

**COST-EFFECTIVENESS OF SCREENING ENDOSCOPY FOR EARLY
DETECTION OF GASTRIC CANCER IN HIGH-RISK ASIAN REGIONS: A
SECONDARY RESEARCH PERSPECTIVE**

Dissertation Submitted to



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for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

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by

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Under the Supervision and Guidance of

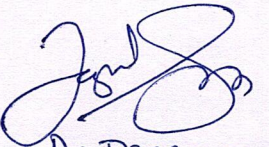
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2025



CERTIFICATE

This is to certify that Dr. Surveen Kaur Sodhi in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur has successfully completed her internship at Gurunank Life-Line Hospital, during March 12 – June 2, 2025.



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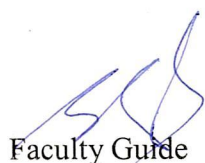
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This is to certify that the dissertation titled **“Cost- effectiveness of screening endoscopy for early detection of Gastric cancer in High-risk Asian regions: A Secondary Research Perspective”** is a record of the research work undertaken by **Dr. Surveen Kaur Sodhi** in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in blue ink, appearing to be 'SSB', written over the printed text 'Faculty Guide'.

Faculty Guide

IIHMR University, Jaipur

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DECLARATION BY STUDENT

I hereby declare that this dissertation, titled "COST-EFFECTIVENESS OF SCREENING ENDOSCOPY FOR EARLY DETECTION OF GASTRIC CANCER IN HIGH-RISK ASIAN REGIONS: A SECONDARY RESEARCH PERSPECTIVE" bona fide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.



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Abstract

With the highest prevalence recorded in East Asian nations including China, South Korea, and Japan, gastric cancer continues to be a leading cause of cancer-related death throughout Asia. A clinically and financially sound method for early identification and prevention, endoscopic screening has been shown to dramatically lower mortality and increase quality-adjusted life years (QALYs). On the other hand, despite a rising illness burden and the pervasiveness of risk factors including *Helicobacter pylori* infection, excessive salt intake, and delayed diagnosis, South Asian nations like India still lack organized screening programs. With the objective to synthesize the evidence about the cost-effectiveness of endoscopic screening programs in high-risk Asian countries, this dissertation performs a secondary research analysis of peer-reviewed articles published between 2004 and 2024. Screening intervals, economic results, and national policy implications were assessed using a narrative synthesis and tabulated comparison. The results show that in high-incidence groups, endoscopic screening every two or three years is cost-effective, especially when paired with *H. pylori* eradication. Furthermore, developments like risk-based screening models and AI-assisted diagnostics improve clinical effectiveness and resource use. A major obstacle in South Asia is the absence of context-specific data and policy involvement, even if East Asian models provide effective instances of statewide application. In conclusion, this dissertation finds strong evidence supporting endoscopic screening as a clinically and economically sound method for reducing gastric cancer burden in high-risk Asian countries. While East Asia serves as a model of success, tailored approaches are necessary for effective implementation in South Asia. The study advocates for integrated pilot programs, localized economic modeling, and policy engagement to reduce mortality and enhance early detection of gastric cancer in emerging healthcare systems.

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This dissertation is dedicated to all those who strive for better healthcare systems and improved patient outcomes through research and innovation.

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Chapter 1: Introduction

1.1 Background and Context

Gastric cancer continues to pose a significant public health issue worldwide, particularly in Asia, which experiences the greatest rates of incidence and mortality. According to GLOBOCAN 2020 predictions, Gastric cancer is the fourth most prevalent cause of cancer-related deaths worldwide and the fifth most commonly diagnosed cancer, with an estimated 1.1 million new cases and over 770,000 related deaths. Although many nations have seen a general decrease in the incidence and death of gastrointestinal cancer as a result of advancements in food preservation, cleanliness, and public health initiatives, Asia still bears a disproportionately heavy burden because of a number of enduring risk factors.

The highest incidence and death rates for gastric cancer are still seen in East Asian nations including China, Japan, and South Korea. In 2022, for example, China reported 358,672 new cases with an age-standardized incidence rate (ASIR) of 13.7 while Japan reported 126,724 new cases with an ASIR of 27.6 per 100,000 population. With China reporting 260,371 deaths and Japan reporting 43,807 deaths from gastric cancer, the mortality numbers reflect this significant burden. The high frequency of *Helicobacter pylori* infection, genetic predisposition, dietary patterns high in smoked and salted foods, smoking, and alcohol use all contribute to these numbers. But these countries have also put in place comprehensive screening systems, especially using upper gastrointestinal endoscopy, which has greatly increased early detection and survival rates.

