

Determining the knowledge on helicobacter pylori, government programs, environmental factors, and media influence on the health behaviors among low-income residents in fujian province: a basis for program development

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Abstract

This study determined the level of knowledge on *Helicobacter pylori* (*H. pylori*) infection, perception of government programmes and support, media influence, environmental factors, and health among low-income residents in Fujian Province, China. The data were collected through structured questionnaires administered to 516 low-income adult residents aged 18–65 years in Xiamen City, Fujian, who met the municipal low-income criteria. A stratified random sampling method was used to obtain samples, with a total of $n=516$ valid questionnaires collected. Descriptive statistics, correlation analysis, multiple regression, and moderation analysis were used to examine the relationships and predictive power among the variables. The findings showed that There is a significant positive correlation between *H. pylori* knowledge, government programs and support, media influence, environmental factors, and health behaviors (all tests $p<.001$); the final model of multiple regression has good explanatory power ($R^2=0.618$, overall F test $p<.001$), with environmental factors having the most significant impact on overall health behaviors (main effect $t=12.66$, $p<.001$). The conclusions remain robust after controlling for age, gender, marital status, and educational level; significant differences were also found in inter-group comparisons based on demographic characteristics ($p<.05$). The study provided evidence-based recommendations for designing targeted public health interventions, government support programs, enhancing media communication strategies, and improving environmental health policies to reduce *H. pylori* infection rates and improve the overall health of low-income communities in China.

Keywords

Helicobacter pylori; low-income residents; health behaviors; government programmes; media influence; environmental factors; health prevention

1. The Problem and Its Background

Helicobacter pylori (*H. pylori*), a Gram-negative bacterium, is a primary colonizer of the human gastric mucosal membrane. It is a major etiological factor in multiple gastrointestinal disorders, including chronic gastritis, gastric ulcer, and gastric cancer. Since its landmark discovery by Australian researchers Barry Marshall and Robin Warren in 1983, *H. pylori* has been the focus of global scientific attention. Epidemiological data indicate that approximately 50% of the global population is infected with *H. pylori*, with disproportionately higher prevalence in developing countries (Papastergiou et al., 2020). In China, the burden of *H. pylori* infection is particularly severe, with a prevalence ranging from 50% to 70%—a rate that constitutes a significant public health concern (Wang et al., 2020).

Notably, low-income populations in China, despite being heavily affected by *H. pylori* infection, remain inadequately informed about key aspects of the disease, including infection awareness, government support mechanisms, media engagement, and self-management strategies for infection. This information gap has detrimental effects on health behaviors, health decision-making, and the implementation of effective population-level health strategies. In contemporary society, media serves as a critical channel for public health information dissemination. However, the impact of media varies significantly across different platforms, highlighting the need for targeted communication strategies to address the information disparities observed in vulnerable populations. Different media channels (e.g., television, radio newspapers, and social media) are distinctive in disseminating health information, educating the public, and advocating healthy behaviours (Blake et al. 2023). However, factors such as the accuracy, reach, and impact of media messages are directly related to their effectiveness in public health. In China, the criteria for low-income households vary from region to region, usually with reference to the minimum subsistence guarantee line (LSSL). According to the most recent standards of the Xiamen municipal government, a low-income household is defined as having a per capita monthly household income of less than or equal to RMB 830 (Su & Xu, 2021). Low-income residents often face multiple health-related socioeconomic barriers, including limited medical resources, lower levels of health literacy, and unhealthy lifestyles, all of which increase their risk of contracting *H. pylori* (Kwon et al., 2020). Programmes and support from governmental and non-governmental organisations (NGOs) in raising public health Knowledge and preventive measures are essential to improve the health status of low-income populations. Through public education, economic support and other forms of assistance, these programs can largely influence individual health behaviours and decision-making.

Currently, most of the research on HP focuses on its medical and biological aspects, and there is a lack of in-depth investigation into the level of Knowledge among the public, especially among low-income populations. Existing studies are mostly qualitative and lack systematic quantitative analyses, resulting in an inability to fully un-

derstand the Knowledge of HP among low-income populations (Fan & Chen, 2020). Despite the government implementing various programs and supporting interventions aimed at HP prevention, little is known about the awareness and impact of these programs among poor people. Further empirical studies within the given context are required to ascertain the impact of these programs and support. While the media serves an important function in the promotion of health education and information, there is a scarcity of research on the media's role in facilitating HP Knowledge and health actions in the disadvantaged groups. The role of health actions in HP prevention is known, but there is a lack of quantitative research on particular action patterns and their determinants among poor populations.

