THE EUROPEAN SOCIETY OF MEDICINE
Medical Research Archives, Volume 14 Issue 6

RESEARCH ARTICLE

Internet Use and Health Outcomes Among Rural Residents in China

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OPEN ACCESS

PUBLISHED
30 June 2026

CITATION
Zhang, Y., An, L., Li, Q., 2026. Internet Use and Health Outcomes Among Rural Residents in China. Medical Research Archives, [online] 14(6).

ISSN
2375-1924

ABSTRACT

Background: Rural residents in China face significant health information gaps relative to their urban counterparts, compounding persistent disparities in health outcomes. The rapid expansion of Internet connectivity in rural areas may offer a low-cost mechanism for bridging these gaps.

Objective: This study examines whether Internet use improves health outcomes among rural residents in China, with the specific aim of quantifying associations with both short-term morbidity and long-term chronic disease, and of identifying the pathways through which health information operates.

Methods: We use longitudinal data from the China Health and Nutrition Survey (waves 2004–2015) and estimate ordinary least squares regression models with year and province fixed effects. Internet use serves as a proxy for health information access. Short-term outcomes include illness incidence, severity, and disability days; long-term outcomes include hypertension, diabetes, asthma, and obesity. Mechanism analysis examines health literacy and social support as mediating channels, stratified by age group.

Results: Internet users demonstrate significantly better short-term and long-term health outcomes. Internet use reduces four-week illness probability by 3.7 percentage points and lowers the likelihood of hypertension, diabetes, asthma, and obesity by 1.2, 0.8, 0.3, and 1.5 percentage points, respectively. Mechanism analysis reveals that Internet use improves health literacy across all age groups and reduces psychological stress among middle-aged and elderly residents.

Conclusions: Health information accessed through the Internet confers significant benefits for rural residents in China. Policies promoting rural Internet infrastructure, digital health literacy, and targeted interventions for older populations are warranted to reduce urban–rural health disparities and support rural revitalization.

Keywords: Internet use; health information; rural health; health literacy; social support; China; China Health and Nutrition Survey.

1. Introduction

Health disparities between rural and urban populations remain one of the most persistent and consequential dimensions of socioeconomic inequality in China. Rural residents face higher burdens of chronic disease, lower rates of preventive care utilization, and substantially inferior access to health information relative to their urban counterparts. These structural disadvantages are compounded by limited health literacy, geographic isolation from tertiary care facilities, and constrained household budgets that discourage timely treatment-seeking. Addressing this urban–rural health gap has become a central objective of China's rural revitalization agenda and its broader "Healthy China 2030" strategy.

The rapid diffusion of Internet connectivity into rural China offers a potentially transformative mechanism for closing these information gaps. By December 2021, China's total Internet user base had reached 1.032 billion, with rural netizens numbering 284 million and rural Internet penetration rising to 57.6%. The Internet has fundamentally altered how individuals produce, share, and consume information—including health information. For rural residents who historically relied on local village doctors or word-of-mouth for health guidance, online platforms provide unprecedented access to dietary advice, disease prevention guidelines, drug interaction databases, and symptom-checking tools. This shift in the information environment has the potential to reduce preventable illness, improve chronic disease management, and alleviate medical expenditure burdens.

Despite its policy importance, the causal relationship between Internet use and health outcomes in rural China remains understudied. Prior literature in high-income country settings has documented positive associations between online health information-seeking and preventive behaviors, medication adherence, and self-management of chronic conditions. Research in developing country contexts, however, is more limited and often constrained by data availability and endogeneity concerns. In China specifically, while a growing body of work examines health returns to education and social capital, the role of digitally mediated health information—particularly among the rural poor—has received insufficient empirical attention.

This study aims to fill this gap by providing systematic empirical evidence on two questions: (1) Does Internet use improve short-term and long-term health outcomes among rural residents in China? (2) Through which pathways—health literacy or social support—do these effects operate, and do they vary by age? To answer these questions, we use longitudinal data from the China Health and Nutrition Survey spanning 2004 to 2015, estimating ordinary least squares regression models with province and year fixed effects. We examine six health outcomes—illness incidence, illness severity, disability days, hypertension, diabetes, asthma, and obesity—and investigate two mediating channels through age-stratified mechanism analyses.