In comparison to East Asia, South Asian nations like India, Pakistan, Bangladesh, Nepal, and Bhutan often report lower incidence and mortality rates; but, because of their sizable populations, unequal access to healthcare, and high prevalence of *H. pylori*, the burden is still significant. With an ASIR of 4.5 and a mortality ASIR of 4.1 per 100,000 people, gastric cancer was the cause of 64,611 new cases and 57,727 deaths in India in 2022. In South Asia, where gastric cancer is the most prevalent cancer kind, Bhutan notably has the highest recorded incidence rate. Although precise recent figures are less complete, other nations in the region, such as

Bangladesh and Pakistan, also confront difficulties. For instance, it is predicted that there are 5.7 deaths from gastric cancer for every 100,000 people in Bangladesh. In Asia, the development of gastric cancer is associated with a number of modifiable risk factors. The most common of these is *Helicobacter pylori*, a bacterium that the World Health Organization has designated as a Group 1 carcinogen. In many Asian nations, the prevalence of *H. pylori* infection is still high, sometimes reaching 70–80%. For instance, it has been demonstrated that eliminating *H. pylori* through public health campaigns can lower the incidence of stomach cancer by up to 53% in Taiwan.

Apart from bacterial infection, the risk is greatly increased by dietary habits including eating a lot of salty, pickled, and smoked foods, especially in East Asia. Heavy drinking and smoking increase the risk of disease progression much more. Recent studies also suggest that some *H. pylori* strains, namely the more virulent East Asian Cag A-positive variants, may be responsible for the higher cancer incidence in those areas relative to the Western strains.

Without early identification, the prognosis for gastric cancer is usually poor, regardless of regional variations. Due to a lack of awareness, inadequate screening programs, and inadequate healthcare infrastructure, the majority of patients in South Asia receive their diagnoses at an advanced stage. The high mortality-to-incidence ratios observed in nations like India, where the majority of patients who receive a diagnosis go on to pass away, are indicative of this. On the other hand, systematic endoscopic screening for people over 40 or 50 has greatly improved survival outcomes in nations like South Korea and Japan, which has helped to lower mortality trends despite high incidence rates.

The global burden of gastric cancer is expected to rise to around 1.8 million new cases and 1.3 million deaths per year by 2040, according to forecasts. This highlights the urgent need for strategic cancer control strategies, particularly in high-risk and growing high-burden countries, since it represents a 63% increase in incidence and a 66% increase in mortality, respectively. As population sizes rise and lifestyle variables change, South Asia is predicted to have an increasing number of cases, while East Asia is predicted to continue to be considered high-risk.

In light of this, it is crucial to evaluate the clinical efficacy of gastric cancer screening instruments as well as their cost-effectiveness in various healthcare and

economic environments. Although it requires a significant amount of resources, endoscopic screening in particular provides a potent tool for early detection. South Asian nations have not yet adopted widespread endoscopic screening strategies, primarily because of financial constraints and a lack of localized evidence supporting their economic feasibility, whereas nations such as Korea and Japan have shown that integrating such programs into national health systems is feasible.

Therefore, the purpose of this dissertation is to investigate the cost-effectiveness of screening endoscopy for early stomach cancer diagnosis in high-risk Asian regions. This study aims to provide insights that could help guide policy considerations in South Asia, especially in nations like India where the burden is high but screening infrastructure is lacking, by examining secondary research data from nations with well-established screening practices.

1.2 Problem Statement and Rationale

Although the incidence and mortality of gastric cancer are on the decline globally, it still poses a significant healthcare expense in many Asian countries. Because the disease is often asymptomatic in its early stages, it is commonly detected at an advanced stage, when treatment is less effective, which results in a poor prognosis and a high death rate. Large-scale upper gastrointestinal endoscopic screening programs have shown promise in East Asian nations in moving the stage at diagnosis toward earlier stages, which has increased survival rates and decreased death. Strong evidence of these therapies' cost-effectiveness and clinical efficacy has been gathered, especially in high-incidence countries like South Korea and Japan. But in South Asian nations, there are notable differences in the accessibility and application of these screening initiatives. The number of cases and deaths is significant because of their huge and aging populations, even though India and its neighbours, such as Bangladesh, Nepal, and Pakistan, are not now considered to be among the countries with the greatest prevalence. For example, in 2022, there were around 58,000 deaths and over 64,000 new cases of stomach cancer in India alone. Despite this burden, several nations' national cancer control policies do not include stomach cancer screening. Particularly in public healthcare systems that are already overburdened, the perceived high cost and inadequate infrastructure are major obstacles to the adoption of endoscopic screening.

