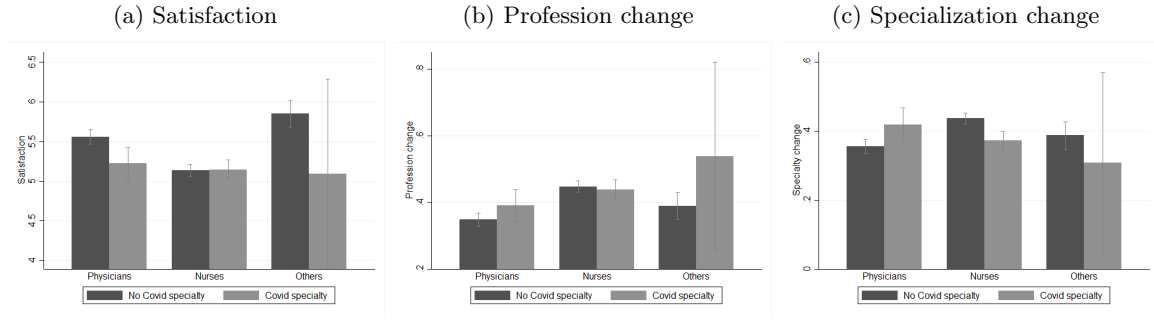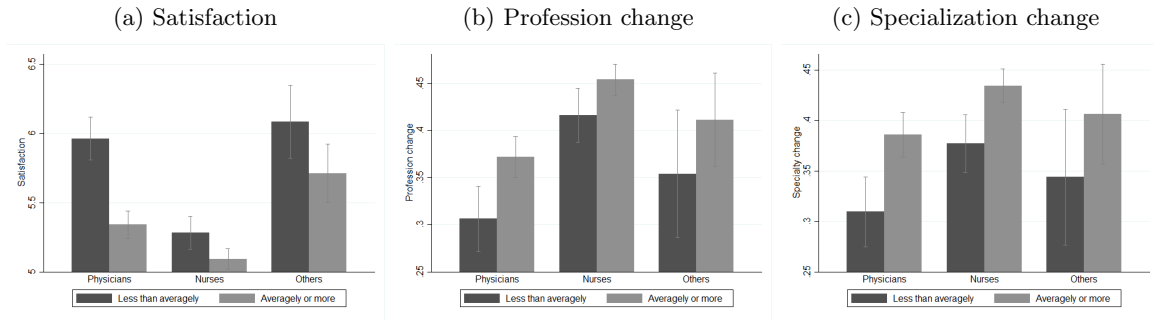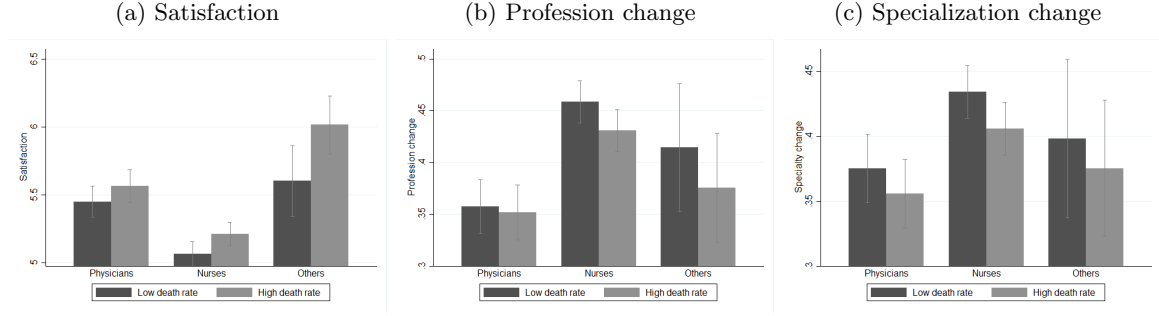| (a) Satisfaction	(b) Profession change	(c) Specialization change

Notes: *Others* identifies healthcare workers other than physicians and nurses, i.e. safety inspectors, controllers, administrative personnel, biologists, and researchers. *Satisfaction* is a measure taking values between 0 and 8, with 8 representing the highest level of satisfaction. *Profession change* and *Specialization change* are two dummies taking value 1 if the respondent reported a high propensity to change profession and medical specialization respectively. *COVID-19 Death rate*, referring to the period January-May 2020, represents the mortality rate due to COVID-19 standardized according to the demographic characteristics of the resident population in each province (values expressed per 100,000 inhabitants); it is a measure computed by the National Institute of Statistics (Istat) together with the Istituto Superiore di Sanità (Iss) on administrative data (Istat and Iss, 2020). For a detailed description of these variables, see Tables A2 and A3.

Table 4: **Summary Statistics: Personal Factors**

	All	Physicians	Nurses	P-value: Physicians - Nurses
Children	0.57	0.68	0.50	0.00***
	(0.50)	(0.47)	(0.50)	
Age	43.78	49.34	40.30	0.00***
	(12.69)	(12.29)	(11.81)	
Female	0.65	0.50	0.72	0.00***
	(0.48)	(0.50)	(0.45)	
Italian	0.98	0.99	0.98	0.00***
	(0.13)	(0.08)	(0.15)	
Married	0.49	0.62	0.42	0.00***
	(0.50)	(0.49)	(0.49)	
House sq. meters >100	0.51	0.68	0.41	0.00***
	(0.50)	(0.47)	(0.49)	
Good health	0.94	0.96	0.94	0.00***
	(0.23)	(0.19)	(0.24)	
Chronic diseases	0.36	0.38	0.35	0.02*
	(0.48)	(0.48)	(0.48)	
Living alone	0.14	0.13	0.15	0.05*
	(0.35)	(0.34)	(0.36)	
Never changed workplace	0.27	0.29	0.26	0.01**
	(0.44)	(0.45)	(0.44)	
Health workers in the family	0.34	0.33	0.35	0.07
	(0.47)	(0.47)	(0.48)	
Obs.	7681	2549	4561	7110

Notes: See Table A3 for the variable definition.. Significant at 10% *; significant at 5% **; significant at 1% ***.