This paper contributes to three interrelated literatures. First, it adds to the economics of health information by providing systematic evidence that Internet-based information access produces measurable improvements in both short-term and long-term health outcomes. Second, it contributes to research on the social determinants of rural health in China, a topic of growing urgency given demographic aging and the persistence of left-behind population dynamics. Third, this study advances understanding of the digital dividends from rural Internet infrastructure investment, contributing to policy debates on digital village construction.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the material and methods. Section 4 presents descriptive statistics and main results. Section 5 reports the mechanism analysis. Section 6 discusses the findings in broader context. Section 7 concludes with policy implications.

2. Literature Review

2.1 HEALTH INFORMATION AND HEALTH OUTCOMES

A substantial body of research has established that access to accurate health information is a critical determinant of health behavior and health outcomes. The classical health production function framework, originating with Grossman[1], treats health as a stock that individuals augment through investment behaviors informed by their knowledge and preferences. Information imperfections—particularly prevalent in low-income and rural

settings—distort these investments, leading to under-utilization of preventive care, late treatment-seeking, and suboptimal self-management of chronic conditions. Interventions that reduce information costs can therefore generate first-order improvements in health outcomes even in the absence of income or infrastructure changes.

Empirical evidence from quasi-experimental designs in developing countries confirms this theoretical prediction. Studies of community health worker programs, mass media health campaigns, and short message service–based reminders have documented significant reductions in child mortality, maternal morbidity, and communicable disease incidence attributable to information provision. In the Chinese context, healthcare reform efforts targeting universal health coverage have demonstrated that improved care access and information dissemination improve practice across chronic conditions including hypertension and diabetes[2].

The health consequences of information deprivation extend beyond individual morbidity to family and community spillovers. Research on left-behind children in rural China demonstrates that parental migration—while delivering remittance income—significantly worsens children's health outcomes through disrupted care and reduced household health information[3]. Intergenerational transmission of health disadvantage has similarly been documented in the context of early-life nutritional shocks: exposure during the 1959–1961 Great Famine produced lasting physiological and socioeconomic consequences for affected cohorts[4]. Even indirect peer-network effects matter—evidence shows that left-behind children in classrooms with higher proportions of peers whose parents remain at home enjoy better health outcomes, suggesting that information and care norms diffuse through social networks[5]. These findings collectively underscore the cumulative, intergenerational, and socially embedded nature of health information gaps in rural China.

2.2 INTERNET USE AND HEALTH

Research on the health effects of Internet use has expanded rapidly since broadband diffusion in the early 2000s. The dominant finding in high-income country studies is that online health information-seeking is associated with greater health awareness, improved preventive behaviors, and more productive patient–provider interactions. Among adults with chronic disease, electronic health behaviors—including web-based health information-seeking and patient portal use—are significantly more prevalent and are positively associated with self-management engagement[6]. Panel data evidence from China confirms that Internet use has a significantly positive impact on the health outcomes of rural adults, operating through pathways including information accessibility, social interaction, and physical exercise facilitation[7].

Urban–rural disparities in health outcomes in China are substantial, and Internet use has been shown to moderate and partially mediate these gaps, particularly for cognitive function and mental health outcomes among older adults[8]. Evidence from China Family Panel Studies data further demonstrates that Internet use reduces health inequality among rural residents by improving both access to and affordability of healthcare services[9]. Press freedom and the broader information environment are independently associated with population health: cross-national evidence indicates that restrictions on information flow significantly reduce life expectancy through multiple channels[10]. These findings suggest that health returns to Internet access are context-dependent and moderated by the quality and trustworthiness of accessible health content.

Beyond physical health, digital media access is associated with mental health benefits in rural China. Longitudinal evidence indicates that increased digital media use can reduce depressive symptoms among rural residents, with leisure and information access identified as key pathways[11]. Peer-network spillovers from information diffusion also matter: evidence shows that left-behind children in classrooms with higher proportions of peers whose parents remain at home enjoy better health outcomes[5]. Heterogeneity analyses across multiple studies consistently find that the health returns to Internet use vary by age and socioeconomic status, motivating the age-stratified mechanism analysis in this study.