This research examines several variables that work together to determine the prevention of *H. pylori* infection among the economically disadvantaged. To begin with, knowledge of *H. pylori* is essential when it comes to determining the steps that individuals will take to prevent its occurrence. It involves comprehension of the symptoms associated with the infection, how it is detected, the channels of its transmission, and the strategies that can be used to avert it. It is more probable that a person with a higher understanding is likely to adopt healthier practices. Furthermore the programs and support of the government are also important, as they provide knowledge, health services at no cost or at a discounted rate, and financial support which directly affects the community's ability to avert *H. pylori* infection. The impact of such programs is no doubt shaped by the breadth, nature, and application of such programs by the intended populace. Moreover, the role of the media is also important. The media's role in improving the public's understanding of health issues and the public's response to media health campaigns is important. The range and credibility of health messages concerning the prevention of *H. pylori* infection that are disseminated through the media can bring about change in the health practices of the community as a whole. Lastly, there are also broader elements such as the standard of housing, the condition of drinking water, and the safety of food which all have a direct impact on health behavior, and the likelihood of infection. For instance, in economically disadvantaged communities, the elements of sanitation and the availability of safe drinking water can significantly facilitate the spread of active infections.

This research endeavors to analyze multiple elements to devise strategies to improve health and unlock processes which govern *H. pylori* infection associated challenges.

This will be achieved through quantitative analysis. The thesis and its argument will attempt to provide data-driven and theoretical justification for a comprehensive intervention plan that aims to tackle *H. pylori* infection. It is expected that the analysis will be more than just a set of strategies which provide focus towards reducing *H. pylori* infection. It should work towards uplifting the health status of low-income citizens and be a feasible template towards further enhancing public health guide-

lines in China.

2. Statement of the Problem

The purpose of this study was to determine the Knowledge to *Helicobacter pylori* (H. pylori), government programs and support, media influences, and health behaviours to prevent H. pylori infection among low-income residents in China, and to analyze the relationship between them and further determine the moderating effect of profile variables to the relationship of these variables. Specifically, this study aimed to answer the following research questions.

1. What is the level of Knowledge of H. pylori among the respondents in terms of:
 - 1.1 Signs and symptoms
 - 1.2 Detection and diagnosis
 - 1.3 Routes of infection
 - 1.4 Preventive measures
2. To what extent do respondents evaluate government programs and support in terms of:
 - 2.1 Knowledge
 - 2.2 Utilization
3. What is the extent of media exposure among respondents' in relation to the prevention of H. pylori infection?
4. To what extent does the respondents perceive their environmental factors on the prevention of H. pylori infection, specifically in relation to:
 - 4.1 Living environment and sanitation
 - 4.2 Drinking water quality
 - 4.3 Food safety
5. How do the respondents assess their health behaviours in terms of:
 - 5.1 Hygiene habits
 - 5.2 Dietary habits
 - 5.3 Health screening
6. Is there interrelationship between the following variables:
 - a. Knowledge of H. pylori and health behaviors
 - b. Government programs and support and health behaviors
 - c. Media influence and health behaviors
 - d. Environmental factors and health behaviors
7. Is there a significant difference in the health behaviors of the low-income residents considering their demographic profile?
 - a. Age
 - b. Sex
 - c. Marital status
 - d. Educational status
8. Which of the following significantly predicts health behaviors of the low-income

respondents?

a. Knowledge of helicobacter pylori

b. Government programs and support,

c. Media influence

d. Environmental factors

9. What intervention program can be developed based of the results of the study?

3. Research Design

This research targets the capacity of the low-income population of China to comprehend *Helicobacter pylori* (HP) infection, the government policies and assistance, the role of the media, and the health behaviours aimed at *H. pylori* infection prevention using the quantitative research methodology and analysing the data quantitatively. The research combines descriptive analysis and correlational analysis. To obtain and systematise the data, the analysis involves the use of questionnaires in order to provide a large set of data to describe and evaluate the Knowledge Level, Government Programmes and Support evaluation, media influences, and health behaviours from different contextual frameworks. Correlations between the variables are examined to evaluate the role of government, the mass media, and the physical environment in the prevention of HP infection among low-income people.

