

Preplanned Studies

Unmet Healthcare Needs Among People with Herpes Zoster — 25 PLADs, China, 2019–2024

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Summary

What is already known about this topic?

The global incidence of herpes zoster (HZ) in the general population is 3–5 cases per 1,000 person-years, with the Asia-Pacific region reporting 3–10 cases per 1,000 person-years. This rate has been rising annually by 2.5%–5.0% and is high among older adults.

What is added by this report?

In 2024, the China Family Panel Study — covering a nationwide sample of 21,750 adults (≥16 years) across 25 provincial-level administrative divisions and cities (PLADs) in China — identified 813 cases of HZ. Among these 813 patients, 28.78% reported unmet outpatient care needs, and 36.36% had unmet inpatient care needs. The main factors associated with unmet healthcare needs were age and place of residence. Older adults demonstrated significantly low unmet outpatient needs, whereas urban residents experienced higher levels of unmet inpatient needs.

What are the implications for public health practice?

These findings highlight the need to advance equity and effectiveness of healthcare services for HZ patients. Strategic investments in health literacy and workforce development are essential to ensure that provider competencies align with community health needs.

for HZ, HZ health service utilization-related questions, and sociodemographic information. Unmet healthcare needs were categorized as unmet outpatient and hospitalization care needs. Odds ratio (*OR*) was estimated from multivariable logistic regression modeling to assess the associations between HZ unmet healthcare needs and sociodemographic characteristics of individuals. This study ultimately completed 21,750 adult surveys (≥16 years old) in 25 PLADs across the country. Among them, a healthcare utilization survey was conducted for patients who had developed HZ in the past five years of the survey period, totaling 813 individuals.

Results: Among 813 participants with HZ, 28.78% had unmet outpatient care needs, and 36.36% of those who met the hospitalization criteria had unmet inpatient needs. Older adults had significantly lower odds of unmet outpatient needs, with an *OR* of 0.57 [95% confidence interval (*CI*): 0.40, 0.81], compared with younger adults. In addition, urban residents had higher odds of unmet inpatient needs, with an *OR* of 2.18 (95% *CI*: 1.00–4.75).

Conclusions: The findings indicate substantial unmet healthcare needs among patients with HZ, with significant variations observed across different age groups and residential regions. This study highlights the necessity of enhancing health literacy, with particular emphasis on improving the standardized diagnosis of HZ in rural areas and the standardized treatment among working-age residents with HZ.

ABSTRACT

Introduction: Addressing the healthcare needs of the growing number of patients with herpes zoster (HZ) presents considerable challenges. This study examined the unmet healthcare needs and associated factors among people with HZ across 25 provincial-level administrative divisions (PLADs) and cities in China from 2019–2024.

Methods: The study conducted a nationwide population-based survey using probability-proportional-to-size sampling. The structured questionnaire incorporated validated diagnostic criteria

Globally, the incidence of herpes zoster (HZ) in the general population is 3–5 cases per 1,000 person-years, with the Asia-Pacific region reporting 3–10 cases per 1,000 person-years. This rate has been rising annually by 2.5%–5.0% and is high among older adults (*1*), driven by population aging and the prevalence of chronic diseases. This trend places substantial pressure on healthcare systems and socioeconomic resources,

including unmet outpatient and hospitalization needs. Without adequate support systems, individuals with HZ face a substantial burden, leading to reduced quality of life and widening health disparities (2). However, systematic surveillance of HZ has not been conducted, and unmet healthcare needs have received limited research attention in China. As a result, the scope of unmet national-level needs for prevention and management remains largely unknown. To address this knowledge gap, this study analyzed data from a nationally representative, population-based cross-sectional survey to identify factors associated with unmet healthcare needs among adults with HZ.