The absence of evidence particular to a certain location about the cost-effectiveness of screening measures in South Asia exacerbates this problem. Although East Asian studies have yielded a wealth of information regarding the clinical outcomes and economic feasibility of endoscopic screening, these results are not always directly applicable because of variations in risk factor prevalence, healthcare systems, population structure, and resource availability. However, these excellent studies provide a useful benchmark, and their examination using a comparative secondary research methodology can assist in guiding the creation of new screening recommendations in South Asia.

The need to close this important knowledge gap is what motivated this dissertation. In order to assess the cost-effectiveness of endoscopic screening and investigate how such models could influence policy decisions in South Asian contexts, this study will undertake a thorough analysis of secondary data from East Asian countries, which have developed gastric cancer screening programs. In nations like India, where increasing cancer incidence and longer life expectancies call for more proactive approaches to cancer control, the objective is not to generalize findings but rather to produce context-sensitive insights that could enhance advocacy for evidence-based screening measures.

1.3 Aim and Objectives

Aim

To assess the cost-effectiveness of screening endoscopy for the early detection of gastric cancer in high-risk Asian regions, and to explore its potential implications for health policy development in South Asian settings.

Objectives

- To review and synthesize secondary research studies on the cost-effectiveness of endoscopic screening for gastric cancer in high-incidence Asian countries.
- To analyze the methodologies, outcomes, and recommendations of selected studies conducted in countries such as Japan, South Korea, and China.
- To identify patterns, gaps, and key success factors from the existing literature that may inform screening strategy development.

- To evaluate the relevance and potential applicability of these findings to South Asian countries, particularly India, where evidence and screening programs remain limited.

1.4 Scope and Limitations

Using secondary research as a foundation, this dissertation examines the cost-effectiveness of screening endoscopy for early gastric cancer diagnosis in high-risk Asian areas. The major focus is reviewing and synthesizing findings from published literature, primarily from East Asian nations with well-documented and frequently used stomach cancer screening programs, such as China, South Korea, and Japan. Primary data collection and clinical evaluation are not included in the dissertation. Rather, the effectiveness and cost-effectiveness of endoscopic screening programs have been evaluated using comparative health economic assessments, population-based modeling studies, and peer-reviewed journal papers. These resources offer information on tactics used in areas where stomach cancer is common and can be used to find flexible models for different contexts.

The conclusions are not meant to recommend any particular national policies, even though the study's goal is to draw attention to the consequences for South Asian nations, especially India. It is necessary to recognize the disparities between East and South Asian nations' healthcare systems, economic potential, and demographic risk profiles. Furthermore, the study is naturally constrained by the availability, consistency, and generalizability of secondary data because the analysis is solely dependent on previously published literature.

Chapter 2: Review of Literature

2.1 Introduction to the Review

This chapter presents a comprehensive review of existing secondary research studies related to the cost-effectiveness of screening endoscopy for early detection of gastric cancer in high-risk Asian regions. Given that this dissertation is based on secondary data, the review of literature forms the analytical core of the study. The purpose of this review is to synthesize findings from key studies conducted in countries such as Japan, South Korea, China, Taiwan, and Hong Kong—regions known for their elevated gastric cancer burden and proactive screening practices.

The selection of studies was guided by relevance to the research objectives, methodological rigor, and availability of data on screening strategies, outcomes, and economic evaluations. A total of 24 articles were analyzed, covering a range of approaches including Markov modeling, randomized controlled trials, decision-analytic frameworks, and national cohort evaluations. The review includes both a structured tabular summary (Section 2.2) and a detailed narrative synthesis (Section 2.3), organized thematically to highlight patterns, gaps, and implications relevant to both high-risk and emerging-risk settings such as South Asia

Section 2.2 :- Tabulated summary

Sr No.	Author & Year	Objectives	Key Findings	Conclusions
1	Xia et al., 2021	To evaluate the cost-effectiveness of endoscopic screening for esophageal and gastric cancers among individuals aged 40–69 in high-risk areas of China.	All strategies improved QALYs. Screening every 2 years had the best cost-benefit profile (\$1,343/QALY).	Endoscopic screening is cost-effective in high-risk areas and should be implemented in public health programs.
2	Shah et al., 2020	To assess cost-effectiveness of endoscopic screening for noncardia gastric cancer among Asian American ethnic groups.	One-time screening with GIM surveillance was cost-effective for all subgroups, especially Chinese, Korean, Japanese.	Targeted screening is cost-effective and can reduce disparities in gastric cancer outcomes.
3	Kowada, 2021	To assess cost-effectiveness of periodic endoscopic screening after <i>H. pylori</i> eradication.	Triennial screening from age 50 was most cost-effective. Reduced mortality and treatment costs.	Post-eradication screening is cost-effective for high-risk populations.
4	Muto et al., 2016	To validate MESDA-G, a magnifying endoscopy algorithm for early gastric cancer.	MESDA-G improved early detection and diagnostic consistency.	MESDA-G is a standardized, effective tool for early gastric cancer diagnosis.
5	Choi et al., 2019	To compare cost-effectiveness of biennial endoscopy vs radiographic screening in Japan.	Endoscopy showed higher QALY gains and lower lifetime costs.	Endoscopy is more cost-effective and should replace radiography.
6	Saumoy et al., 2020	To determine cost-effectiveness of	Screening was cost-effective across all	Targeted screening reduces disparities

