

# Socioeconomic inequity in inpatient service utilization based on need among internal migrants: Evidence from 2014 national cross-sectional survey in China

**Yi Wang**

Shandong University

**Zhengyue Jing**

Shandong University

**Lulu Ding**

Shandong University

**Xue Tang**

Shandong University

**Yuejing Feng**

Shandong University

**Jie Li**

Shandong University

**Zhuo Chen**

University of Georgia

**Chengchao Zhou** (✉ [zhouchengchao@sdu.edu.cn](mailto:zhouchengchao@sdu.edu.cn))

<https://orcid.org/0000-0002-9364-3579>

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## Research article

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1 **Title page**

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6 Yi Wang, Zhengyue Jing, Lulu Ding, Xue Tang, Yuejing Feng, Jie Li, Zhuo Chen, Chengchao  
7 Zhou\*

8

9 Yi Wang; Centre for Health Management and Policy Research, School of Public Health,  
10 Cheeloo College of Medicine, Shandong University, Jinan, 250012, China; NHC Key Lab of  
11 Health Economics and Policy Research (Shandong University), Jinan, 250012, China;  
12 wangyi031104@163.com

13 Zhengyue Jing; Centre for Health Management and Policy Research, School of Public  
14 Health, Cheeloo College of Medicine, Shandong University, Jinan, 250012, China; NHC Key  
15 Lab of Health Economics and Policy Research (Shandong University), Jinan, 250012, China;;  
16 2680929012@qq.com

17 Lulu Ding; Centre for Health Management and Policy Research, School of Public  
18 Health, Cheeloo College of Medicine, Shandong University, Jinan, 250012, China; NHC Key  
19 Lab of Health Economics and Policy Research (Shandong University), Jinan, 250012, China;  
20 1531520959@qq.com

21 Xue Tang; Centre for Health Management and Policy Research, School of Public  
22 Health, Cheeloo College of Medicine, Shandong University, Jinan, 250012, China; NHC Key

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23 Lab of Health Economics and Policy Research (Shandong University), Jinan, 250012, China;  
24 tessie0929@163.com

25 Yuejing Feng; Centre for Health Management and Policy Research, School of Public  
26 Health, Cheeloo College of Medicine, Shandong University, Jinan, 250012, China; NHC Key  
27 Lab of Health Economics and Policy Research (Shandong University), Jinan, 250012, China;  
28 fengyuejing1994@163.com

29 Jie Li; Centre for Health Management and Policy Research, School of Public Health,  
30 Cheeloo College of Medicine, Shandong University, Jinan, 250012, China; NHC Key Lab of  
31 Health Economics and Policy Research (Shandong University), Jinan, 250012, China;  
32 lijie2@126.com

33 Zhuo Chen; College of Public Health, University of Georgia, Athens, GA 30606,  
34 USA; School of Economics, University of Nottingham, Ningbo, China, zchen1@uga.edu

35 Chengchao Zhou; Centre for Health Management and Policy Research, School of  
36 Public Health, Cheeloo College of Medicine, Shandong University, Jinan, 250012, China;  
37 NHC Key Lab of Health Economics and Policy Research (Shandong University), Jinan,  
38 250012, China;; zhouchengchao@sdu.edu.cn

39 Tel: (+86) 531 8838 1567 Fax: (+86) 531 8838 2553

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## Abstract

42 **Background:** Providing equal treatment for those who have the same need for healthcare,  
43 regardless of their socioeconomic and cultural background, has become a shared goal among  
44 policymakers who strive to improve healthcare. This study aims to identify the socioeconomic

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45 status (SES) inequities in inpatient service utilization based on need among migrants by using  
46 a nationally representative study in China.

47 **Methods:** The data used in this study was derived from the 2014 National Internal Migrant  
48 Population Dynamic Monitoring Survey collected by the National Health Commission of  
49 China. The sampling frame for this study was taken using the stratified multistage random  
50 sampling method. All provincial urban belt and key cities were stratified, and 119 strata were  
51 finally determined. We used logistic regression method and Blinder-Oaxaca decomposition  
52 and calculated the concentration index to measure inequities of SES in inpatient service  
53 utilization based on need. Sample weights provided in the survey were applied in all the  
54 analysis and all standard errors in this study were clustered at the strata level.

55 **Results:** Of the total internal migrants, 18.75% unmet the inpatient service need. Results  
56 showed that inpatient service utilization concentrated among high-SES migrants  
57 (Concentration Index: 0.036,  $p < 0.001$ ) and the decomposition results suggested that about  
58 44.16% of the total SES gap in inpatient service utilization could be attributed to the gradient  
59 effect. After adjusting for other confounding variables, those had high school degree and  
60 university degree were more likely to meet the inpatient services need, and the OR values  
61 were 1.48 (95% CI 1.07, 2.03,  $p = 0.017$ ) and 2.04 (95% CI 1.45, 2.88,  $p = 0.001$ ), respectively.  
62 The OR values for Quartile 3 and Quartile 4 income groups was 1.28 (95% CI 1.01, 1.62,  
63  $p = 0.044$ ) and 1.37 (95% CI 1.02, 1.83,  $p = 0.035$ ), respectively.

64 **Conclusion:** This study observed an inequity in inpatient service utilization where the  
65 utilization concentrates among high SES migrants. It is important for policy makers to be  
66 aware of them and more intervention should be conducted.

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67 **Keywords**

68 Migrants, Socioeconomic status (SES), Inpatient service utilization, Concentration index,  
69 Blinder-Oaxaca decomposition, China

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71 **Background**

72 According to the World Health Organization (WHO) [1], the key goal of the universal health  
73 coverage (UHC) is to ensure that everyone receive the health care they need. Providing equal  
74 treatment for those who have the same need for healthcare, regardless of their socioeconomic  
75 and cultural background, has become a shared goal among policymakers who strive to improve  
76 healthcare. However, millions of people, especially migrants, do not have the adequate access  
77 to health-care services they need [1]. Migrants face many obstacles in accessing essential  
78 health care services due to factors such as language barriers, a lack of inclusive health policies,  
79 and inaccessible public services [2]. The WHO has been promoting the health of migrants and  
80 committed to adequately address health needs for migrants. A WHO framework for migrant  
81 health has recognized the urgent need for the health sector to address the impact of migration  
82 on health effectively [2].

