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Social Impact Assessment Project on Cholangiocarcinoma Screening and Care Program

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Abstract

The research aims to assess users utility and cost-effectiveness based on the results of rapid antigen test kits for urine and abdominal ultrasound methods. This study uses qualitative methods to analyze liver fluke screening among individuals aged 40 and above in four provinces. Purposive sampling was used, with 373 participants and 379 participants, respectively. Utility measurement tools included a direct Visual Analog Scale (VAS) and indirect EuroQoL (5Q-5D-5L), and willingness to pay value was measured using bidding. The result shows that the sample group has an average VAS score of 76.90, with slight pain or discomfort reported in the five health dimensions. The utility value reflecting daily quality of life is 0.89. The average willingness to pay per use for rapid test kits and abdominal ultrasounds is 187 baht and 796 baht, respectively. Reasons for not paying higher include income factors, high prices, and personal limitations. However, participants believe public hospitals could support examination costs and provide access to benefits. The project benefits people economically, socially, and culturally, and if the Ministry of Public Health and related agencies can effectively use it, it will maximize benefits.

Keywords: *Social Impact Assessment, Screening and Care Program, Social Sciences, Liver Fluke Disease, Cholangiocarcinoma.*

Introduction

This research aims to evaluate the impact of a liver fluke and cholangiocarcinoma problem-solving project. The Cholangiocarcinoma (CCA) is still a major public health problem among Thailand (Songserm et al., 2020). Cholangiocarcinoma is a malignant tumor of the cholangiocytes (i.e., the epithelial cells lining the bile ducts), which can develop at any portion of the biliary tree, from the canals of Hering to the main bile duct (Gringeri et al., 2020; Rodrigues et al., 2021). The Cholangiocarcinoma Screening and Care Program (CASCAP) is one of the projects commemorating the 50 th anniversary of Khon Kaen University. The Cholangiocarcinoma Screening and Care Program (CASCAP) was developed at the Medical Faculty of Khon Kaen University in cooperation with the Cholangiocarcinoma Foundation, Thailand (Khuntikeo et al., 2015). It conducts screening of at-risk populations in the Isan region to identify early-stage cholangiocarcinoma patients. The project collaborates with various public health personnel, ranging from Village Health Volunteers (VHVs), Subdistrict Health Promoting Hospitals, community hospitals, provincial hospitals, Udon Thani Cancer Center, Ubon Ratchathani Cancer Center, some private hospitals, and Srinagarind Hospital of Khon Kaen University (Cohort, 2024). The Cholangiocarcinoma Screening and Care Program (CASCAP) under the Faculty of Medicine, Khon Kaen University is aware of this problem and the severity of the impact (Morement & Khuntikeo, 2023). Therefore, the program cooperated with the allied network for the implementation of the Thailand Grand Challenges: Fluke Free Thailand Project, supported by the National Research Council of Thailand (NRCT) to control and eliminate liver fluke. And CCA in Thailand (Suriya & Saiyut, 2020). This activity has been organized more than 50 times to date (Huang et al., 2023). The cholangiocarcinoma screening data of the Isan population participating

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in the CASCAP project has been recorded in the Isan Cohort database, a technology developed with the funding support for this project implementation.

The CASCAP project successfully advocated for elevating the issue of liver fluke infection and cholangiocarcinoma to a 'national agenda'. (Khuntikeo, N., Andrews, R. H., Petney, T. N., & Khan, 2023). The Cabinet approved the 'Decade Strategic Plan for Solving Liver Fluke and Cholangiocarcinoma Problems', thereby escalating the importance of this issue from a regional Isan concern to a national priority with concrete sustainability. Relevant agencies were designated, and budgets were allocated to facilitate operations. The goal is to reduce liver fluke infections and cholangiocarcinoma incidence to levels that no longer constitute a public health problem (Brindley et al., 2021). Cholangiocarcinoma (CCA) is the second most common type of liver cancer after hepatocellular carcinoma, accounting for 10-15% of all primary liver malignancies (Banales et al., 2020; Namn & Bucobo, 2022; Sarcognato et al., 2021). The incidence of intrahepatic Cholangiocarcinoma (CCA) is increasing, whereas that of extrahepatic Cholangiocarcinoma (CCA) is decreasing (Yao et al., 2014). The CASCAP project has expanded its at-risk population base for cholangiocarcinoma to include six additional provinces in the Northern region and one province in the Eastern region, areas which have been found to have a high incidence of liver fluke infections (Anchalee et al., 2024; Khuntikeo et al., 2015, 2018). Screening for Cholangiocarcinoma (CCA) and improvement of healthcare facilities to provide better treatment for Cholangiocarcinoma (CCA) patients should be prioritized in these high-risk areas (K. Thinkhamrop et al., 2020). Cholangiocarcinoma (CCA) is an extremely aggressive cancer that is usually fatal. Although globally morbidity and mortality are increasing, knowledge of the disease remains limited (Khuntikeo et al., 2015).