Table 5: **Summary Statistics: Contextual Factors**

	Full Sample	Physicians	Nurses	P-value: Physicians - Nurses
Hospital worker	0.68	0.65	0.72	0.00***
	(0.47)	(0.48)	(0.47)	
Teaching hospital	0.04	0.06	0.006	0.00***
	(0.18)	(0.23)	(0.18)	
Private	0.14	0.10	0.17	0.00***
	(0.35)	(0.30)	(0.35)	
Management role	0.17	0.20	0.13	0.00***
	(0.38)	(0.40)	(0.38)	
Contract with work-shifts	0.74	0.69	0.83	0.00***
	(0.44)	(0.46)	(0.44)	
Average hours worked	39.96	43.99	37.76	0.00***
	(8.45)	(10.18)	(8.45)	
Tenure	12.41	13.44	11.53	0.00***
	(11.37)	(11.32)	(11.37)	
COVID-19 related specialization	0.20	0.16	0.25	0.00***
	(0.40)	(0.36)	(0.40)	
High quality facility	0.36	0.37	0.33	0.00***
	(0.48)	(0.48)	(0.48)	
Lack of medical personnel	0.74	0.73	0.75	0.05
	(0.44)	(0.44)	(0.44)	
High salary	0.22	0.59	0.03	0.00***
	(0.42)	(0.49)	(0.42)	
Obs.	7681	2549	4561	7110

Notes: See Table A3 for the variable definition.. Significant at 10% *; significant at 5% **; significant at 1% ***.

Table 6: **Summary Statistics: COVID-19 Related Factors**

	All	Physicians	Nurses	P-value: Physicians - Nurses
COVID-19 Death rate	59.76	58.35	59.88	0.32
	(64.43)	(58.48)	(64.43)	
Prompt response	0.62	0.62	0.61	0.66
	(0.49)	(0.49)	(0.49)	
Effective response	0.79	0.80	0.78	0.03*
	(0.41)	(0.40)	(0.41)	
Infected colleagues	0.72	0.75	0.72	0.01**
	(0.45)	(0.43)	(0.45)	
Dead colleagues	0.07	0.10	0.05	0.00***
	(0.25)	(0.30)	(0.25)	
COVID-19 overtime	0.68	0.79	0.62	0.00***
	(0.47)	(0.41)	(0.47)	
Exposed to COVID-19	0.09	0.09	0.10	0.02*
	(0.29)	(0.28)	(0.29)	
Positive to COVID-19	0.10	0.07	0.12	0.00***
	(0.30)	(0.26)	(0.30)	
Work with COVID-19 positives	0.43	0.43	0.47	0.00***
	(0.50)	(0.49)	(0.50)	
COVID-19: change of specialization/function	0.21	0.17	0.24	0.00***
	(0.40)	(0.37)	(0.40)	
Obs.	7681	2549	4561	7110

Notes: See Table A3 for the variable definition.. Significant at 10% *; significant at 5% **; significant at 1% ***.

Figure 12: **Post-estimation Analysis**
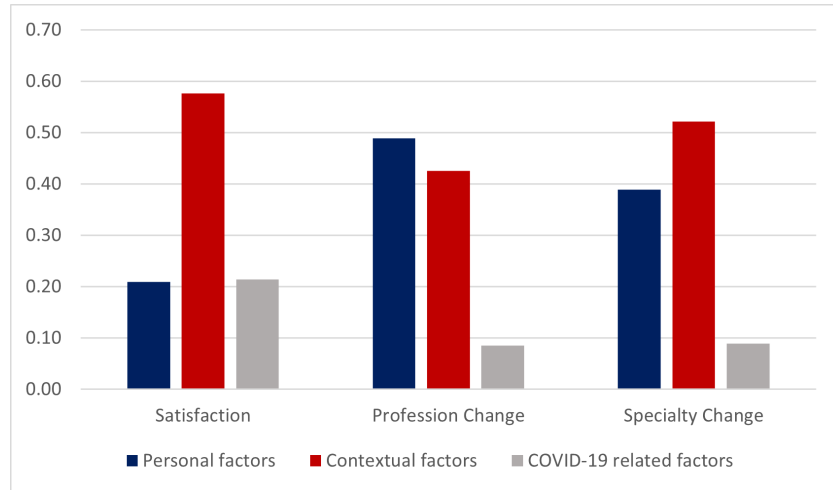
R2.png R2.png R2.png

Notes: We perform a post-estimation analysis based on the results presented in Table 7. The analysis estimates the partial η^2 for each regressor included in the model. The Figure presents the share of the total explanatory power of the model that can be attributable to the factors within each of the three category (i.e., personal, contextual, COVID-19 related factors).

