Demand-side Interventions to Control Moral Hazard in Health Systems, Beneficial or Detrimental: A Systematic Review Study

Zohreh Koohi Rostamkalaee¹, Mehdi Jafari¹* , Hasan Abolghasem Gorji²

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Abstract

**Background:** Moral hazard is one of the main reasons for health market failure where supply-side and demand-side interventions are used for its control and prevention. This study aimed to identify the effects of demand-side interventions on moral hazards in health systems.

**Methods:** For this systematic review, electronic databases, including Scopus, PubMed, Web of Science, Embase, ProQuest, Google Scholar’s search engine, and Iranian databases such as SID and Magiran, were investigated. No time limitation was considered in the search process. The narrative synthesis approach was used for data analysis.

**Results:** Out of 7484 retrieved papers, 61 papers were included in the study. The identified effects were divided into 2 categories: health services consumption effects and financial effects, which were summarized in the form of advantages and disadvantages. The most important advantages included a decrease in the utilization of different services and a reduction in health expenditures. Also, the most important disadvantages included lower quality of care, shifting financing burden to the consumers, and limited access to necessary care.

**Conclusion:** The results showed that the most benefits of interventions, especially in cost-sharing and waiting list interventions, are for insurance organizations, where the disadvantages also affect consumers more. Therefore, it is necessary to pay more attention to these effects and their management because a lack of attention in this regard may impair the performance of insurance financial protection and health provision as one of the major goals of the health system.

**Keywords:** Demand-Side Intervention, Moral Hazards, Health Systems

**Conflicts of Interest:** None declared

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**Introduction**

The uncertainty feature of health care makes the time of need for health services and their costs unpredictable (1). Insurance coverage is a solution to the uncertainty of health care (2) and fair financing of health services (3). Experts believe that insurance coverage distorts the patients’ choices and creates a problem known as a moral hazard (4). Moral hazard is a situation in which the consumer demands additional health services because of the insurance coverage and reduction in the price of health care (5). Moral hazard as a topic in the field of behavioral economics in addition to changes in consumption behavior—leads to a reduction in preventive behaviors because of the reduced financial cost of health consequences. Insurance coverage also changes the behavior of the provider so that the provider

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**What is “already known” in this topic:**

Moral hazard is one of the health market concerns that affect both the provider and the consumer of health services, and its control methods are classified into supply-side and demand-side interventions.

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**What this article adds:**

The effects of demand-side interventions are presented in this work as 2 general effects: health-care consumption effects and financial effects, which are summarized as advantages and disadvantages for each intervention.

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¹ Department of Health Services Management, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran

² Health Management Research Institute, Iran University of Medical Sciences, Tehran, Iran

*Corresponding author: Dr Mehdi Jafari, mjafari@iums.ac.ir
also has no incentive to provide the optimal service and creates an induced demand for the patient to increase her income and benefits; (6) therefore, it is known as the consumer moral hazard and provider moral hazard (7). Moral hazard is one of the main reasons for the failure of the health market (8). Reduction in welfare, reduction in insurance coverage, and increase in health costs are the negative consequences of moral hazard (9). Evidence shows that health care costs have increased in recent years (10, 11). The increase in health spending was equivalent to 9% of Gross Domestic Product (GDP) in the Organization for Economic Co-operation and Development countries in 2018 and 18% of GDP in the United States in 2015. Moral hazard is recognized as one of the main factors in increasing the cost of health (12).

Some interventions have been proposed to manage and reduce moral hazards. These interventions are divided into 2 categories: (1) supply-side interventions and (2) demand-side interventions. Supply-side interventions are used to control provider moral hazards, and demand-side interventions are used to control consumer moral hazards (7). Referral system and gate-keeping, managed care, payment systems such as diagnosis-related group per capita payment and global payment, consumption pattern review, statistical reports, and prospective consumption monitoring are the most common interventions to prevent and control moral hazards in supply-side (13, 14). The most important demand-side interventions include cost-sharing, medical savings accounts (MSA) or health savings accounts (HSA), waiting lists, and nonuse incentives schemes (7).

