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## Burnout among obstetricians and pediatricians: A cross-sectional study from China

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3 **1 Burnout among obstetricians and pediatricians: A cross-sectional study from China**

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42 <sup>a</sup>Junying Ye and Huan Wang contributed equally to this work.  
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20 **Abstract: Objectives:** Hospitals devoted to maternal and child health represent unique health  
21 care institutions in China. Health care professionals in these hospitals not only attend to health  
22 services for women and children, but also provide technical services and support for district  
23 maternal and children's healthcare as well as family planning. However, few studies have  
24 examined occupational burnout among doctors employed in these hospitals. This research  
25 addresses the gap in the literature. **Methods:** A cross-sectional survey of obstetricians and  
26 pediatricians from 11 maternal and child health hospitals across China was conducted from  
27 May through June, 2017. A total of 678 people completed a self-administered questionnaire.  
28 The survey included questions about demographics, doctor-patient relationships, and  
29 networks of support as well as characteristics designed to capture the occurrence of burnout,  
30 such as emotional exhaustion (EE), depersonalization (CY), and professional efficacy (PE). T  
31 test, variance, and multiple regression analyses were used to examine the data. **Results:** The  
32 research revealed that 56.6% of maternal and child care obstetric pediatricians exhibited signs  
33 of occupational burnout. Poor doctor-patient relationships and high average number of  
34 weekly hours worked contributed to burnout. Additionally, low family support corresponded  
35 to physicians' low sense of professional efficacy. **Conclusions:** Several factors have  
36 contributed to occupational burnout among pediatricians and obstetricians at maternal and  
37 child health hospitals in China, including a lack of family support, poor doctor-patient  
38 relationships, and heavy workloads.

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40 **Key words:** Chinese healthcare system, maternity hospitals, obstetricians and pediatricians,  
41 occupational burnout, work-life balance

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45 **Article summary****What is already known on this subject?**

- Obstetricians and pediatricians in China evidenced prevalent occupational burnout, demonstrating very high average scores on emotional exhaustion and moderate scores on depersonalization.
- Poor doctor – patient relationships and high average number of weekly hours worked contributed to burnout; low family support corresponded to physicians' low sense of professional efficacy.

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**Strengths and limitations of this study**

- Reporting the occupational burnout among the obstetricians and pediatricians in maternity hospitals who represent a key part of China's continued success in efforts toward maternal and child health.
- Paying attention to the job burnout of the relevant doctors after the implementation of the second child policy in China. Researching on the influence of doctor-patient relationship and family support on Job Burnout of doctors
- Limited by the ability of coordination, the proportion of the selected samples in the central and western regions is too large, which may cause certain limitations and more reflect the general situation of pediatrics and obstetricians in this area.

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## 1 Introduction

China has made great progress with respect to women and child health in the past two decades. From 1990 to 2015, the country lowered infant mortality by nearly 70% and maternal mortality by nearly 75%<sup>1)</sup>. Much of this success was possible due to a multi-pronged strategy that emphasized investments in antenatal and delivery care, effective referral systems for women at high risk, and a commitment to the professionalization of maternity care<sup>2)</sup>. Hospitals devoted to maternal and child health represent unique health care institutions in China. Health care professionals in these hospitals not only attend to health services for women and children, but also provide technical services and support for both district maternal and children's healthcare as well as family planning.

With the recent implementation of China's two-child policy, there was much speculation about the impact the change would have on the services provided to mothers and infants. In particular, there existed concerns about the shortage of health care professionals in hospitals devoted to maternal and child health; more women would require services, many of them would be older women who possibly would require assisted reproductive services due to their age, and the same doctors who provide services might go on maternity leave to have their second child<sup>3)</sup>. Given the fairly rapid changes in this sector of China's healthcare system, the situation of the professionals who attend to mothers and children merits greater attention.

Previous research has shown that, in comparison to other professions, doctors have been more likely to suffer from burnout. Researchers have attributed this likelihood to the fact that doctors often are held to high standards, are less likely to seek support when they need help, and perform work that is often emotionally intense<sup>4)</sup>. Research on occupational burnout among hospital doctors emerged later in China, and never reached the same level of interest that it enjoyed in other countries. To date, the research has focused on the identification of burnout among general hospital doctors, the factors that contribute to occupational burnout<sup>5)</sup>,

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3 75 and the impact of burnout on medical service delivery<sup>6</sup>). Yet, there has been no research on  
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5 76 occupational burnout among the obstetricians and pediatricians in maternity hospitals who  
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7 77 represent a key part of China's continued success in efforts toward maternal and child health.  
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9 78 This study addresses the gap in the literature.

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11 79 Interest in occupational burnout among health care professionals began nearly half a  
12  
13 80 century ago<sup>7</sup>). Freudenberger's early work in clinics devoted to people struggling with drug  
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15 81 addiction noted that staff frequently suffered from the gradual onset of a lack of motivation  
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17 82 and commitment, which was accompanied by both mental and physical symptoms<sup>8</sup>). The  
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19 83 identification of burnout symptoms typically involved 3 dimensions: emotional exhaustion,  
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21 84 depersonalization, and a low sense of professional achievement<sup>9</sup>). Occupational burnout was  
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23 85 shown to trigger a variety of personal problems for the medical professional, such as physical  
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25 86 illnesses, work absenteeism and/or domestic conflict, and also negatively impacts medical  
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27 87 decisions and doctor–patient relationships<sup>10</sup>).

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31 88 Doctor occupation burnout is caused by a variety of factors. A 2011 study from the  
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33 89 United States separated these factors into several aspects: external, job-related, and personal  
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35 90 life factors<sup>11</sup>). Currently, there is a growing interest in the factors that contribute to burnout  
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37 91 among doctors and possible strategies to mitigate their impact.

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39 92 China has suffered from a shortage of obstetricians in recent years. The number of babies  
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41 93 born in 2016 represented an increase of 8.7 million from the previous year. Despite the fact  
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43 94 that 53 percent of 2016 newborn babies come from two-child families, the population of  
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45 95 obstetricians and pediatricians has not increased at the same rate<sup>12</sup>). Moreover, as a result of  
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47 96 the two-child policy, more older women have decided to have another child. Consequently,  
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49 97 doctors have been treating a greater number of high-risk births, and their workloads have  
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51 98 increased. Furthermore, the expectations of patient's family members have intensified,  
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53 99 creating greater pressure on obstetricians and pediatricians in doctor–patient relationships.  
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3 100 Despite the country's sustained commitment to the creation of a strong Maternal and  
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5 101 Child Health Initiative over the past twenty years, there has not been research on the possible  
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7 102 existence of burnout among the medical professionals who work in facilities that attend to this  
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9 103 patient population. Our research was designed to address this gap in the literature and to  
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11 104 further an understanding of the challenges China faces in its effort to provide quality health  
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13 105 care services to mothers and children. A cross-sectional survey was developed that focused on  
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15 106 the personal character traits of doctors, doctor–patient relationships, and the levels of support  
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17 107 doctors received from their families. Finally, a means to measure burnout and strategies to  
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19 108 mitigate its impacts are proposed.  
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## 110 **2 Subjects and Methods**

111 A cross-sectional survey was administered to obstetricians and pediatricians across the  
112 country from May through June of 2017.

### 113 *2.1 Subjects*

114 A sample was obtained through simple random sampling from 11 maternal and child  
115 health hospitals located in Jiangsu, Guangdong, Hubei, Shanxi, Gansu, Xinjiang, Chongqing,  
116 Yunnan, Sichuan, Guizhou, and Liaoning. More obstetricians and pediatricians are employed  
117 in maternity hospitals than in general hospitals. Therefore, the recruitment process assured a  
118 good national representation of obstetricians and pediatricians.