2.3 MECHANISMS: HEALTH LITERACY AND SOCIAL SUPPORT

Two mechanisms have received the most theoretical and empirical attention as pathways linking health information access to health outcomes: health literacy and social support.

Health literacy—defined as the capacity to obtain, process, and understand health information and services needed to make appropriate health decisions—is widely recognized as a critical mediating variable. Low health literacy is independently associated with worse self-management of chronic disease, higher hospitalization rates, and greater reliance on emergency care[12]. A systematic review and meta-analysis confirms that eHealth literacy is positively and moderately correlated with health-related behaviors, indicating that eHealth literacy mediates the pathway by which online health information leads to behavior change[6]. A separate systematic review of health literacy interventions across patients with chronic diseases confirms that improving health literacy produces measurable gains in medication adherence, disease understanding, and self-management behaviors[13]. Internet use facilitates these gains by enabling self-directed learning, access to authoritative health portals, and participation in online health communities; e-health literacy has been shown to improve chronic disease self-management in older Chinese patients, with self-efficacy serving as an important mediating pathway[14].

Social support constitutes a second important channel. Perceived social support is consistently associated with better physical and mental health outcomes across diverse populations and is particularly protective for elderly rural residents who may face limited in-person social interaction. Research demonstrates that social support—operating through both main-effect and stress-buffering pathways—protects mental health by moderating the negative physiological impact of stressors[15]. For older adults in rural China, intergenerational support significantly reduces depression and improves subjective well-being, with emotional support proving more effective than economic support alone[16]. Internet platforms facilitate maintenance of social ties, access to peer support networks, and reduction of social isolation—factors of particular importance when working-age children have migrated to cities.

The relative importance of health literacy versus social support channels is expected to vary across the life course. Middle-aged and elderly individuals may rely more heavily on social support pathways, while younger individuals with higher baseline health literacy may derive greater returns from information access per se. Consistent with the broader literature on social capital and wellbeing, reduced psychological stress and improved social connectedness from Internet use may also generate wellbeing returns that complement the direct health effects[17]. This age-stratified heterogeneity provides an important empirical target for mechanism analysis.

3. Material and Methods

3.1 DATA

This study uses data from the China Health and Nutrition Survey (CHNS), a longitudinal household survey conducted collaboratively by the National Institute for Nutrition and Health at the Chinese Center for Disease Control and Prevention and the Carolina Population Center at the University of North Carolina. The survey employs multistage stratified cluster sampling to draw a nationally representative sample from nine provinces, with waves conducted in 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011, and 2015. We focus on waves 2004 to 2015, the period during which Internet use data are available, and restrict the sample to rural residents. This yields an unbalanced panel with approximately 125,000 rural observations across waves.

Rich information on individual and household characteristics—including demographics, income, health status, health behaviors, health literacy, and Internet use—makes the survey uniquely suited for our research questions. We exploit the panel structure to address missingness in time-invariant variables such as educational attainment by forward- and backward-filling within individuals across waves. All income and expenditure variables are deflated to 2015 CNY using provincial price indices.

3.2 VARIABLES

Our key independent variable is Internet use, a binary indicator equal to one if the individual uses the Internet and zero otherwise. This variable serves as a proxy for health information access, consistent with prior literature documenting that rural Internet users predominantly seek health information online.

Health outcomes are organized into two categories. Short-term health outcomes include: (1) a binary indicator for any illness or injury in the past

four weeks; (2) illness severity (rated on a scale); and (3) number of days unable to perform normal activities due to illness. Long-term health outcomes include binary indicators for four chronic conditions—hypertension, diabetes, asthma, and obesity—selected based on World Health Organization definitions and data availability. Following Ye et al.,[18] obesity is defined as body mass index ≥ 30.

Control variables include gender, age, Han ethnicity, years of education, personal income (log), and household per-capita income (log). Province fixed effects and survey-year fixed effects are included in all specifications to absorb time-invariant regional confounders and common temporal shocks.

