# An Overview In Adverse Selection: A Case Study In Indonesia Healthcare Insurance

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***Abstract***.

*This study analyzes adverse selection in health insurance poses a significant challenge to the sustainability of insurance schemes, particularly in developing countries where enrolment is voluntary and insurance literacy is low. Information asymmetry between participants and insurers often results in higher-risk individuals dominating the pool, threatening the program's financial stability. This study aims to synthesize findings from various studies on adverse selection in health insurance, identifying common patterns, causal factors, and mitigation strategies. A systematic literature review approach was used to examine about 40 selected articles published between 2012 and 2025 related to adverse selection in different types of health insurance schemes (public, private, and community-based). Literature was sourced from academic databases such as Google Scholar, PubMed, and others, using specific boolean keyword combinations. Adverse selection was found to be most prevalent in voluntary schemes in developing countries. In contrast, evidence from some developed nations indicated advantageous selection. Mitigation strategies such as premium subsidies, risk-based premium setting, risk pooling, and improving insurance literacy proved effective in reducing negative selection. Advanced technologies like big data and machine learning also showed promise in managing risk profiles. Addressing adverse selection requires a multi-dimensional approach involving public policy, financial incentives, and technological innovation. A combination of mandatory enrolment, risk adjustment, targeted subsidies, and improved literacy is essential for building a sustainable and inclusive health insurance system.*

***Keywords***: *Adverse selection; health insurance; insurance literacy; premium subsidy and risk.*

## I. INTRODUCTION

Health insurance has become an increasingly important topic in the context of universalization of health services in various countries, especially in developing countries. One of the biggest challenges faced in health insurance systems is a phenomenon known as adverse selection, where individuals with higher health risks tend to be more selective in enrolling in health insurance programs. This can make it difficult for insurers to ensure the financial sustainability and desirability of the insurance programs offered, because the potential losses from higher claims from high-risk individuals can exceed the premiums paid.Adverse selection can have a detrimental impact on the desire of individuals to remain enrolled in health insurance programs. A study in Kenya showed that individuals who frequently use health services are more likely to renew their insurance, while those who do not interact frequently with the health system are less likely to renew their insurance. The study found that health insurance enrolment and renewal behaviour is influence by the frequency of health service use, which is relevant in the context of adverse selection[1]. In addition, a study conducted in Ethiopia also found that adverse selection is a significant threat to the long-term desirability of health insurance schemes. Adverse selection can be mitigated through strategy transfer[2].Balanced risk and premium settings. The implementation of an effective risk pooling model can reduce the incentives for insurers to selectively attract only healthier individuals or reject those who are at higher risk. In this regard, better regulation of risk-based premium setting can help achieve the desired efficiency in a competitive health insurance market.

Other strategies that have been proposed include effective subsidies, although their implementation must be tailored to the specific context of the health insurance system[3].It should be note that health insurance literacy among the public plays an important role in reducing the risk of adverse selection. Lack of understanding of insurance products and how they work often leads individuals to make poor decisions in choosing or renewing health insurance. This problem was exacerbated by poor economic conditions, where

people may underestimate their ability to pay premiums even when they know the benefits of having health insurance[4]. Therefore, promoting better understanding of health insurance among the public is essential to address this issue of Adverse Selection[5].In addition, appropriate policy interventions are needed to address this problem. Experiments in Indonesia have shown that a more aggressive strategy in offering subsidies can attract healthier participants and reduce the potential for adverse selection, which in turn can improve the efficiency and desirability of health insurance programs[6]. Further research suggests that arrangements designed to encourage active participation in these insurance schemes can reduce adverse selection by facilitating greater access to healthcare for a wider population[7].

The importance of technology in reducing adverse selection is also increasingly recognized. The use of advanced data analytics to understand consumer selection patterns and behaviour in insurance markets can help insurers tailor their offerings to be more inclusive and attractive to a wider segment of the population, while reducing the risk of sicker individuals. In this context, data analytics not only improves efficiency in premium setting but also facilitates a more personalized approach to health insurance services[8].Overall, addressing the challenges of adverse selection in health insurance requires a multidimensional approach involving political, strategic, and technological interventions. Each country must adapt existing policies and programs to its local context to achieve the goal of universalizing healthcare, with reducing adverse selection a key factor in the long-term success of a sustainable health insurance scheme. Adverse selection not only affects the financial stability of insurance providers but also has serious implications for people's access to essential healthcare services[9].In closing, the phenomenon of adverse selection in health insurance is a significant challenge that needs to be addressed proactively and systematically. With a combination of measures to improve health literacy, adjust regulatory models, and utilize technology in data analysis, it is possible to create a more inclusive and efficient health insurance system that can serve the entire community fairly and sustainably.