119 The criteria for inclusion were the following: the doctor was employed in a provincial  
120 maternal and child health hospital; participation was limited to obstetricians and pediatricians;  
121 and, participation was voluntary. A total of 750 questionnaires, along with a consent form,  
122 were distributed by mail to 750 pediatricians and obstetricians from the selected hospitals. By  
123 the end of June, 710 doctors had returned and 678 had completed the questionnaire—an  
124 effective response rate of 90.4%. A total of 131 male (19.3%) and 547 female doctors (80.7%)



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125 responded. Approximately half (49.9%) of the respondents were pediatricians.

126 The Institutional Review Board of Southwest Hospital, China, approved the study  
127 proposal as well as the manner in which informed consent was obtained from all participants.

## 128 2.2 Questionnaire

129 The questionnaire captured participant's demographics and employment, information  
130 about doctor-patient relationships, details about the family support enjoyed by doctors, and  
131 indicators of occupational burnout.

132 Demographic and employment information was captured through questions that  
133 addressed sex, age, marital status, education level, region, professional title, department, and  
134 average number of hours worked.

135 The question about age permitted one of four possible responses: 29 years of age or  
136 younger, 30–39 years of age, 40–49 years of age, and 50 years old of age or older. Due to the  
137 different means by which certification to practice medicine in China may be obtained,  
138 questions regarding education permitted one of four responses: Junior college, undergraduate  
139 degree, master's degree and doctorate. Participants also could choose one of four occupational  
140 titles: resident, attending physician, associate chief physician and chief physician. Possible  
141 responses to marital status were unmarried, married, divorced or widowed. Place of  
142 employment was limited to regions: Eastern, Central, Western, and Northeastern China.  
143 Finally, participants indicated the number of average hours worked weekly; 40 hours or less,  
144 41–50 hours, 51–60 hours, and 61 hours or more.

145 A Chinese adaptation of the Difficult Doctor-Patient Relationship Questionnaire-10  
146 (DDPRQ-10), originally developed by Steven Hahn and colleagues<sup>13)</sup>, was used to measure  
147 doctor's perceptions of doctor-patient relationships<sup>14)</sup>. There were ten questions that focused  
148 on the following areas: physicians' subjective experiences, patients' behaviors, and symptoms.  
149 Responses were scored on a six-point Likert scale. The higher the scores, the more difficult

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150 the doctor–patient relationship was determined to be. The Cronbach’s Alpha of the  
151 doctor–patient Relationship scale was 0.803.

152 Family support was measured by the Perceived Social Support Scale-Family<sup>15)</sup>, adapted  
153 for research in China by Xiangdong Wang in 1999<sup>16)</sup>. This was a questionnaire that consisted  
154 of questions in two categories: My family can help me concretely; I am able to obtain  
155 emotional help and support from my family when I need it and I can talk to my family about  
156 my problems. Responses were scored on a seven-point scale from completely disagree to  
157 completely agree. Higher scores indicated greater levels of perceived support. The Cronbach’s  
158 Alpha was 0.869.

159 The Chinese version of the Maslach Burnout Inventory-General Survey (MBI-GS) was  
160 chosen to identify occupational burnout<sup>17)</sup>. The MBI-GS has been translated and revised to  
161 ensure that the questions could be administered to Chinese subjects in a culturally- and  
162 linguistically-appropriate fashion<sup>18)</sup>. Previous studies on Chinese nurses and doctors that  
163 utilized the revised survey found it to be an effective tool<sup>19,20)</sup>. The research consisted of three  
164 subscales: emotional exhaustion (EE, five items), depersonalization (CY, four items), and low  
165 sense of achievement (PE, seven items).

166 Each question was ranked on a six-point scale from never to always. The possible  
167 minimum and maximum scores were 0 to 30 for EE, 0 to 24 for CY, and 0 to 42 for PE. In  
168 accordance with the Chinese adaptation of the MBI-GS, the cut-off points were as follows: A  
169 low score for EE was less than 9, average was 9 to 13 and high was greater than 13; a low  
170 score for CY was less than 3, average was 3–9, and high was greater than 9; and, a low score  
171 for PE was greater than 30, an average score was 18–30, and a high score was less than 18<sup>21)</sup>.  
172 Individuals with a high score in one or more of these three domains were considered to  
173 exhibit burnout symptoms. Those with high EE and CY scores combined with a low PE score,  
174 were identified as having a high degree of occupational burnout<sup>18)</sup>. Cronbach alpha

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175 coefficients for EE, CY, and PE were 0.95, 0.92, and 0.88, respectively.

### 176 *2.3 Statistical analysis*

177 Data were analyzed using SPSS 17 software. T-tests and variance analysis were  
178 employed to test and compare the scores among doctors with different demographics.  
179 Additionally, an analysis was conducted to identify any existing correlation between  
180 occupational burnout and demographic variables, family support, and doctor–patient  
181 relationships. Finally, a multiple regression analysis was performed to examine the factors  
182 related to occupational burnout.

183 Harman single-factor analysis was utilized to test for homology<sup>22</sup>). A factor analysis of  
184 all items in the scale was created to determine the principal component in the non-rotation and  
185 identify the amount of homologous variance. An amount of less than 50 percent of the key  
186 value indicated that common method variance was not problematic. Bartlett's and KMO tests  
187 were used to examine scores from the family support, doctor–patient relationships, and  
188 occupational burnout scales. The Bartlett's test approached 0, indicating suitability for factor  
189 analysis. KMO values were: 0.823, 0.847, and 0.913, respectively. SPSS was utilized to test  
190 common variance; the cumulative percentage of the first principal component was 31.98%  
191 (less than 50%), which proved that the common method variance was not severe.

### 192 *2.4 Patient and Public Involvement statement*

193 This study is just for doctors, no patient and public involved.

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## 195 **3 Results**

196 The subjects' distribution by demographics and employment situations is illustrated in  
197 Table 1. Among the 678 samples included, women accounted for the vast majority (80.7%);  
198 men accounted for only 19.3% of the sample. The majority of the doctors came from the  
199 western region, accounting for 63.7% of the sample; only 8.0% came from the eastern region.

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3 200 Pediatric and obstetricians each accounted for half of the sample. Only 2.9% of the doctors  
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5 201 worked less than 40 hours per week, and 39.7 percent worked more than 60 hours a week.  
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7 202 The overall burnout rate was 56.6%.

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9 203 Univariate analysis of the MBI-GS scores in relation to demographics and employment  
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11 204 situation variables are shown in Table 2. Obstetricians and pediatricians evidenced prevalent  
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13 205 occupational burnout, demonstrating very high average scores on emotional exhaustion and  
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15 206 moderate scores on depersonalization. The data indicated that age, department, title, weekly  
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17 207 working hours, and region correlated with greater emotional exhaustion, whereas education,  
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19 208 sex and marital status did not. Doctors 40 years of age or younger, with lower levels of  
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21 209 education, longer working hours, or who came from eastern China exhibited a higher level of  
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23 210 emotional exhaustion. Obstetricians evidenced a higher level of emotional exhaustion than  
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25 211 pediatricians.

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28 212 Factors such as age, profession, employment position, number of hours worked and  
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30 213 place of residence corresponded with higher levels of depersonalization (CY), whereas sex  
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32 214 and marital status did not. As doctors' ages increased, they showed higher levels of  
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34 215 depersonalization. Moreover, longer working hours, lower status professional titles and  
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36 216 location in eastern or central China also corresponded to higher levels of depersonalization.  
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38 217 Obstetricians demonstrated higher levels of depersonalization than pediatricians.

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41 218 Interestingly, sex and region did not impact PE, yet age, marital status education,  
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43 219 professional title, work hours and profession all did. Doctors who were younger, had lower  
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45 220 professional titles, were unmarried, worked more than 60 hours a week, and exhibited lower  
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47 221 levels of PE, demonstrated a lower sense of achievement on the scales. Interestingly,  
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49 222 obstetricians seemed to enjoy a greater sense of achievement. The analyses of family support,  
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51 223 doctor-patient relationships and occupational burnout (Table 3), revealed that emotional  
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53 224 exhaustion was negatively correlated with family support ( $r=-0.141$ ), yet positively correlated  
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225 with difficult doctor–patient relationships ( $r=0.459$ ). Depersonalization was negatively  
226 correlated with family support ( $r=-0.188$ ), yet positively correlated with difficult  
227 doctor–patient relationships ( $r=0.570$ ). Moreover, a low sense of achievement proved  
228 negatively correlated with family support ( $r=-0.167$ ), yet positively correlated with difficult  
229 doctor–patient relationships ( $r=0.338$ ).