Table 7: **Satisfaction and Willingness to Change Profession or Specialization**

	All			Physicians			Nurses		
	Satisfaction	Profession change	Specialization change	Satisfaction	Profession change	Specialization change	Satisfaction	Profession change	Specialization change
Personal factors:									
Children	0.044	−0.012	0.014	0.051	0.019	0.035	−0.024	−0.017	0.004
	(0.057)	(0.019)	(0.013)	(0.092)	(0.025)	(0.031)	(0.081)	(0.026)	(0.016)
Age: >=30 - <40	−0.586***	0.091***	0.093***	−1.107***	0.098**	0.108***	−0.522***	0.078***	0.075***
	(0.072)	(0.024)	(0.016)	(0.142)	(0.041)	(0.036)	(0.129)	(0.027)	(0.023)
Age: >=40 - <50	−0.712***	0.115***	0.106***	−1.455***	0.133**	0.102***	−0.504***	0.105**	0.112***
	(0.090)	(0.036)	(0.018)	(0.150)	(0.054)	(0.032)	(0.141)	(0.040)	(0.025)
Age: >=50 - <60	−0.635***	0.062*	0.094***	−1.601***	0.109	0.063	−0.350*	0.043	0.110***
	(0.093)	(0.033)	(0.017)	(0.150)	(0.078)	(0.057)	(0.169)	(0.035)	(0.024)
Age: >=60	−0.478***	−0.006	0.060**	−1.256***	0.062	0.029	−0.108	−0.090*	0.082
	(0.136)	(0.042)	(0.027)	(0.153)	(0.068)	(0.045)	(0.199)	(0.049)	(0.054)
Female	−0.118**	−0.047***	−0.049**	−0.116	−0.026	−0.025	−0.085	−0.068***	−0.077***
	(0.046)	(0.013)	(0.018)	(0.119)	(0.023)	(0.028)	(0.049)	(0.022)	(0.027)
Italian	0.049	−0.004	−0.105**	0.342	0.111	−0.036	−0.207	0.013	−0.077*
	(0.152)	(0.045)	(0.042)	(0.540)	(0.066)	(0.126)	(0.136)	(0.067)	(0.039)
Married	0.118*	−0.002	−0.012	0.329***	−0.049*	−0.040	0.028	0.021	0.013
	(0.061)	(0.015)	(0.016)	(0.091)	(0.027)	(0.036)	(0.091)	(0.024)	(0.011)
House sq. meters >100	0.034	−0.026**	−0.016	0.074	−0.035	−0.004	0.025	−0.023	−0.018
	(0.039)	(0.011)	(0.012)	(0.094)	(0.032)	(0.015)	(0.058)	(0.016)	(0.018)
Good health status	0.907***	−0.109***	−0.112***	1.397***	−0.205***	−0.095**	0.672***	−0.085**	−0.113**
	(0.107)	(0.026)	(0.035)	(0.234)	(0.070)	(0.042)	(0.145)	(0.038)	(0.048)
Chronic diseases	−0.299***	0.061***	0.041**	−0.189*	0.070***	0.056***	−0.418***	0.065***	0.041
	(0.053)	(0.014)	(0.016)	(0.102)	(0.020)	(0.012)	(0.075)	(0.022)	(0.025)
Living alone	0.070	−0.003	−0.036	0.169	−0.023	−0.046*	0.005	−0.004	−0.042
	(0.074)	(0.025)	(0.023)	(0.130)	(0.036)	(0.026)	(0.090)	(0.035)	(0.032)
Never changed workplace	0.083	−0.024***	−0.039***	0.124	−0.031	−0.043***	0.017	−0.018	−0.029*
	(0.066)	(0.008)	(0.013)	(0.124)	(0.019)	(0.014)	(0.062)	(0.017)	(0.017)
Health workers in the family	0.031	0.015	0.010	0.099	0.039**	0.011	−0.009	−0.004	0.013
	(0.061)	(0.009)	(0.012)	(0.059)	(0.017)	(0.018)	(0.057)	(0.016)	(0.016)
Contextual factors:									
Hospital worker	−0.247***	0.026	−0.004	−0.548***	0.039	−0.010	−0.132	0.021	−0.001
	(0.047)	(0.017)	(0.013)	(0.106)	(0.036)	(0.023)	(0.090)	(0.024)	(0.023)
Teaching hospital	−0.206	0.010	−0.060***	−0.437*	−0.003	−0.105***	−0.150	−0.095	−0.165***
	(0.143)	(0.028)	(0.020)	(0.239)	(0.054)	(0.025)	(0.230)	(0.067)	(0.057)
Private	−0.117	0.004	−0.014	−0.153	0.045	0.025	−0.108	−0.004	−0.019
	(0.110)	(0.015)	(0.016)	(0.122)	(0.028)	(0.053)	(0.138)	(0.020)	(0.013)
Management role	0.199***	−0.057***	−0.024	0.568***	−0.068**	−0.082**	0.017	−0.056**	0.032
	(0.053)	(0.019)	(0.018)	(0.064)	(0.026)	(0.035)	(0.094)	(0.022)	(0.023)
Contract with work-shifts	−0.413***	−0.000	0.023	−0.446***	0.049	0.046	−0.288**	−0.014	0.031
	(0.052)	(0.028)	(0.018)	(0.093)	(0.039)	(0.037)	(0.111)	(0.027)	(0.023)
Average hours worked	−0.036***	0.003***	0.003***	−0.040***	0.003***	0.003**	−0.029***	0.002*	0.002*
	(0.003)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.005)	(0.001)	(0.001)
Tenure	−0.003	0.001	−0.000	−0.013**	−0.000	0.002*	0.001	0.000	−0.002**
	(0.003)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)
COVID-19 specialty	0.018	0.008	−0.021*	−0.033	0.025	0.053*	0.069	−0.008	−0.056***
	(0.069)	(0.013)	(0.011)	(0.100)	(0.029)	(0.030)	(0.078)	(0.019)	(0.018)
High quality facility	0.827***	−0.095***	−0.113***	0.791***	−0.093***	−0.089***	0.917***	−0.100***	−0.124***
	(0.042)	(0.019)	(0.015)	(0.135)	(0.019)	(0.018)	(0.088)	(0.026)	(0.018)
Lack of medical personnel	−0.165***	0.038**	0.048**	−0.472***	0.053*	0.051**	−0.007	0.027	0.049**
	(0.035)	(0.014)	(0.019)	(0.051)	(0.027)	(0.023)	(0.055)	(0.020)	(0.020)
High salary	0.665***	−0.061***	−0.068***	0.782***	−0.056	−0.051	0.751***	−0.039	−0.067*
	(0.090)	(0.016)	(0.023)	(0.167)	(0.065)	(0.042)	(0.144)	(0.041)	(0.033)
Nurse	0.002	0.037	0.018						
	(0.101)	(0.024)	(0.029)						
COVID-19 related factors:									
COVID-19 Death rate	0.002***	−0.000	−0.000**	0.001*	0.000	0.000*	0.002***	−0.000**	−0.000***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Prompt response	0.623***	−0.009	0.002	0.449***	−0.041	0.013	0.683***	0.013	−0.008
	(0.091)	(0.009)	(0.012)	(0.111)	(0.028)	(0.024)	(0.108)	(0.013)	(0.017)
Effective response	0.434***	−0.034*	−0.038***	0.463***	0.011	−0.013	0.449***	−0.072**	−0.051*
	(0.087)	(0.017)	(0.010)	(0.123)	(0.031)	(0.025)	(0.153)	(0.030)	(0.026)
Infected colleagues	−0.051	0.011	0.009	−0.016	−0.004	−0.001	−0.055	0.028	0.036***
	(0.065)	(0.018)	(0.008)	(0.050)	(0.026)	(0.020)	(0.086)	(0.024)	(0.012)
Dead colleagues	−0.123	0.027	−0.022	−0.246*	0.055	−0.004	−0.105	0.039	−0.019
	(0.084)	(0.023)	(0.026)	(0.138)	(0.032)	(0.045)	(0.109)	(0.033)	(0.028)
COVID-19 overtime	−0.313***	0.007	0.008	−0.166	−0.028	−0.012	−0.352***	0.019	0.011
	(0.043)	(0.011)	(0.013)	(0.096)	(0.018)	(0.036)	(0.061)	(0.016)	(0.016)
Exposed to COVID19	−0.008	0.008	−0.003	0.240**	−0.039	−0.048	−0.094	0.015	0.008
	(0.052)	(0.019)	(0.022)	(0.095)	(0.028)	(0.030)	(0.066)	(0.030)	(0.030)
Positive to COVID19	0.026	−0.015	0.005	0.150	−0.031	−0.031	0.046	−0.008	0.008
	(0.089)	(0.017)	(0.019)	(0.119)	(0.034)	(0.034)	(0.117)	(0.020)	(0.024)
Work with COVID19 positives	0.003	−0.035***	−0.040***	−0.006	−0.020	−0.020	−0.018	−0.037**	−0.045***
	(0.040)	(0.009)	(0.009)	(0.091)	(0.029)	(0.027)	(0.052)	(0.016)	(0.011)
COVID-19: change of specialization/function	−0.173***	0.034*	0.033**	−0.161	0.025	0.015	−0.187***	0.041*	0.044**
	(0.049)	(0.018)	(0.015)	(0.166)	(0.030)	(0.025)	(0.072)	(0.023)	(0.016)
Constant	6.250***	0.413***	0.476***	6.449***	0.326**	0.328**	6.155***	0.444***	0.488***
	(0.269)	(0.076)	(0.068)	(0.698)	(0.120)	(0.152)	(0.183)	(0.096)	(0.079)
N Obs.	7,134	7,134	7,134	2,352	2,352	2,352	4,255	4,255	4,255
Macro area fixed effect	No	No	No	No	No	No	No	No	No
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

OLS regressions. See Tables A2 and A3 for outcomes and controls definitions, respectively. Standard errors clustered at the level of the region of work in parentheses. Significant at 10% *; significant at 5% **; significant at 1% ***.