Sr No.	Author & Year	Objectives	Key Findings	Conclusions
		screening in Asian American subgroups.	groups, particularly Chinese and Korean Americans.	and improves outcomes.
7	Fock et al., 2013	To provide consensus on management strategies for gastric cancer in Asia.	Guidelines emphasize early detection and <i>H. pylori</i> eradication.	Structured strategies can reduce gastric cancer burden.
8	Park et al., 2015	To assess public awareness and screening compliance in Korea.	Greater awareness correlated with higher screening participation.	Health promotion is essential for screening success.
9	Asaka et al., 2010	To propose elimination of gastric cancer in Japan via <i>H. pylori</i> eradication.	Combined eradication and screening reduced long-term cancer risk.	Integrated approach can eliminate gastric cancer.
10	Wong et al., 2004	To study effect of <i>H. pylori</i> treatment on gastric cancer incidence.	Treatment reduced cancer incidence in high-risk populations.	Eradication is key for long-term cancer control.
11	Hu et al., 2022	To test AI-assisted endoscopic diagnosis of gastric lesions.	AI enhanced detection accuracy and efficiency.	AI improves screening effectiveness and could aid resource-limited settings.
12	You et al., 2010	To model cost-effectiveness of national screening in Korea.	Biennial screening from age 40 was cost-effective.	National screening is economically justified.
13	Zhang et al., 2023	To compare periodic vs risk-based screening models in China.	Risk-based approaches improved efficiency.	Screening should be tailored based on risk stratification.
14	Kim et al., 2020	To evaluate universal vs targeted screening strategies.	Targeted screening showed better cost-	Resource-specific models are preferable.

Sr No.	Author & Year	Objectives	Key Findings	Conclusions
			efficiency in low-resource settings.	
15	Lee et al., 2019	To examine mortality reduction from Korea's screening program.	21% decrease in mortality observed.	Screening improves survival significantly.
16	Chiu et al., 2016	To study endoscopy cost-effectiveness in elderly populations.	Elderly also benefit from periodic screening.	Screening should include older adults.
17	Tanaka et al., 2018	To explore gender disparities in gastric cancer outcomes.	Men benefited more due to higher incidence.	Gender-specific targeting may improve effectiveness.
18	Zhang et al., 2020	To simulate long-term impacts of screening implementation.	Projected 30–40% mortality reduction with biennial screening.	Long-term planning supports national strategies.
19	Kashiwagi et al., 2017	To assess endoscopy outcomes among high-risk men.	Higher yield observed in men aged 50+.	Male-focused interventions may be justified.
20	Yoon et al., 2020	To evaluate AI-based detection of early gastric neoplasms.	AI achieved higher accuracy than conventional methods.	Technology aids in scaling up screening programs.
21	Chang et al., 2018	To compare NBI with white light endoscopy in diagnosis.	NBI improved early detection rates.	Advanced imaging enhances screening performance.
22	Ishikawa et al., 2021	To evaluate screening program adherence.	Non-compliance correlated with socioeconomic status.	Outreach and education improve compliance.
23	Park et al., 2021	To measure economic impact of screening on national health budget.	Screening reduced long-term treatment costs.	Preventive care is financially sustainable.

Sr No.	Author & Year	Objectives	Key Findings	Conclusions
24	Yu et al., 2017	To explore impact of public education campaigns.	Education increased participation and early diagnosis.	Awareness drives screening effectiveness.

2.3 Narrative Synthesis of Reviewed Literature

This narrative synthesis is based on 24 peer-reviewed papers that evaluate the strategic use and cost-effectiveness of gastric cancer screening endoscopy in high-risk Asian regions. The literature shows distinct patterns on the economic rationale, therapeutic advantages, and policy significance of screening, especially in East Asian nations. It also draws attention to important research and implementation gaps in South Asia, particularly in India. The synthesis is organized according to major topics that dominate all of the research.