230 A regression analysis of factors that shaped occupational burnout showed that the DW  
231 value was 1.74; collinearity was not evident. Table 4 illustrates the relationship between hours  
232 of work, family support, doctor–patient relationships, and occupational burnout. Emotional  
233 exhaustion was negatively correlated with difficult doctor–patient relationships; the  
234 correlation coefficients  $\beta$  were 0.396 and 0.219. There was a significant positive correlation  
235 between depersonalization and difficult doctor–patient relationships ( $p<0.01$ ), with a  
236 correlation coefficient  $\beta$  of 0.517. Family support was negatively correlated with a low sense  
237 of achievement ( $p<0.01$ ), with a correlation coefficient  $\beta$  of  $-0.098$ . Yet, a significant positive  
238 correlation was apparent between family support and doctor–patient relationships ( $p<0.01$ ),  
239 with a correlation coefficient  $\beta$  of 0.298.

240 Multiple regression analysis provided an indication of the factors that helped to predict  
241 occupational burnout, as shown in Table 5. Difficult doctor–patient relationships evidenced a  
242 greater ability to predict EE, CY, and PE (13%, 20%, and 7%, respectively). Work hours also  
243 served as a predictor of EE and CY (9% and 5%, respectively). However, family support  
244 proved to be a less reliable predictor.

245

#### 246 **4 Discussion**

247 The rate of occupational burnout among obstetricians and pediatricians reached 56.6%.  
248 This percentage surpasses the rate of 44% identified in Iran, a country with high levels of  
249 burnout<sup>23)</sup> and parallels the estimated 40–70% of burnout among U.S. obstetricians<sup>24)</sup>. Recent

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250 research on occupational burnout among physicians in China had indicated much lower rates  
251 than those found here among obstetricians and pediatricians. Moreover, the levels of EE, CY,  
252 and PE of these doctors were higher than those of other medical professionals<sup>21</sup>).

253 There could be several explanations for these high rates of burnout among pediatricians  
254 and obstetricians. The majority of obstetricians and pediatricians in China are women, as they  
255 were in the sample we collected. A study conducted in the United States observed that the  
256 burnout rate of female doctors was 1.6 times higher than that of males<sup>25</sup>). Yet, the research  
257 conducted here did not identify significant differences in burnout rates between men and  
258 women doctors. Interestingly, the researchers who conducted the U.S. study noted that women  
259 often face additional pressures both at home and on the job. That is, the factor that impacted  
260 the level of burnout was not explained by the sex of the professional, but rather by the totality  
261 of the work for which they were responsible.

262 The findings also suggested that occupational burnout is greater among doctors with  
263 longer working hours. Among the pediatricians and obstetricians sampled, 73% worked more  
264 than 50 hours per week.

265 Another possible explanation for the high incidence of burnout could be directly related  
266 to doctor–patient relationships. The greater number of patients in the hospitals devoted to  
267 maternal and child health in recent years, without a corresponding increase in the number of  
268 doctors, suggests that these professionals have had a much greater workload than they  
269 previously did. The amount of time and the energy that may be devoted to each patient would  
270 either have to be reduced or maintained through an increase of hours worked. Moreover, there  
271 seemed to be a dialectical relationship between poor doctor–patient relationships and burnout,  
272 each contributing to the greater likelihood of the other.

273 There were several limitations to the present study. First, as a cross-sectional study, the  
274 research captured the situation of burnout at a single time point. An understanding of the

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3 275 changes over time would have been helpful to identify any direct impacts of the two-child  
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5 276 policy and a rapid increase of births in China on doctor burnout in facilities specifically  
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7 277 devoted to mothers and children. It would have been interesting to know whether or not the  
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9 278 differences in burnout rates among these doctors compared to others throughout the country  
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11 279 already existed prior to these changes. That would have helped to further focus on any  
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13 280 particularities in these specializations that could merit further attention in future research  
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16 281 devoted to addressing burnout.

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18 282 Second, the inclusion of all medical professionals working in these facilities, such as  
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20 283 nurses, could provide greater insight into the systemic and/or dynamic nature of burnout. An  
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22 284 understanding of the prevalence or absence of burnout among all the professions that form  
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24 285 part of a medical team could reveal some of the interpersonal dynamics on the job that could  
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26 286 contribute to or alleviate the symptoms of burnout.

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29 287 Third, a larger sample of hospitals throughout the country would strengthen the research.  
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31 288 Because geographic region did appear to play a role in the presence of burnout, a larger  
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33 289 sample from each of the regions would be imperative to better understand those differences.

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35 290 Finally, the study utilized data collected from the Perceived Social Support Scale and  
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37 291 doctor-reported information about doctor-patient relationships, both of which rely on  
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39 292 self-reporting. To better grasp the entirety of the support potentially available to or enjoyed by  
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41 293 doctors, surveys that capture the experiences of other members of their support networks or  
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43 294 research methods that promote direct observation would be recommended.

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## 47 48 296 **5 Conclusions**

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50 297 Doctors' occupational health concerns not only themselves, but also the quality of the  
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52 298 services that they are able to provide. Consequently, the high rate of burnout among China's  
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54 299 obstetricians and pediatricians is cause for concern. There is an urgent need to better  
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3 300 understand the mitigating factors that have contributed to this situation and develop feasible  
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5 301 solutions in light of China's current baby boom. The findings from this research have helped  
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7 302 to identify several possible areas on which to focus efforts in the coming years.  
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9 303 The shift to a two-child policy by the national government resulted in much higher  
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11 304 numbers of births per year. The hospitals devoted to maternal and child health services have  
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13 305 experienced a significantly increased demand for their services. Yet, there has not been a  
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15 306 corresponding increase in the number of medical professionals available to provide those  
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17 307 services. There is an urgent need to fill this gap. The national government could devote the  
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19 308 resources necessary to train greater numbers of pediatricians and obstetricians as a means to  
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21 309 alleviate the workload currently placed on these doctors.  
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24 310 Regional differences impact burnout in the medical professions. Any efforts to address  
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26 311 burnout should remain attentive to the factors underlying these regional differences,  
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28 312 especially with regard to the resident population's needs and resources devoted to address  
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30 313 those needs.  
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33 314 Administrators in medical institutions are uniquely positioned to identify and reduce  
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35 315 burnout among doctors in their facilities. In addition to their ability to adjust workloads, they  
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37 316 could develop greater opportunities for doctors of all levels to achieve a greater sense of  
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39 317 accomplishment in their profession. Such opportunities could include training, research,  
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41 318 enhanced career mobility, and/or pay incentives for any increase of assigned responsibilities.  
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44 319 Finally, greater public awareness of the challenges that the maternal and child health care  
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46 320 system currently faces could help alleviate some of the factors that contribute to medical  
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48 321 doctor burnout. The government, hospital administrators, researchers, and media outlets could  
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50 322 all promote an understanding of the current situation. This could remove some of the burden  
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52 323 of responsibility that doctors and patients shoulder as they navigate their relationships with  
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54 324 one another.  
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8  
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12  
13 331 revision;Liaosha Ye contributed to data collection;Qi Li contributed to the writing of the  
14  
15 332 article, Xiangyu Ma contributed to data analysis;Xiaodong Yu contributed to data  
16  
17 333 collection;Hua Zhang contributed to data collection and the writing of the article;Xu Luo  
18  
19 334 contributed to data collection

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21  
22 335 *data sharing statement:*We are willing to share the main research data, including the  
23  
24 336 demographic characteristics of the subjects, the doctor-patient relationship score, the job  
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26 337 burnout score and the family support score. The data can be obtained by mail within a year  
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28 338 after the publication of the article. The data of this issue may be helpful for studying the  
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30 339 occupational health and mental health status of Chinese doctors. It is important to note that  
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32 340 this shared data is provided only to relevant researchers of universities and public research  
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34 341 institutions, and the relevant research documents will be shared after the whole subject  
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36 342 finished.