## II. METHODS

This study uses a systematic literature review approach to examine the issue of adverse selection in health insurance schemes. This approach was chosen to gain a comprehensive understanding of the patterns, causal factors, and impacts of adverse selection reported in various cross-country studies and insurance schemes, both public, private, and community-based[10], [11].The literature search was conducted in April 2025 using scientific databases such as Google Scholar, PubMed, ScienceDirect, and SpringerLink. The keywords used include: "adverse selection" AND "health insurance", "community-based health insurance" AND "selection bias", "risk selection" AND "supplementary private health insurance", "voluntary health insurance" AND "dropout", and "health insurance enrollment" AND "risk behavior". This combination of keywords was designed using Boolean operators to increase the accuracy of the search results.Inclusion criteria included peer-reviewed articles in English, published between years 2012 to 2025, with an empirical focus (quantitative or qualitative) that discuss adverse selection in health insurance. Editorial articles, opinion articles, and non-peer-reviewed studies were excluded.

In addition, studies outside the context of health insurance, such as vehicle or property insurance, were also excluded[11].The article selection process consisted of three stages: (1) title and abstract selection, (2) full-text review to ensure compliance with the inclusion criteria, and (3) data verification, then from the initial search results of >50 articles, 30 final articles that met the criteria were selected. Two researchers conducted the screening process independently to minimize bias. If there were differences in assessment regarding article inclusion, the two researchers discussed to reach a consensus. If the discussion did not result in an agreement, a third researcher was asked to review and decided[10].Primary data studies were extracted using a standardized format that included title, authors, year of publication, study locus, type of insurance, methods, and main findings related to adverse selection. In addition to data extraction, each study was assessed for quality using the appropriate risk of bias assessment tool[11]:

- For quantitative observational studies, the Newcastle-Ottawa Scale (NOS) was used to assess methodological quality and potential bias.

- For experimental or quasi-experimental studies, the latest version of the Cochrane-Risk of bias tool was used.

Risk of bias assessment was performed independently by two investigators, with the same procedure for resolving discrepancies as in the selection stage. Quality scores were used for sensitivity analyses and to interpret the overall strength of evidence.

## III. RESULT AND DISCUSSION

The results of this study about Adverse Selection has become a fundamental issue in health insurance systems in various countries. Various empirical and theoretical studies have examined how information imbalances between participants and insurance providers can trigger systemic losses in insurance schemes. A study by Yang et al. (2025) in China shows strong evidence that individuals with higher health risks are more likely to enroll in voluntary insurance schemes, causing significant adverse selection, especially in urban areas and among young people[9]. A similar phenomenon was also found in the study of Parmar et al. (2012) in Africa, where subsidies in Community-Based Health Insurance (CBHI) actually increased the risk of adverse selection because they attracted more sick individuals to enroll[12]. However, not all studies find a clear pattern of adverse selection. Jiang & Ni (2019), for example, reported advantageous selection in the supplementary insurance market in China, where healthy individuals preferred to buy private insurance[13]. This result is in line with the findings of Fang, Keane & Silverman (2006) in the Medigap market in the US and Hemenway (1990) who proposed the concept of propitious selection, namely that individuals with careful characteristics (including healthy ones) tend to buy more insurance[14]. Several studies such as Ahmed et al. (2018) and Olayiwola & Olaniyan (2017) reaffirm the existence of adverse selection in developing countries, by emphasizing that informal sector workers or CBHI participants tend to only participate when they feel they need health services. Xu & Yang's study (2021) shows that dropout from social insurance schemes in China is more common among healthy individuals, creating reverse adverse selection that threatens the sustainability of the scheme[15].

From a theoretical perspective, classic journals such as Rothschild & Stiglitz (1976) provide the basis for the insurance market model with imperfect information[16]. Cutler & Zeckhauser (1998) and Cohen & Siegelman (2010) then enriched the literature with empirical reviews and evidence from various markets, showing that adverse selection is highly contextual and influenced by the design of the insurance market[17]. Chiappori & Salanié (2000) and Finkelstein & McGarry (2006) developed methodologies to detect asymmetric information[18], [19]. Handel (2013) emphasized that switching costs can exacerbate risk selection[20]. Other studies have addressed the impact of adverse selection in annuity markets, such as those outlined by Finkelstein & Poterba (2004) and Einav et al. (2010), who showed that individuals with longer life expectancies are more likely to purchase annuity products. This poses a similar challenge to adverse selection in health-related financial products[21], [22]. Several articles have also examined solutions to this problem. Glazer & McGuire (2016) discuss risk adjustment as a balancing mechanism, while Pauly & Herring (2000) suggest an employer-based strategy to mitigate risk selection in dual-package offerings[23], [24]. Bundorf et al. (2012) and Bajari et al. (2006) examine the interaction between price, package choice, and spending expectations, showing that price and incentive design influence package choice and the risks involved[25], [26]. The literature on adverse selection in health insurance shows the complexity between market conditions, participant behavior, and policy design[27]. In developing countries, adverse selection is more pronounced because insurance is voluntary and public knowledge is low, while in developed countries there is mixed evidence of adverse and advantageous selection, depending on the type of product and participant characteristics.