83 China has experienced the largest migration during the past three decades, with the  
84 number of migrants increased from 230 million in 2011 to 244 million in 2017, which  
85 constituted 18% of the total population of China [3]. Internal migrants, in Chinese literally  
86 “floating population”, which is defined as those who have left their hometowns to live and work  
87 in a new place for more than one month but do not have a local ‘Hukou’ (registered residence)  
88 at the new location [4]. Since 1980s, the rate of urbanization has increased dramatically in

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89 China which is due to internal rural-to-urban migration [5]. However, migrants are known to be  
90 marginalized in China, because of the Hukou system. Although the internal migrants have  
91 made an important contribution to urban economic growth and social stability, their health  
92 status and health service utilization have not received due attention. Comparing with local  
93 residents, the migrants face higher unmet health care need and poorer quality care [2, 6]. The  
94 challenge for China is how to promote economic growth and develop wealth while reducing  
95 inequality among migrants. Addressing the health care needs of migrants can improve their  
96 health status, facilitate social integration, and contribute to economic development [7]. During  
97 the past two decades, China implemented several national healthcare development plans [8] to  
98 improve healthcare access and equality with many challenges and successes. National Health  
99 Commission of the People's Republic of China (NHC-PRC) has started an initiative called  
100 'Equal Access to Public Health Services among Migrants' since 2013, to improve access to  
101 public health service especially the utilization of health service.

102 Equity in health can only be attained if persons with the same level of healthcare needs  
103 receive equal level of care, regardless of their socioeconomic status (SES). However, little  
104 evidence exists on the SES inequities in health service utilization among internal migrants in  
105 China. To date, published studies have mostly been divided into three categories. The first is  
106 about the difference and comparison of the utilization of health services between the migrants  
107 and the local residents [6, 9, 10]. Second, most studies on the internal migrants are based on  
108 regional data [11-15], and there were few studies using a nation-wide data about the migrants.  
109 More importantly, most of the studies focused on the influencing factors of the utilization of  
110 health services of the migrants, but few explored from the perspective of health need [13, 16,

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111 17]. Although SES equity is very important for migrants in access to healthcare services, there  
112 is a shortage of studies explored the SES inequities in inpatient service utilization among  
113 internal migrants in China, especially based on the need of inpatient service. In order to fill  
114 these gaps, this study was performed to explore the SES inequities in inpatient service  
115 utilization based on need among the internal migrants in China, in order to quantify SES roles  
116 in healthcare utilization inequity as a guide for health policy makers and draw public policy  
117 implications to further reform the health care systems.

118

## 119 **Methods**

### 120 **Study design and data**

121 The data used in this study was derived from the 2014 National Internal Migrant Population  
122 Dynamic Monitoring Survey [18], which covered 348 cities in 32 provincial units and collected  
123 by the National Health Commission of China. The purpose of the survey was to investigate the  
124 utilization of health services among internal migrants. The sampling frame for this study was  
125 taken using the stratified multistage random sampling method by probability proportional to  
126 size (PPS) approach. All respondents in this study were aged 15-59 years who had been living  
127 in local residence without the ‘Hukou’ for more than one month, including migrants from both  
128 rural and urban areas. For more details on sampling, design and approvals of the survey, please  
129 refer to an earlier study [19]. The detailed sampling process was shown in **Fig. 1**. Finally, a  
130 total of 7,592 migrants with inpatient service need were included in this nationally  
131 representative analysis.

### 132 **Dependent variable**

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133 In this study, the estimation of the need of inpatient services is based on doctor's  
134 recommendations. Thus, migrants' inpatient service need was measured by questions about  
135 whether they were asked to be hospitalized by a doctor's diagnosis. Based on the inpatient  
136 service need, the outcome was categorized into unmet inpatient services need and met need.  
137 The unmet need for inpatient service referred to the proportion migrants who were asked to be  
138 hospitalized by a doctor but did not utilize it. The key independent variable was  
139 socioeconomic status (SES). American sociologist Duncan pointed out that income and  
140 education can directly represent socioeconomic status, that is, income represents economic  
141 status, and education represents social status [20]. Li et al. [21] also suggested that the SES  
142 estimated based on education and income was largely consistent with people's subjective  
143 evaluation of occupation prestige. Consequently, we used educational attainment (primary  
144 school or below, middle school, high school, and university or above) and economic level  
145 (measured by household income per month. Quartile 1 was the poorest and Quartile 4 was the  
146 richest) to present SES. In this study, we assessed the SES in two ways. First, in order to  
147 compare the inequity of the high-low SES in inpatient service utilization from a macro  
148 perspective, we integrated the educational level and economic status (household income per  
149 month) into a single SES index using principal component analysis (PCA) [22] method  
150 (details see in Appendix Table A1). Then, we used the two specific indicators to show the  
151 associations between SES and inpatient service utilization.

## 152 **Independent variables**

153 The confounders adjusted in this study are based on previous literature on health service  
154 utilization and Andersen health service utilization model [23-25]. The selection principle of

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155 control variables is related to both core explanatory variables (SES) and dependent variables  
156 (inpatient services). According to Andersen model, individuals deciding whether or not to use  
157 health services are mainly influenced by three factors: predisposing characteristics, enabling  
158 resources and actual need for care. Based on previous studies, predisposing factors mainly  
159 include gender, age, marital status, number of children, and duration of migration etc.  
160 Enabling resources mainly include the individual's SES, ethnic group, health insurance status,  
161 health records, and hukou etc. Thus, control variables in this study include gender, age,  
162 marital status (married or single), number of children, ethnic group (Han or ethnic minority),  
163 establishment of health records, Hukou types (urban or rural), health insurance, movement area  
164 (across province, city or county), duration of migration, region (east, central or west), and  
165 willingness for long-term residence of more than 5 years (yes, no, and not decided yet). Types  
166 of health insurance were divided into four subgroups: no health insurance, having New Rural  
167 Cooperative Medical Scheme (NCMS), having Urban Employee Basic Medical Insurance  
168 (UEBMI), and having Urban Resident Basic Medical Insurance (URBMI). Movement area was  
169 categorized into three types: migration across provinces; migration across prefectural cities but  
170 within a province and migration across counties but within a prefectural city. All the control  
171 variables were available through the 2014 National Internal Migrant Population Dynamic  
172 Monitoring Survey. In order to avoid collinearity caused by the possible highly correlation  
173 between control variables and SES, regression diagnosis was carried out. The correlation  
174 matrix among SES and confounding variables have shown that the largest absolute value of  
175 the correlation coefficient was only 0.4, showing a weak correlation. Further, we calculated

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176 the variance inflation factors and found all the factors were no more than 2, a trivial amount,  
177 suggesting that the correlation between SES and covariates is not a serious problem.