The CASCAP project at Khon Kaen University serves as an exemplary initiative that facilitates collaboration between personnel from various faculties within the university and external network partners (Khuntikeo et al., 2015). The CASCAP serves as an innovative and comprehensive approach to combat cholangiocarcinoma (Khuntikeo et al., 2015). The Cholangiocarcinoma Research Institute has received research funding from the National Research Council of Thailand (NRCT) through the Grand Challenge Thailand: Fluke Free Thailand grant. The project addressing liver fluke and cholangiocarcinoma issues has completed its designated duration. The funding agency now seeks to obtain information on the impact generated by the research outcomes. The objectives of this research are to: 1) Evaluate the impact of the liver fluke and cholangiocarcinoma problem-solving project; 2) Assess the cost-effectiveness and utility of the research outcome "Abdominal Ultrasound Method for Detecting Early-Stage Cholangiocarcinoma"; and 3) Evaluate the cost-effectiveness and utility of the research outcome "Ready-to-Use Kit for Antigen Detection in Urine (ELISA and Rapid Test) for Liver Fluke Diagnosis". These assessments aim to demonstrate the value, cost-effectiveness, and utility derived from the utilization of research outcomes, leading to policy recommendations for expanding research results into policy implementation, obtaining information on nationwide public access rights to screening, and further extending the outcomes to an international.

Materials and Methods

This research involved the collection of both quantitative and qualitative data. The study population consisted of 66,960 individuals registered for screening, residing in four provinces: Kalasin, Khon Kaen, Maha Sarakham, and Roi Et. The sample size was determined using a standardized population table combining all provinces (Campbell et al., 2020), resulting in a sample of 752 individuals. Purposive sampling was employed, with 373 participants in the group for the ready-to-use kit for antigen detection in urine (for liver fluke diagnosis) and 379 participants in the group for the abdominal ultrasound method (for detecting early-stage cholangiocarcinoma). The research instruments included a questionnaire reviewed by three experts and a structured interview form. These research tools underwent an ethical review process for social science research involving human subjects to protect the rights of project volunteers. The study was approved by the Human Research Ethics Committee of Khon Kaen University, with approval number HE651522, dated March 10, 2023.

Data analysis, questionnaires were used to measure utility or quality of life, both directly through a Visual Analog Scale (VAS) scoring system and indirectly through the calculation of coefficients across 5

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dimensions and 5 levels (5Q-5D-5L) (Xu et al., 2024). In the case of utility measurement using the VAS method, respondents were asked to assess their current health status on a scale from 0 to 100, where 0 represents the worst imaginable health state (equivalent to death) and 100 represents the best imaginable health state. While this utility measurement method is simple and minimally time consuming for respondents, its accuracy is relatively low. However, it can be useful for comparison with the EuroQoL (5Q-5D-5L) method, which measures quality of life through 5 health dimensions (mobility, self care, usual activities, pain/discomfort, and anxiety/depression) (Kungwanrunkul, 2020).

Additionally, willingness to pay was measured using a bidding method, starting with an initial price (determined by expert consultation) presented to the interviewee. The proposed value was then increased or decreased based on the respondent's answers in each round until the maximum willingness-to-pay price was obtained. Qualitative data were analyzed using the Atlas software program (Friese Susanne, 2019).

The research results are divided into two parts. The first part presents the quantitative study results, focusing on the rapid test kit for urinary antigen detection and the abdominal ultrasound examination. This section covers the utility (quality of life) measurement using a scoring system and the willingness to pay for the aforementioned test kit. It also includes the utility (quality of life) measurement using a scoring system and the willingness to pay for both screening methods. The second part presents the qualitative research findings.

Research Findings and Discussions

Results of Utility Measurement from the Use of Rapid Test Kits for Urinary Antigen Detection in the Diagnosis of Liver Fluke Disease.

