

1 **Public Health Services Utilization and Its Determinants among Internal
2 Migrants in China: Evidence from a Nationally Representative Survey**

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25 **Abstract:** *Background:* Internal migrants had obstacles in accessing local public
26 health services in China. This study aimed to estimate the utilization of local public
27 health services and its determinants among internal migrants. *Methods:* Data were
28 from the 2014 and 2015 nationally representative cross-sectional survey of internal
29 migrants in China. Multivariate logistic regressions were used to estimate the
30 relationship between socioeconomic, migration, demographic characteristics and
31 public health services utilization. *Results:* Internal migrants in more developed eastern
32 regions used less public health services. Those with higher socioeconomic status were
33 more likely to use public health services. The broader and shorter they migrated, the
34 less they used public health services. Compared to migration within the city,
35 migration across provinces is negatively associated with health records (OR=0.88, 95%
36 CI: 0.86-0.90), health education (OR=0.97, 95% CI: 0.94-1.00), and health education
37 on NCDs (OR=0.92, 95% CI: 0.89-0.95) or through Internet channel (OR=0.96, 95%
38 CI: 0.94-0.99). *Conclusion:* Public health services coverage for internal migrants has
39 seen great improvement due to government subsidies. Internal migrants with lower
40 socioeconomic status and across provinces need to be targeted. More attention should
41 be given to the local government in the developed eastern regions in order to narrow
42 the regional gaps.

43

44 **Keywords:** migrant, public health, health education, health records, China

45 **1. Introduction**

46 During the last three decades, the number of internal migrants has been increasing
47 dramatically in China, reaching 245 million and accounting for 18% of the total
48 population in 2016.¹ In China, internal migrants (i.e., the floating population) are
49 defined as those who live outside their cities of Hukou registration. Hukou, a
50 permanent household registration system, ties citizens' access to services according to
51 their Hukou location and Hukou classification (rural vs. urban).² Many public
52 policies and social welfare programs are implemented based on the long-established
53 Hukou system.^{3,4} The Hukou status is also difficult for citizens to be transferred from
54 rural into urban or from one place to another place when people migrate.⁵ Thus, the
55 social welfare and healthcare benefits in urban areas are only available to local
56 residents with registered Hukou, but not to the internal migrants.⁶ The health of
57 internal migrants has not been a focus of the urban healthcare system for a long time.
58 The city government in urban areas mainly addressed three health problems for
59 internal migrants: infectious diseases, reproductive health, and occupational disease,
60 because these problems had external effect on local residents.⁷ However, the
61 prevention and control of non-communicable diseases (NCD) among internal
62 migrants has not become the top priority.

63

64 The national program of Equalization of Essential Public Health Services is one of the
65 very few programs that cover the NCD prevention and control for internal migrants.⁸
66 In 2009, the Chinese government issued this national program, aiming to provide the
67 essential public health services for all residents free of charge.⁹ The essential public
68 health services included the establishment of health records, health education,
69 immunization, children and maternal health management, and NCD management.^{9,10}
70 The government subsidies were given to primary care providers for delivering these
71 services. The government raised the subsidy from 15 Renminbi (RMB) per capita in
72 2009 to 40 RMB in 2015 for financing essential public health services.¹⁰

73

74 Unfortunately, migrants might have obstacles in accessing local public health services

75 because these capitation-based subsidies were generally allocated based on the
76 number of residents with local Hukou. Although establishing health records was
77 necessary for disease prevention and treatment, only 23.8% of migrants had
78 established health records in 2013.¹¹ While 64.12% of migrants received some health
79 education, more than half of them did not receive any health education on
80 occupational safety and health protection at the cities in 2013.¹¹ Recently some cities
81 issued policies to promote the equalization of essential public health services between
82 migrants and local residents. However, previous studies showed that migrants were
83 still less likely to receive public health services than local residents.¹² A survey in
84 Guangdong province showed that in 2014, the rate of utilizing essential public health
85 services was only 30.37% among the migrants, far below that in the urban residents
86 (43.23%).¹³

87

88 In fact, little has been known about national status, regional variations, and the
89 determinants of public health services utilization among internal migrants in China.
90 The existing literature mainly focused on utilization of medical services for internal
91 migrants.^{14,15} The few studies that did investigate the utilization of public health
92 services were limited in generalizability because they only focused on several
93 megacities such as Beijing, Shanghai and Guangzhou,^{16,17} or focused on patients with
94 certain diseases.¹⁸ Moreover, they emphasized on the demographic and
95 socioeconomic factors that affected the utilization of public health services but did not
96 examine the influence of migration characteristics.^{17,19} To provide evidence to
97 achieve the equalization of public health services between residents and migrants, this
98 study aims to investigate the national status, regional variation, and influencing
99 factors of the public health services utilization among Chinese internal migrants,
100 using a nationally representative survey for migrants.