The research team designed a questionnaire and collaborated with the 2024 China Family Panel Study (CFPS) to conduct a population-based national cross-sectional household survey administered by well-trained investigators through in-person, one-on-one, questionnaire-based interviews. The Institute of Social Science Survey at Peking University conducted the survey from July to September 2024. Systematic probability-proportional-to-size sampling was used at three levels: individual, household, and community (3). The target population included all household members from sampled families across 25 provincial-level administrative divisions and cities (PLADs) in mainland China (excluding Tibet, Xinjiang, Qinghai, Inner Mongolia, Ningxia and Hainan), representing 94.5% of China's total population.

The research surveyed adults (aged ≥ 16 years) to determine whether they had herpes zoster. In the questionnaire survey, we conducted semi-structured interviews with clinical experts and reviewed clinical guidelines and relevant literature (4). Participants were shown photographs of the characteristic symptoms and rash locations of HZ to determine if they had experienced similar symptoms. Subsequently, we asked whether they had been diagnosed with HZ in the past five years. If they were uncertain, their recorded responses were reviewed by dermatologists. An HZ case was defined as meeting at least one of the following criteria: 1) A prior clinical diagnosis of HZ by a physician; 2) having signs or symptoms consistent with HZ but not remembering the doctor's diagnosis; or 3) Confirmation of HZ by a dermatologist after reviewing the recorded responses. The total sample size was 21,750 individuals aged ≥ 16 years in the CFPS survey, among whom 813 people were identified as having HZ in the past 5 years.

For all participants, we collected sociodemographic characteristics, including sex, age, education level,

residency, and annual personal income (5–6).

The dependent variable was whether respondents had experienced unmet healthcare needs. This was assessed with two questions: “Are you an HZ case, and did you visit an outpatient clinic — either in a hospital or online — for HZ this time?” and “Were you advised by a doctor to be hospitalized for HZ this time, and if yes, did you do so?” Respondents who answered “Yes” were classified as not having unmet healthcare needs, whereas others were defined as having unmet healthcare needs.

Multiple quality-control measures were implemented to ensure data accuracy and reliability. First, the interviewers underwent rigorous training on survey procedures and were supervised during the survey. Second, daily statistical checks were performed throughout the survey, focusing on response time and response rate. Third, after the survey, recordings made with the participants' consent were reviewed, and a random sample of participants was contacted to verify the accuracy of their answers.

Categorical variables were presented as frequencies and analyzed using χ^2 tests or Fisher's exact tests. Logistic regression analyses were conducted to identify the factors associated with unmet HZ needs, with 95% confidence intervals (CIs). Stratified logistic regression analysis was used to examine urban-rural disparities in unmet healthcare needs related to HZ, by place of residency. All analyses were performed using STATA 17 (StataCorp., T.X., USA).

Anonymized individual-level data and datasets generated or analyzed during the current study are available on the CFPS portal (<https://www.issp.pku.edu.cn/cfps/>) upon request.

Among the cohort of 813 people with HZ, for those who required outpatient care, Table 1 indicates that 234 reported unmet outpatient needs, while 579 received outpatient care. For hospitalization services, 143 participants met the clinical criteria for hospital admission. Of these, 52 declined or were otherwise unable to obtain hospitalization, whereas 91 received appropriate inpatient care.

Women accounted for a slightly higher proportion of unmet outpatient needs (55.13%) than men (44.87%). Age disparities were notable: participants aged < 60 years accounted for a larger share of unmet outpatient needs (62.39%) compared with those aged ≥ 60 years (37.61%). Educational differences were also evident: individuals with middle school education or below constituted the majority of unmet outpatient needs (65.81%), whereas those with education above

TABLE 1. Reported unmet outpatient and inpatient needs according to sociodemographic characteristics of participants with HZ in 25 PLADs, China, 2019–2024.