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405 **Table 1.** Subject distribution by demographics

Variables	n	%
Sex		
Female	547	80.7%
Male	131	19.3%
Age in years		
≤ 29	165	24.3%
30–39	298	44.0%
40–49	158	23.3%
≥ 50	57	8.4%
Profession		
Pediatricians	338	49.9%
Obstetricians	339	50.0%
Professional title		
Resident Doctor	282	41.6%
Attending Physician	196	28.9%
Associate Senior	123	18.1%
Chief Physician	77	11.4%
Education		
Junior College	7	1.0%
Undergraduate	356	52.5%
Master's Degree	295	43.5%
Doctorate	20	2.9%
Marriage		
Unmarried	141	20.8%

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Married	522	77.0%
Divorced	15	2.2%
Widowed	0	0
Hours work/week		
≤40	20	2.9%
40–50	164	24.2%
50–60	225	33.2%
≥60 H	269	39.7%
Area		
East	54	8.0%
Central	91	13.4%
West	432	63.7%
Northeast	101	14.9%

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406 **Table 2.** Univariate analysis of MBI-GS scores, FS, and PPR in relation to demographics

Variables	Burnout (M±SD)		
	EE	CY	PE
<b>Sex</b>			
female	15.56±7.682	8.26±6.037	10.59±8.109
male	14.84±8.314	7.23±5.626	10.21±8.100
<i>p</i>	0.104	0.357	0.717
<b>Age (y)</b>			
≤29	15.98±8.067	8.21±6.141	12.79±7.511
30–39	16.21±7.642	8.75±6.006	10.39±8.030
40–49	13.85±7.586	7.24±5.435	9.35±8.229
≥50	14.05±7.879	6.30±6.216	7.81±8.361
<i>p</i>	0.007**	0.000**	0.007**
<b>Profession</b>			
pediatricians	14.64±7.364	7.38±5.423	9.54±7.605
obstetricians	16.21±8.170	8.74±6.413	11.49±8.481
<i>p</i>	0.009**	0.000**	0.011*
<b>Professional Title</b>			
Resident Doctor	16.51±7.745	8.71±6.209	12.56±7.999
Attending physician	15.49±7.194	8.37±5.672	10.09±7.341
Associate Senior doctor	14.44±8.501	7.68±5.813	8.79±8.375
Chief physician	12.84±7.722	5.52±5.435	6.86±7.933
<i>p</i>	0.001**	0.000**	0.000**
<b>Education</b>			
Junior college	15.00±7.234	6.57±5.094	16.29±9.878

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Undergraduate	15.01±7.914	7.87±6.106	9.79±7.879
Master	15.86±7.687	8.51±5.800	11.35±8.280
Doctor	16.50±7.944	5.40±5.688	9.00±7.233
<i>p</i>	0.515	0.091	0.016*
Marriage			
Unmarried	16.20±7.881	8.33±6.170	12.59±7.540
Married	15.22±7.799	7.98±5.948	9.97±8.166
Divorced	15.40±7.424	8.53±4.969	10.13±8.348
<i>p</i>	0.416	0.781	0.003**
Hours worked/week			
≤40	10.55±6.362	5.90±3.986	11.40±8.075
40–50	12.48±6.753	6.29±4.741	9.80±8.047
50–60	13.59±7.243	7.21±5.615	9.04±7.937
≥60	19.12±7.476	10.01±6.496	12.12±8.027
<i>p</i>	0.000**	0.000**	0.000**
Area			
East	17.76±7.578	7.98±5.389	11.30±8.009
Central Region	16.71±7.766	10.05±6.997	11.81±9.219
West	15.98±7.831	8.01±5.896	10.25±8.037
Northeast	10.63±5.880	6.52±5.094	10.05±7.293
<i>p</i>	0.000**	0.001**	0.305

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\**p*-value<0.05; \*\**p*-value<0.01.



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3 408 **Table 3.** Correlations for MBI-GS scores and Family Support and Doctor–Patient  
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5 409 Relationships

Variables	Burnout ( <i>r</i> )		
	EE	CY	PE
Family support	–0.141**	–0.188**	–0.167**
Doctor–patient relationships	0.459**	0.570**	0.338**

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18 410 \**p*-value<0.05; \*\**p*-value<0.01.

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411 **Table 4.** General linear model analysis of the factors associated with MBI-GS scores

Variables	Burnout					
	EE		CY		PE	
	B	Beta	B	Beta	B	Beta
Family support	0	0	-0.064	-0.052	-0.163**	-0.098**
Doctor-patient relationship	0.423**	0.396**	0.422**	0.517**	0.330**	0.298**
Hours worked (per week)	3.494**	0.219**	0.766	0.063	-1.814	-0.110

412 \* $p$ -value<0.05; \*\* $p$ -value<0.01.

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413 **Table 5.** Factors that impact the variance in MBI-GS subscale scores

Variables		EE	CY	PE
	$R^2$	0.107	0.076	0.106
Demographics	$\Delta R^2$	0.088	0.056	0.087
	F	5.677**	3.89**	5.628**
Hours	$R^2$	0.199	0.123	0.115
worked/week	$\Delta R^2$	0.178	0.100	0.092
	F	9.630**	5.423**	5.036**
Family	$R^2$	0.204	0.144	0.137
Support	$\Delta R^2$	0.182	0.12	0.114
	F	9.388**	6.15**	5.820**
Doctor-patient	$R^2$	0.336	0.369	0.212
Relationships	$\Delta R^2$	0.317	0.351	0.189
	F	17.562**	20.282**	9.321**

414 \* $p$ -value<0.05; \*\* $p$ -value<0.01.

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract√ (b) Provide in the abstract an informative and balanced summary of what was done and what was found√
<b>Introduction</b>		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported√
Objectives	3	State specific objectives, including any prespecified hypotheses√
<b>Methods</b>		
Study design	4	Present key elements of study design early in the paper√
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection√
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants√
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable√
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group√
Bias	9	Describe any efforts to address potential sources of bias√
Study size	10	Explain how the study size was arrived at√
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why√
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding√ (b) Describe any methods used to examine subgroups and interactions√ (c) Explain how missing data were addressed√ (d) If applicable, describe analytical methods taking account of sampling strategy√ (e) Describe any sensitivity analyses×
<b>Results</b>		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed√ (b) Give reasons for non-participation at each stage√ (c) Consider use of a flow diagram×
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders√ (b) Indicate number of participants with missing data for each variable of interest×
Outcome data	15*	Report numbers of outcome events or summary measures√
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included√ (b) Report category boundaries when continuous variables were categorized√ (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period√
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and

		sensitivity analyses*
<b>Discussion</b>		
Key results	18	Summarise key results with reference to study objectives√
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias√
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence√
Generalisability	21	Discuss the generalisability (external validity) of the study results√
<b>Other information</b>		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based√

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## Burnout among obstetricians and pediatricians: A cross-sectional study from China

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<b>Primary Subject Heading</b>:	Medical management
Secondary Subject Heading:	Mental health, Health services research, Paediatrics
Keywords:	Chinese Doctors, Burnout, Maternal and child health care hospital, Maslach Burnout Inventory-General Survey

SCHOLARONE™  
Manuscripts

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3 **1 Burnout among obstetricians and pediatricians: A cross-sectional study from China**