101

102 **2. Materials and Methods**

103 **2.1. Data and Study Design**

104 The data were from the 2014 and 2015 waves of the National Internal Migrants

105 Dynamic Monitoring Survey (NIMDMS), conducted by the National Health and
106 Family Planning Commission of China. The NIMDMS is a cross-sectional and
107 nationally representative survey of internal migrants aged 15-59 years who did not
108 have the local “Hukou” and had been living in local cities for more than one month.

109

110 The sample was drawn using the stratified multi-stage random sampling method with
111 the Probability Proportional to Size (PPS) approach. The survey covered 348 cities
112 from all 32 provincial units in China. Within each city, neighborhoods in urban or
113 suburban areas were randomly selected using the PPS, resulting in a total of 10,300
114 communities nationwide. In each selected neighborhood, 20 migrants were randomly
115 selected to participate in the survey, and the survey was conducted through the
116 face-to-face interviews. Finally, there were 200,937 and 206,000 migrants who
117 participated in the survey in 2014 and 2015 respectively. All subjects gave their
118 informed consent for inclusion before they participated in the study. Our study was
119 conducted in accordance with the Declaration of Helsinki, and approved by the Ethics
120 Committee of the School of Public health, Fudan University, China.

121

122 The questionnaires included five sections: (I) basic demographic characteristics
123 including gender, age, marital status and etc.; (II) socioeconomic status including
124 education, income and occupational status; (III) migration characteristics; (IV) public
125 health and medical services including establishment of health records, health
126 education, health insurance coverage and hospitalization services; (V) family planning
127 services.

128

129 **2.2. Dependent Variables**

130 The outcome of the analysis is the utilization of public health services, which is
131 measured by two binary variables indicating the establishment of health records and
132 the attendance of health education sessions in the living city respectively.

133 We are also interested in the content and methods of health education among internal
134 migrants who received health education. As discussed in the introduction section, the

135 prevention and control of NCD among internal migrants were often neglected. Thus,
136 we are especially interested in whether migrants received any health education on
137 NCD. We constructed a binary variable based on the question “whether migrants
138 received health education content on NCD prevention, including nutrition health
139 knowledge, chronic disease prevention and mental health prevention.” In addition, the
140 method of health education is measured by a binary variable indicating whether health
141 education is done by face-to-face or online. This variable is constructed based on the
142 question “whether migrants received health education by the Internet channel,
143 including phone message, WeChat and online consultation.”

144

145 **2.3. Independent variables**

146 The independent variables were socioeconomic, migration, and demographic
147 characteristics.

148 • Socioeconomic status: Variables included monthly income, educational
149 attainment, employment status, and Hukou status. Income was measured as a
150 continuous variable. Respondents’ education levels were categorized into four
151 groups: primary school or below, middle school, high school and college degree or
152 above. Employment status contained three categories: unemployment, employed,
153 self-employed. Hukou status was categorized into two types: rural and urban Hukou.

154 • Migration characteristics: Migration characteristics were measured by the years
155 of living in the local city, migration scope, causes of migration, and where they lived
156 currently. Migrants may move across counties within the city, across cities within the
157 province, or across provinces, which measured migration scope. The causes of
158 migration included seeking jobs, and their family members following them to
159 migrate or other reasons. The place where they lived was divided as the urban and
160 suburban areas.

161 • Demographic characteristics: gender, marital status (currently married vs. single),
162 and age were included.

163

164 **2.4. Statistical analysis**

165 We first described the characteristics of the respondents and their public health
 166 services utilization. The provincial variation of public health services utilization rates
 167 were then displayed by maps which were created by the geographic information
 168 system (GIS). In addition, multivariate regressions were used to estimate the
 169 relationship between socioeconomic, migration, demographic characteristics and
 170 public health services utilization. In order to control the homogeneity within each city,
 171 generalized multilevel models were used in multivariate regressions. All statistical
 172 analyses were conducted using SAS 9.4 except for the maps.