Appendix A

Figure A1: **Timeline of the Survey**

June 15th	**June 22nd**	**Week 2**	**Week 3**

Start Pilot	**End Pilot**	**First**	**Second**
	Invitation - Full sample	**Reminder**	**Reminder**
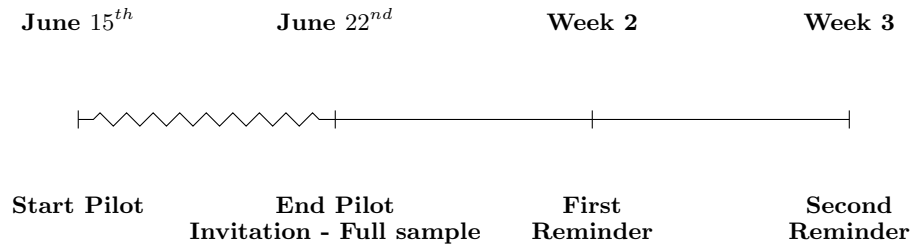
Table A1: **Associations Participating in the Survey**

Description	Professionals
Segretariato Italiano Giovani Medici	Physicians
Associazione Anestesisti Rianimatori Ospedalieri Italiani - Emergenza Area Critica	Physicians
Organizzazione Sindacale interdisciplinare e apartitica dei Medici Ospedalieri Dipendenti dal S.S.N.	Physicians
Associazione Italiana Nursing Sociale	Nurses
Associazione Infermieri di Famiglia e di Comunità	Nurses

Notes: The table lists the professional associations that shared our survey with their members through their website and/or their mailing list.

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Table A2: **Outcomes Definition**

</div>

Outcomes	Definition
Outcomes of interest	
Satisfaction	Discrete from 0 to 8, with 8 being the highest value. It is the sum of 8 dummies: Profession, Work, Salary, Work-Life balance, Relationship with colleagues and administration, Hours of work, Career path.
Profession change	Dummy=1 for medium to high agreement with the statement "If I could start over, I would not be in this profession"
Specialization change	Dummy=1 for medium to high agreement with the statement "If I could start over, I would choose a different field of specialization"
Alternative outcomes	
Satisfaction 2	Discrete from 8 to 40, with 40 being the highest value. It is the sum of 8 categorical variables (5-items scale): Profession, Work, Salary, Work-Life balance, Relationship with colleagues and administration, Hours of work, Career path.
Satisfaction 3	Discrete from 1 to 5, with 5 being the highest value. It is the arithmetic mean of 8 categorical variables (5-items scale) : Profession, Work, Salary, Work-Life balance, Relationship with colleagues and administration, Hours of work, Career path.
Satisfaction PCA	Continuous measure ranging from -5.42 to 4.69 (mean 0). It is the first principal component derived from a PCA analysis on 8 categorical variables (5-item scale): Profession, Work, Salary, Work-Life balance, Relationship with colleagues and administration, Hours of work, Career path.
Individual components	
Profession	Dummy=1 if the worker is satisfied with the profession: extremely or averagely and 0 otherwise
Work	Dummy=1 if the worker is satisfied with the current job: extremely or averagely and 0 otherwise
Salary	Dummy=1 if the worker is satisfied with the current pay: extremely or averagely and 0 otherwise
Work-Life balance	Dummy=1 if the worker is satisfied with the balance between private and work commitments: extremely or averagely and 0 otherwise
Relationship with colleagues	Dummy=1 if the worker is satisfied with the relationship with the colleagues: extremely or averagely and 0 otherwise
Relationship with administration	Dummy=1 if the worker is satisfied with the relationship with the administration: extremely or averagely and 0 otherwise
Hours of work	Dummy=1 if the worker is satisfied with the number of hours worked: extremely or averagely and 0 otherwise
Career Path	Dummy=1 if the worker is satisfied with the career prospects: extremely or averagely and 0 otherwise

Notes: Definition of the outcomes of interest, alternative outcomes and individual components of satisfactions. Individual components are defined as dummies, moving from categorical variables originally measures on a 5-items scale.

Table A3: **Variables Definition**

Variable	Definition
Children	Dummy=1 if you have children and 0 otherwise
Age	Categorical variable: <30, 30-40, 40-50, 50-60, >60.
Female	Dummy=1 if you are female and 0 otherwise
Italian	Dummy=1 if you are Italian and 0 otherwise
Married	Dummy=1 if you are married and 0 otherwise
House sq. meter > 100	Dummy=1 if your home size is bigger than 100 squared meters and 0 otherwise
Good health status	Dummy=1 if you classify your health status as good or very good and 0 otherwise
Chronic disease	Dummy=1 if you have at least one chronic disease
Living alone	Dummy=1 if you live alone and 0 otherwise
Never changed workplace	Dummy=1 if you have always worked in the same workplace and 0 otherwise
Health workers in the family	Dummy=1 if in your family of origin there are healthcare workers and 0 otherwise
Hospital worker	Dummy=1 if you work in a hospital and 0 otherwise
Teaching hospital	Dummy=1 if you work in a teaching hospital and 0 otherwise
Private	Dummy=1 if you work for the private sector and 0 otherwise
Managerial role	Dummy=1 for workers with managerial or coordinating roles
Contract with work-shifts	Dummy=1 if you have a contract which requires work-shifts and 0 otherwise
Average hours worked	Continuous variable indicating the average number of hours worked per week.
Tenure	Continuous variable indicating the number of years of work.
COVID-19 specialization	Dummy=1 for "ICU", "Pneumology", "Infectious Diseases", "Anaesthesia" and "Emergency Room" wards.
High quality facility	Dummy=1 for workplaces with very good or higher quality.
Lack of medical personnel	Dummy=1 for a medium to high lack of the medical personnel in the province of work.
High salary	Dummy=1 for workers earning at least 2,000€net per month.
COVID-19 Death rate	Continuous variable measuring the adjusted COVID-19 death rate over 100,000 inhabitants at the provincial level.
Prompt response	Dummy=1 for good or higher promptness of the new regulation.
Effective response	Dummy=1 for good or higher effectiveness of the new regulation.
Infected colleagues	Dummy=1 for one or more infected or hospitalized colleagues.
Dead colleagues	Dummy=1 for one or more dead colleagues.
COVID-19 overtime	Dummy=1 for COVID-19 related overtime at work.
Exposed to COVID-19	Dummy=1 for workers quarantined as suspicious contacts.
Positive to COVID-19	Dummy=1 for quarantined workers with symptoms.
Work with COVID-19 positives	Dummy=1 for working with COVID-19 positives.
COVID-19: change of specialization/function	Dummy=1 for a change in specialization/function due to COVID-19.