These findings highlight the importance of public policies based on risk adjustment, pricing, and participant education to maintain the sustainability of the insurance system[28]. Adverse selection is a major challenge in health insurance schemes due to the information imbalance between insurers and participants. In this context, individuals with higher health risks are more likely to enroll and maintain their insurance policies, while those with lower risks are more likely to drop out, thus affecting the financial stability of the scheme. Studies have shown that the frequency of health service use significantly influences the decision to

renew a policy, with individuals who use services less frequently being less likely to renew their insurance[29]. This suggests a lack of understanding of the benefits of health insurance among the community. In Ethiopia, the challenge of adverse selection is more profound, where a study found that this phenomenon could threaten the long-term viability of health insurance schemes as premiums collected from healthy participants decrease as they opt out of insurance. As a result, premiums become insufficient to cover the cost of health services for high-risk participants who remain enrolled[30]. This study highlights the importance of effective mitigation strategies to ensure the viability and sustainability of health insurance schemes in an economically disadvantaged context[31]. To address the challenges of adverse selection in health insurance, an appropriate approach to risk management and premium structure is crucial[32]. One strategy that can be applied is the risk pooling model, which serves to equalize incentives for insurance providers not to select participants, thereby reducing the possibility of adverse selection[33].

By implementing this model, insurance can attract individuals with varying risks, thereby increasing the financial stability of the insurance program[34], [35]. In addition, targeted premium subsidies, especially for vulnerable segments of society, play an important role in attracting healthy participants to insurance programs. Research shows that premium subsidies can reduce the costs borne by individuals, thus encouraging more people to enroll in insurance and creating a larger risk pool, which in turn can stabilize the claim and premium ratio[36], [37]. For example, policies such as the National Health Insurance Program in several countries show that when subsidies are provided effectively, the number of participants who enroll increases, including from groups with lower health risks, thereby increasing the sustainability of the program as a whole[38]. To improve the efficiency of the insurance market and prevent the accumulation of excessive claim burdens, the premium structure should be determined based on individual risk indicators. With this approach, the premium paid reflects the health risk faced by each participant, thereby reducing the incentive for high-risk individuals to opt-in, and increasing the incentive for healthy individuals to participate[39]. Such an approach not only improves market efficiency but also contributes to the long-term sustainability of health insurance schemes, by mitigating adverse selection effects, with a combination of effective pooling models, appropriate subsidies for vulnerable segments, and premium settings based on individual risk indicators, we can create a more inclusive environment in health insurance schemes. These initiatives will not only increase participation in health insurance but will also ensure that the schemes are financially viable in the long run[40]. Therefore, integrating these strategies is a vital step in addressing the challenges of adverse selection in the current health insurance system.

Aggressive policy interventions, such as offering targeted subsidies to low-risk groups, are recognized as a vital component in addressing the problem of adverse selection in health insurance schemes. Research shows that targeted subsidies can attract more healthy participants and promote the sustainability of health insurance programs[41]. An experiments in Indonesia indicate that targeted subsidy offerings not only increase participation in health insurance, but also help balance the ratio of healthy participants to high-risk participants, which is essential for maintaining the financial stability of the insurance program[42]. In addition, the use of advanced analytical technologies, such as big data and machine learning, also shows significant potential in reducing adverse selection risks. By leveraging data analytics, insurers can better understand participant behavior and tailor their offerings to meet the needs of the wider market.

## IV. CONCLUSION

This study highlights the importance of understanding the dynamics of adverse selection in health insurance through a systematic literature analysis across insurance schemes. The results identify patterns and drivers of adverse selection (e.g., information asymmetry between providers and participants, voluntary risk choices, and premium and benefit designs) providing an empirical basis for formulating underwriting policies and community empowerment mechanisms. The quality assessment of studies using the Newcastle-Ottawa Scale and the Cochrane Risk of Bias Tool also showed varying levels of evidence, highlighting the need for future studies with more robust methodological designs. Future studies should expand the scope to include digital insurance schemes and microinsurance models and employ longitudinal analyses to understand the evolution of adverse selection over the long term. In addition, experimental studies evaluating

policy interventions such as premium subsidies based on risk profiles or incentives for active participation can provide deeper insights into the effectiveness of mitigation strategies. Research in low- and middle-income countries is also needed to capture the diverse socio-economic contexts and their impacts on risk selection behavior.

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