The majority of the sample group, comprising 373 individuals, were aged 50 years and above, with approximately two-thirds being female. Most had completed primary education, had a monthly income below 10,000 baht, and were employed in agriculture. The average number of family members was 4. Regarding behavioral data, 69.4% of the sample group reported a history of consuming partially cooked freshwater fish with scales. Liver fluke eggs were detected in 36.5 of the samples. However, when asked about family history of cholangiocarcinoma, only 49 individuals (13.1% of those screened) reported such a history. Among those with a family history of cholangiocarcinoma, the majority of affected relatives were parents (40.82%) and siblings (26.53%). For healthcare coverage, the majority of the sample group utilized the Universal Coverage Scheme. Utility measurement was conducted using two methods: direct measurement via Visual Analog Scale (VAS) and indirect measurement using the EuroQoL (EQ-5D-5L) instrument. The study results showed that the utility values, which reflect quality of life and daily living activities, as measured by VAS, are presented in Table 1.

Table 1: Summary Statistics of VAS Variables (Rapid Urine Test Kit)

Variable	Mean	Maximum	Minimum	Standard Deviation	Sample Size"
VAS	76.90	100	10	14.33	373

Source. Author data analysis, 2024.

From Table 1, the mean value is 76.90 (SD = 14.33). When compared with the EuroQoL (EQ-5D-5L) method, it was found that in four health dimensions of the respondents (mobility, self-care, usual activities, and anxiety/depression), the majority reported no problems (scoring at level 1). However, in the pain/discomfort dimension, most respondents evaluated themselves as having slight pain or discomfort (scoring at level 2). This accounted for 180 respondents or 48.3% of the total number of respondents.

Table 2: Summary Statistics of 5Q-5D-5L Variables (Rapid Urine Test Kit)

Variable	Mean	Maximum	Minimum	Standard Deviation	Sample Size"

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5Q-5D-5L	0.89	1	0.35	0.11	373

Source. Author data analysis, 2024.

From Table 2, the health status values in all 5 dimensions of the respondents were used to calculate the utility value by assigning coefficients for each dimension and each level. It was found that the average utility value of all 373 respondents was 0.89 (compared to the previous average VAS value of approximately 77).

In the section on the study results of willingness to pay for urine test kits (ELISA and Rapid Test) for diagnosing liver fluke disease, the determination of willingness to pay employed the bargaining method. The study results are as follows:

Table 3: Willingness to pay for Rapid Test kits

Willingness to pay (Bath)	Sample Size	Percentile (%)
0-99	32	8.6
100-200	273	73.3
250-500	59	15.8
600-900	3	0.8
1,000-2000	6	1.7
Total	**373**	**100**

Source. Author data analysis, 2024.

Table 3 presents the willingness to pay (WTP) price structure for all 373 survey respondents. The research team set an initial price of 100 baht, after which the bargaining process was employed to obtain the willingness to pay data at each price level (in baht). The table indicates that the majority of respondents' willingness to pay ranges from 100 to 200 baht, accounting for 73 percent.

Table 4: Summary statistics of the willingness to pay variable (for Rapid Test kits)

Variable	**Mean**	**Maximum**	**Minimum**	**Standard Deviation**	**Sample Size"**
Willingness to pay (Bath)	187	2,000	0	178.311	373

Source. Author data analysis, 2024.

Furthermore, upon examination of Table 4, it is observed that the average willingness to pay price is 187 baht (SD = 178.31). The primary reason for willingness to pay, accounting for 48.33 percent, is attributed to respondents' financial capacity. Conversely, the main reasons for not paying above their stated willingness to pay are excessive pricing and insufficient income. However, interviews revealed that potential sources of financial support or assistance are predominantly state healthcare facilities (including Tambon Health Promoting Hospitals, community hospitals, regional hospitals, and provincial hospitals), Tambon Administrative Organizations/Municipalities, and affiliated government agencies/state enterprises.

Results of Utility Measurement Using Abdominal Ultrasound for Early-Stage Cholangiocarcinoma Detection

The majority of the sample group consisted of females aged 50 years and above, predominantly employed in agriculture, with primary education and monthly income below 10,000 baht. On average, households comprised 4 members. Upon examining the behavioral survey of this sample group, it was found that 72.3%

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had consumed semi-cooked freshwater fish with scales. Liver fluke eggs were detected in 36.9% of the participants. However, when inquiring about family history of cholangiocarcinoma, the survey revealed that only 56 individuals in the sample group (or 14.8%) had such a history. Regarding the familial relationship of those with cholangiocarcinoma, the majority were in the parent group and the sibling group, accounting for 49.09% and 18.18% respectively. Concerning healthcare coverage for medical treatment, the majority of respondents, 284 individuals (74.9%), utilized the Universal Coverage Scheme (Gold Card).