Notes: When we refer to the COVID-19 crisis, we refer to the first wave that took place in Italy from the end of February 2020 to the beginning of June 2020.

Table A4: **Satisfaction and Willingness to Change Profession or Specialization - Robustness on COVID-19 Factors**

	Satisfaction			Profession change			Specialization change		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Personal factors:									
Children	0.018	-0.012	0.014	0.018	-0.012	0.014	0.018	-0.012	0.014
	(0.060)	(0.019)	(0.013)	(0.060)	(0.019)	(0.013)	(0.060)	(0.019)	(0.013)
Age: >=30 - <40	-0.610***	0.091***	0.093***	-0.610***	0.091***	0.093***	-0.610***	0.091***	0.093***
	(0.078)	(0.024)	(0.016)	(0.078)	(0.024)	(0.016)	(0.078)	(0.024)	(0.016)
Age: >=40 - <50	-0.674***	0.115***	0.106***	-0.674***	0.115***	0.106***	-0.674***	0.115***	0.106***
	(0.089)	(0.036)	(0.018)	(0.089)	(0.036)	(0.018)	(0.089)	(0.036)	(0.018)
Age: >=50 - <60	-0.583***	0.062*	0.094***	-0.583***	0.062*	0.094***	-0.583***	0.062*	0.094***
	(0.103)	(0.034)	(0.017)	(0.103)	(0.034)	(0.017)	(0.103)	(0.034)	(0.017)
Age: >=60	-0.404**	-0.004	0.060**	-0.404**	-0.004	0.060**	-0.404**	-0.004	0.060**
	(0.142)	(0.043)	(0.027)	(0.142)	(0.043)	(0.027)	(0.142)	(0.043)	(0.027)
Female	-0.064	-0.047***	-0.049**	-0.064	-0.047***	-0.049**	-0.064	-0.047***	-0.049**
	(0.047)	(0.012)	(0.018)	(0.047)	(0.012)	(0.018)	(0.047)	(0.012)	(0.018)
Italian	0.074	-0.005	-0.105**	0.074	-0.005	-0.105**	0.074	-0.005	-0.105**
	(0.191)	(0.044)	(0.042)	(0.191)	(0.044)	(0.042)	(0.191)	(0.044)	(0.042)
Married	0.150**	-0.002	-0.012	0.150**	-0.002	-0.012	0.150**	-0.002	-0.012
	(0.062)	(0.014)	(0.016)	(0.062)	(0.014)	(0.016)	(0.062)	(0.014)	(0.016)
House sq. meters >100	0.044	-0.026**	-0.016	0.044	-0.026**	-0.016	0.044	-0.026**	-0.016
	(0.035)	(0.011)	(0.012)	(0.035)	(0.011)	(0.012)	(0.035)	(0.011)	(0.012)
Good health status	0.918***	-0.109***	-0.112***	0.918***	-0.109***	-0.112***	0.918***	-0.109***	-0.112***
	(0.122)	(0.026)	(0.035)	(0.122)	(0.026)	(0.035)	(0.122)	(0.026)	(0.035)
Chronic diseases	-0.330***	0.061***	0.041**	-0.330***	0.061***	0.041**	-0.330***	0.061***	0.041**
	(0.051)	(0.014)	(0.016)	(0.051)	(0.014)	(0.016)	(0.051)	(0.014)	(0.016)
Living alone	0.051	-0.003	-0.036	0.051	-0.003	-0.036	0.051	-0.003	-0.036
	(0.078)	(0.025)	(0.023)	(0.078)	(0.025)	(0.023)	(0.078)	(0.025)	(0.023)
Never changed workplace	0.108	-0.025***	-0.039***	0.108	-0.025***	-0.039***	0.108	-0.025***	-0.039***
	(0.071)	(0.008)	(0.013)	(0.071)	(0.008)	(0.013)	(0.071)	(0.008)	(0.013)
Health workers in the family	0.026	0.015	0.010	0.026	0.015	0.010	0.026	0.015	0.010
	(0.051)	(0.009)	(0.012)	(0.051)	(0.009)	(0.012)	(0.051)	(0.009)	(0.012)
Contextual factors:									
Hospital worker	-0.275***	0.026	-0.004	-0.275***	0.026	-0.004	-0.275***	0.026	-0.004
	(0.051)	(0.018)	(0.013)	(0.051)	(0.018)	(0.013)	(0.051)	(0.018)	(0.013)
Teaching hospital	-0.208	0.011	-0.060***	-0.208	0.011	-0.060***	-0.208	0.011	-0.060***
	(0.148)	(0.029)	(0.020)	(0.148)	(0.029)	(0.020)	(0.148)	(0.029)	(0.020)
Private	-0.088	0.004	-0.014	-0.088	0.004	-0.014	-0.088	0.004	-0.014
	(0.107)	(0.015)	(0.016)	(0.107)	(0.015)	(0.016)	(0.107)	(0.015)	(0.016)
Management role	0.233***	-0.058***	-0.024	0.233***	-0.058***	-0.024	0.233***	-0.058***	-0.024
	(0.057)	(0.019)	(0.018)	(0.057)	(0.019)	(0.018)	(0.057)	(0.019)	(0.018)
Contract with work-shifts	-0.441***	-0.000	0.023	-0.441***	-0.000	0.023	-0.441***	-0.000	0.023
	(0.049)	(0.027)	(0.018)	(0.049)	(0.027)	(0.018)	(0.049)	(0.027)	(0.018)
Average hours worked	-0.042***	0.003***	0.003***	-0.042***	0.003***	0.003***	-0.042***	0.003***	0.003***
	(0.004)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)
Tenure	-0.003	0.001	-0.000	-0.003	0.001	-0.000	-0.003	0.001	-0.000
	(0.004)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)
COVID-19 specialization	0.022	0.009	-0.021*	0.022	0.009	-0.021*	0.022	0.009	-0.021*
	(0.079)	(0.013)	(0.011)	(0.079)	(0.013)	(0.011)	(0.079)	(0.013)	(0.011)
High quality facility	1.058***	-0.095***	-0.113***	1.058***	-0.095***	-0.113***	1.058***	-0.095***	-0.113***
	(0.030)	(0.019)	(0.015)	(0.030)	(0.019)	(0.015)	(0.030)	(0.019)	(0.015)
Lack of medical personnel	-0.228***	0.038**	0.048**	-0.228***	0.038**	0.048**	-0.228***	0.038**	0.048**
	(0.045)	(0.014)	(0.019)	(0.045)	(0.014)	(0.019)	(0.045)	(0.014)	(0.019)
High salary	0.640***	-0.061***	-0.068***	0.640***	-0.061***	-0.068***	0.640***	-0.061***	-0.068***
	(0.081)	(0.016)	(0.023)	(0.081)	(0.016)	(0.023)	(0.081)	(0.016)	(0.023)
Nurse	0.008	0.037	0.018	0.008	0.037	0.018	0.008	0.037	0.018
	(0.110)	(0.025)	(0.029)	(0.110)	(0.025)	(0.029)	(0.110)	(0.025)	(0.029)
COVID-19 related factors:									
COVID-19 Death rate	0.001***		-0.000**	0.001***		-0.000**	0.001***		-0.000**
	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)
Prompt response		-0.009	0.002		-0.009	0.002		-0.009	0.002
		(0.009)	(0.012)		(0.009)	(0.012)		(0.009)	(0.012)
Effective response		-0.034*	-0.038***		-0.034*	-0.038***		-0.034*	-0.038***
		(0.017)	(0.010)		(0.017)	(0.010)		(0.017)	(0.010)
Infected colleagues		0.010	0.009		0.010	0.009		0.010	0.009
		(0.019)	(0.008)		(0.019)	(0.008)		(0.019)	(0.008)
Dead colleagues		0.024	-0.022		0.024	-0.022		0.024	-0.022
		(0.022)	(0.026)		(0.022)	(0.026)		(0.022)	(0.026)
COVID-19 overtime		0.006	0.008		0.006	0.008		0.006	0.008
		(0.011)	(0.013)		(0.011)	(0.013)		(0.011)	(0.013)
Exposed to COVID19		0.007	-0.003		0.007	-0.003		0.007	-0.003
		(0.020)	(0.022)		(0.020)	(0.022)		(0.020)	(0.022)
Positive to COVID19		-0.016	0.005		-0.016	0.005		-0.016	0.005
		(0.017)	(0.019)		(0.017)	(0.019)		(0.017)	(0.019)
Work with COVID19 positives		-0.036***	-0.040***		-0.036***	-0.040***		-0.036***	-0.040***
		(0.009)	(0.009)		(0.009)	(0.009)		(0.009)	(0.009)
COVID-19: change of specialization/function		0.034*	0.033**		0.034*	0.033**		0.034*	0.033**
		(0.018)	(0.015)		(0.018)	(0.015)		(0.018)	(0.015)
Constant	6.716***	0.407***	0.476***	6.716***	0.407***	0.476***	6.716***	0.407***	0.476***
	(0.334)	(0.075)	(0.068)	(0.334)	(0.075)	(0.068)	(0.334)	(0.075)	(0.068)
N Obs.	7,134	7,134	7,134	7,134	7,134	7,134	7,134	7,134	7,134
Macro area fixed effect	No	No	No	No	No	No	No	No	No
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS regressions. See Tables A2 and A3 for outcomes and controls definitions, respectively. Standard errors clustered at the level of the region of work in parentheses. Significant at 10% *; significant at 5% **; significant at 1% ***.