173

174 **3. Results**

175 ***3.1. Characteristics of the respondents***

176 The characteristics of study participants are presented in Table 1. Overall, the average
 177 age was around 35 years in both panels, and there were more males than females, with
 178 the majority married. Average monthly income increased from 3721 RMB in 2014 to
 179 4077 RMB in 2015. About 85% of the respondents had completed the education of
 180 middle school or above and were registered as rural Hukou. In 2014, about 90% of
 181 internal migrants were either employed or self-employed, and this proportion dropped
 182 to 82% in 2015. These migrants had lived in the local city around five years, about
 183 half migrated across provinces, and 70% lived in urban areas. According to the causes
 184 of migration, the percentage of seeking jobs decreased slightly from 88.13% in 2014
 185 to 84.39% in 2015.

186

187 **Table 1. Characteristics of the respondents in NIMDMS, 2014 & 2015**

Characteristics	2014, N (%)	2015, N (%)
<i>Demographic characteristics</i>		
Gender		
Male	117624 (58.55)	109300 (53.06)
Female	83273 (41.45)	96689 (46.94)
Age (year)*	34.66 (9.40)	36.29 (10.64)
Marital status		
Single	47997 (23.89)	43521 (21.13)
Married	152899 (76.11)	162468 (78.87)

Socioeconomic status

Monthly income (RMB)*	3721.86 (5439.44)	4077.82 (4873.15)
Education		
Primary school or below	27911 (13.89)	31336 (15.21)
Middle school	105874 (52.70)	104005 (50.49)
High school	41280 (20.55)	44774 (21.74)
College degree or above	25832 (12.86)	25874 (12.56)
Employment status		
Unemployed	24537 (12.21)	36443 (17.69)
Employed	82099 (40.87)	78902 (38.30)
Self-employed	94257 (46.92)	90641 (44.00)
Hukou status		
Rural Hukou	170870 (85.05)	174691 (84.81)
Urban Hukou	30027 (14.95)	31298 (15.19)
Migration characteristics		
Years of living in the local city*	5.06 (4.78)	5.17 (4.95)
Causes of migration		
Seeking jobs	177045 (88.13)	173829 (84.39)
Family members following migrants or other reasons	23852 (11.87)	32160 (15.61)
Migration scope		
Across provinces	102371 (50.96)	102781 (49.90)
Across cities within the province	60933 (30.33)	62503 (30.34)
Across counties within the city	37593 (18.71)	40705 (19.76)
Currently living area		
Urban	140460 (69.92)	146691 (71.21)
Suburban	60437 (30.08)	59298 (28.79)
N	200,937	206,000

Note: *Mean, SD.

188

189

190 **3.2. Utilization of local public health services among internal migrants**

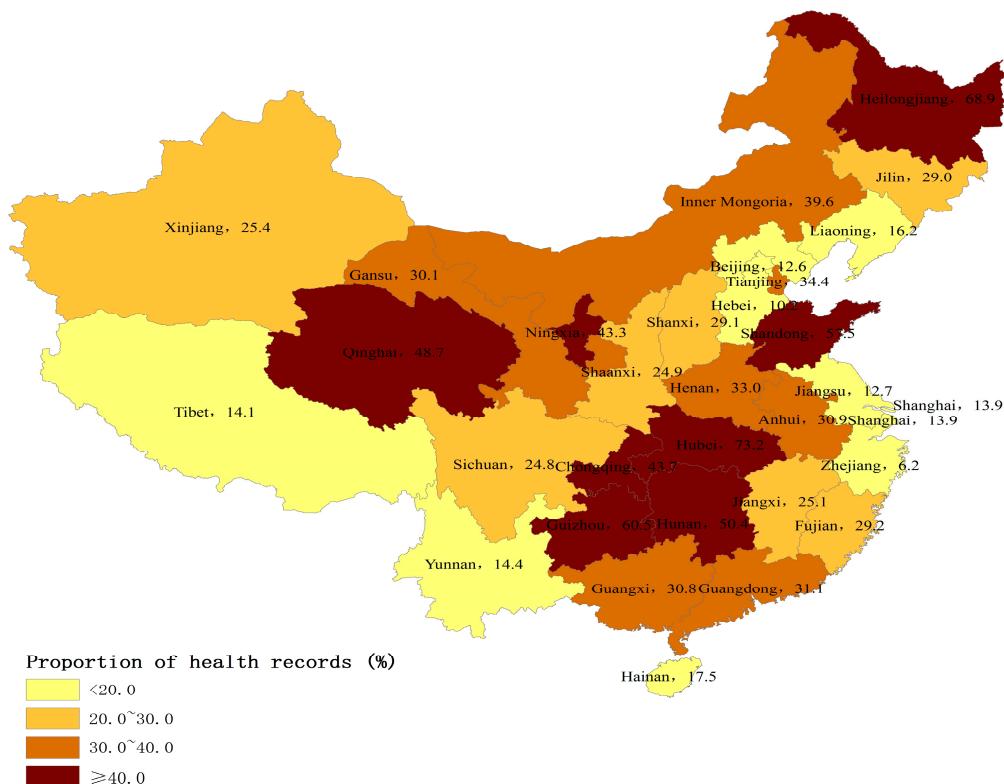
191 Table 2 demonstrates the utilization percentages of local public health services among
 192 internal migrants in China. In 2015, 29.10% of the migrants in the survey reported
 193 that they have established health records, which increased from 22.98% in 2014. The
 194 proportion of migrants who have accessed health education rose from 70.14% in 2014
 195 to 90.70% in 2015. In terms of the content of health education, 95% of the migrants
 196 have accessed health education on infection diseases in both panels. Meanwhile,
 197 80.86% of the migrants have accessed health education on NCDs prevention in 2015,