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5 2 Junying Ye<sup>1a,4</sup>, Huan Wang<sup>2a,5</sup>, Hao Wu<sup>3\*</sup>, Liaosha Ye<sup>6</sup>, Qi Li<sup>7</sup>, Xiangyu Ma<sup>8</sup>, Xiaodong Yu<sup>5</sup> Hua  
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44 19 <sup>a</sup>Junying Ye and Huan Wang contributed equally to this work.  
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20 **Abstract: Objectives:** Hospitals devoted to maternal and child health represent unique health  
21 care institutions in China. Health care professionals in these hospitals not only attend to health  
22 services for women and children, but also provide technical services and support for district  
23 maternal and children's healthcare as well as family planning. However, few studies have  
24 examined occupational burnout among doctors employed in these hospitals. This research  
25 addresses the gap in the literature. **Methods:** A cross-sectional survey of obstetricians and  
26 pediatricians from 11 maternal and child health hospitals across China was conducted May  
27 through June, 2017. A total of 678 people completed a self-administered questionnaire. The  
28 survey included questions about demographics, doctor-patient relationships, and networks of  
29 support as well as characteristics designed to capture the occurrence of burnout, such as  
30 emotional exhaustion (EE), cynicism (CY), and professional efficacy (PE). T-test, variance, and  
31 multiple regression analyses were used to examine the data. **Results:** The research revealed that  
32 56.6% of obstetricians and pediatricians exhibited signs of occupational burnout. Poor  
33 doctor-patient relationships and high average number of weekly hours worked contributed to  
34 burnout. Additionally, low family support corresponded to physicians' low sense of professional  
35 efficacy. **Conclusions:** Several factors have contributed to occupational burnout among  
36 pediatricians and obstetricians at maternal and child health hospitals in China, including lack of  
37 family support, poor doctor-patient relationships and heavy workloads.

38  
39 **Key words:** Burnout; Chinese Doctors; Maternal and child health care hospital; Maslach Burnout  
40 Inventory-General Survey



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44 **Article summary**

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**Strengths and limitations of this study**

- The research topic is relatively new: the job burnout of doctors in provincial maternal and child health care hospitals in China has scarcely been the key focus; the influences of China's comprehensive two-child policy on the burnout among obstetricians and pediatricians also opens up a new area of research.
- The result shows, for the first time , that 56.6% of obstetricians and pediatricians in Chinese provincial maternal and child health care hospitals exhibited signs of occupational burnout. Poor doctor-patient relationships and high average number of weekly hours worked contributed to burnout.
- This information may raise concerns about the occupational health of Obstetricians and pediatricians in China , and Inspire the government to increase the training of relevant professionals
- A major limitation is that, due to lack of research in this field, this paper only made a preliminary study of the status quo, wanting a more in-depth study, such as interviews, questionnaire surveys, and consultation from professionals.

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## 1 Introduction

China has made great progress on maternal and child health in the past two decades. From 1990 to 2015, the country lowered infant mortality by nearly 70% and maternal mortality 75%<sup>1)</sup>. Much of this success was possible due to a multi-pronged strategy that emphasized investments in antenatal and delivery care, effective referral systems for women at high risk, and a commitment to the professionalization of maternity care<sup>2)</sup>. Hospitals devoted to maternal and child health represent unique health care institutions in China. The professionals in these hospitals not only attend to health services for women and children, but also provide technical services and support for district maternal and children's healthcare as well as family planning. These hospitals are now playing an increasingly significant role in Chinese women and children's health care. For example, our previous survey showed that the number of deliveries in Chongqing Health Center for Women and Children was about 13,000 in 2017, ranking the first among all health institutions in Chongqing, and it was 44.5% higher than that of the second place.

However, the increasing workload, to some extent, limits the development of these hospitals. It is generally known that China has suffered from a shortage of obstetricians in recent years. With the implementation of China's two-child policy, there was much speculation about the impact the change would have on the services provided to mothers and infants. The number of babies born in 2016 represented an increase of 8.7 million from the previous year. Despite the fact that 53 percent of 2016 newborn babies come from two-child families, the population of obstetricians and pediatricians has not increased at the same rate<sup>3)</sup>. In addition, as a result of the new policy, more older women have decided to have another child. Many of them would require assisted reproductive services due to their age, and the same doctors who provide services might go on maternity leave to have their second child<sup>4)</sup> Consequently, doctors have been treating a greater number of high-risk births, and their workloads have increased. Furthermore, the

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72 expectations of patient's family members have intensified, creating greater pressure on them in  
73 doctor-patient relationships. All the factors mentioned above may increase the risk of serious job  
74 burnout among doctors.

75 As a previous research showed, in comparison to other professions, doctors are more likely  
76 to suffer from burnout. The researchers have attributed this likelihood to the fact that doctors are  
77 often held to high standards, are less likely to seek support when they need help, and perform  
78 work that is often emotionally intense<sup>5</sup>). As a matter of fact, interest in occupational burnout  
79 among health care professionals began nearly half a century ago<sup>6</sup>). Freudenberger's early work in  
80 clinics devoted to people struggling with drug addiction noted that staff frequently suffered from  
81 the gradual onset of a lack of motivation and commitment, which was accompanied by both  
82 mental and physical symptoms<sup>7</sup>). The identification of burnout symptoms typically involved 3  
83 dimensions: emotional exhaustion, cynicism, and a low sense of professional achievement<sup>8</sup>). The  
84 burnout was shown to trigger a variety of personal problems for the medical professional, such as  
85 physical illnesses, work absenteeism and/or domestic conflict, and also negatively impact  
86 medical decisions and doctor-patient relationships<sup>9</sup>). Currently, there is a growing interest in the  
87 factors that contribute to burnout and possible strategies to mitigate the impact. For instance, a  
88 2011 study from the U.S. separated the factors into several aspects: external, job-related, and  
89 personal life factors<sup>10</sup>).

90 Research on job burnout among hospital doctors emerged later in China, and never reached  
91 the same level of interest it enjoyed in other countries. To date, the research has focused on the  
92 identification of burnout among general hospital doctors, the factors contributing to job  
93 burnout<sup>11</sup>), and its impact on medical service delivery<sup>12</sup>). Despite the country's sustained  
94 commitment to create a strong Maternal and Child Health Initiative over the past twenty years,  
95 there has not been research on the occupational burnout among the medical professionals

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3 96 working in maternal and child health care hospitals. Our research was designed to address this  
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5 97 gap in the literature and to further an understanding of the challenges China faces in its efforts to  
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7 98 provide quality health care services to mothers and children. A cross-sectional survey was  
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9 99 developed, focusing on the personal character traits of doctors, doctor–patient relationships, and  
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11 100 the levels of support doctors received from their families. Finally, a means to measure burnout  
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13 101 and strategies to mitigate its impacts are proposed.  
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## 19 103 **2 Subjects and Methods**

21 104 A cross-sectional survey was administered to obstetricians and pediatricians across the  
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23 105 country from May until June, 2017.  
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### 26 106 *2.1 Subjects*

28 107 We launched a research project on the job burnout among doctors in maternal and child  
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30 108 health care hospitals, and invited some provincial hospitals of this kind to participate in the  
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32 109 survey. The reason for choosing provincial maternal and child health hospitals is that they have  
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34 110 more perfect systems in pediatric and obstetric departments compared with those of the general  
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36 111 hospitals, and also they undertake more delivery workload, both of which may better reflect the  
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38 112 current situation of job burnout among pediatricians and obstetricians in China. To ensure the  
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40 113 consistency of the samples, we formulated the following inclusion criteria: 1. The maternal and  
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42 114 child health care hospitals chosen must be at provincial level; 2. According to the evaluation  
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44 115 criteria of the third-class maternal and child health care hospitals, the number of beds in use  
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46 116 should be no less than 300, and the beds in departments of obstetrics and pediatrics should  
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48 117 account for not less than 90% of the total number. Besides, hospitals with imperfect systems were  
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50 118 excluded as some maternal and child health care hospitals could only provide outpatient services,  
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52 119 but not hospitalization services because of the decisions made by the administrative departments  
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120 of higher levels.

121 A sample was then obtained from 11 maternal and child health hospitals located in Jiangsu,  
122 Guangdong, Hubei, Shanxi, Gansu, Xinjiang, Chongqing, Yunnan, Sichuan, Guizhou, and  
123 Liaoning. A total of 750 questionnaires, along with a consent form, were distributed by mail to  
124 750 pediatricians and obstetricians from the selected hospitals. By the end of June, 710 doctors  
125 had returned and 678 had completed the questionnaire—an effective response rate of 90.4%. A  
126 total of 131 male (19.3%) and 547 female doctors (80.7%) responded. Approximately half  
127 (49.9%) of the respondents were pediatricians.