Cost-sharing is a method whose aim is to increase the responsibility of individuals by participating in the payment of health costs through out-of-pocket payments (15). Cost-sharing is determined in different ways, such as deductibles, coinsurance, copayment, and ceiling (16). Cost-sharing, while reducing the consumption of health services, can reduce insurance costs by preventing moral hazards. This method is common in countries with social health insurance (17). Medical savings accounts are kinds of personal accounts in which enrollees save a portion of their income to pay for health expenses. Health saving accounts are a financing tool, which is also used to control the consumer moral hazard (18). The waiting list is a method that rations health care according to the waiting time (19). The waiting list, by imposing the cost of time instead of paying directly, will reduce moral hazard (13). Nonuse incentive schemes encourage low consumption or nonconsumption in exchange for a lower premium (13) or generous coverage in the next contract (20). The premium reduction is often used to risk adjustment schemes (21).

Since the implementation of any intervention requires the identification of possible consequences for planning to be dealt with, this study aimed to identify the effects of demand-side interventions to control the moral hazard. Our focus in this study is on studies that have sought to reduce consumer moral hazard and used demand-side interventions in this regard. The results of this study are expected to be useful in reducing moral hazards planning and ultimately reducing health costs.

### Methods

#### Data Sources and Searches Strategy

In this systematic review, the following electronic databases were searched until February 7, 2021: Scopus, PubMed, ISI Web of Science, Embase, ProQuest, and Iranian databases including SID and Magiran. Google Scholar’s search engine was used to ensure that all relevant records were covered. No time limitation was considered in the search process. On January 15, 2022, the databases indicated were searched to ensure that the most recent related studies were not missed. During the new search, several studies were added. The main keywords used for searching databases included “moral hazard”, “principal agency problem”, “principal-agent dilemma”, “principal-agent problem”, “unnecessary use”, “unnecessary utilization”, “non-essential use”, “non-essential utilization”, “overutilization”, “health”, “health system”, “health insurance”, “health care”, “healthcare”, “health service”, “medical care”, and “medical service” (Appendix 1).

#### Inclusion and Exclusion Criteria

All Persian and English papers that examined the effect of demand-side interventions on controlling moral hazard or consumer moral hazard in health systems were included in this study. Papers without full texts, letters to editors, books, reports, seminars, and conference presentations were excluded.

#### Screening and Study Selection

Founded records were imported to the Endnote software Version 9. After removing duplicate papers, 2 skilled researchers independently conducted an initial screening of the records’ titles. In the second step, the abstracts of the remaining papers were screened independently by 2 researchers, and unrelated papers were removed. In the final screening round, the full texts of papers were independently assessed for inclusion and exclusion criteria by 2 authors. Any disagreement between the researchers was resolved by consultation with a third reviewer. Also, references of the selected papers were assessed to find additional papers. The literature selection and retrieval flow diagram are shown in Figure 1.

#### Data Extraction and Quality Assessment

Data extraction was performed based on the following information: author(s), year of publication, country, study language, title, study design, demand-side intervention, analyzed outcome, main results, and quality appraisal score. Quality appraisal of the papers was performed using the Dixon-Woods quality appraisal checklist (22). The general characteristics of the included studies are presented in Appendix 2.

#### Data Analysis

The narrative synthesis approach was used to summarize
the results of the studies because the studies were heterogeneous in terms of the type of study, type of demand-side interventions and how to implement them, outcome variables, and high diversity in the approach of analyzing and reporting results. Thus, it was not possible to select a common criterion for the relationship between studies for meta-analysis. Hence, the findings are synthesized in text and table format to provide a summary of the effects and consequences of demand-side interventions.

**Results**

In the search of databases (N = 7468) and other sources (N = 16), a total of 7484 records were found after removing duplicate records and reviewing the inclusion and exclusion criteria during the screening steps of titles, abstracts, and reviewing the full text of selected papers. A total of 61 papers were included in the study (Fig. 1).

The time of publication of the articles are from 1995 to 2000 (N = 1), from 2001 to 2005 (N = 9), from 2006 to 2010 (N = 10), from 2011 to 2015 (N = 17), as well as 24 studies from 2016 to 2021. Most studies were conducted in a quantitative approach (N = 44), but they were also in a qualitative approach (N = 2), review approach (N = 4), and theoretical approach based on the model formulation (N = 11). Demand-side interventions in these studies included cost-sharing (N = 47), medical or health savings accounts (N = 4), waiting lists (N = 4), and nonuse incentives (N = 6).