198 which increased from 66.54% in 2014. Almost all internal migrants accessed health
 199 education face-to-face in both panels, whereas the proportion of using the Internet
 200 increased from 43.04% in 2014 to 64.97% in 2015.

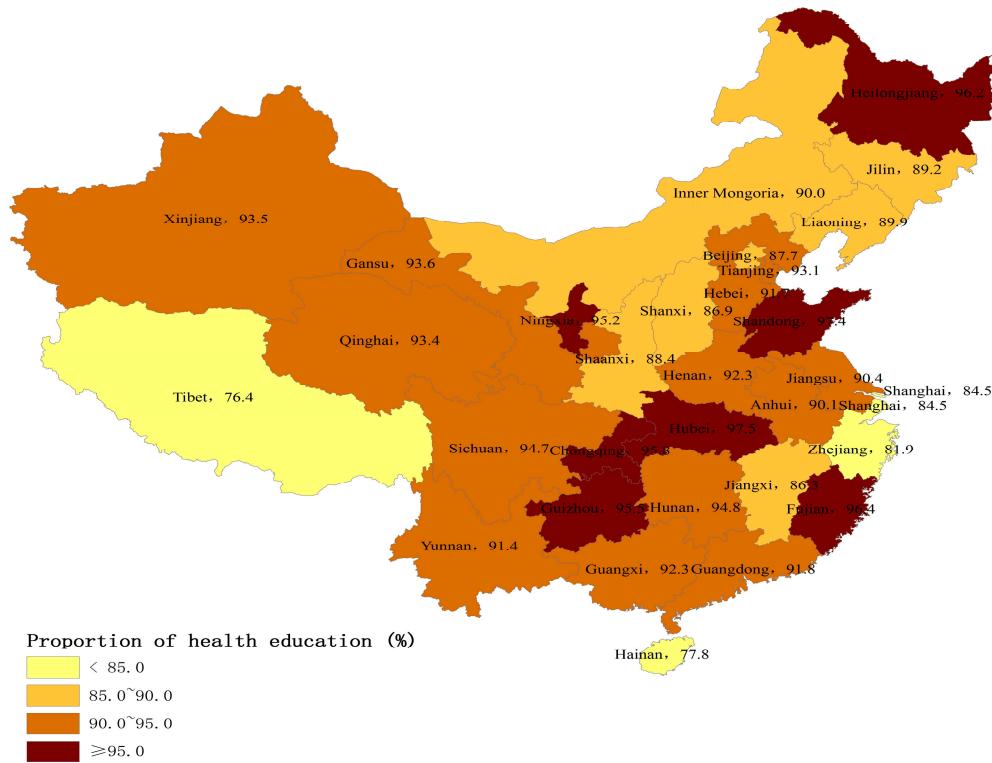
201 **Table 2. Utilization of local public health services among internal migrants in**
 202 **NIMDMS, 2014 & 2015 (%)**

Public health services	2014	2015
Establishment of health records	22.98	29.10
Accessing health education	70.14	90.70
Content of health education accessed		
Prevention of infectious diseases	95.98	94.38
Prevention of non-communicable diseases	66.54	80.86
Methods for accessing health education		
Face-to-face channel	99.26	99.12
Internet channel	43.04	64.97

203
 204 Figure 1 and 2 show the provincial variation on the percentages of internal migrants
 205 who had established health records and accessed health education in 2015. The
 206 percentages of using both public health services were higher in central China, and
 207 lower in eastern and western China.