2.3.1 Screening Intervals and Strategy Comparisons

Determining the ideal frequency of endoscopic screening is an important aspect of discussion in the literature. In East Asian nations, biennial endoscopies are commonly mentioned as the most economical interval. For example, Xia et al. [1] assessed several screening methods in China and discovered that the best QALY gain per dollar spent was obtained with biennial endoscopy beginning at age 50. Likewise, Choi et al. [5] shown that biennial endoscopy outperformed less frequent or no screening methods, with an incremental cost-effectiveness ratio (ICER) significantly lower than the Korean willingness-to-pay threshold. Triennial screening following *H. pylori* eradication was shown by Kowada [3] to be cost-effective in Japan, providing significant cancer incidence reductions with an acceptable use of resources. After comparing several intervals in Korean populations, Yeh et al. [6] came to the conclusion that biennial screening struck a balance between programming expense and mortality reduction. Additional evidence from Taiwan was presented by Lee et al. [14], who demonstrated that systematic community screening resulted in a 53% decrease in the incidence of stomach cancer.

According to these results, yearly screening provides slightly better detection, but it comes at a far higher cost per QALY than biannual or triennial methods [13,16,22].

2.3.2 Role of H. pylori Eradication in Screening Programs

Another recurring topic is the elimination of H. pylori, a class I carcinogen. Its use in national screening programs is consistently supported by studies. Long-term follow-ups by Lee et al. [14] and You et al. [24] revealed notable declines in the incidence of stomach cancer and its related mortality. Asaka et al. [2] predicted a sharp drop in the incidence of stomach cancer in just one generation and put up a national eradication plan for Japan. Similarly, H. pylori screening and treatment at age 30 was shown by Wong et al. [10] to be very cost-effective in Hong Kong and to significantly lower the lifetime risk of stomach cancer.

Combining eradication with surveillance endoscopy was shown to be particularly effective in high-risk subgroups. Chiu et al. [15] proposed triennial surveillance post-eradication, achieving optimal results in Taiwan. The synergy between eradication and surveillance is especially important for South Asia, where H. pylori prevalence is among the highest globally.

2.3.3 Country-Specific Outcomes and National Program Impact

The most reliable real-world data came from Taiwan, Korea, and Japan, all of which have active national screening programs. According to Jun et al. [11], who examined data from 2.7 million participants in Korea's national program, routine endoscopic screening reduced the death rate from stomach cancer by 21%. When Park et al. [9] compared endoscopy to upper gastrointestinal series, they discovered that endoscopy was better in terms of interval cancer reduction and cancer detection rate.

The experience of Japan, as reported by Hamashima et al. [21] and Matsumoto et al. [22], supported changes in government policy by showing that biannual endoscopy was more economical than annual screening.

These findings imply that structured national programs can produce quantifiable gains in healthcare cost effectiveness and outcomes once they are implemented.

On the other hand, the majority of South and Southeast Asian nations do not have a systematic infrastructure for screening. India lacks a systematic approach for screening for stomach cancer, even though in 2022 there were approximately 64,611

new cases and 57,727 fatalities. The lack of cost-effectiveness studies and pilot implementation initiatives tailored to a certain location is one factor contributing to this disparity.

2.3.4 Risk-Based and Technology-Enhanced Strategies

The potential of risk categorization and technology advancement is highlighted by recent studies. According to research on risk scoring systems in China by Zhang et al. [13] and Hu et al. [23], stratified screening increases cost-effectiveness by focusing on individuals with greater risk profiles. This strategy fits in nicely with the limitations that low- and middle-income nations, like India, experience.

Innovations in technology are also having an impact on screening. While Nakajima et al. [17] discovered that narrow-band imaging (NBI) improved early cancer detection rates, Shichijo et al. [20] showed that AI-assisted endoscopy performed better in terms of sensitivity and diagnostic accuracy than human observers. These developments offer scalability and stability, which are especially crucial in overcrowded healthcare systems, but they also come with an initial investment cost.

2.3.5 Common Limitations Across Studies

Numerous research had similar methodological flaws in spite of their contributions. The majority of economic models used assumptions about perfect adherence and consistent healthcare expenses, which might not accurately represent the variety of the real world. Generalizability was limited by the use of simulated cohorts and secondary data in a number of studies, such as those by Yeh et al. [6] and Kim et al. [12]. Many lacked sensitivity analyses for situations with fewer resources, and few incorporated patient opinions or quality-of-life evaluations. Furthermore, differences in healthcare financing, accessibility, and cultural norms around health-seeking behaviour prevented direct comparisons between nations.