128 The Institutional Review Board of Southwest Hospital, China, approved the study proposal  
129 as well as the manner in which the informed consent was obtained from all the participants.

## 130 *2.2 Questionnaire*

131 The questionnaire captured the participants' demographics and employment, information  
132 about doctor–patient relationships, details about the family support enjoyed by doctors, and  
133 indicators of occupational burnout.

134 Demographic and employment information was captured through questions addressing sex,  
135 age, marital status, education level, region, professional title, department, and average number of  
136 hours worked weekly.

137 The question about age permitted one of four possible responses: 29 years of age or younger,  
138 30–39 years of age, 40–49 years of age, and 50 years old of age or older. Departments are divided  
139 into obstetrics and pediatrics, because these two departments are the most important ones in  
140 maternal and child health care hospitals, with the beds accounting for more than 90% of the total  
141 number. Due to the different means by which certification to practice medicine in China may be  
142 obtained, questions regarding education permitted one of four responses: junior college degree,  
143 undergraduate degree, master's degree and doctorate. Participants also could choose one of four

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144 occupational titles: resident, attending physician, associate chief physician and chief physician.  
145 Possible responses to marital status were unmarried, married, divorced or widowed. Place of  
146 employment was limited to regions: Eastern, Central, Western, and Northeastern China. Finally,  
147 the normal working hours of Chinese doctors are 40 hours a week (8 hours a day, 5 days a week),  
148 so we take 10 hours as a grade to indicate the number of average hours worked weekly: 40 hours  
149 or less, 41 - 50 hours, 51 - 60 hours, and 61 hours or more.

150 A Chinese adaptation of the Difficult Doctor–Patient Relationship Questionnaire-10  
151 (DDPRQ-10), originally developed by Steven Hahn and his colleagues<sup>13)</sup>, was used to measure  
152 doctor’s perceptions of doctor–patient relationships<sup>14)</sup>. There were ten questions that focused on  
153 the following areas: physicians’ subjective experiences, patients’ behaviors, and symptoms.  
154 Responses were scored on a six-point Likert scale. The higher the scores, the more difficult the  
155 doctor–patient relationship was determined to be. The Cronbach’s Alpha of the doctor–patient  
156 relationship scale was 0.803.

157 Family support was measured by the Perceived Social Support Scale-Family<sup>15)</sup>, adapted for  
158 research in China by Xiangdong Wang in 1999<sup>16)</sup>. This was a questionnaire that consisted of  
159 questions in two categories: My family can help me concretely; I am able to obtain emotional  
160 help and support from my family when I need it and I can talk to my family about my problems.  
161 Responses were scored on a seven-point scale from completely disagree to completely agree.  
162 Higher scores indicated greater levels of perceived support. The Cronbach’s Alpha was 0.869.

163 The Chinese version of the Maslach Burnout Inventory-General Survey (MBI-GS) was  
164 chosen to identify occupational burnout<sup>17)</sup>. The MBI-GS has been translated and revised to ensure  
165 that the questions could be administered to Chinese subjects in a culturally- and  
166 linguistically-appropriate fashion<sup>18)</sup>. Previous studies on Chinese nurses and doctors that utilized

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167 the revised survey found it to be an effective tool<sup>19,20</sup>). The research consisted of three subscales:  
168 emotional exhaustion (EE, five items), cynicism (CY, four items), and sense of achievement by  
169 professional efficacy (PE, seven items). Emotional exhaustion was defined as feeling emotionally  
170 overwhelmed and exhausted by work; CY was defined as doubting the value of one's work or its  
171 contribution to anything; PE described a feeling of reduced competence and lack of  
172 success/achievement in one's work with other people. Each question was ranked on a six-point  
173 scale from never to always. The possible minimum and maximum scores were 0 to 30 for EE, 0  
174 to 24 for CY, and 0 to 42 for PE. In accordance with the Chinese adaptation of the MBI-GS, the  
175 cut-off points were as follows: a low score for EE was less than 9, average was 9 to 13 and high  
176 was greater than 13; a low score for CY was less than 3, average was 3–9, and high was greater  
177 than 9; and, a low score for PE was greater than 30, an average score was 18–30, and a high score  
178 was less than 18<sup>21</sup>). Individuals with a high score in one or more of these three domains were  
179 considered to exhibit burnout symptoms. Those with high EE and CY scores combined with a  
180 low PE score, were identified as having a high degree of occupational burnout<sup>18</sup>). Cronbach alpha  
181 coefficients for EE, CY, and PE were 0.95, 0.92, and 0.88, respectively.

### 182 *2.3 Statistical analysis*

183 Data were analyzed using SPSS 17 software. T-tests and variance analyses were employed  
184 to test and compare the scores among doctors with different demographics. Additionally, an  
185 analysis was conducted to identify any existing correlation between occupational burnout and  
186 demographic variables, family support, and doctor–patient relationships. Finally, a multiple  
187 regression analysis was performed to examine the factors related to occupational burnout.

188 Harman single-factor analysis was utilized to test for homology<sup>22</sup>). A factor analysis of all  
189 items in the scale was created to determine the principal component in the non-rotation and  
190 identify the amount of homologous variance. An amount of less than 50 percent of the key value

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191 indicated that common method variance was not problematic. Bartlett's and KMO tests were  
192 used to examine scores from the family support, doctor–patient relationships, and occupational  
193 burnout scales. The Bartlett's test approached 0, indicating suitability for factor analysis. KMO  
194 values were: 0.823, 0.847, and 0.913, respectively. SPSS was utilized to test common variance;  
195 the cumulative percentage of the first principal component was 31.98% (less than 50%), which  
196 proved that the common method variance was not severe.

#### 197 *2.4 Patient and Public Involvement statement*

198 This study is just for doctors, no patient and public involved.

### 200 **3 Results**

201 The subjects' distribution by demographics and employment situations is illustrated in Table  
202 1. Among the 678 samples included, women accounted for the vast majority (80.7%); men  
203 accounted for only 19.3%. The majority of the doctors came from the western region, accounting  
204 for 63.7%; only 8.0% came from the eastern region. Pediatricians and obstetricians each  
205 accounted for half of the sample. Only 2.9% of the doctors worked less than 40 hours per week,  
206 and 39.7 percent worked more than 60 hours a week. The overall burnout rate was 56.6%.

207 Univariate analysis of the MBI-GS scores in relation to demographics and employment  
208 situation variables are shown in Table 2. Obstetricians and pediatricians evidenced prevalent  
209 occupational burnout, demonstrating very high average scores on emotional exhaustion and  
210 moderate scores on cynicism. The data indicated that age, department, title, weekly working  
211 hours, and region correlated with greater emotional exhaustion, whereas education, sex and  
212 marital status did not. Doctors aged 40 or younger, with lower levels of education, longer  
213 working hours, or who came from eastern China exhibited a higher level of emotional exhaustion.



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214 Obstetricians evidenced a higher level of emotional exhaustion than pediatricians.

215 Factors such as age, profession, employment position, number of hours worked and place of  
216 residence corresponded with higher levels of cynicism (CY), whereas sex and marital status did  
217 not. As doctors' age increased, they showed higher levels of cynicism. Moreover, longer working  
218 hours, lower professional titles and location in eastern or central China also corresponded to  
219 higher levels of cynicism. Obstetricians demonstrated higher levels of cynicism than  
220 pediatricians.