208
 209 **Figure 1: Percentage of internal migrants establishing health records by province, 2015**
 210 **(%)**

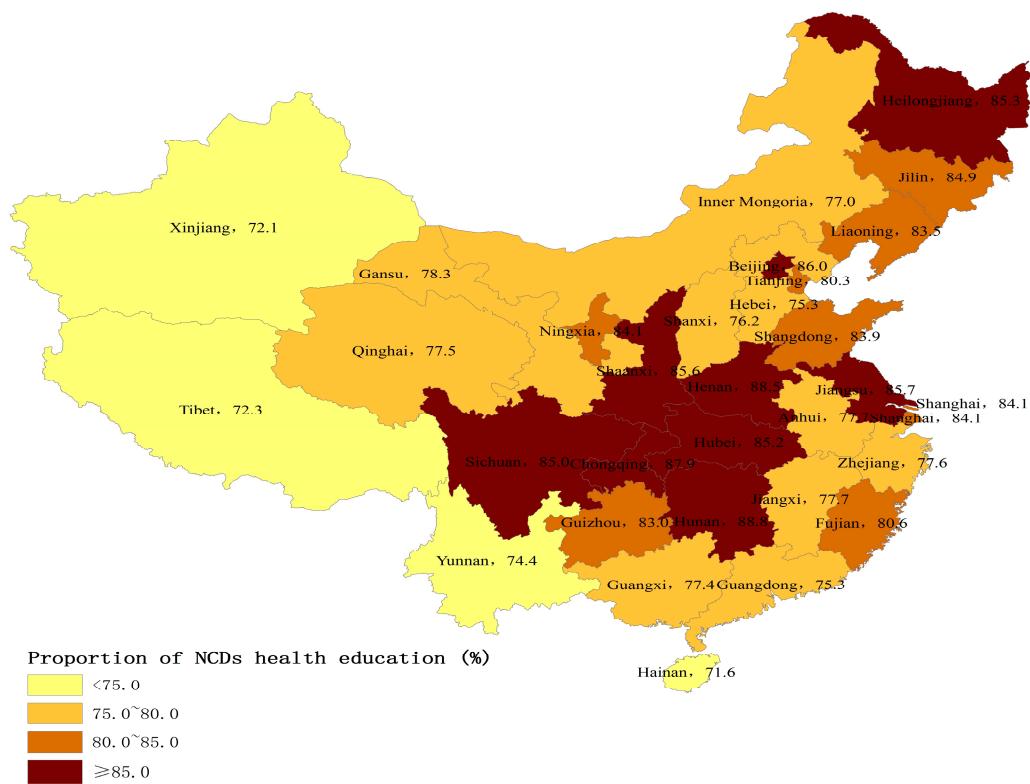


211

212 **Figure 2: Percentage of internal migrants accessing health education by province, 2015**
213 (%)

214

215 Figure 3 and 4 present the provincial variation on the percentages of internal migrants
216 who received health education on NCDs prevention and through Internet channel in
217 2015. Internal migrants in western China were less likely to receive health education
218 on NCDs prevention and through Internet channel than eastern and central China.



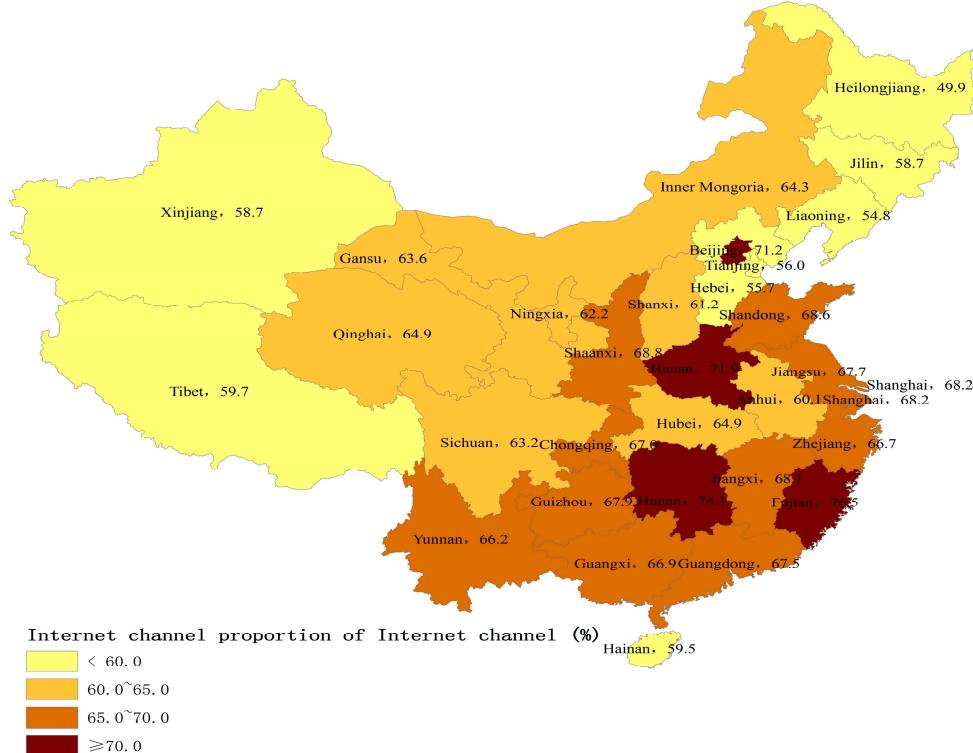
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Figure 3: Percentage of internal migrants receiving health education on NCDs prevention by province, 2015 (%)