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Table A5: **Satisfaction and Willingness to Change Profession or Specialization - Robustness on Administrative information**

	Satisfaction			Profession change			Specialization change		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Personal factors:									
Children	0.044	0.038	0.041	-0.012	-0.011	-0.011	0.014	0.015	0.014
	(0.057)	(0.056)	(0.056)	(0.019)	(0.019)	(0.018)	(0.013)	(0.013)	(0.012)
Age: >=30 - <40	-0.586***	-0.586***	-0.589***	0.091***	0.091***	0.091***	0.093***	0.093***	0.093***
	(0.072)	(0.072)	(0.072)	(0.024)	(0.024)	(0.024)	(0.016)	(0.017)	(0.016)
Age: >=40 - <50	-0.712***	-0.710***	-0.711***	0.115***	0.114***	0.113***	0.106***	0.106***	0.107***
	(0.090)	(0.090)	(0.090)	(0.036)	(0.036)	(0.036)	(0.018)	(0.018)	(0.018)
Age: >=50 - <60	-0.635***	-0.632***	-0.637***	0.062*	0.061*	0.060*	0.094***	0.093***	0.096***
	(0.093)	(0.096)	(0.090)	(0.033)	(0.033)	(0.034)	(0.017)	(0.017)	(0.017)
Age: >=60	-0.478***	-0.478***	-0.474***	-0.006	-0.006	-0.009	0.060**	0.060**	0.061**
	(0.136)	(0.141)	(0.137)	(0.042)	(0.042)	(0.043)	(0.027)	(0.026)	(0.026)
Female	-0.118**	-0.123**	-0.116**	-0.047***	-0.046***	-0.046***	-0.049**	-0.048**	-0.049**
	(0.046)	(0.047)	(0.046)	(0.013)	(0.013)	(0.012)	(0.018)	(0.018)	(0.017)
Italian	0.049	0.034	0.048	-0.004	-0.002	-0.007	-0.105**	-0.103**	-0.110**
	(0.152)	(0.150)	(0.153)	(0.045)	(0.045)	(0.047)	(0.042)	(0.041)	(0.042)
Married	0.118*	0.117*	0.125**	-0.002	-0.002	-0.003	-0.012	-0.011	-0.012
	(0.061)	(0.061)	(0.058)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)
House sq. meters >100	0.034	0.028	0.036	-0.026**	-0.025**	-0.025**	-0.016	-0.014	-0.015
	(0.039)	(0.040)	(0.039)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)
Good health status	0.907***	0.902***	0.899***	-0.109***	-0.108***	-0.110***	-0.112***	-0.111***	-0.110***
	(0.107)	(0.106)	(0.108)	(0.026)	(0.026)	(0.026)	(0.035)	(0.034)	(0.035)
Chronic diseases	-0.299***	-0.297***	-0.292***	0.061***	0.061***	0.060***	0.041**	0.040**	0.040**
	(0.053)	(0.054)	(0.054)	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)	(0.018)
Living alone	0.070	0.075	0.077	-0.003	-0.003	-0.002	-0.036	-0.037	-0.037
	(0.074)	(0.074)	(0.075)	(0.025)	(0.025)	(0.025)	(0.023)	(0.023)	(0.024)
Never changed workplace	0.083	0.084	0.082	-0.024***	-0.024***	-0.025***	-0.039***	-0.039***	-0.039***
	(0.066)	(0.065)	(0.066)	(0.008)	(0.008)	(0.008)	(0.013)	(0.013)	(0.013)
Health workers in the family	0.031	0.029	0.028	0.015	0.015	0.016*	0.010	0.011	0.011
	(0.061)	(0.061)	(0.058)	(0.009)	(0.009)	(0.009)	(0.012)	(0.012)	(0.011)
Contextual factors:									
Hospital worker	-0.247***	-0.243***	-0.240***	0.026	0.026	0.028	-0.004	-0.005	-0.004
	(0.047)	(0.045)	(0.047)	(0.017)	(0.018)	(0.017)	(0.013)	(0.013)	(0.013)
Teaching hospital	-0.206	-0.168	-0.194	0.010	0.007	0.010	-0.060***	-0.067***	-0.062***
	(0.143)	(0.144)	(0.143)	(0.028)	(0.028)	(0.030)	(0.020)	(0.018)	(0.020)
Private	-0.117	-0.105	-0.114	0.004	0.003	0.001	-0.014	-0.016	-0.015
	(0.110)	(0.114)	(0.111)	(0.015)	(0.015)	(0.014)	(0.016)	(0.017)	(0.015)
Management role	0.199***	0.193***	0.205***	-0.057***	-0.057***	-0.056***	-0.024	-0.023	-0.024
	(0.053)	(0.051)	(0.052)	(0.019)	(0.019)	(0.019)	(0.018)	(0.017)	(0.018)
Contract with work-shifts	-0.413***	-0.412***	-0.414***	-0.000	-0.000	0.000	0.023	0.023	0.022
	(0.052)	(0.051)	(0.053)	(0.028)	(0.027)	(0.028)	(0.018)	(0.018)	(0.018)
Average hours worked	-0.036***	-0.036***	-0.036***	0.003***	0.002***	0.003***	0.003***	0.003***	0.003***
	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tenure	-0.003	-0.003	-0.004	0.001	0.001	0.001	-0.000	-0.000	-0.000
	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