178 **Analytical methods**

179 Data analyses were conducted by using the STATA 14.2 (Stata Corporation, College Station,  
180 TX, USA). Descriptive analyses were performed to compare the inpatient service utilization  
181 across different subgroups of the participants using t-test or chi-square test as appropriate and  
182 reported their *p*-values. Sample weights were applied in all the analysis to represent the China  
183 population. To avoid possible regional variation in this study, we controlled regional variable  
184 (east, central or west) in all regressions, and all standard errors were clustered at the strata  
185 level. To be specific, based on the study design of this survey, the weights of this study are  
186 only derived from strata and non-response weight, and all provincial urban belt and key cities  
187 were stratified, and 119 strata were finally determined. For example, Beijing was divided into  
188 seven strata, namely Chaoyang district, Haidian District, Fengtai District, Daxing District and  
189 etc. We used survey commands (*svy*) for estimates of sample weighting and clustering. The  
190 *pweight* command was used to define the sample weights and *strata* command was used to  
191 define strata in order to generate clustering robust standard errors. These commands fits  
192 statistical models for complex survey data by adjusting the results of a command for survey  
193 settings identified by *svyset*. Thus, all standard errors in this study were clustered at the strata  
194 level in order to eliminate the variations within strata level.

195 First, we estimated the concentration index (CI) and constructed a concentration curve  
196 (CC) to illustrate inequity in unmet inpatient service need among migrants. The CC graphs the  
197 cumulative percentage of the sample on the x-axis, ranked by SES index, beginning with the

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198 lowest. CI was used to quantify the magnitude of inequity in unmet need and corresponds to  
199 twice the area between the CC and the 45° line [26]. CC runs from -1 (over-diagonal) to +1  
200 (under-diagonal), indicating whether the unmet inpatient service need is concentrated among  
201 the low-SES (CI < 0), the high-SES (CI > 0), or equally distributed (CI = 0) [27].

202 The concentration index  $C_M$  was calculated by the following formula:

$$203 \quad C_M = \frac{2}{N\bar{y}} \sum_{i=1}^N (y_i - \bar{y}) \left( R_i - \frac{1}{2} \right) \quad (1)$$

$$204 \quad = \frac{2}{\bar{y}} \text{cov}_w(y_i, R_i) \quad (2)$$

205 Where  $\bar{y}$  stands for the mean of  $y$ ,  $y_i$  is the measure of unmet inpatient service need of  
206  $i$ th individual,  $R_i$  denotes the fractional rank of the  $i$ th individual in the SES index, and  
207  $\text{cov}_w$  is the covariance with sampling probability weights. The concentration index and the  
208 associated  $p$ -values were obtained by the delta method [28]. If the  $C_M$  is significantly smaller  
209 than 0, low SES individuals are more likely to have unmet inpatient service need, and vice  
210 versa [29].

211 Then, we adopted logistic regression method to investigate the SES disparities in  
212 multivariate analyses adjusted for confounding variables. Those who received inpatient  
213 services were defined as the reference group. In model 1, we examined the association between  
214 SES and inpatient service utilization without control variables. In model 2, we controlled for  
215 potential confounding factors and estimated the adjusted odds ratio and the 95% confidence  
216 intervals. The model was specified as:

$$217 \quad \text{Logit} \left( \frac{p_i}{1-p_i} \right) = \beta_0 + \beta_1 * \text{SES}_i + \beta_2 * C_i + \epsilon \quad (3)$$

218 Where  $p_i$  represented the probability of inpatient service utilization;  $\text{SES}_i$  represented  
219 the socioeconomic status of  $i$ th individual;  $C_i$  indicated the confounding variables;

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220 Coefficients  $\beta_0$  and  $\beta_1$  represented intercept and SES inequalities, respectively;  $\epsilon$  indicated  
221 error terms; OR indicated Odds Ratio.

222 Finally, the decomposition of the gap in inpatient service use between the high and low  
223 SES migrants was assessed using the Blinder-Oaxaca (BO) decomposition method. The BO  
224 decomposition method was originally developed to explain wage gaps between whites and  
225 blacks and between men and women since the seminal work of Oaxaca and Blinder in the  
226 early 1970s [30, 31]. The BO decomposition [32] was a counterfactual method with an  
227 assumption that "what the probability of unmet inpatient service need would be if low SES  
228 migrants had the same characteristics as their high SES counterparts". In this part, SES was  
229 created using a median split with low SES categorized as below the median of SES index  
230 total score and high SES categorized as above the median. Based on it, the SES inequity was  
231 divided into two parts by using BO decomposition as followed:

$$232 \quad E(P_h - P_l) = (E[Z_h] - E[Z_l])\beta_l + E[Z_h](\beta_h - \beta_l) \quad (4)$$

233 Where  $l$  represented low SES migrants and  $h$  represented high SES migrants;  $Z$   
234 represented all the independent variables in our study;  $\beta$  represented the estimated  
235 coefficients. The first term in Equation (4) corresponded to the proportion of the gap in  
236 outcomes between two groups that were accounted for by group differences in the distribution  
237 of observable characteristics, it indicated "endowments effect" – in our case, this part caused  
238 by differences in migrants' characteristics, so it was also called explained component; while  
239 the second term was "gradient effect" which traced the differences attributable to the effect of  
240 the variables, this part aroused because of the differences in SES effects or attributed to  
241 "discrimination". Decomposing SES differences in inpatient service utilization into

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242 endowments and gradient effects has strong policy implications since the evidence of gradient  
243 effect would reflect that high-low SES migrants endowed with the same characteristics do not  
244 enjoy the same level of inpatient service.