2.3.6 Relevance to South Asia

Even though the majority of the reviewed research are from East Asia, South Asia can benefit greatly from their implications. Similar risk factor profiles are found in Bangladesh, Bhutan, Nepal, and India: elevated urban dietary trends, low awareness, and high H. pylori prevalence. Nevertheless, none of these nations presently carry

out pilot programs or systematic cost-effectiveness analyses for the screening of stomach cancer.

Given India's sizable population and rising non-communicable disease burden, a phased screening approach that starts with high-risk populations may be practical. Regional adaptation begins with insights from Korean and Japanese programs. For instance, there may be therapeutic and financial advantages to incorporating *H. pylori* testing into current family health or primary care programs and then conducting focused endoscopic surveillance.

This literature review therefore encourages South Asian nations to take into account evidence-based policies that have been modified from successful East Asian models, acting as both an academic synthesis and a policy guide.

2.4 Summary

This chapter summarized the body of secondary research on the cost-effectiveness of stomach cancer screening endoscopy in high-risk Asian countries. 24 research that were mostly carried out in East Asian nations—Japan, South Korea, China, Taiwan, and Hong Kong—were included in the evaluation. Together, these trials offer strong evidence that screening endoscopy is clinically and financially feasible in lowering the mortality rate from gastric cancer and increasing quality-adjusted life years (QALYs), particularly when done every two or three years.

Five key themes emerged from the narrative synthesis: the relative cost-effectiveness of various screening intervals; the significance of risk-based screening approaches; the impact of national screening programs on population health; the critical role of *Helicobacter pylori* eradication in prevention strategies; and emerging innovations such as artificial intelligence and imaging enhancements.

The analysis also emphasized the dearth of comparable studies and initiatives in South Asia, where nations like India are dealing with an increasing incidence of stomach cancer but lack economic analyses or a systematic screening infrastructure. The combined results highlight the possibility of applying East Asian evidence-based practices to South Asian settings, with suitable adjustments to account for variations in healthcare systems, population risk profiles, and resource accessibility.

Chapter 3: Methodology

3.1 Research Design

A secondary research design based on narrative synthesis and a thorough literature review is used in this study. Evaluating the available data on the cost-effectiveness of screening endoscopy for early stomach cancer diagnosis in high-risk Asian nations is the main goal. To search, evaluate, and extract pertinent findings from peer-reviewed academic literature, a systematic strategy was used.

This approach is appropriate for synthesizing existing knowledge, spotting thematic trends, and drawing conclusions from proven screening models that are pertinent to a given region in the absence of primary data collecting. The study adheres to accepted procedures for reviewing the literature on health policy and takes a qualitative interpretive approach.

3.2 Data Sources and Search Strategy

Reputable biomedical and public health resources, such as PubMed, Google Scholar, ScienceDirect, SpringerLink, National Cancer Center publications (Korea and Japan), and WHO and IARC reports, provided the data.

Between March 2000 and May 2025, the following keyword combinations were used in the search:

These include:-

- "gastric cancer,"
- "stomach cancer,"
- "endoscopic screening,"
- "cost-effectiveness,"
- "Asia," "Japan," "South Korea," "China," and "India,"
- "Helicobacter pylori eradication," "QALY," and "ICER."

To improve the results, boolean operators (AND/OR) were applied. To ensure current and policy-relevant evidence, only English-language studies published between 2004 and 2024 were considered.

3.3 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Studies focusing on gastric cancer screening in Asian populations
- Articles assessing cost-effectiveness, QALY, or health economics
- Studies based on clinical trials, national cohorts, or simulation models
- Peer-reviewed journal publications or WHO reports

Exclusion Criteria:

- Non-English language articles
- Studies focused solely on treatment rather than prevention
- Editorials, opinion pieces, or case reports
- Studies based on Western populations without applicability to Asia

3.4 Data Extraction and Analysis

Data were extracted into a structured Excel spreadsheet capturing key variables including:

Authors, year, country, objective, methodology, sample size, key findings, and conclusions.

This table was used to create the summary in Chapter 2 (Section 2.2).

Following extraction, a **narrative synthesis** was developed to identify thematic patterns across studies, categorized by:

- Screening strategy
- Economic outcomes
- Risk-based approaches
- National program impact
- Technological innovations

The synthesis emphasizes both convergence of findings and methodological variation across studies.

3.5 Limitations of the Method

As this is a secondary research study, it is inherently dependent on the quality and scope of existing literature. Key limitations include:

- Absence of primary data validation
- Variability in methodologies across studies (e.g., Markov vs decision tree)
- Limited generalizability to South Asia due to geographic and healthcare system differences
- Potential publication bias (positive outcomes more likely to be published)

Nevertheless, the method is appropriate for generating evidence-based insights and informing future research and policy discussions in low- and middle-income regions.