4. Results And Discussion

Table 1. Descriptive Statistics of Knowledge of *H. pylori* in Terms of Signs and Symptoms

Indicators	Correct		Incorrect	
	n	%	n	%
H. pylori infection is unrelated to the development of stomach pain and gastritis.	299	57.9%	217	42.1%
H. pylori infection can not cause nausea and vomiting.	296	57.4%	220	42.6%
H. pylori infection can cause stomach ulcers.	295	57.2%	221	42.8%
H. pylori infection increases the risk of stomach cancer.	293	56.8%	223	43.2%
H. pylori infection cannot cause indigestion.	290	56.2%	226	43.8%

The results in Table 1 show that the majority of respondents were able to correctly identify the typical symptoms of *H. pylori*. 57.9% of the respondents knew that 'H. pylori infection is associated with stomach pain and gastritis', 56.2% knew that the infection can cause nausea and vomiting, and 60.2% knew that the use of public chopsticks can reduce the risk of transmission; at the same time, about 42% of the respondents still gave incorrect answers to some of the statements, which shows that there is a blind spot in the knowledge of certain symptoms. 57.4% of the respondents were aware that *H. pylori* can increase the risk of gastric cancer, indicating that more than half of them were able to identify typical symptoms correctly. 57.4% of respondents were aware that *H. pylori* increases the risk of gastric can-

cer, indicating that more than half of them have a basic understanding of the serious consequences, but 42.6% still failed to make a correct judgement, suggesting that the risk of complications needs to be reinforced in health education.

The subjects' understanding of the typical signs and symptoms of *H. pylori* is generally at a moderate level: a considerable number of people can associate dyspepsia/epigastric pain, ulcer-like pain, nausea/vomiting, and the risk of gastric cancer with the infection, but a significant proportion still choose incorrectly or are uncertain. This shows a coexistence and differentiation between 'basic awareness' and 'symptom interpretation and severity judgment.' This uneven knowledge structure may weaken the triggering effect of 'symptom cues → seeking medical care/screening,' and to some extent explains the phenomenon in the subsequent results of this study that 'knowledge is significantly positively correlated with protective health behaviors, while subjective symptoms alone are insufficient to drive action consistently' (Liou et al., 2020; Katelaris et al., 2023). *H. pylori* is an important cause of peptic ulcers and a recognized risk factor for gastric cancer. Standardized non-invasive testing and timely management can reduce the disease burden, while short prompts and procedural guidance based on social media can help improve adherence and screening rates (Lee et al., 2024; Guevara & Cogdill, 2020).

Level of Knowledge of *H. pylori* in Terms of Detection and Diagnosis

The aim of this section is to find out the level of knowledge of the respondents regarding *H. pylori* detection and diagnostic methods. The roles of breath test, serological test, faecal antigen test and gastroscopy in the diagnosis of *H. pylori* are covered respectively. By assessing the knowledge of these common clinical diagnostic tools among low-income groups, it can provide a basis for subsequent targeted health education and screening promotion.

Table 2. Descriptive Statistics of Knowledge of *H. pylori* in Terms of Detection and Diagnosis

Indicators	Correct		Incorrect	
	n	%	n	%
<i>H. pylori</i> cannot be detected by a stool test.	293	56.8%	223	43.2%
<i>H. pylori</i> cannot be diagnosed by a blood test.	295	57.2%	221	42.8%
<i>H. pylori</i> can be detected by a breath test.	305	59.1%	211	40.9%
Gastroscopy can be used to diagnose <i>H. pylori</i> infection.	285	55.2%	231	44.8%

The results in Table 2 show that the respondents' knowledge of the various testing methods showed a relatively balanced pattern: 57.0% knew that the breath test could be used to detect *H. pylori*, while 43.0% answered incorrectly; 59.6% incorrectly believed that faecal testing could not detect *H. pylori*, while 40.4% were able to judge it correctly; 55.0% were aware of the role of gastroscopy in diagnosis, but still 45.0% answered incorrectly; and about 42.6% thought that serological testing could not be used for diagnosis, indicating that nearly half of the respondents had a cognitive bias about the use of serological testing reagents.

Overall, respondents' knowledge of non-invasive tests (e.g., breath test) was slightly

better than that of invasive diagnostics (e.g., gastroscopy), but the overall level of knowledge was still average.

Most people can recognize that breath tests and stool antigen tests are commonly used and non-invasive methods, but there is inadequate understanding of the limitations of serology, the applicable scenarios for endoscopic biopsy, the timing of post-treatment re-examination, and the impact of medications on testing accuracy. This means that even when there is a willingness to seek medical care, operational knowledge about 'how to correctly perform tests' may still become a bottleneck for behavior transformation. This weak link aligns with the findings from this study's statistics, where 'knowledge is positively correlated with health behavior but the conversion rate is limited,' explaining why it is difficult to consistently trigger screening based solely on symptom cues. However, when government programs are available, accessible, and achievable, coupled with media prompts, behavioral growth becomes more pronounced (Zhao et al., 2020). Mainstream consensus and guidelines list urea breath tests (UBT) and stool antigen tests (SAT) as the preferred non-invasive diagnostic and re-examination tools, and they provide clear recommendations on the applicable limitations of serology, indications for invasive biopsy, and timing for re-examinations post-treatment, supporting the educational-service linking strategy proposed in this study (Liou et al., 2020; Katelaris et al., 2023; Lee et al., 2024).