245

## 246 **Results**

247 The participants enrolled in 2014 National Internal Migrant Population Dynamic Monitoring  
248 Survey were 200,937, of which, around 3.82% had the inpatient service need. According to  
249 the Table 1, the total number of the migrants who needed inpatient service diagnosed by doctors  
250 was 7,592, of which, 1,667 (18.75% of total population) did not use the inpatient services  
251 (unmet inpatient service need) and 5,925 (81.25% of total population) had used the inpatient  
252 services. Of the 7,592 participants, about two-thirds (n=5,461) were female. The mean age was  
253 32 years old. Most of the migrants had middle school degree (45.65% of total population),  
254 were Han Chinese (92.92% of total population) and had been married (94.70% of total  
255 population). About 97.31% had at least one child; 82.46% were registered as having a rural  
256 'Hukou' and 76.90% had established the health records in the local residence. Regarding health  
257 insurance, 50.90% were covered by the NCMS, 6.41% and 25.19% were covered by the  
258 URBMI and UEBMI, respectively, while 17.50% had no social health insurance. The majority  
259 of the migrants was across province migration (66.87%) and has willingness for long-term  
260 residence (63.02%). In terms of geographic region, the proportion of migrants in eastern  
261 region was the highest (77.90%), followed by western (15.05%), while central regions had the  
262 lowest proportion (7.05%). In general, we found that there were statistically significant

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263 differences in socioeconomic status, gender, age, marital status, number of children, duration  
264 of migration, and regions by whether met inpatient services needs using chi-square tests.

265 **Figure 2** plotted the concentration curves for probability of inpatient service utilization  
266 among migrants in the previous 12 month. A significant distribution of inpatient service  
267 utilization based on need concentrated among high-SES migrants was observed (CI: 0.036,  
268  $P<0.001$ ).

269 Table 2 showed the association between SES indicators and met inpatient healthcare  
270 services need among migrants. Model 1 presented the disparities in met inpatient services need  
271 in different SES without covariate adjustment. Compared with migrants who had primary  
272 school or below degree, those had middle school degree, high school degree, and university  
273 degree were more likely to meet the inpatient services need, and the OR values were 1.72 (95%  
274 CI 1.33, 2.22,  $p<0.001$ ), 2.15 (95% CI 1.63, 2.85,  $p<0.001$ ), and 2.76 (95% CI 2.11, 3.62,  
275  $p<0.001$ ), respectively. Regarding economic status, compared with the migrants from lowest  
276 economic group, the odds of inpatient service utilization when needed were significantly  
277 higher among those with higher economic group. The OR values for each income group from  
278 the Quartile 2 to the Quartile 4 was 1.41 (95% CI 1.14, 1.76,  $p=0.002$ ), 1.62 (95% CI 1.34,  
279 1.97,  $p<0.001$ ), and 1.67 (95% CI 1.25, 2.22,  $p<0.001$ ), respectively. In Model 2, we included  
280 the two SES indicators at the same time and adjusted for other confounding variables. Both the  
281 coefficients of education and income were attenuated compared with model 1. Specifically,  
282 compared with migrants who had primary school or below degree, those had high school  
283 degree and university degree were more likely to meet the inpatient services need, and the OR  
284 values were 1.48 (95% CI 1.07, 2.03,  $p=0.017$ ) and 2.04 (95% CI 1.45, 2.88,  $p=0.001$ ),

285 respectively. For migrants who had middles school degree, the OR was greater than 1, but it is  
 286 not statistically significant. Regarding economic status, after adjusting for other confounding  
 287 variables, the OR values for Quartile 3 groups and Quartile 4 groups was 1.28 (95% CI 1.01,  
 288 1.62,  $p=0.044$ ) and 1.37 (95% CI 1.02, 1.83,  $p=0.035$ ), respectively.

289 **Table 2** Association between socioeconomic status and receivers of inpatient services among  
 290 migrants who need them, China

Characteristics	Model 1 (No covariates)			Model 2 (Covariates)		
	OR (SE)	95% CI	<i>P</i>	OR (SE)	95%CI	<i>P</i>
<b><i>Socioeconomic status</i></b>						
<b>Educational attainment</b>						
Primary school or below	Ref.			Ref.		
Middle school	1.72 (0.23)	1.33, 2.22	<0.001	1.21 (0.16)	0.93, 1.57	0.154
High school	2.15 (0.31)	1.63, 2.85	<0.001	1.48 (0.24)	1.07, 2.03	0.017
University or above	2.76 (0.38)	2.11, 3.62	<0.001	2.04 (0.36)	1.45, 2.88	0.001
<b>Economic status</b>						
Quartile 1	Ref.			Ref.		
Quartile 2	1.41 (0.16)	1.14, 1.76	0.002	1.15 (0.14)	0.90, 1.47	0.250
Quartile 3	1.62 (0.16)	1.34, 1.97	<0.001	1.28 (0.16)	1.01, 1.62	0.044
Quartile 4	1.67 (0.24)	1.25, 2.22	<0.001	1.37 (0.20)	1.02, 1.83	0.035

291 *Note: Standard error in parentheses all clustered at strata; Sample weights applied; CI indicated*

292 confidence interval; Model 2 were adjusted for gender, age, marital status, number of children, ethnic  
 293 group, health record, Hukou type, health insurance, movement area, duration of migration and  
 294 willingness for long-term residence of more than 5 years and region.

295 Table 3 presented the BO decomposition results. The probabilities of inpatient service  
 296 utilization when needed were 84.8% for high-SES migrants and 77.2% for low-SES. Both  
 297 endowments effect and gradient effect were significant in logistic decompositions, 55.84% of  
 298 the gap between the two groups could be attributed to differences in the distribution of  
 299 explanatory variables included in the model. About 44.16% of the total SES difference in  
 300 inpatient service utilization could be attributed to gradient effect.