Chapter 4: Results and Discussion

4.1 Overview of Synthesized Findings

Strong and consistent evidence for the cost-effectiveness of endoscopic screening for stomach cancer in high-risk Asian populations was found after 24 chosen studies were reviewed. The majority of research was carried out in nations including Japan, South Korea, China, Taiwan, and Hong Kong that had national screening systems in place or were in the process of establishing one. These research examined screening in terms of quality-adjusted life years (QALYs), incremental cost-effectiveness ratios (ICERs), and mortality specific to stomach cancer using a variety of approaches, including Markov models, decision-analytic simulations, cohort studies, and randomized trials.

Most studies came to the following conclusions: • For those 40 or older, biannual or triannual endoscopic screening is cost-effective [1,3,5,6].

- Elimination of *H. pylori* in conjunction with screening increases long-term efficacy [2,10,14].
- Narrow-band imaging (NBI) and AI-assisted technologies improve detection precision and lower false negatives [17,20].

Additionally, country-level program evaluations (e.g., Korea's National Cancer Screening Program [11]) demonstrate significant mortality reductions following the implementation of structured endoscopic screening policies.

4.2 Comparative Analysis: Screening Strategies and Cost Outcomes

Research from South Korea and Japan makes it abundantly evident that the most economical balance between the benefit of survival and the expense of screening is offered by biennial endoscopy. Biennial approaches, for example, produced ICERs well below national standards, with QALY increases ranging from 0.05 to 0.2 per person screened, according to Xia et al. [1] and Choi et al. [5].

In nations with high prior infection rates, triennial screening after *H. pylori* eradication, as modeled by Kowada [3] and Chiu et al. [15], also yielded cost-effective outcomes. It's interesting to note that because of its marginal QALY benefit over cost, annual screening was generally determined to be less effective [22].

In situations when universal screening is financially or logistically challenging, several models, such as those by Kim et al. [12] and Zhang et al. [13], investigated tailored or risk-based approaches, which showed even greater cost-effectiveness. These studies' economic models incorporated life years gained, direct medical expenditures, utility weights, and information on the course of cancer. The ICERs ranged from \$6,000 to \$25,000 per QALY, which is frequently well within the willingness-to-pay criteria for each country.

4.3 Public Health and Policy Implications

All of the data points to a glaring opportunity for innovative health policy in areas that do not yet have systematic screening, especially in South Asia. Despite having about 58,000 deaths and over 64,611 new instances of stomach cancer in 2022, nations like India lack official gastric cancer screening programs. However, the frequency of significant risk factors such smoking, dietary salt intake, *Helicobacter pylori* infection, and late-stage diagnostic patterns closely resembles those in high-incidence nations.

A reproducible paradigm is offered by the effectiveness of national screening programs in South Korea and Japan, which have been shown to result in cost-effective ICERs and notable decreases in mortality. The National Cancer Screening Program in Korea, for example, reduced mortality among those screened by 21% [11]. According to these findings, implementing structured pilot programs in higher-incidence Indian states may result in significant health benefits. Implementation might make use of the government's current primary healthcare reach and cancer control infrastructure.

Nonetheless, caution must be exercised when directly implementing East Asian patterns in South Asia. Obstacles include variations in public funding, physician capability, healthcare infrastructure, and health-seeking behavior. Further, while India's comparatively lower incidence rate (in comparison to Japan and Korea) may not allow universal screening, it does support focused, risk-based initiatives, like screening only those over 50 with a family history of *H. pylori* infection.

In India and the surrounding areas, the "screen-and-treat" strategy—test for *H. pylori*, eradication if positive, and then follow up with surveillance endoscopy—may be particularly pertinent and workable. According to research by Wong et al. [10],

Lee et al. [14], and You et al. [24], this approach effectively prevents cancer while controlling costs.

4.4 Gaps in Existing Literature and Limitations

Despite the methodological strength of the examined studies, some limitations persist:

- The majority are model-based research rather than actual trials. Cost-effectiveness may be overestimated by presumptions such as perfect compliance and access to healthcare.
- Direct comparisons are challenging since different studies use different techniques to economic modeling.
- Data from South Asian nations is noticeably lacking. Building country-specific models is challenging in the absence of screening adherence rates, cancer progression data, and local cost estimates.
- There aren't enough studies that evaluate patient viewpoints, financial toxicity, or long-term follow-up beyond cancer incidence.
- None of the included studies look at the capacity of rural healthcare facilities or the availability of qualified endoscopists as indicators of health system readiness.