Table 5: Statistical Summary of VAS (Ultrasound Method)

Variable	Mean	Maximum	Minimum	Standard Deviation	Sample Size"
VAS	77.12	100	40	14.15	379

Source. Author data analysis, 2024.

The results from table 5 indicate that in terms of quality of life, as directly measured by the VAS, the mean value was 77.12 (SD = 14.15). However, when compared to the EuroQoL (5Q-5D-5L) method, it was found that in four health status domains of the respondents (mobility, self-care, usual activities, and anxiety/depression), the majority reported no problems (scoring at level 1). Nevertheless, in the domain of pain/discomfort, nearly half of the sample group assessed themselves as having slight pain or discomfort (scoring at level 2). Subsequently, when all five domains were used to calculate the utility value by assigning coefficients to each domain and level.

Table 6: Statistical Summary of 5Q-5D-5L (Ultrasound Method)

Variable	Mean	Maximum	Minimum	Standard Deviation	Sample Size"
5Q-5D-5L	0.89	1	0.34	0.109	379

Source. Author data analysis, 2024.

From Table 6, it was found that the mean utility value of all 379 respondents was 0.89 (compared to the previously mentioned mean VAS value of approximately 77).

Table 7: Willingness to pay for Ultrasound Method

Willingness to pay (Bath)	Sample Size	Percentile (%)
0-1,000	303	80.1
1,100- 2,000	73	19.3
3,000-6,000	3	0.6
Total	**379**	**100**

Source. Author data analysis, 2024.

Table 7 presents the structure of willingness to pay (WTP). The research team set an initial price of 1,000 baht (this price was determined through consultation with medical experts in this field). Subsequently, a negotiation process was employed to obtain willingness to pay data at each price level (in baht). The table indicates that the majority of willingness to pay values did not exceed 1,000 baht, accounting for approximately 80.1% of the respondents.

Table 8: Statistical Summary of Willingness to Pay Variables (Ultrasound Method)

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Variable	Mean	Maximum	Minimum	Standard Deviation	Sample Size
Willingness to Pay (Bath)	796	6,000	0	524.35	379

Source. Author data analysis, 2024.

Furthermore, considering Table 8, the average willingness to pay price was 769 baht (SD = 524.35). The main reason for willingness to pay was the respondents' financial ability to afford it. Meanwhile, the reason for not paying higher than their stated willingness to pay was due to the price being too high and insufficient income. However, respondents indicated that organizations that could potentially support or provide financial assistance for the examination were primarily government hospitals, affiliated government agencies/state enterprises, and sub-district/municipal administrations.

Qualitative Data

From the in-depth interviews conducted using a structured interview format by the research team, key informants included 10 individuals from three groups of practitioners: 3 researchers from the project, 3 medical doctors and healthcare personnel involved in the project, and 4 project staff members. Nearly all key informants had experience participating in the project since its inception. Overall, all key informants unanimously expressed happiness in being part of the project addressing the issues of liver fluke disease and cholangiocarcinoma. Many affirmed that the work was very demanding, but the value or reward that alleviated their fatigue was the opportunity to benefit others, especially in helping the Isaan community achieve better health and longer lives. As one project staff member proudly stated:

"in the early days of working here, I was involved in patient visits, obtaining patient consent, and providing advice and education to patients in both OPD and Ward settings. I had the opportunity to see a variety of patients, one case being my own father, among others. I felt that it was beneficial, and when they were ill, they had many needs, and we were able to assist them, which made me feel that it was worthwhile (Chuanphit Sunee, 2023).

"Professor Doctor Narong Kantikeo, the researcher, emphasized the process from the nursing department, stating that to open a patient ward, it is essential to have a system for selecting suitable candidates for management. Therefore, when we identify candidates, the administration views this as a field where they have previously cared for patients. Consequently, it is believed that they can leverage their management competencies, as they have previously served as sub-heads and senior nurses. Thus, when transitioning to this role, they possess several competencies that enable them to open a ward. This aligns with the ideology of the CASCAP project, where they contribute as one of the key supporters.