3.3 EMPIRICAL MODEL

We estimate the following baseline specification:

$$y_i = \beta_0 + \beta_1 \cdot HI_i + X_i'\gamma + \tau_t + \varepsilon_i \quad (1)$$

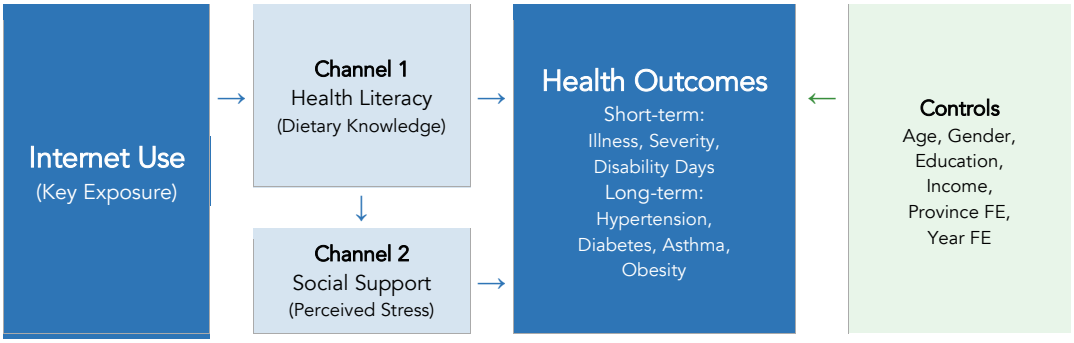
where y_i is the health outcome of rural individual i. HI_i is Internet use (=1 if the individual uses the Internet). X_i is a vector of individual controls. τ_t denotes survey-year fixed effects. Province fixed effects are absorbed into the intercept. Standard errors are clustered at the household level. The coefficient of interest, β_1, identifies the within-province, within-year association between Internet use and health outcomes, conditional on individual characteristics.

We acknowledge that Internet use is unlikely to be randomly assigned: individuals with higher income, education, and underlying health consciousness are more likely to be online. While the inclusion of rich controls and fixed effects addresses many sources of confounding, residual selection bias may remain. Our estimates should therefore be interpreted as conditional associations rather than causal effects. Future research with credible instrumental variables—such as local broadband rollout timing—is warranted.

For mechanism analysis, we replace the dependent variable with proxies for health literacy (dietary knowledge index) and social support (perceived stress, reversed). These analyses are conducted separately for three age groups: young adults (18–44), middle-aged adults (45–59), and elderly individuals (60+), motivated by the expectation that health literacy and social support pathways may operate differently across the life course.

Figure 1 presents the conceptual framework linking Internet use to health outcomes through the two proposed channels and accounting for individual and regional controls.

Figure 1: Conceptual Framework



Note: The figure illustrates the two proposed mediating channels—health literacy and social support—through which Internet use is hypothesized to affect short-term and long-term health outcomes, conditional on individual and regional controls.

4. Descriptive Statistics

Table 1 presents summary statistics by Internet use status. Internet users are on average 3.7 years younger, have 3.7 more years of education, and earn substantially higher personal and household incomes than non-users, reflecting the digital divide that characterizes rural China. In terms of health outcomes, Internet users report significantly better self-rated health, lower four-week illness probability, and less severe illness episodes. Non-users face substantially higher rates of hypertension (6.6% vs. 3.6%), diabetes (1.5% vs. 0.6%), asthma (1.2% vs. 0.3%), and lower rates of obesity (8.6% vs. 13.7%). The obesity differential may reflect the younger age profile of Internet users and associated behavioral differences. No statistically significant differences are observed in medical expenditures and out-of-pocket burden in raw comparisons, although regression-adjusted estimates suggest potential cost effects.

Table 1: Descriptive Statistics by Internet Use Status, Rural Sample

	Non-Users (1)		Users (2)		(1)–(2)
	N	Mean	N	Mean	Diff.
Age (years)	119,741	34.825	6,262	31.133	3.692***
Han ethnicity (=1)	119,741	0.827	6,262	0.908	−0.082***
Education (years)	88,621	6.043	6,255	9.762	−3.719***
Personal income (CNY)	54,380	9,897	3,703	31,576	−21,680***
Household per-capita inc.	119,741	7,404	6,262	17,720	−10,316***
Illness past 4 weeks	77,990	0.102	6,245	0.116	−0.014***
Disability days	9,803	1.997	1,054	0.667	1.330***
Illness severity	10,800	1.688	1,063	1.550	0.137***
Hypertension (=1)	52,799	0.066	3,933	0.036	0.030***
Diabetes (=1)	40,692	0.015	3,931	0.006	0.009***
Asthma (=1)	12,401	0.012	2,384	0.003	0.010***
Obesity (=1)	119,741	0.086	6,262	0.137	−0.051***
Self-rated health	28,421	3.736	1,367	3.849	−0.112***