301 **Table 3** BO decomposition of the inpatient service utilization when needed among migrants  
 302 (n = 7,592)

	Coef. (SE)	95% CI	Contrib. (%)	P
<b>Predicted probability</b>				
High SES	0.848 (0.017)	0.816, 0.881	-	<0.001
Low SES	0.772 (0.014)	0.744, 0.779	-	<0.001
<b>Difference in predicted probability</b>				
Total gap	0.077 (0.016)	0.046, 0.107	100	<0.001
Due to endowments effect	0.043 (0.011)	0.022, 0.064	55.84	<0.001
Due to gradient effect	0.034 (0.013)	0.009, 0.059	44.16	0.008

303 Note: Regressions and decompositions are weighted with sampling weights provided in the survey.

---

304 *Standard error in parentheses all clustered at strata.*

305 **Table 4** showed the composition of the self-reported reasons for unmet inpatient service  
306 need, of which the most important was feeling unnecessary (41.0%), followed by the economic  
307 difficulties (29.5%).

308 **Table 4** Self-reported reasons for unmet inpatient service need among the migrants

---

<b>Reasons</b>	<b>%</b>
Feeling unnecessary	41.0
Economic difficulty	29.5
Have no time	16.9
No one to take care of	7.1
No effective treatment	2.3
Others	2.1
Lack of hospital beds	1.0

---

309 *Note: The percent were weighted with sampling weights provided in the survey*

310

## 311 **Discussion**

312 Healthcare utilization based on need is a key indicator to assess the operation of a country's  
313 healthcare system, and any barriers of access to healthcare should be identified and then  
314 eliminated [33]. It is important to assess equity in meeting health services need rather than  
315 accessing to healthcare, since access simply denotes an opportunity to receive healthcare,  
316 while meeting need mean utilizing the opportunity. One of the objectives of UHC is equity in

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317 access to healthcare services, which means ‘everyone who needs these services should get  
318 them, not just those who can pay for them [34]. Analyzing the SES inequities in inpatient  
319 service utilization based on need among the migrants is vital to develop targeting measures, so  
320 as to better meet the health services need of the migrants. Using the National Internal Migrant  
321 Population Dynamic Monitoring Survey dataset in 2014, we found that the rate of unmet  
322 inpatient service need among migrants was 21.96%, which was higher than 17.1% of general  
323 population [35], implying the migrants still face many barriers in accessing essential health  
324 care than the local residents. CI has been widely used in the health inequity literature. This  
325 study found that CI was significantly larger than 0 and the CC lying over the line of equality,  
326 meaning inpatient service utilization concentrated more among the high SES group.  
327 Socioeconomic inequality in the use of healthcare, i.e., the high SES group having a higher  
328 probability of healthcare utilization when needed, is a persistent in low- and middle- income  
329 countries [36]. Our results are similar to previous studies on general healthcare utilization in  
330 China [37, 38].

331 We found the two SES indicators, including economic status and educational attainment,  
332 are statistically significant. Our study indicated that low economic status of internal migrants  
333 was a key barrier to accessing inpatient service. Compared with those in the low-economic  
334 status group, internal migrants with higher economic status were more likely to utilize inpatient  
335 service when they had an inpatient service need, which was consistent with the second  
336 self-reported reason shown in Table 4 (economic difficulty, 29.5%) for unmet inpatient service  
337 need among internal migrant. Previous studies have shown that the risk of unmet inpatient  
338 service of the poor people was significantly higher than that of non-poor people [24], both in

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339 the permanent residents and the migrants [4, 39] . There are several possible reasons for this  
340 finding. First, migrants with higher economic status in China have higher payment capacity,  
341 and hence, they were more likely to use inpatient services when in need. In contrast, most of the  
342 migrants abandon hospitalization because of poor affordability [40]. Second, most of those  
343 with low economic status are those rural-to-urban migrants. The primary goal of migration  
344 among this population is in search of economic opportunities in urban areas. Thus, they tend to  
345 focus on their economic conditions only, and usually do not prioritize their own health [2].  
346 Even if they needed inpatient health services, going to hospital would cost them a fortune.  
347 Despite the nearly universal medical insurance coverage in China, economic status remains the  
348 dominant barrier to healthcare services utilization [25, 41, 42], including outpatient and  
349 inpatient services, and lead to inequity in general health care utilization [38, 40, 43]. This  
350 phenomenon is even more severe among the internal migrants. This study also suggests that  
351 low educational attainment is associated with unmet inpatient service need among internal  
352 migrants, which is consistent with other studies [16, 44-46]. One possible interpretation for this  
353 finding is that the internal migrants with higher education usually have more knowledge and  
354 higher awareness about the importance of inpatient service use, and this may facilitate their  
355 utilization of inpatient services when they have a need.

356 Consistently, the results of BO decomposition also show that migrants with high SES  
357 have higher probability of meeting inpatient service need. About 55.84% gap in unmet  
358 inpatient service need between low and high SES can be explained by difference in the levels  
359 of observable characteristics. The "gradient effect", which is considered as "discrimination" in  
360 previous studies, reflects inequity here. The decomposition results suggest that about 44.16%

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361 of the total SES gap in inpatient service utilization could be attributed to the gradient effect.  
362 Namely, SES inequity could account for around 44% in unmet inpatient service need among  
363 migrants. Migrants with lower SES may choose to delay or resist the need of inpatient  
364 services since meeting the need of inpatient services often means high medical expenses.  
365 Improving social and economic resources of low SES migrants would be helpful for reducing  
366 the barriers of unmet inpatient need. To be specific, policy makers should develop pro-poor  
367 health insurance scheme in migrants with low economic status. Also, future interventions  
368 might consider using health education focusing on migrants with low level of education. It is  
369 worth mentioning that popular and easy ways should be conducted to intervene for migrants  
370 with low educational attainment and improve their use of inpatient service when in need. For  
371 example, a better form of health education on migrants is peer education. Those low education  
372 migrants with similar age profile, gender and economic status can have common topics of  
373 discussion, and thus share information, so as to amplify the effect of "peer effect".