"In addition to directly caring for this patient group, we also participate in screening units and ultrasound examinations, which allows us to understand the entire process"(Jitraporn Wongwiwatchai, 2023).

It is gratifying that the project addressing liver fluke disease and cholangiocarcinoma has been able to elevate the issue to a "National Agenda," thereby enhancing its significance from a "Northeastern Agenda" to a national level with tangible sustainability. The primary goal of the project, from the perspective of those involved, aligns uniformly: they wish to see liver fluke disease and cholangiocarcinoma no longer be a problem for the people of Isaan. As one of the project researchers stated.

"The CASCAP project's key objectives consist of three main points: First, it aims to advocate for the issue to be recognized as a National Agenda, leading the government to announce a 10-year strategic plan to address liver fluke disease and cholangiocarcinoma in 2016. However, a plan is merely a piece of paper; the critical question is how to implement it for the benefit of the public. Second, it is essential to develop tools or innovations created to solve these problems and to apply them in the community. Currently, efforts are being made to advocate for screening and treatment for liver fluke disease and cholangiocarcinoma to be a public benefit. This means that everyone has the right to access these services, including free testing for liver fluke and medication to prevent cancer, as well as free cancer screenings for individuals aged 40 and

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older. If cancer is detected, they can enter a treatment system that is already established, similar to "cancer anywhere." However, the challenge is that the community is often unaware of the disease because early stages show no symptoms. By the time it develops into cancer, symptoms are prevalent, making treatment difficult, often ineffective, and costly. This initiative is still in progress, pushing for action from the National Health Security Office (NHSO) to prevent people from developing cholangiocarcinoma.

Third, the ultimate goal is for liver fluke disease and cholangiocarcinoma to no longer be a problem for the public. The highest achievement would be to eradicate these diseases entirely, although this may be difficult or impossible. However, the aim is to reduce the incidence of these diseases to a point where they no longer pose a problem. This is the ultimate outcome we hope to achieve through this work" (Chuanphit Sunee, 2023).

Economic Impact

When considering the economic impact of the project addressing liver fluke disease and cholangiocarcinoma, key informants from the project staff and researchers mentioned data collected by Srinakharin Hospital. It was found that the majority of patients are male, often serving as heads of households or key income earners for their families. Most of these individuals tend to die from cholangiocarcinoma during their prime working age, which is critical for supporting their families. Consequently, if the head of the family falls ill, the family inevitably faces hardship. Conversely, if they remain healthy, they can continue to work and support their families to the best of their ability. As one project researcher affirmed:

"This undoubtedly has an impact, such as reducing the loss and cost if someone in the family has cancer. If there is one person with cancer in the household, many problems will follow, both socially and economically. One has to sit and be sad, unable to work..." (Atthapol Titapan, 2023).

Social and Cultural Impact

When considering the impact in the social and cultural dimensions, most key informants believe that it primarily affects certain groups, typically the older generation. It is expected that the cultural direction regarding beliefs on this matter has changed considerably. This may be due to the issue being declared a policy, leading to various forms of communication that reach younger generations who are aware of the related problems, resulting in increased awareness of the issue. Additionally, some younger people have seen patients who are sometimes close to them, such as parents or relatives, further heightening awareness and alertness to this issue. As one project staff member recounted:

If it's the older generation, I think it has a significant impact because they have the concept that it's been like this for a long time. But for the younger generation, I've found that recently they've been declaring that they won't eat raw food. I think the direction of the cultural beliefs in this matter has changed quite a bit. It may be due to various forms of communication reaching them, including patient cases or parents who have been ill and have seen examples of the disease" (Wasin Thanasukarn, 2023).

C. Impact on Health Resource and Service Management

The project has also helped develop tools or innovations created to solve these problems, which have been applied in the community. Currently, efforts are being made to advocate for screening, treatment, and prevention of liver fluke disease and cholangiocarcinoma to be included as a public benefit package. This means that all citizens have the right to access these services, including free testing for liver fluke, medication to prevent cancer, and free cancer screenings for individuals aged 40 and above. If diagnosed with the disease, they can enter the treatment system under the Cancer Anywhere policy. As one of the healthcare personnel involved in the project stated:

Sometimes, it may take time to use personnel and staff for screening. However, if we focus on early detection, the budget required will be less than for treatment. When a person falls ill and requires surgery,

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they must stay in the hospital, which affects not just the patient but also their relatives. Additionally, after treatment, some may need chemotherapy. In comparison, if we detect the disease early and remove it promptly, avoiding chemotherapy, we can reduce economic and social losses associated with caregiving. I believe that screening is the most beneficial approach." (Supranee Woranpan, 2023).