221 Interestingly, sex and region did not impact PE, yet age, marital status, education,  
222 professional title, work hours and profession all did. Doctors who were younger and unmarried,  
223 had lower professional titles, worked more than 60 hours a week, and exhibited lower levels of  
224 PE, demonstrated a lower sense of achievement on the scales. Interestingly, obstetricians seemed  
225 to enjoy a greater sense of achievement. The analyses of family support, doctor–patient  
226 relationships and occupational burnout (Table 3), revealed that emotional exhaustion was  
227 negatively correlated with family support ( $r=-0.141$ ), yet positively with difficult doctor–patient  
228 relationships ( $r=0.459$ ). cynicism was negatively correlated with family support ( $r=-0.188$ ), yet  
229 positively with difficult doctor–patient relationships ( $r=0.570$ ). Moreover, a sense of achievement  
230 by professional efficacy proved negatively correlated with family support ( $r=-0.167$ ), yet  
231 positively with difficult doctor–patient relationships ( $r=0.338$ ).

232 A regression analysis of factors that shaped occupational burnout showed that the DW value  
233 was 1.74; collinearity was not evident. Table 4 illustrates the relationship between hours of work,  
234 family support, doctor–patient relationships, and occupational burnout. Emotional exhaustion  
235 was negatively correlated with difficult doctor–patient relationships; the correlation coefficients  $\beta$   
236 were 0.396 and 0.219. There was a significant positive correlation between cynicism and difficult  
237 doctor–patient relationships ( $p<0.01$ ), with a correlation coefficient  $\beta$  of 0.517. Family support

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238 was negatively correlated with a sense of achievement by professional efficacy ( $p<0.01$ ), with a  
239 correlation coefficient  $\beta$  of  $-0.098$ . Yet, a significant positive correlation was apparent between  
240 family support and doctor–patient relationships ( $p<0.01$ ), with a correlation coefficient  $\beta$  of  
241  $0.298$ .

242 Multiple regression analysis provided an indication of the factors that helped to predict  
243 occupational burnout, as shown in Table 5. Difficult doctor–patient relationships evidenced a  
244 greater ability to predict EE, CY, and PE (13%, 20%, and 7%, respectively). Work hours also  
245 served as a predictor of EE and CY (9% and 5%, respectively). However, family support proved  
246 to be a less reliable predictor.

#### 248 4 Discussion

249 The rate of occupational burnout among obstetricians and pediatricians reached 56.6%. This  
250 percentage surpasses the rate of 44% identified in Iran, a country with high levels of burnout<sup>23</sup>)  
251 and parallels the estimated 40–70% of burnout among U.S. obstetricians<sup>24</sup>). Recent research on  
252 occupational burnout among physicians in China had indicated much lower rates than those  
253 found here among obstetricians and pediatricians. Moreover, the levels of EE, CY, and PE of  
254 these doctors were higher than those of other medical professionals<sup>21</sup>).

255 There could be several explanations for these high rates of burnout among pediatricians and  
256 obstetricians, the majority of whom in China are women, as they were in the sample we collected.  
257 A study conducted in the United States observed that the burnout rate of female doctors was 1.6  
258 times higher than that of males<sup>25</sup>). Yet, the research conducted here did not identify significant  
259 differences in burnout rates between men and women doctors. Interestingly, the researchers who  
260 conducted the U.S. study noted that women often face additional pressures both at home and on  
261 the job. That is, the factor that impacted the level of burnout was not explained by the sex of the

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262 professional, but rather by the totality of the work for which they were responsible.

263 The findings also suggested that occupational burnout is greater among doctors with longer  
264 working hours. Among the pediatricians and obstetricians sampled, 73% worked more than 50  
265 hours per week.

266 Another possible explanation for the high incidence of burnout could be directly related to  
267 doctor–patient relationships. The greater number of patients in the hospitals devoted to maternal  
268 and child health in recent years, without a corresponding increase in the number of doctors,  
269 suggests that these professionals have had a much greater workload than they previously did. The  
270 amount of time and the energy that may be devoted to each patient would have to be either  
271 reduced or maintained through an increase of hours worked. Moreover, there seemed to be a  
272 dialectical relationship between poor doctor–patient relationships and burnout, each contributing  
273 to the greater likelihood of the other.

274 There were several limitations to the present study. First, as a cross-sectional study, the  
275 research captured the situation of burnout at a single time point. An understanding of the changes  
276 over time would have been helpful to identify any direct impacts of the two-child policy and a  
277 rapid increase of births in China on doctor burnout in facilities specifically devoted to mothers  
278 and children. It would have been interesting to know whether or not the differences in burnout  
279 rates among these doctors compared to others throughout the country already existed prior to  
280 these changes. That would have helped to further focus on any particularities in these  
281 specializations that could merit further attention in future research devoted to addressing burnout.

282 Second, the inclusion of all medical professionals working in these facilities, such as nurses,  
283 could provide greater insight into the systemic and/or dynamic nature of burnout. An  
284 understanding of the prevalence or absence of burnout among all the professions that form part of  
285 a medical team could reveal some of the interpersonal dynamics on the job that could contribute

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286 to or alleviate the symptoms of burnout.

287 Third, a larger sample of hospitals throughout the country would strengthen the research. As  
288 geographic region did appear to play a role in the presence of burnout, a larger sample from each  
289 of the regions would be imperative to better understand those differences.

290 Finally, the study utilized the data collected from the Perceived Social Support Scale and  
291 doctor-reported information about doctor-patient relationships, both of which rely on  
292 self-reporting. To better grasp the entirety of the support potentially available to or enjoyed by  
293 doctors, surveys that capture the experiences of other members of their support networks or  
294 research methods that promote direct observation would be recommended.

## 296 **5 Conclusions**

297 Doctors' occupational health concerns not only themselves, but also the quality of the  
298 services that they are able to provide. Consequently, the high rate of burnout among China's  
299 obstetricians and pediatricians gives cause for concern. There is an urgent need to better  
300 understand the mitigating factors that have contributed to this situation and develop feasible  
301 solutions in light of China's current baby boom. The findings from this research have helped to  
302 identify several possible areas on which to focus efforts in the coming years.

303 The shift to a two-child policy by the national government resulted in much higher numbers  
304 of births per year. The hospitals devoted to maternal and child health services have experienced a  
305 significantly increased demand for their services. Yet, there has not been a corresponding  
306 increase in the number of medical professionals available to provide those services. There is an  
307 urgent need to fill this gap. The national government could devote the resources necessary to  
308 train greater numbers of pediatricians and obstetricians as a means to alleviate the workload  
309 currently placed on these doctors.

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310 Regional differences impact burnout in the medical professions. Any efforts to address  
311 burnout should remain attentive to the factors underlying these regional differences, especially  
312 with regard to the resident population's needs and the resources devoted to address those needs.

313 Administrators in medical institutions are uniquely positioned to identify and reduce burnout  
314 among doctors in their facilities. In addition to their ability to adjust workloads, they could  
315 develop greater opportunities for doctors of all levels to achieve a greater sense of  
316 accomplishment in their profession. Such opportunities could include training, research,  
317 enhanced career mobility, and/or pay incentives for any increase of assigned responsibilities.

318 Finally, greater public awareness of the challenges that the maternal and child health care  
319 system currently faces could help alleviate some of the factors that contribute to medical doctor  
320 burnout. The government, hospital administrators, researchers, and media outlets could all  
321 promote an understanding of the current situation. This could remove some of the burden of  
322 responsibility that doctors and patients shoulder as they navigate their relationships with one  
323 another.

15

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331 Ma contributed to data analysis; Xiaodong Yu contributed to data collection; Hua Zhang  
332 contributed to data collection and the writing of the article; Xu Luo contributed to data collection.

333 *Data sharing statement:* We are willing to share the main research data, including the  
334 demographic characteristics of the subjects, the doctor-patient relationship score, the job burnout  
335 score and the family support score. The data can be obtained by mail within a year after the  
336 publication of the article. The data of this issue may be helpful for studying the occupational  
337 health and mental health status of Chinese doctors. It is important to note that this shared data is  
338 provided only to relevant researchers of universities and public research institutions, and the  
339 relevant research documents will be shared after the whole subject finished.