374 Although previous studies have shown that high-SES is a protective factor in using public  
375 health service among the migrants [12, 16, 17, 47-49], few explored from the perspective of  
376 inpatient services need among internal migrants in China. The present study also has several  
377 limitations. First, the utilization of inpatient services is self-reported, thus, recall bias might  
378 exist. Second, due to the lack of the information on the use of outpatient services, we cannot  
379 analyze the utilization of full health services of migrants. Third, most of migrants using  
380 inpatient services are female. The reasons of inpatient services for female may be childbirth,  
381 which might lead to some bias. Finally, although we have controlled the inpatient service need,

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382 we are unable to further adjust for health-related variables due to the limitations of our dataset,  
383 such as comorbidities or clinical risk factors.

384

### 385 **Conclusion**

386 In conclusion, this study observes an inequity in meeting inpatient service needs among  
387 migrants where the utilization concentrates among those with high SES. The migrants with  
388 higher economic status and educational attainment are both more inclined to utilize inpatient  
389 services when needed. The findings imply that more interventions should be conducted. A  
390 mix of pro-poor health insurance schemes and a post-discharge medical finance aids might be  
391 useful to improve the inpatient service use when needed among the migrants with low  
392 economic status. In addition, a health education about the importance of inpatient service use  
393 when needed for those with low educational attainment might be helpful.

394

### 395 **List of abbreviations**

396 SES: socioeconomic status; UHC: universal health coverage; WHO: World Health  
397 Organization; NHC-PRC: National Health Commission of the People's Republic of China;  
398 PPS: probability proportional to size; PCA: Principal Component Analysis; NCMS: New  
399 Rural Cooperative Medical Scheme; UEBMI: Urban Employee Basic Medical Insurance;  
400 URBMI: Urban Resident Basic Medical Insurance; CI: Concentration Index; CC:  
401 Concentration Curve; BO: Blinder-Oaxaca; OR: Odds Ratio

402

### 403 **Declarations**

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404 **Ethics approval and consent to participate**

405 Not applicable.

406 **Consent for publication**

407 Not applicable.

408 **Availability of data and materials**

409 The datasets are open to all of the potential users online.

410 [<http://www.chinaldrk.org.cn/wjw/#/data/classify/population/yearList>].

411 **Competing interests**

412 The authors declare that they have no competing interests.

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418 **Authors' contributions**

419 CCZ and ZC conceived the idea and polished the manuscript. YW coded and analyzed data  
420 and wrote the manuscript. ZJ, YF, XT, and LD participated in interpretation of the data. All  
421 authors read and approved the final manuscript.

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563

564 **Tables**

565 **Table 1** Characteristics of the migrants who need to be hospitalized by doctor's diagnosis,  
 566 China (n=7,592)

Characteristics	Total N (%)	Inpatient services		p-value
		Met need N (%)	Unmet need N (%)	
<b>Total</b>	7592	5925 (81.25)	1667 (18.75)	
<b>Socioeconomic status</b>				
<b>Educational attainment</b>				<0.001
Primary school or below	1106 (12.48)	721 (10.66)	385 (20.37)	
Middle school	3544 (45.65)	2725 (45.17)	819 (47.74)	
High school	1499 (21.42)	1226 (22.12)	273 (18.37)	
University or above	1443 (20.45)	1253 (22.05)	190 (13.52)	
<b>Economic status</b>				<0.001
Quartile 1	1927 (18.26)	1363 (16.93)	564 (23.99)	
Quartile 2	2227 (26.27)	1724 (25.70)	503 (28.74)	
Quartile 3	1565 (22.21)	1286 (22.97)	279 (18.94)	
Quartile 4	1873 (33.26)	1552 (34.40)	321 (28.34)	
<b>Control variables</b>				
<b>Gender</b>				<0.001
Female	5461 (78.82)	4670 (83.87)	791 (56.92)	
Male	2131 (21.18)	1255 (16.13)	876 (43.08)	
<b>Age</b>	32.31	31.25	36.90	<0.001
<b>Marital status</b>				<0.001
Married	7120 (94.70)	5649 (96.21)	1471 (88.19)	
Single	472 (5.30)	276 (3.79)	196 (11.81)	
<b>Number of children</b>				<0.001
0	195 (2.69)	126 (2.01)	69 (5.60)	

1	4070 (50.72)	3340 (53.04)	730 (40.69)	
≥2	3327 (46.59)	2459 (44.95)	868 (53.71)	
<b>Ethnic group</b>				0.943
Han	6915 (92.92)	5396 (92.91)	1519 (92.99)	
Ethnic minority	677 (7.08)	529 (7.09)	148 (7.01)	
<b>Health records</b>				0.103
Yes	5648 (76.90)	4396 (76.25)	1252 (79.74)	
No	1944 (23.10)	1529 (23.75)	415 (20.26)	
<b>Hukou</b>				0.423
Urban	1301 (17.54)	1041 (17.84)	260 (16.22)	
Rural	6291 (82.46)	4884 (82.16)	1407 (83.78)	
<b>Health insurance</b>				0.318
No insurance	1066 (17.50)	844 (18.00)	222 (15.34)	
NCMS	4447 (50.90)	3433 (50.04)	1014 (54.60)	
URBMI	551 (6.41)	410 (6.51)	141 (5.98)	
UEBMI	1528 (25.19)	1238 (25.45)	290 (24.08)	
<b>Movement area</b>				0.077
Across province	3650 (66.87)	2867 (67.60)	783 (63.71)	
Across city	2330 (23.23)	1838 (23.00)	492 (24.23)	
Across county	1612 (9.90)	1220 (9.40)	392 (12.05)	
<b>Duration of migration (year),</b>	4.30	3.98	5.66	<0.001
<b>Plans for long-term residence (&gt; 5 years)</b>				0.195
Yes	5072 (63.02)	3940 (62.59)	1132 (64.85)	
No	740 (9.60)	565 (9.31)	175 (10.84)	
Not decided yet	1780 (27.39)	1420 (28.10)	360 (24.31)	
<b>Regions</b>				<0.001
East	3286 (77.90)	2716 (79.23)	570 (72.12)	
Central	1632 (7.05)	1219 (6.70)	413 (8.61)	
West	2674 (15.05)	1990 (14.07)	684 (19.27)	

567 *Note: The percent in parentheses were weighted with sampling weights provided in the survey;*

568 *NCMS: New Rural Cooperative Medical Scheme; UEBMI: Urban Employee Basic Medical*