Impact on Institutions

The benefits of addressing liver fluke disease and cholangiocarcinoma for institutions are as follows:1) Enhancement of Reputation and Image: The efforts to combat liver fluke disease and cholangiocarcinoma positively impact the institution's reputation and image in various aspects. For instance, as a leader in this field, the institution will be recognized for its research and development in liver fluke disease and cholangiocarcinoma. The Cholangiocarcinoma Research Institute at Khon Kaen University has gained international recognition for its research contributions. 2) Increased Opportunities for Research Funding: The institution's achievements and commitment to addressing liver fluke disease and cholangiocarcinoma will enhance opportunities to secure funding from various sources, both public and private. 3) Expansion of Knowledge and Data: The institution's operations will contribute to the creation of knowledge and data regarding liver fluke disease and cholangiocarcinoma, particularly in research. Data from the institution's research will help understand the causes and mechanisms of the disease, develop prevention strategies, and treatment approaches. Notably, the research on "Ready-to-Use Test Kits for Detecting Antigens in Urine for Diagnosing Liver Fluke Disease" has received acclaim from the global medical community. 4) Database Development: Developing a database for patients and at-risk groups will facilitate monitoring the situation and strategizing the dissemination of research findings to the public. This will enhance knowledge and understanding. The Cholangiocarcinoma Research Institute has developed the Isan Cohort database, which collects information on cholangiocarcinoma patients in the Isan region and organizes academic meetings to share research findings with physicians, nurses, and researchers, serving as a valuable resource for other agencies seeking to benefit from the Isan Cohort. 5) Improvement of Public Quality of Life: Addressing liver fluke disease and cholangiocarcinoma positively impacts the quality of life of the public by reducing the number of patients and the risk of developing these diseases. Early detection through screening helps identify patients at an early stage, increasing the chances of successful treatment and survival while reducing mortality risks. Moreover, the support of funding, equipment, and personnel for the cholangiocarcinoma screening project is a crucial tool in reducing patient numbers and enhancing treatment opportunities. It is essential to receive support from all sectors, including government, private, and the public. Furthermore, this initiative brings global recognition and leadership in medical innovation to the Cholangiocarcinoma Research Institute at the Faculty of Medicine, Khon Kaen University, sustaining its mission to promote public health.

Summary and Discussion of Research Results

Cholangiocarcinoma (CCA) is a growing cancer in northeastern Thailand, affecting the biliary tree and is higher in endemic regions like China and Thailand. A project addressing liver fluke disease and cholangiocarcinoma has yielded significant benefits, including the Rapid Test, a world-first medical innovation supported by the National Research Council of Thailand. This rapid urine test kit has improved diagnosis and contributed to economic, social, cultural, medical resource allocation, and institutional impacts. Detecting antigens in urine is useful for screening, evaluating treatment outcomes, and monitoring reinfection of liver fluke disease caused by Opisthorchis viverrini (OV). The CASCAP online platform monitors risk behaviours, infection, abnormalities, and morbidity. Early detection of cholangiocarcinoma patients using ultrasound can reduce social and economic losses, allowing for faster treatment and reduced patient mortality. The Cholangiocarcinoma Research Institute has developed a crucial data storage system called Isan Cohort for epidemiological surveillance. This project has received funding from the National Research Council of Thailand and other agencies, demonstrating their commitment to providing timely, equitable, quality, and dignified access to health services.

The Cholangiocarcinoma Research Institute has successfully provided benefits for screening liver fluke disease and cholangiocarcinoma screening as rights for citizens. However, these benefits have not been

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widely disseminated due to a lack communication and adequate testing facilities. To drive the project's success, people should develop their health networks, receiving knowledge from educational institutions, researchers, and other relevant agencies. This will help strengthen community health networks and contribute to the institute's goals. The policy recommendations suggest that the Ministry of Public Health use research findings to inform management decisions and develop policies, measures, guidelines, and strategies. Once established, methods should be designed for implementation within responsible agencies to achieve objectives aligned with identified problems and needs at various levels. Then, the research should be applied to improve the public quality of life by enhancing understanding, raising awareness, and promoting mindset and behaviour changes. Agencies should establish health social networks for collaboration and support.

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