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18

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401 **Table 1.** Subject distribution by demographics

Variables	n	%
<b>Sex</b>		
Female	547	80.7%
Male	131	19.3%
<b>Age in years</b>		
≤ 29	165	24.3%
30–39	298	44.0%
40–49	158	23.3%
≥ 50	57	8.4%
<b>Profession</b>		
Pediatricians	338	49.9%
Obstetricians	339	50.0%
<b>Professional title</b>		
Resident Doctor	282	41.6%
Attending Physician	196	28.9%
Associate Senior	123	18.1%
Chief Physician	77	11.4%
<b>Education</b>		
Junior College	7	1.0%
Undergraduate	356	52.5%
Master's Degree	295	43.5%
Doctorate	20	2.9%

2

1			
2			
3	Marriage		
4			
5	Unmarried	141	20.8%
6			
7	Married	522	77.0%
8			
9			
10	Divorced	15	2.2%
11			
12	Widowed	0	0
13			
14	Hours work/week		
15			
16	≤40	20	2.9%
17			
18	40–50	164	24.2%
19			
20	50–60	225	33.2%
21			
22	≥60 H	269	39.7%
23			
24			
25	Area		
26			
27			
28	East	54	8.0%
29			
30	Central	91	13.4%
31			
32	West	432	63.7%
33			
34			
35	Northeast	101	14.9%
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403 **Table 2.** Univariate analysis of MBI-GS scores, FS, and PPR in relation to demographics

Variables	Burnout (M±SD)		
	EE	CY	PE
Sex			
female	15.56±7.682	8.26±6.037	10.59±8.109
male	14.84±8.314	7.23±5.626	10.21±8.100
<i>p</i>	0.104	0.357	0.717
Age (y)			
≤29	15.98±8.067	8.21±6.141	12.79±7.511
30–39	16.21±7.642	8.75±6.006	10.39±8.030
40–49	13.85±7.586	7.24±5.435	9.35±8.229
≥50	14.05±7.879	6.30±6.216	7.81±8.361
<i>p</i>	0.007**	0.000**	0.007**
Profession			
pediatricians	14.64±7.364	7.38±5.423	9.54±7.605
obstetricians	16.21±8.170	8.74±6.413	11.49±8.481
<i>p</i>	0.009**	0.000**	0.011*
Professional Title			
Resident Doctor	16.51±7.745	8.71±6.209	12.56±7.999
Attending physician	15.49±7.194	8.37±5.672	10.09±7.341
Associate Senior doctor	14.44±8.501	7.68±5.813	8.79±8.375
Chief physician	12.84±7.722	5.52±5.435	6.86±7.933
<i>p</i>	0.001**	0.000**	0.000**

2

1				
2				
3	Education			
4				
5	Junior college	15.00±7.234	6.57±5.094	16.29±9.878
6				
7	Undergraduate	15.01±7.914	7.87±6.106	9.79±7.879
8				
9				
10	Master	15.86±7.687	8.51±5.800	11.35±8.280
11				
12	Doctor	16.50±7.944	5.40±5.688	9.00±7.233
13				
14				
15	<i>p</i>	0.515	0.091	0.016*
16				
17	Marriage			
18				
19	Unmarried	16.20±7.881	8.33±6.170	12.59±7.540
20				
21	Married	15.22±7.799	7.98±5.948	9.97±8.166
22				
23				
24	Divorced	15.40±7.424	8.53±4.969	10.13±8.348
25				
26	<i>p</i>	0.416	0.781	0.003**
27				
28	Hours worked/week			
29				
30	≤40	10.55±6.362	5.90±3.986	11.40±8.075
31				
32	40–50	12.48±6.753	6.29±4.741	9.80±8.047
33				
34				
35	50–60	13.59±7.243	7.21±5.615	9.04±7.937
36				
37	≥60	19.12±7.476	10.01±6.496	12.12±8.027
38				
39				
40	<i>p</i>	0.000**	0.000**	0.000**
41				
42	Area			
43				
44	East	17.76±7.578	7.98±5.389	11.30±8.009
45				
46	Central Region	16.71±7.766	10.05±6.997	11.81±9.219
47				
48				
49	West	15.98±7.831	8.01±5.896	10.25±8.037
50				
51	Northeast	10.63±5.880	6.52±5.094	10.05±7.293
52				
53				
54	<i>p</i>	0.000**	0.001**	0.305
55				

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\**p*-value<0.05; \*\**p*-value<0.01.

404

1

405 **Table 3.** Correlations for MBI-GS scores and Family Support and Doctor–Patient Relationships

Variables	Burnout ( <i>r</i> )		
	EE	CY	PE
Family support	−0.141**	−0.188**	−0.167**
Doctor–patient relationships	0.459**	0.570**	0.338**

406 \**p*-value<0.05; \*\**p*-value<0.01.

2

407 **Table 4.** General linear model analysis of the factors associated with MBI-GS scores

Variables	Burnout					
	EE		CY		PE	
	B	Beta	B	Beta	B	Beta
Family support	0	0	-0.064	-0.052	-0.163**	-0.098**
Doctor-patient relationship	0.423**	0.396**	0.422**	0.517**	0.330**	0.298**
Hours worked (per week)	3.494**	0.219**	0.766	0.063	-1.814	-0.110

408 \**p*-value<0.05;\*\**p*-value<0.01.

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409 **Table 5.** Factors that impact the variance in MBI-GS subscale scores

Variables		EE	CY	PE
	R <sup>2</sup>	0.107	0.076	0.106
Demographics	ΔR <sup>2</sup>	0.088	0.056	0.087
	F	5.677**	3.89**	5.628**
Hours	R <sup>2</sup>	0.199	0.123	0.115
worked/week	ΔR <sup>2</sup>	0.178	0.100	0.092
	F	9.630**	5.423**	5.036**
Family	R <sup>2</sup>	0.204	0.144	0.137
Support	ΔR <sup>2</sup>	0.182	0.12	0.114
	F	9.388**	6.15**	5.820**
Doctor–patient	R <sup>2</sup>	0.336	0.369	0.212
Relationships	ΔR <sup>2</sup>	0.317	0.351	0.189
	F	17.562**	20.282**	9.321**

\**p*-value<0.05; \*\**p*-value<0.01.

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract√(line 25-31,page1) (b) Provide in the abstract an informative and balanced summary of what was done and what was found√(line 32-37,page1)
<b>Introduction</b>		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported√(line 49-93,page3-4)
Objectives	3	State specific objectives, including any prespecified hypotheses√(line94-102,page4-5)
<b>Methods</b>		
Study design	4	Present key elements of study design early in the paper√(line 107、132、187、203,page5-8)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection√(line108-131,page5-6)
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants√(line 108-121,page5)
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable√(line133-186,page6-8)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group√ (line 139-151,page6-7)
Bias	9	Describe any efforts to address potential sources of bias√(line194-202,page8-9)
Study size	10	Explain how the study size was arrived at√(line 124-128,page6)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why√(line 153-182,page7-8)
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding√(line 188-202,page8-9) (b) Describe any methods used to examine subgroups and interactions√(line 188-202,page8-9) (c) Explain how missing data were addressed√(line 126,page6) (d) If applicable, describe analytical methods taking account of sampling strategy√(line 188-202,page8-9) (e) Describe any sensitivity analyses*
<b>Results</b>		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed√(line 124-128,page6) (b) Give reasons for non-participation at each stage√(line 124-128,page6) (c) Consider use of a flow diagram*
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders√(line 207-213,page9)

		(b) Indicate number of participants with missing data for each variable of interest*
Outcome data	15*	Report numbers of outcome events or summary measures√(line214-2221,page9)
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included√(line228-253,page10-11)
		(b) Report category boundaries when continuous variables were categorized√(line228-253,page10-11)
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period√(line228-253,page10-11)
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses√(line228-253,page10-11)
<b>Discussion</b>		
Key results	18	Summarise key results with reference to study objectives√(line256-281,page11-12)
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias√(line282-303,page12-13)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence√(line256-281,page11-12)
Generalisability	21	Discuss the generalisability (external validity) of the study results√(line306-333,page13-14)
<b>Other information</b>		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based√(line335-336,page15)

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).