COVID-19 specialization	0.018	0.018	0.015	0.008	0.008	0.007	-0.021*	-0.021*	-0.020*
	(0.069)	(0.069)	(0.067)	(0.013)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)
High quality facility	0.827***	0.836***	0.829***	-0.095***	-0.095***	-0.095***	-0.113***	-0.115***	-0.114***
	(0.042)	(0.041)	(0.042)	(0.019)	(0.019)	(0.020)	(0.015)	(0.014)	(0.015)
Lack of medical personnel	-0.165***	-0.180***	-0.166***	0.038**	0.039***	0.038**	0.048**	0.051***	0.049**
	(0.035)	(0.036)	(0.035)	(0.014)	(0.013)	(0.014)	(0.019)	(0.018)	(0.019)
High salary	0.665***	0.665***	0.662***	-0.061***	-0.061***	-0.062***	-0.068***	-0.068***	-0.069***
	(0.090)	(0.091)	(0.091)	(0.016)	(0.016)	(0.016)	(0.023)	(0.023)	(0.023)
Nurse	0.002	0.004	0.006	0.037	0.037	0.037	0.018	0.018	0.017
	(0.101)	(0.108)	(0.099)	(0.024)	(0.025)	(0.026)	(0.029)	(0.029)	(0.028)
COVID-19 related factors:									
COVID-19 Death rate	0.002***	0.001**	0.002***	-0.000	-0.000	-0.000	-0.000**	-0.000*	-0.000***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Prompt response	0.623***	0.623***	0.619***	-0.009	-0.009	-0.010	0.002	0.002	0.002
	(0.091)	(0.090)	(0.089)	(0.009)	(0.009)	(0.009)	(0.012)	(0.012)	(0.012)
Effective response	0.434***	0.434***	0.440***	-0.034*	-0.034*	-0.034*	-0.038***	-0.038***	-0.039***
	(0.087)	(0.087)	(0.085)	(0.017)	(0.017)	(0.017)	(0.010)	(0.010)	(0.010)
Infected colleagues	-0.051	-0.053	-0.063	0.011	0.011	0.011	0.009	0.009	0.011
	(0.065)	(0.064)	(0.059)	(0.018)	(0.018)	(0.018)	(0.008)	(0.008)	(0.008)
Dead colleagues	-0.123	-0.128	-0.118	0.027	0.028	0.027	-0.022	-0.021	-0.024
	(0.084)	(0.082)	(0.083)	(0.023)	(0.023)	(0.023)	(0.026)	(0.025)	(0.025)
COVID-19 overtime	-0.313***	-0.314***	-0.312***	0.007	0.007	0.006	0.008	0.008	0.007
	(0.043)	(0.042)	(0.043)	(0.011)	(0.011)	(0.011)	(0.013)	(0.014)	(0.014)
Exposed to COVID19	-0.008	-0.006	0.002	0.008	0.008	0.010	-0.003	-0.004	-0.002
	(0.052)	(0.053)	(0.049)	(0.019)	(0.019)	(0.020)	(0.022)	(0.022)	(0.023)
Positive to COVID19	0.026	0.030	0.026	-0.015	-0.015	-0.016	0.005	0.005	0.005
	(0.089)	(0.090)	(0.090)	(0.017)	(0.017)	(0.017)	(0.019)	(0.019)	(0.019)
Work with COVID19 positives	0.003	-0.003	0.005	-0.035***	-0.034***	-0.036***	-0.040***	-0.039***	-0.040***
	(0.040)	(0.041)	(0.042)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
COVID-19: change of specialization/function	-0.173***	-0.173***	-0.167***	0.034*	0.034*	0.033*	0.033**	0.033**	0.032*
	(0.049)	(0.049)	(0.055)	(0.018)	(0.018)	(0.018)	(0.015)	(0.015)	(0.016)
Administrative information:									
Physicians/10.000 inhabitants		Yes			Yes			Yes	
PNE 30days readmissions			Yes			Yes			Yes
Constant	6.250***	6.552***	6.156***	0.413***	0.386***	0.417***	0.476***	0.424***	0.501***
	(0.269)	(0.294)	(0.426)	(0.076)	(0.081)	(0.086)	(0.068)	(0.062)	(0.064)
N Obs.	7,134	7,134	7,110	7,134	7,134	7,110	7,134	7,134	7,110
Macro area fixed effect	No	No	No	No	No	No	No	No	No
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS regressions. See Tables A2 and A3 for outcomes and controls definitions, respectively. Standard errors clustered at the level of the region of work in parentheses. Significant at 10% *; significant at 5% **; significant at 1% ***. *Physicians/10.000 inhabitants* administrative information reporting the number of physicians registered in each province weighted over the provincial resident population (source: Health-for-All Italy. Year 2019). *PNE 30days readmissions* are three standardized measures reporting the provincial rate of readmission to hospital 30 days after discharged for selected diseases (i.e., Acute Myocardial Infarction-AMI-, stroke, Chronic Obstructive Pulmonary Disease-COPD-) (source: Piano Nazionale Esiti-PNE- Ministry of Health. Year: 2019).