569 *Insurance; URBMI: Urban Resident Basic Medical Insurance. Quartile 1 was the poorest and*

570 *Quartile 4 was the richest.*

571

572 **Figures**

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573 Figure 1: Flow chart of sample selection

574 Figure 2: Concentration curves for probability of inpatient service use among migrants

# Figures

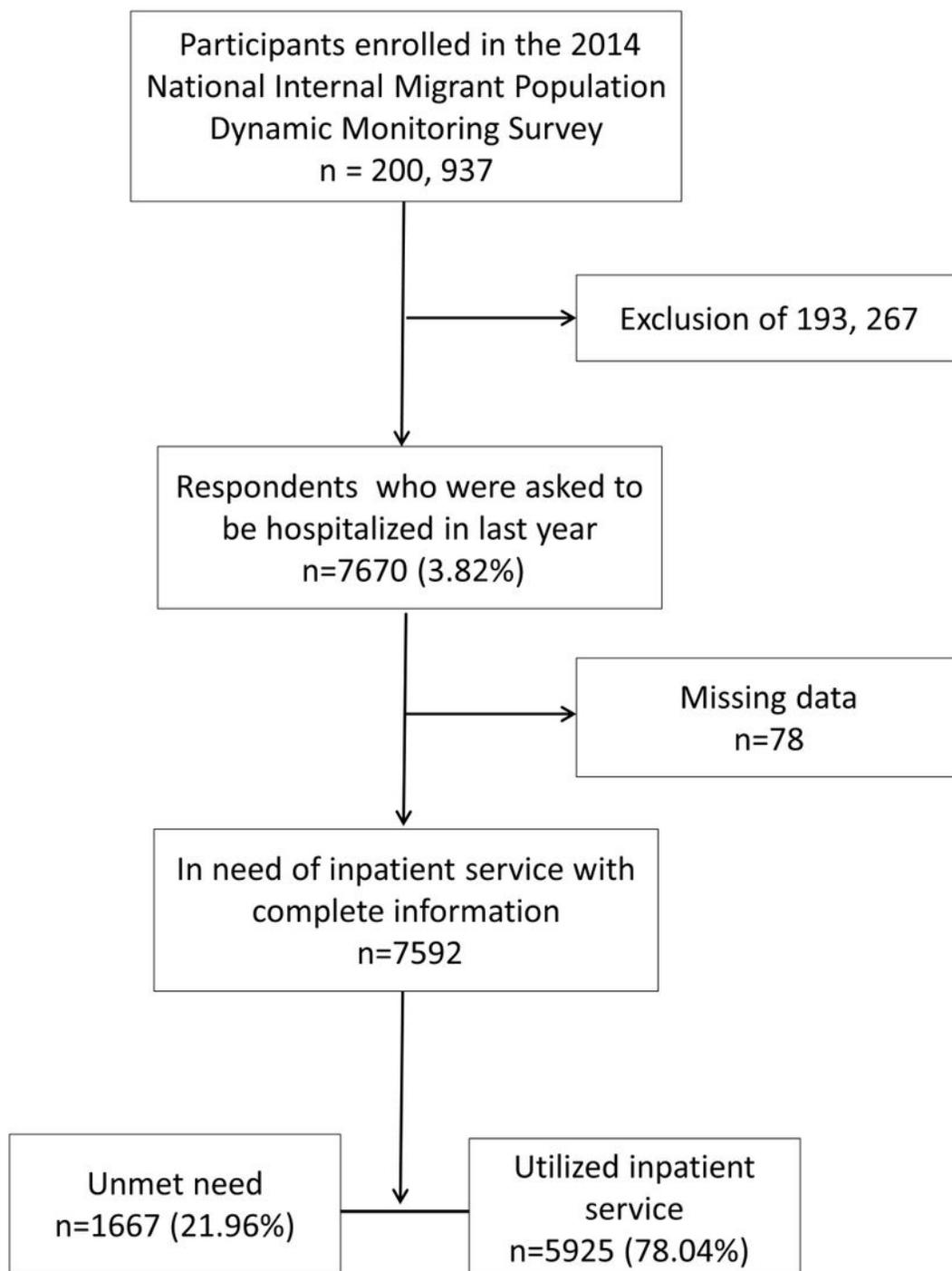