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Figure 4: Percentage of internal migrants receiving health education through Internet channel by province, 2015 (%)

225

226

227 **3.3. Determinants of local public health services utilization among internal
228 migrants**

229 Table 3 presents the multivariate regression results for the factors associated with
230 utilization of local public health services among all internal migrants (the second and
231 third columns). In terms of the socioeconomic status, internal migrants with higher
232 income and education level were more likely to establish health records and access
233 health education in their living cities. The internal migrants who had a college degree
234 or above were more likely to establish health records (OR=1.37, 95% CI: 1.32-1.42)
235 and access health education (OR=1.86, 95% CI: 1.78-1.94) than those with primary
236 school or below. The employed or self-employed internal migrants had the
237 significantly higher probability to use local public health services than those
238 unemployed. It was also found that the internal migrants with urban Hukou were more
239 likely to establish health records (OR=1.09, 95% CI: 1.70-1.12) and access health
240 education (OR=1.06; 95%CI: 1.03-1.10).

241

242 With respect to the migration characteristics, the years of living in the local city was
243 positively associated with the utilization of local public health services. Compared
244 with internal migrants seeking jobs, those who followed others as family members or
245 other reasons for migration were more likely to establish health records (OR=1.09, 95%
246 CI: 1.05-1.13), but were less likely to access health education (OR=0.96, 95% CI:
247 0.92-1.00). Compared to migration within the city, migration across provinces is
248 negatively associated with the establishment of health records (OR=0.88, 95% CI:
249 0.86-0.90) and utilization of health education (OR=0.97, 95% CI: 0.94-1.00). Living
250 in urban areas was more positively associated with the establishment of health records
251 (OR=1.26, 95% CI: 1.23-1.29) and utilization of health education (OR=1.34, 95% CI:
252 1.31-1.37).

253

254 In terms of the demographic characteristics, female and currently married internal
255 migrants were more likely to establish health records and utilize health education.
256 Increased age would be related to a higher proportion of health records establishment

257 but lower percentage of health education utilization. The coverage of local public
258 health services was much higher in 2015 than in 2014.

Table 3. Determinants of local public health services utilization, the contents and channels of health education

Variables	Total sample		Subsample using health education	
	Establishment of health records	Using health education	NCDs content	Internet channel
Socioeconomic status				
Monthly income (1000 RMB)	1.00 (1.00-1.01)**	1.01 (1.00-1.01)***	1.01 (1.01-1.01)***	1.02 (1.02-1.02)***
Education (referred to primary school or below)				
Middle school	1.17 (1.13-1.20)***	1.34 (1.30-1.38)***	1.16 (1.12-1.19)***	1.44 (1.40-1.48)***
High school	1.24 (1.20-1.28)***	1.58 (1.52-1.63)***	1.34 (1.30-1.39)***	1.72 (1.67-1.77)***
College degree or above	1.37 (1.32-1.42)***	1.86 (1.78-1.94)***	1.74 (1.67-1.81)***	2.13 (2.06-2.21)***
Employment status (referred to unemployed)				
Employed	1.16 (1.01-1.24)***	1.26 (1.18-1.35)***	1.01 (0.94-1.07)	1.19 (1.12-1.26)***
Self-employed	1.11 (1.04-1.18)**	1.17 (1.09-1.25)***	1.12 (1.05-1.19)***	1.13 (1.07-1.20)***
Urban Hukou	1.09 (1.07-1.12)***	1.06 (1.03-1.10)***	1.12 (1.09-1.15)***	1.13 (1.10-1.16)***
Migration characteristics				
Years of living in the local city	1.02 (1.02-1.02)***	1.01 (1.00-1.01)***	1.01 (1.01-1.01)***	1.00 (1.00-1.00)
Causes of migration (referred to seeking jobs)				
Family members following migrants or other reasons	1.09 (1.05-1.13)***	0.96 (0.92-1.00)*	1.10 (1.05-1.14)***	0.97 (0.94-1.00)
Migration scope (referred to across counties within the city)				
Across provinces	0.88 (0.86-0.90)***	0.97 (0.94-1.00)*	0.92 (0.89-0.95)***	0.96 (0.94-0.99)**
Across cities within the province	0.98 (0.96-0.90)	1.00 (0.97-1.04)	0.96 (0.93-0.98)**	0.92 (0.89-0.94)***
Living in urban areas	1.26 (1.23-1.29)***	1.34 (1.31-1.37)***	1.39 (1.36-1.42)***	1.07 (1.05-1.09)***
Demographic characteristics				
Female	1.14 (1.12-1.16)***	1.30 (1.27-1.32)***	1.08 (1.06-1.10)***	0.90 (0.89-0.92)***
Age (10 years)	1.01 (1.00-1.02)*	0.92 (0.91-0.93)***	1.05 (1.04-1.06)***	0.73 (0.72-0.74)***