Characteristics	Need for outpatient care n(%)			Need for hospitalization n(%)		
	Total	Met	Unmet	Total	Met	Unmet
Total	813 (100.00)	579 (100.00)	234 (100.00)	143 (100.00)	91 (100.00)	52 (100.00)
Sex						
Male	347 (42.68)	242 (41.80)	105 (44.87)	78 (54.55)	53 (58.24)	25 (48.08)
Female	466 (57.32)	337 (58.20)	129 (55.13)	65 (45.45)	38 (41.76)	27 (51.92)
Age (years)						
<60	427 (52.52)	281 (48.53)	146 (62.39)	51 (35.66)	30 (32.97)	21 (40.38)
≥60	386 (47.48)	298 (51.47)	88 (37.61)	92 (64.34)	61 (67.03)	31 (59.62)
Marriage status						
Partnered	153 (18.82)	108 (18.65)	45 (19.23)	24 (16.78)	15 (16.48)	9 (17.31)
Others	660 (81.18)	471 (81.35)	189 (80.77)	119 (83.22)	76 (83.52)	43 (82.69)
Education						
Middle school or below	567 (69.74)	413 (71.33)	154 (65.81)	110 (76.92)	70 (76.92)	40 (76.92)
Above middle school	246 (30.26)	166 (28.67)	80 (34.19)	33 (23.08)	21 (23.08)	12 (23.08)
Residence						
Rural	342 (43.62)	240 (43.01)	102 (45.13)	70 (51.09)	51 (58.62)	19 (38.00)
Urban	442 (56.38)	318 (56.99)	124 (54.87)	67 (48.91)	36 (41.38)	31 (62.00)
Per-capita income						
<Median (21,221.33 CNY)	391 (50.00)	279 (50.73)	112 (48.28)	88 (65.19)	54 (63.53)	34 (68.00)
≥Median	391 (50.00)	271 (49.27)	120 (51.72)	47 (34.81)	31 (36.47)	16 (32.00)
Chronic disease						
No	290 (35.71)	194 (33.51)	96 (41.20)	34 (23.78)	19 (20.88)	15 (28.85)
Yes	522 (64.29)	385 (66.49)	137 (58.80)	109 (76.22)	72 (79.12)	37 (71.15)

Note: Chi-square test was used to determine differences in the presence of unmet healthcare needs according to general characteristics. Residence, per capita income, and chronic disease had missing values, so valid observations was less than total survey samples of 813 cases.

Abbreviation: CNY=Chinese Yuan; PLADs=provincial-level administrative divisions and cities.

middle school accounted for 34.19% ($n=80$). Geographically, the number of confirmed HZ cases in urban areas exceeded that in rural areas by 29.24%. Rural and urban residents contributed relatively evenly to unmet outpatient needs (45.13% and 54.87%, respectively). Among those with unmet outpatient needs, 48.28% had a per-capita income below the median, and 58.80% reported having at least one chronic disease.

Regarding unmet hospitalization needs, women accounted for a slightly higher proportion (51.92%) than men (48.08%). In contrast to outpatient trends, older adults (≥60 years) accounted for a larger share of unmet hospitalization needs (59.62%) than younger adults (40.38%). Urban residents predominated unmet hospitalization needs (62.00%), nearly doubling the proportion of rural residents (38.00%). Economically, 68% of individuals with unmet hospitalization needs

had a per capita income below the median. In addition, 71.15% of the participants with unmet hospitalization needs had at least one chronic disease, indicating a high burden in this subgroup.

Table 2 summarizes the results of multiple logistic regression analysis. The results indicated that age was a significant determinant of unmet outpatient care needs, with older adults (≥60 years) demonstrating a significantly low likelihood of unmet needs. Among those with unmet hospitalization needs, participants residing in urban areas had higher odds of unmet healthcare needs [odds ratio (OR)=2.18, 95% CI : 1.00, 4.75].

Table 3 presents the distribution of outpatient care and hospitalization needs by residency. Older adults (≥60 years) had significantly lower odds of unmet outpatient needs compared with those of younger adults. These findings are consistent with the main

TABLE 2. Multivariate analysis of unmet outpatient and inpatient needs among people with HZ in 25 PLADs, China, 2019–2024.