5. Conclusion

Among low-income residents, knowledge of *H. pylori* and related health behaviors were only moderate. Health behaviors were most strongly driven by environmental sanitation and safety, with knowledge and the utilization of government programs also contributing; media influence did not retain independent predictive power after adjustment. Women and higher-educated groups showed better behaviors. The integrated model showed high explanatory power. Practically, preventing *H. pylori* in this population should prioritize upgrading water/food safety and community sanitation, coupled with targeted knowledge education and streamlined "one-stop" government services; media should support—rather than substitute—policy and environmental measures.

Recommendation

- (1) Targeting the elderly. In view of the tendency for health behaviour scores to fall by 0.009 per year of age, and the fact that older people have limited mobility and access to information, regular 'health at home' services should be provided in the community.
- (2) Targeting the male population. Considering that men lag behind women in terms of health and screening behaviours, it is possible to take advantage of their interests and preferences to set up thematic activities on the theme of 'exercise + health'. For

example, in collaboration with community sports clubs, short quizzes on H. pylori prevention and hand hygiene exercises can be inserted in between badminton or tai chi activities; during football or basketball matches, short health videos can be played on a big screen or on the radio, and on-site booking cards for breath kits can be given out to increase men's participation in health check-ups.

(3) Targeting groups with low education levels. As education level has a significant impact on knowledge acquisition and behavioural implementation, low-text, illustration-heavy popularisation materials, such as posters, wall charts and comic booklets, should be produced, focusing on 'How to use chopsticks', 'Seven steps to proper hand washing', 'Home cooking temperature indication', 'How to use chopsticks', 'How to wash hands', and 'The right way of washing hands'. 'Home Cooking Temperature Indicators', etc.

(4) Targeting single and separated people. In the study, the single and separated groups performed better in terms of screening participation, but the association between marital status and daily hygienic eating behaviours was not obvious. A 'community health mutual aid group' can be organised, led by community volunteers, to conduct fortnightly thematic sharing sessions, allowing single or separated residents to share their health experiences with each other, and inviting professionals to provide free medical check-up appointments and counselling, so as to enhance the sustainability of behavioural implementation by means of group dynamics.

(5) Targeting high-risk groups with symptoms. For residents with a history of indigestion or stomach pain, a 'high-risk group whitelist' can be established, and community doctors can make regular calls or WeChat visits to remind them to seek medical treatment in a timely manner and arrange for a fast-track test to ensure same-day feedback of the test results, which further reduces the possibility of delays in diagnosis and treatment due to symptom neglect.

(6) Targeting the entire population. Given that environmental factors have the greatest impact on behaviour, the community should install hand-washing stations at major entrances and public places, display signs that say 'please use chopsticks' and 'wash your hands before eating', and conduct monthly environmental hygiene assessments. The results of the assessment are made public in real time through community bulletin boards and WeChat groups, forming a closed loop of 'hardware - reminder - feedback', so that residents can receive timely behavioural reminders and environmental conveniences when they are at home or when they are out and about.

(7) Recommendation on Utilization of Government Programs and Support . Building on our finding that program utilization—not mere awareness—most strongly predicts protective behaviors, we recommend a conversion-focused, barrier-light model: implement a one-stop "Scan-Book-Attend" flow (QR codes on all materials plus a staffed hotline), deploy community navigators to complete on-the-spot eligibility checks and enrolments, extend service windows to evenings/weekends and add

pop-up/mobile clinics at community centers and wet markets, simplify enrolment (short forms, single-ID, paperless options, proxy enrolment via family/community workers), and target low-uptake strata (married mid-/older adults and lower-education groups) with plain-language content and Mandarin/Hokkien audio. To remove practical barriers, provide fee waivers/transport vouchers and small non-cash incentives (e.g., hygiene kits) tied to first-time screening; close the loop with WeChat/SMS reminders and missed-appointment callbacks, and monitor awareness→booking→attendance conversion on a monthly dashboard for rapid PDSA-style improvements.

(8) For future researchers. More psychological and social support variables should be introduced, such as 'self-efficacy', 'social norms' and the influence of family and neighbourhood networks in the health belief model, to explore how these intrinsic motivations and external environments work together to regulate the transformation path of knowledge and behaviour. The sample could be expanded to cover different provinces and rural and peri-urban areas to test the applicability and effectiveness of the intervention programme in a variety of community scenarios.

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