Currently married	1.35 (1.32-1.39)***	1.47 (1.44-1.51)***	0.88 (0.86-0.90)***	0.97 (0.95-0.99)*
2015	1.55 (1.53-1.58)***	4.88 (4.78-4.98)***	2.27 (2.23-2.31)***	2.99 (2.94-3.04)***
Observations	352945	352945	284490	284488

260 Notes: Odds ratio and 95% confidence intervals were shown.

261 Significance level: *** p<0.001, ** p<0.01, * p<0.05.

262

263

264 **3.4. Determinants of the content and methods of health education among internal
265 migrants using health education**

266 Table 3 further shows the multivariate regression results for the factors associated
267 with the content and methods of health education among internal migrants using
268 health education (the fourth and fifth columns). In terms of the socioeconomic status,
269 income, education and urban Hukou positively affected the access to health education
270 on NCDs or through Internet channel. The internal migrants with college or above
271 level of education were more likely to access health education on NCDs (OR=1.74,
272 95% CI: 1.67-1.81) and through Internet channel (OR=2.13, 95% CI: 2.06-2.21) than
273 those with primary or below. Compared to those unemployed, self-employed internal
274 migrants had the higher likelihood of access to health education on NCDs (OR=1.12,
275 95% CI: 1.05-1.19) and through Internet channel (OR=1.13, 95% CI: 1.07-1.20).

276

277 Regarding the migration characteristics, the longer the internal migrants lived in the
278 local city, the higher the possibility of accessing health education on NCDs but no
279 significant difference for usage of Internet channel. The internal migrants who
280 followed others as family members or other reasons for migration were more likely to
281 utilize health education on NCDs than those seeking jobs (OR=1.10, 95% CI:
282 1.05-1.14), but no significant difference for usage of Internet channel. Compared to
283 migration within the city, migration across provinces and across cities was negatively
284 associated with the access to health education on NCDs or through Internet channel.
285 Living in urban areas was positively associated with the access to health education on
286 NCDs (OR=1.39, 95% CI: 1.36-1.42) and through Internet channel (OR=1.07, 95%
287 CI: 1.05-1.09).

288

289 In terms of the demographic characteristics, female and older migrants were more
290 likely to receive health education on NCDs, but were less likely to use Internet
291 channel for health education. Current married participants were less likely to receive
292 health education on NCDs or through Internet channel. The probability of receiving
293 health education on NCDs or through Internet channel in 2015 was twice or three

294 times of that in 2014.

295

296 **4. Discussion**

297 Using a nationally representative sample, this study to investigate the utilization of
298 essential public health services and its determinants among internal migrants in China.

299 Our study showed the great improvement of public health services coverage among
300 internal migrants. Specifically, the coverage of health education increased 20
301 percentages, and the coverage of health education specifically on NCD prevention
302 also increased 14 percentages between 2014 and 2015. More interestingly, there were
303 remarkable regional differences in public health services utilization among internal
304 migrants. Internal migrants in more economically-rich municipalities and eastern
305 coastal areas had lower utilization level of public health services than those in central
306 and northeast regions, which was inconsistent with their regional economic levels.
307 Our study also found that migration characteristics and socioeconomic status were
308 closely associated with the utilization of public health services among internal
309 migrants, which was rarely studied previously.^{11,17}