Notes: Data from the China Health and Nutrition Survey, 2004–2015, rural sample. All income and expenditure variables are deflated to 2015 CNY. *** p<0.01, ** p<0.05, * p<0.10. Differences are means tests; significance indicates rejection of the null of equal means.

5. Results

5.1 SHORT-TERM HEALTH OUTCOMES

Table 2 presents ordinary least squares estimates of the association between Internet use and short-term health outcomes. Column (1) shows that Internet use is associated with a 3.7-percentage-point reduction in the probability of any illness or injury in the past four weeks (t = −7.24). Given a baseline illness prevalence of approximately 10%, this corresponds to roughly a one-third relative reduction—a substantively large effect. Columns (2) and (3) show that conditional on being ill, Internet users experience less severe illness and approximately 0.43 fewer disability days (t = −2.70). These results are consistent with earlier illness onset detection and more timely treatment-seeking facilitated by access to online health information. The association between Internet use and reduced acute morbidity is broadly consistent with evidence from other middle-income settings, where digital health platforms have been shown to reduce emergency visits and promote timely care-seeking[22].

Control variable results are broadly consistent with expectations. Female residents are approximately 1.7 percentage points more likely to report four-week illness, reflecting either true biological differences or greater health awareness and reporting propensity. Illness probability rises monotonically with age and falls with education, consistent with the literature documenting health returns to schooling. Han residents have a slightly higher illness probability than ethnic minorities but experience less severe illness conditional on becoming ill, potentially reflecting differences in healthcare utilization patterns.

Table 2: Internet Use and Short-Term Health Outcomes, Rural Sample

	(1) Illness past 4 weeks	(2) Illness severity	(3) Disability days
Internet use (=1)	−0.037***	−0.051***	−0.43***
	(−7.24)	(−3.16)	(−2.70)
Female (=1)	0.017***	−0.22	−0.011
	(4.79)	(−1.33)	(−0.70)
Age (years)	0.003***	0.036***	0.005***
	(29.8)	(7.24)	(10.4)
Han ethnicity (=1)	0.021***	−0.68**	−0.010

	(1) Illness past 4 weeks	(2) Illness severity	(3) Disability days
	(3.43)	(−2.23)	(−0.38)
Education (years)	−0.005***	−0.010	−0.009***
	(−9.50)	(−0.47)	(−4.15)
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	39,135	7,731	7,786
Adjusted R^2	0.043	0.018	0.032

Notes: Ordinary least squares estimates. t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.10. Year and province fixed effects included in all specifications.

5.2 LONG-TERM HEALTH OUTCOMES (CHRONIC DISEASE)

Table 3 reports results for chronic disease outcomes. Internet use is associated with statistically significant reductions in hypertension (1.2 percentage points, p<0.05), diabetes (0.8 percentage points, p<0.01), asthma (0.3 percentage points, p<0.10), and obesity (1.5 percentage points, p<0.01). The largest absolute effect is observed for obesity, though the relative reduction is most pronounced for diabetes (approximately 53% relative to the non-user mean of 1.5%). These findings suggest that beyond acute health responses, access to health information through the Internet may facilitate sustained behavioral change—including dietary modification, physical activity, and tobacco cessation—that reduces chronic disease risk over time.

Age and education coefficients follow consistent patterns: chronic disease risk rises sharply with age across all conditions, while education is protective for hypertension, diabetes, and asthma but is positively associated with obesity—a finding that may reflect the sedentary nature of higher-educated white-collar occupations. These patterns reinforce the value of targeting health information interventions toward older, less-educated rural residents who face the greatest chronic disease burden.