Table A6: **Satisfaction - Robustness on Alternative Outcomes**

	Satisfaction (1)	Satisfaction 2 (2)	Satisfaction 3 (3)	Satisfaction PCA (4)
Personal factors:				
Children	0.044	0.156	0.020	0.053
	(0.057)	(0.131)	(0.016)	(0.041)
Age: >=30 - <40	-0.586***	-1.738***	-0.217***	-0.543***
	(0.072)	(0.188)	(0.024)	(0.059)
Age: >=40 - <50	-0.712***	-1.934***	-0.242***	-0.598***
	(0.090)	(0.229)	(0.029)	(0.073)
Age: >=50 - <60	-0.635***	-1.768***	-0.221***	-0.543***
	(0.093)	(0.214)	(0.027)	(0.067)
Age: >=60	-0.478***	-1.118***	-0.140***	-0.338***
	(0.136)	(0.360)	(0.045)	(0.112)
Female	-0.118**	0.043	0.005	0.013
	(0.046)	(0.121)	(0.015)	(0.038)
Italian	0.049	0.417	0.052	0.132
	(0.152)	(0.391)	(0.049)	(0.130)
Married	0.118*	0.310*	0.039*	0.100*
	(0.061)	(0.158)	(0.020)	(0.050)
House sq. meters >100	0.034	0.207*	0.026*	0.066*
	(0.039)	(0.101)	(0.013)	(0.032)
Good health status	0.907***	2.581***	0.323***	0.826***
	(0.107)	(0.214)	(0.027)	(0.067)
Chronic diseases	-0.299***	-0.820***	-0.102***	-0.261***
	(0.053)	(0.125)	(0.016)	(0.040)
Living alone	0.070	0.329	0.041	0.105
	(0.074)	(0.231)	(0.029)	(0.073)
Never changed workplace	0.083	0.445**	0.056**	0.142**
	(0.066)	(0.203)	(0.025)	(0.064)
Health workers in the family	0.031	0.150	0.019	0.050
	(0.061)	(0.154)	(0.019)	(0.048)
Contextual factors:				
Hospital worker	-0.247***	-0.810***	-0.101***	-0.246***
	(0.047)	(0.108)	(0.014)	(0.033)
Teaching hospital	-0.206	-0.984***	-0.123***	-0.297***
	(0.143)	(0.311)	(0.039)	(0.100)
Private	-0.117	-0.340	-0.043	-0.111
	(0.110)	(0.259)	(0.032)	(0.083)
Management role	0.199***	1.016***	0.127***	0.331***
	(0.053)	(0.158)	(0.020)	(0.050)
Contract with work-shifts	-0.413***	-1.214***	-0.152***	-0.380***
	(0.052)	(0.165)	(0.021)	(0.052)
Average hours worked	-0.036***	-0.096***	-0.012***	-0.030***
	(0.003)	(0.007)	(0.001)	(0.002)
Tenure	-0.003	-0.018	-0.002	-0.006
	(0.003)	(0.011)	(0.001)	(0.003)
COVID-19 specialization	0.018	0.032	0.004	0.014
	(0.069)	(0.226)	(0.028)	(0.072)
High quality facility	0.827***	3.087***	0.386***	0.988***
	(0.042)	(0.173)	(0.022)	(0.055)
Lack of medical personnel	-0.165***	-0.606***	-0.076***	-0.191***
	(0.035)	(0.117)	(0.015)	(0.037)
High salary	0.665***	1.880***	0.235***	0.563***
	(0.090)	(0.235)	(0.029)	(0.075)
Nurse	0.002	0.063	0.008	0.028
	(0.101)	(0.263)	(0.033)	(0.083)
COVID-19 related factors:				
COVID-19 Death rate	0.002***	0.003**	0.000**	0.001**
	(0.001)	(0.001)	(0.000)	(0.000)
Prompt response	0.623***	1.526***	0.191***	0.484***
	(0.091)	(0.219)	(0.027)	(0.068)
Effective response	0.434***	1.180***	0.147***	0.374***
	(0.087)	(0.195)	(0.024)	(0.062)
Infected colleagues	-0.051	-0.176	-0.022	-0.052
	(0.065)	(0.192)	(0.024)	(0.061)
Dead colleagues	-0.123	-0.173	-0.022	-0.054
	(0.084)	(0.261)	(0.033)	(0.082)
COVID-19 overtime	-0.313***	-0.749***	-0.094***	-0.237***
	(0.043)	(0.141)	(0.018)	(0.044)
Exposed to COVID19	-0.008	-0.242*	-0.030*	-0.079*
	(0.052)	(0.130)	(0.016)	(0.041)
Positive to COVID19	0.026	0.168	0.021	0.049
	(0.089)	(0.229)	(0.029)	(0.073)
Work with COVID19 positives	0.003	0.087	0.011	0.032
	(0.040)	(0.094)	(0.012)	(0.030)
COVID-19: change of specialization/function	-0.173***	-0.493***	-0.062***	-0.159***
	(0.049)	(0.131)	(0.016)	(0.040)
Constant	6.250***	26.940***	3.368***	0.555***
	(0.269)	(0.598)	(0.075)	(0.189)
Mean Dep. Var.	5.312	25.039	3.130	-1.73e-09
N Obs.	7,134	7,134	7,134	7,134
Macro area fixed effect	No	No	No	No
Region fixed effect	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes

Notes: OLS regressions. See Tables A2 and A3 for outcomes and controls definitions, respectively. Standard errors clustered at the level of the region of work in parentheses. Significant at 10% *; significant at 5% **; significant at 1% ***.