Characteristics	Unmet need for outpatient care (N=756)			Unmet need for hospitalization (N=130)		
	OR	95% CI	P	OR	95% CI	P
Sex						
Male	Ref.	Ref.		Ref.	Ref.	
Female	0.93	(0.67, 1.28)	0.64	1.40	(0.65, 3.02)	0.39
Age (years)						
<60	Ref.	Ref.		Ref.	Ref.	
≥60	0.57	(0.41, 0.81)	0.00	1.02	(0.45, 2.34)	0.96
Marriage status						
Partnered	Ref.	Ref.		Ref.	Ref.	
Others	0.98	(0.65, 1.49)	0.94	1.14	(0.42, 3.12)	0.80
Education						
Middle school or below	Ref.	Ref.		Ref.	Ref.	
Above middle school	1.12	(0.76, 1.64)	0.57	0.79	(0.29, 2.14)	0.64
Residence						
Rural	Ref.	Ref.		Ref.	Ref.	
Urban	0.85	(0.61, 1.19)	0.34	2.18	(1.00, 4.75)	0.05
Per-capita income						
<Median (21,221.33 CNY)	Ref.	Ref.		Ref.	Ref.	
≥Median	1.05	(0.75, 1.48)	0.77	0.71	(0.30, 1.69)	0.44
Chronic disease						
No	Ref.	Ref.		Ref.	Ref.	
Yes	0.87	(0.61, 1.25)	0.44	0.73	(0.29, 1.84)	0.51

Note: Logistic regression analysis with a complex sampling design was performed after adjusting for covariates.

Abbreviation: PLADs=provincial-level administrative divisions and cities; OR=odds ratio; CI=confidence interval; Ref=reference group.

regression results, suggesting that the reduction in unmet outpatient needs is related to age among people with HZ.

DISCUSSION

This study examined the status and correlations of unmet healthcare needs among people with HZ using data from the CFPS, a nationally representative population-based survey. This is the first study to examine the association between the unmet healthcare needs of people with HZ and individuals' sociodemographic characteristics. Overall, 28.78% of people with HZ had unmet outpatient needs, and 36.36% had unmet hospitalization needs. Age was strongly associated with low outpatient unmet needs ($OR=0.57$, 95% CI : 0.41, 0.81), whereas urban residency doubled hospitalization unmet needs ($OR=2.18$, 95% CI : 1.00, 4.75), identifying age and residence as key predictors.

The inverse relationship between age and unmet outpatients needs observed in our study offers a novel perspective. Within China's context, this may be explained by the fact that younger individuals might experience milder or subclinical symptoms, potentially leading to delayed care-seeking due to lower perceived severity. While elders might possess greater time availability and benefit from established care routines for managing chronic conditions, thereby prioritizing and facilitating their access to outpatient services (7). This finding contrasts with some prior research that reported heightened unmet needs with advancing age in the world (8). It is important to note that our findings do not imply that the burden of HZ among the elderly population should be overlooked as individuals of 55 years or older had the highest average incidence of shingles in China (9). Furthermore, work-related time constraints may also contribute to the higher unmet healthcare needs observed among the working-age population.

The elevated unmet hospitalization needs in urban

TABLE 3. Multivariate analysis of unmet outpatient and inpatient needs among people with HZ, by urban-rural area, 25 PLADs, China, 2019–2024.