Table 3: Internet Use and Chronic Disease Outcomes, Rural Sample

	(1) Hypertension	(2) Diabetes	(3) Asthma	(4) Obesity
Internet use (=1)	−0.012**	−0.008***	−0.003*	−0.015***
	(−2.51)	(−3.20)	(−1.75)	(−3.04)
Female (=1)	0.013***	0.0024	−0.0058***	0.00078
	(4.14)	(1.49)	(−3.73)	(0.23)
Age (years)	0.0071***	0.0017***	0.00070***	0.00074***
	(53.2)	(24.0)	(9.95)	(5.52)
Han ethnicity (=1)	0.022***	0.011***	0.0047*	0.032***
	(4.32)	(4.35)	(1.78)	(5.43)
Education (years)	−0.002***	−0.002***	−0.001**	0.001***
	(−4.83)	(−7.46)	(−2.27)	(2.72)
Year FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	40,317	40,332	21,976	52,970
Adjusted R^2	0.106	0.029	0.011	0.121

Notes: Ordinary least squares estimates. t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.10. Year and province fixed effects included in all specifications.

5.3 MECHANISM ANALYSIS: HEALTH LITERACY AND SOCIAL SUPPORT

Table 4 presents mechanism analyses for health literacy (Channel 1) and social support (Channel 2), stratified by age group. Regarding health literacy, Internet use significantly increases dietary knowledge scores across all three age groups: by 8.0 percentage points among young adults, 8.6 percentage points among middle-aged adults, and 9.8 percentage points among elderly respondents—with the largest absolute effect observed among the elderly. This pattern suggests

that Internet-based health information is particularly valuable for older rural residents who have historically had the least access to formal health education channels.

For social support, measured as reduced perceived psychological stress, Internet use has no significant association with stress levels among young adults (coefficient: 0.009, t = 0.16) but is significantly associated with lower perceived stress among middle-aged (coefficient: −0.13, p<0.10) and elderly (coefficient: −0.13, p<0.05) respondents. These results suggest that for younger rural residents, Internet use improves health primarily through information acquisition and literacy enhancement, while for middle-aged and elderly individuals, the social connectivity afforded by online platforms—including access to peer networks, family communication, and community support—plays an additional role. This age-differentiated mechanism is consistent with the social support literature's emphasis on the special vulnerability of older individuals to social isolation and its health consequences.

Table 4: Mechanism Analysis by Age Group

	(1) Young (18–44)	(2) Middle-aged (45–59)	(3) Elderly (60+)
Channel 1: Health Literacy			
Internet use (=1)	0.080***	0.086***	0.098***
	(8.74)	(6.00)	(3.56)
Controls	Yes	Yes	Yes
Observations	14,274	12,197	8,417
Adjusted R^2	0.105	0.074	0.058
Channel 2: Social Support			
Internet use (=1)	0.009	−0.13*	−0.13**
	(0.16)	(−1.80)	(−2.58)
Controls	Yes	Yes	Yes
Observations	2,460	2,570	2,240
Adjusted R^2	0.01	0.01	0.02

Notes: Ordinary least squares estimates. t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.10. Controls include gender, age, ethnicity, education, income, year, and province fixed effects.

6. Discussion

This study provides systematic empirical evidence that Internet use—as a proxy for health information access—significantly improves both short-term and long-term health outcomes among rural residents in China. The findings are robust across multiple dimensions of health, spanning acute morbidity outcomes and four chronic conditions. Mechanism analyses identify two distinct pathways through which these benefits accrue: enhanced health literacy, which operates across all age groups, and improved social support, which is concentrated among middle-aged and elderly populations.

The health literacy channel is consistent with a well-established theoretical tradition linking information access to preventive investment and timely healthcare utilization. Our finding that the effect of Internet use on dietary knowledge is largest among elderly respondents—historically the most information-deprived segment of the rural population—suggests that digital information provision may have particularly high marginal returns for groups with the lowest baseline health literacy. This result aligns with prior meta-analytic evidence demonstrating a moderate positive correlation between eHealth literacy and health-promoting behaviors, with the relationship being strongest among older adults.

The social support channel adds an important dimension to the standard information-seeking narrative. For rural elderly residents whose adult children have migrated to cities, Internet platforms may function as a substitute for in-person social networks, buffering the psychological stress associated with social isolation and reduced intergenerational contact. Digital tools have been shown in other contexts to improve social connectedness and reduce loneliness among isolated

older adults, with consequent benefits for both mental and physical health outcomes[23]. Our results suggest that these dynamics operate in the rural Chinese context, with implications for how digital interventions should be designed and targeted.