310

311 These improvements in health education coverage may be due to the
312 government-subsidized national program, Equalization of Essential Public Health
313 Services, and the subsidy increased year by year.¹⁰ The government free-of-charge
314 policy and subsidies could extend the essential public health services to the vulnerable
315 population such as internal migrants. It was notable that the coverage of health
316 records only saw slow increase. Our results indicated that only 29% of internal
317 migrants established health records in 2015, whereas 75% of local residents had
318 health records.²⁰ This finding was consistent with the previous studies showing that
319 internal migrants had less access to public health services.^{3,12} In fact, health education
320 may not depend on their Hukou status and can reach all people, but health records
321 were much more related with their Hukou status. Since the Hukou status was not
322 easily transferred from rural to urban areas, internal migrants may face major
323 obstacles to establish health records and manage their health in cities.⁴

324

325 There may be two reasons to explain the regional variations of public health services
326 utilization. First, compared to local residents, the internal migrants may be more
327 vulnerable in the more developed eastern areas than the remaining areas. In the
328 developed eastern areas, there were much more factors that limited internal migrants
329 to interact with local residents, leading to the larger gap between internal migrants and
330 local residents. Some research showed that the social integration of internal migrants
331 in the eastern areas was worse than in the other areas.²¹ Second, the central
332 government mainly provided subsidies to the underdeveloped central and western
333 areas, and the delivery of public health services was considered as the sole
334 responsibility of local government in the developed eastern areas. According to the
335 national policy, central government should provide 80% and 60% of total subsidies to
336 the western and central regions to deliver essential public health services respectively,
337 but only 10-50% to the eastern regions.²² For example, Gansu province, a
338 less-developed region, received the subsidy from the central government, but
339 Zhejiang province, a developed region did not receive any subsidy.^{23,24} The subsidies
340 from central government may be more likely to target internal migrants than local
341 government.

342

343 Migration characteristics might also influence public health services utilization in
344 different ways. First, instability due to migration status would reduce the continuum
345 and compliance with public health services. Because of residential change and job
346 instability, internal migrants had little incentive to establish health records in the city
347 where they lived, and our study proved this point that less than 30% of internal
348 migrants established health records in the city in 2015. Lack of health records brought
349 challenges to overall health management. Instead, cross-regional resource and
350 information sharing would improve the continuum of public health services for
351 internal migrants.¹⁷ Second, internal migrants may face more stress when they hunt
352 jobs, find and purchase housing and child education,¹⁴ and may have less time to
353 participate in health education. Previous research also showed that to encourage

354 internal migrants to participate in community activities was important to improve the
355 accessibility of public health services.¹¹ Third, we found that years of migration would
356 increase the probability of utilizing public health services, and also the access to
357 health education on NCDs or through Internet channel, whereas the scope of
358 migration would decrease. Therefore, internal migrants who moved to the local city
359 for a shorter time period or migrated across provinces, were more vulnerable and
360 should be given more attention when providing essential public health services.

361

362 In addition, public health services utilization for internal migrants saw the large
363 disparity by socioeconomic status. Higher education level, the employed and urban
364 Hukou were the main protective factors for public health services utilization among
365 internal migrants, which are consistent with previous studies.^{11,18} The internal
366 migrants with higher education levels, usually own the better knowledge and
367 awareness about public health services.¹¹ The employed internal migrants with formal
368 jobs were more likely to establish health records and utilize health education about
369 occupation diseases and NCDs in their community. The internal migrants with urban
370 Hukou had the equal access to public health services with local residents,⁴ indicating
371 rural Hukou was a key hinder of accessing public health services for internal migrants.
372 Therefore, internal migrants with low socioeconomic status should be given more
373 attention in urban healthcare system to achieve the equalization of public health
374 services.

375

376 This study has several limitations. First, the public health services policies for internal
377 migrants in each city were not available, and we cannot identify the effect of different
378 policies by city. To control for the effects of city-level variables, we considered the
379 city fixed effect in the analysis. Second, internal migrants with poor health may be
380 more likely to use public health services, but we had no data on their health status.
381 Since age is the key predictor of health, so we included age in our analysis.

382

383 **5. Conclusions**

384 Public health services coverage for internal migrants has seen great improvement due
385 to government subsidies. Internal migrants with lower socioeconomic status and across
386 provinces are less likely to use public health services and need to be targeted. More
387 attention should be given to the local government in the developed eastern regions in
388 order to narrow the regional gaps and to achieve the equalization of public health
389 services.

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395

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397 Zhang analyzed the data. Jingya Zhang drafted the manuscript, and Zhiyuan Hou
398 revised the manuscript deeply. Di Liang, Yi Qian and Donglan Zhang also revised the
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401 **Conflicts of Interest:** The authors declare no conflict of interest.

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