Characteristics	Unmet need for outpatient care						Unmet need for hospitalization					
	Urban (N=426)			Rural (N=330)			Urban (N=63)			Rural (N=67)		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Sex												
Male	Ref.	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	Ref.	
Female	0.95	(0.61, 1.46)	0.80	0.90	(0.56, 1.46)	0.68	2.28	(0.75, 6.91)	0.15	0.86	(0.25, 3.02)	0.82
Age (years)												
<60	Ref.	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	Ref.	
≥60	0.57	(0.35, 0.92)	0.02	0.57	(0.34, 0.95)	0.03	0.51	(0.16, 1.62)	0.25	1.85	(0.47, 7.34)	0.38
Marriage status												
Partnered	Ref.	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	Ref.	
Others	1.06	(0.61, 1.83)	0.85	0.88	(0.46, 1.68)	0.69	0.62	(0.15, 2.61)	0.52	2.02	(0.37, 10.94)	0.41
Education												
Middle school or below	Ref.	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	Ref.	
Above middle school	0.94	(0.58, 1.51)	0.79	1.51	(0.80, 2.84)	0.20	1.66	(0.45, 6.05)	0.45	0.17	(0.02, 1.65)	0.13
Per-capita income												
<Median (21,221.33 CNY)	Ref.	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	Ref.	
≥Median	1.19	(0.76, 1.89)	0.45	0.89	(0.53, 1.51)	0.68	0.62	(0.20, 1.93)	0.41	0.74	(0.16, 3.34)	0.69
Chronic disease												
No	Ref.	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	Ref.	
Yes	0.91	(0.57, 1.46)	0.69	0.84	(0.48, 1.47)	0.54	0.83	(0.23, 2.95)	0.77	0.41	(0.09, 1.83)	0.24

Note: Logistic regression analysis with a complex sampling design was performed after adjusting for covariates.

Abbreviation: PLADs=provincial-level administrative divisions and cities; Ref=reference group; OR=odds ratio; CI=confidence interval.

areas may stem from urban-rural disparities in health literacy or constrained access to diagnostic services. The number of confirmed HZ cases in urban areas exceeded that in rural areas by 29.24%. Rural residents might delay seeking outpatient care until symptom exacerbation necessitates hospitalization. Conversely, urban residents' greater access to healthcare services likely reduces the need for hospital admission. Our analysis revealed a pronounced aggravating impact on unmet hospitalization needs within urban populations, which contrasts with prior research demonstrating lower unmet healthcare needs among urban residents (10).

The study has four limitations. First, the analysis excluded six provinces, where the situation is likely more pronounced; this warrants a more comprehensive and detailed investigation in the future. Second, this study relies on self-reported healthcare utilization over a retrospective 5-year period, which introduces potential recall bias, particularly for episodic or less severe conditions. Third, the restricted sample size of eligible participants with HZ may have reduced the statistical power to detect subtle associations and

limited the generalizability of the subgroup analyses. Furthermore, the range of controlled covariates was limited, and unmeasured confounders (including China's medical insurance coverage, availability of transport, and HZ vaccine coverage) may remain unaddressed. Finally, the operationalization of unmet outpatient needs assumed homogeneity in clinical necessity across all respondents, disregarding potential variations in symptom severity. However, this study still makes significant contributions to the field of HZ research and fills the gap between unmet HZ needs and sociodemographic characteristics of participants in China, underscoring the need for targeted interventions to fulfill the unmet healthcare needs of people with HZ and enhance the equity and effectiveness of healthcare services.

In conclusion, to address two key issues found from this study: rural-urban equity and barriers to healthcare access among working-age population, in addition to reducing HZ incidence through vaccination, we also suggest highlighting the necessity of enhancing health literacy, with particular emphasis on improving the standardized diagnosis of HZ in rural areas and the

standardized treatment among working-age residents. Collectively, implementing these measures could alleviate the substantial disease and economic burden of HZ, aligning with the goals of the WHO position paper on herpes zoster vaccines (11).

Conflicts of interest: No conflicts of interest.

Ethical statement: Both the CFPS and the HZ-related sub-study received ethical approval (IRB00001052-14010 and IRB00001052-24022) from the Institutional Review Board of Peking University. This study was registered with the Chinese Clinical Trial Registry (ChiCTR2400085891).

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