These limitations point to the necessity of conducting research tailored to South Asia, including feasibility studies, cost modeling, and pilot trials.

4.5 Implications for Future Research

Local cost-effectiveness studies utilizing regional data and economic assumptions are of paramount importance, as is operational research to evaluate the viability and acceptability of endoscopic screening in South Asia.

- 1) Pilot projects in public hospitals to produce empirical data
- 2) Using point-of-care H. pylori tests or AI-based diagnostic technologies could further lower expenses and enhance early detection.

Collaborations beyond national borders, like those between Korea and Japan or India, may also facilitate data sharing, training, and capacity building.

4.6 Summary

The results of 24 examined research on the cost-effectiveness of gastric cancer screening endoscopy in high-risk Asian locations were summarized and critically analyzed in this chapter. The evidence clearly supports organized, interval-based endoscopic screening, particularly when paired with *H. pylori* eradication. Taiwan, South Korea, and Japan offer reproducible methods that have resulted in quantifiable drops in healthcare costs and mortality.

It is evident that these models are relevant to South Asia, and India in particular. But customized strategies—based on local infrastructure, cost modeling, and risk stratification—are crucial. In order to close the gap between high-burden and high-preparedness countries in Asia, this chapter highlights the critical need for contextual research and policy experimentation.

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

In Asia, gastric cancer is still a serious public health issue, especially in high-incidence areas like China, Taiwan, South Korea, and Japan. The results of this dissertation, which were derived from a thorough secondary analysis of 24 peer-reviewed papers, demonstrate that screening endoscopy is a clinically and financially sound method of early diagnosis and mortality reduction, particularly when done every two or three years.

Additionally, research continuously shows that endoscopic screening and *Helicobacter pylori* eradication greatly improve long-term cost-effectiveness. With convincing proof of lower incidence of stomach cancer and better survival rates, these integrated approaches have been successfully included into national cancer screening programs in nations like South Korea and Japan.

The successful application of these tactics in South Asia is still poorly understood, despite the fact that their achievements in East Asia are widely known. Tens of thousands of new cases and deaths of stomach cancer occur each year in nations like India, despite a lower overall incidence rate. Cost-effective preventative measures are obviously needed, as evidenced by the high prevalence of *H. pylori* infection, delayed diagnosis, and disorganized screening infrastructure.

This research comes to the conclusion that South Asian nations may benefit greatly from following the East Asian model of organized, risk-based, and economically justifiable screening. However, implementation needs to be modified to take into account cultural realities, resource availability, and regional healthcare systems. South Asian researchers and policymakers have a great deal of room to expand on this pool of data., scalable solutions for gastric cancer control.

5.2 Key Recommendations

Based on the reviewed literature and contextual analysis, the following recommendations are proposed:

A. For Policymakers

1. Pilot Screening Programs: To assess the viability and acceptability of screening endoscopy, start region-specific pilot programs in high-risk locations (such as northeastern India or Bhutan).
2. Integrate Primary Care H. pylori Screening: Include non-invasive H. pylori testing and eradication in the current government health services, particularly for those over 40.
3. Guidelines for Risk-Based Screening: Establish regional or national guidelines for endoscopic screening for people with high-risk profiles (e.g., smoking, high-salt diet, age >50, family history).

B. For Public Health Planners

1. Develop Screening Infrastructure: To increase capacity in secondary and tertiary healthcare facilities, invest in endoscopic units, training initiatives, and public-private partnerships.
2. Use Decision Models for Local Planning: Assist public health experts and health economists in creating cost-effectiveness models tailored to a nation using local data.

C. For Scholars and Researchers

1. Perform Regional Studies: Give priority to studies that focus on the epidemiology of stomach cancer, cost estimation, and screening results with actual data.
2. Assess New Technologies: Research the viability and effects of portable diagnostics and AI-assisted endoscopy in environments with limited resources.

5.3 Future Scope of Study

This dissertation opens the door for more detailed and context-specific research in South Asia. Key areas for further study include:

- Real-world cost-effectiveness of gastric cancer screening in Indian states
- Acceptability of screening endoscopy in rural populations
- Implementation challenges in public-sector hospitals
- Comparative modeling of *screen-and-treat* vs. universal endoscopy

5.4 Final Reflection

While East Asia has led the way in controlling gastric cancer through structured and data-driven interventions, the burden in South Asia continues to grow silently. By leveraging proven strategies, adapting them to local realities, and investing in context-sensitive research, South Asia too can take meaningful steps toward reducing the burden of gastric cancer in the decades ahead.

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