Figure 1

Flow chart of sample selection

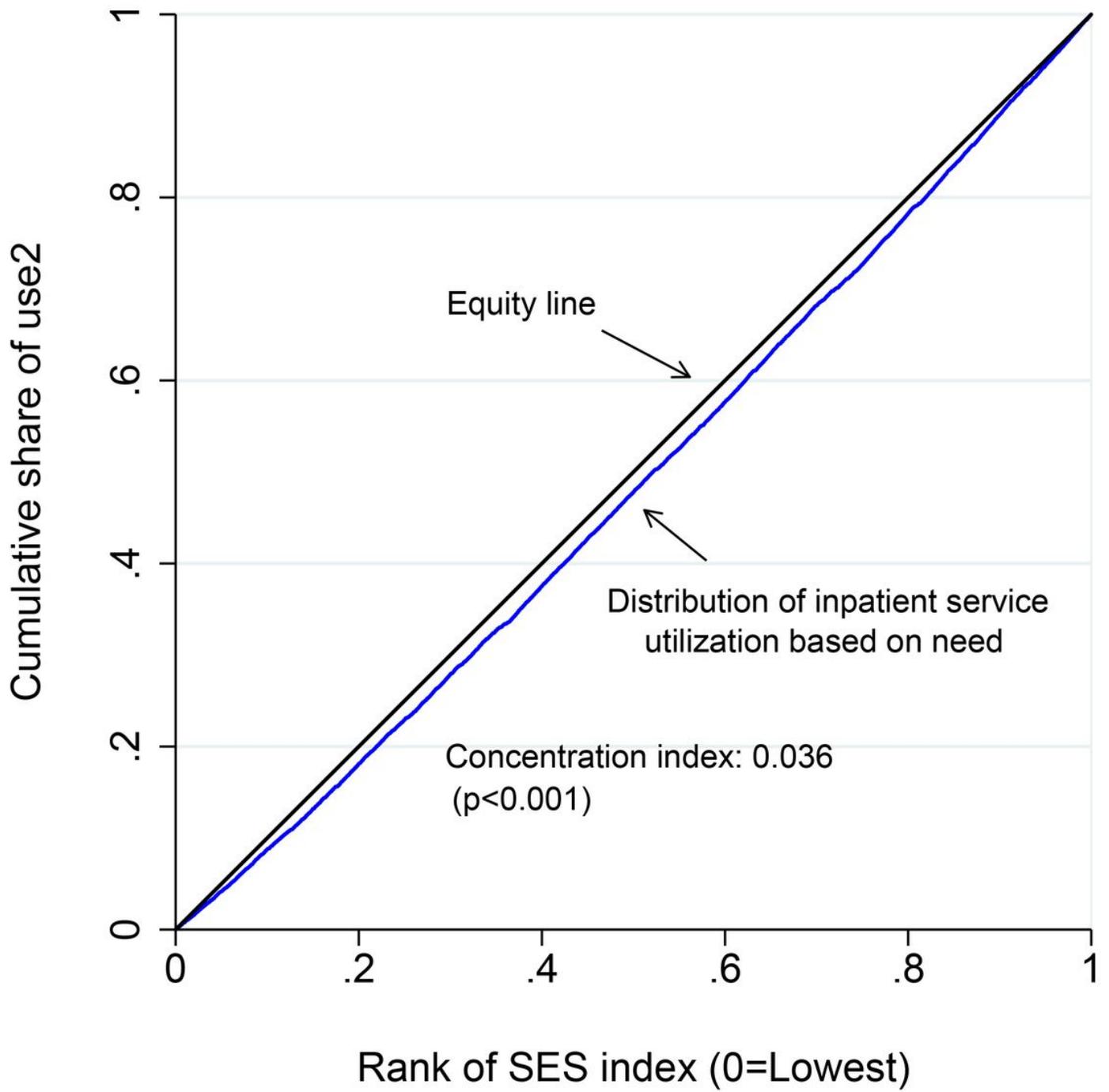


Figure 2

Concentration curves for probability of inpatient service use among migrants

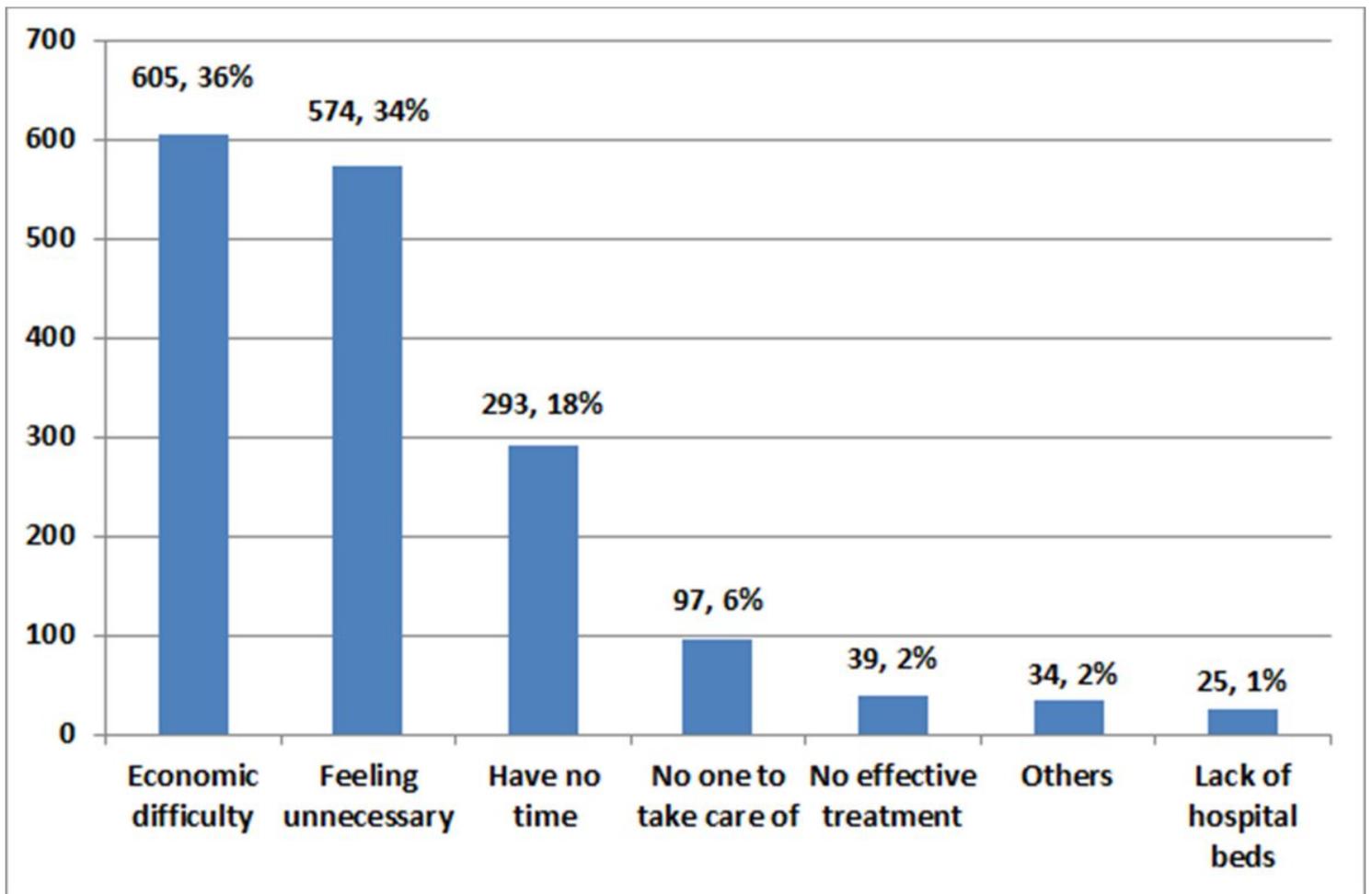


Figure 3

Self-reported reasons for unmet inpatient service need among the migrants

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryAppendixTableA1.docx](#)