The finding that Internet use reduces chronic disease incidence—particularly for hypertension and diabetes, which are the dominant causes of morbidity among older rural Chinese—has substantive policy significance. Both conditions are highly amenable to information-driven prevention: dietary modification, physical activity, weight management, and regular monitoring are all behaviors that can be prompted and reinforced through online health platforms. The magnitudes of our estimates, while modest in absolute terms, are comparable to those documented in studies of community health worker programs and mass media health campaigns, suggesting that Internet-based information delivery is cost-competitive with more resource-intensive interventions.

Our results also contribute to the broader literature on the governance of digital health systems. Collaborative health governance frameworks across complex institutional environments have emphasized health information exchange and digital infrastructure as foundational enablers of integrated care[19]. The present findings reinforce this perspective at the household level: just as health information exchange improves care coordination across jurisdictions, Internet-mediated health information access improves individual health decision-making within households. Extending this logic, policies promoting rural broadband infrastructure and digital health literacy programs can be understood as investments in the informational infrastructure of the health system, complementing supply-side investments in facilities and personnel.

Several limitations of the analysis warrant acknowledgment. First, Internet use is an imperfect proxy for health information access: it encompasses non-health uses and excludes non-digital information sources. Future research with granular measures of online health information-seeking would strengthen causal identification. Second, health literacy is proxied by dietary knowledge, which captures only one dimension of this multifaceted construct. Third, while our regression controls are comprehensive, residual selection bias from unobserved determinants of Internet adoption cannot be fully ruled out. Instrumental variable approaches exploiting exogenous variation in local Internet infrastructure rollout would provide more credible causal estimates. Fourth, the survey data cover through 2015, and given the acceleration of Internet penetration in rural China since 2016—particularly through smartphone adoption and mobile health applications—contemporary effects may differ in magnitude and mechanism. Fifth, our mechanism analysis relies on proxies rather than direct measures of health literacy and social support; future work using validated scales would strengthen mechanistic inference.

7. Conclusion

This study examined whether Internet use improves health outcomes among rural residents in China and identified the channels through which these effects operate. Using panel data from the China Health and Nutrition Survey spanning 2004–2015, we find robust evidence that Internet users in rural areas experience significantly better outcomes across a broad range of short-term and long-term health measures. The effects are mediated primarily through improved health literacy—with the largest gains among elderly residents—and through reduced psychological stress among middle-aged and elderly populations.

Several policy implications follow. First, the documented health returns to Internet access provide economic justification for continued public investment in rural digital infrastructure. Broadband expansion, subsidized data plans, and community Internet access centers can simultaneously serve as poverty reduction and public health policy, consistent with China's rural revitalization agenda. Second, Internet connectivity alone is insufficient: the health literacy channel identified in our mechanism analysis underscores the importance of simultaneous investment in digital health literacy education. Third, for elderly rural residents, digital interventions targeting social connectivity—such as platforms facilitating contact with migrant children or participation in online community health groups—may generate meaningful health benefits beyond pure information provision. Research has documented that parental migration has significant

negative health consequences for left-behind family members, and that information-based interventions may partially compensate for these disruptions[3]. Fourth, health literacy should be incorporated as a key performance indicator in evaluations of digital village and rural health education programs.

In sum, our results support the proposition that information is among the most cost-effective medicines available for rural health promotion. Expanding rural residents' access to the Internet—and equipping them to use it effectively for health purposes—offers a scalable, affordable complement to traditional health infrastructure investment in the pursuit of health equity between urban and rural China.

Conflict of Interest Statement:

The authors declare no conflicts of interest.

Funding Statement:

This research received no specific funding.

Acknowledgements:

None.

Author Contributions

Conceptualization: QL, YZ. Methodology: QL. Data Analysis: QL, YZ. Writing – Original Draft: YZ, LA, QL. Writing – Review & Editing: QL, LA. All authors have read and approved the final manuscript.

Data Availability Statement

Data from the China Health and Nutrition Survey are publicly available. Access instructions are provided at www.cpc.unc.edu/projects/china .

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