The main findings of the study on the effects of demand-side interventions were presented in Table 1. The identified effects of the study were divided into 2 general effects: (1) health services consumption effects and (2) financial effects for each intervention. Health services consumption effects show the effect of interventions on outcomes such as demand and utilization of various health services, access to health services, and issues related to the quality of health services. Financial effects also show the effect of interventions on the expenditure of different health services, financial effects for consumers, and insurance organizations or other third-party payers.

Table 2 shows the most important advantages and disadvantages of demand-side interventions.

**Discussion**

This systematic review study aimed to identify the effects of demand-side interventions to control moral hazards in health systems. A variety of study objectives and methods were reviewed and reported in this study. The majority of studies investigated the effects of cost-sharing methods. The basis of cost-sharing goes back to the theory of moral hazards where nonparticipation in costs leads to reckless choices and increased costs (76). The study's findings show that a variety of cost-sharing schemes exist—including uniform and fixed-rate cost-sharing, shift deductibles, high-level cost-sharing plans such as higher deductibles, high deductible health plans (HDHPS), consumer-directed health plans (CDHPS), and value-based cost-sharing or value-based insurance design (VBID)—which determines the cost-sharing rate based on the price elasticity of demand for health services. The bulk of the results related to cost-sharing showed a significant reduction in the consumption of health services; a few studies indicated no or little effect on consumption; this variation in results is expected in different studies due to the variety of regulatory cost-sharing rates in different countries. Regarding the reduction of service consumption, some essential points should be mentioned. The transitory effect is one of the significant issues in reducing the consumption of health services. In Kan and

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**Table 1.** Classified effects of demand-side intervention on health services consumption

**Table 2.** Advantages and disadvantages of demand-side intervention

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[Fig. 1. Literature selection and retrieval flow diagram]

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Suzuki’s study, the effect of reduction in demand for physician visits following the increase in coinsurance rate was not sustainable 6 months after the implementation of the program (36). The substitution effect is another significant effect of reducing service consumption. This effect shifts services with cost-sharing to free services or services with less cost-sharing (43, 27, 25). Since usually hospital ser-
Table 1. The Most Important Advantages and Disadvantages of Demand Side Interventions

<table>
<thead>
<tr>
<th>Demand-side intervention</th>
<th>Health services consumption effects</th>
<th>Financial effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost-sharing</td>
<td>Decrease in the utilization of different services, especially ambulatory services (5, 16, 23-35, 37, 45, 47, 54)</td>
<td>- Restrictions on the use of funds (67)</td>
</tr>
<tr>
<td></td>
<td>- Having lower health care expenditure (32, 36, 45, 52, 54, 59-61, 63, 64)</td>
<td>- Increasing individual savings or preventive behavior (68)</td>
</tr>
<tr>
<td></td>
<td>- Increasing profits of third-party payers due to reduced consumer financial claims (16)</td>
<td>- Reducing members' health costs due to reduced MSA funds (69)</td>
</tr>
<tr>
<td></td>
<td>- Improving healthcare price transparency in CDHPs (59)</td>
<td>- Being useful to reduce costs and save for the future (18)</td>
</tr>
<tr>
<td>Medical Saving Accounts (MSA) / Health Saving Accounts (HSA)</td>
<td>- Suitable for enabling consumption (18)</td>
<td>- Having a negative effect on containing medical expenses (67)</td>
</tr>
<tr>
<td></td>
<td>- Negative effect on reducing moral hazard (67)</td>
<td>- Having a positive effect on medical expenses for healthier groups (67)</td>
</tr>
<tr>
<td>Non-use incentives</td>
<td>- Increasing Risk reduction behavior and improving the utility of insured people (20)</td>
<td>- No welfare gain (70)</td>
</tr>
<tr>
<td></td>
<td>- Reduction in the likelihood of visiting GPs (73)</td>
<td>- Potentially encouraging high-income patients or patients with high waiting costs to select private settings (72)</td>
</tr>
<tr>
<td></td>
<td>- Reduction of moral hazard (73)</td>
<td>- Lower social costs with a smaller patient risk premium than the price of provider information (75)</td>
</tr>
<tr>
<td></td>
<td>- Limited effect of extensive risk adjustment on access to long term care (44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- No restriction on consumption of efficient care (21)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less optimistic and less justified compared to cost-sharing (74)</td>
<td></td>
</tr>
</tbody>
</table>

* High deductible health plans (HDHPs); **consumer-directed health plans (CDHPs); ***Value-based Insurance Design (VBID); ****GPs: general practitioners

Table 2. Continued

<table>
<thead>
<tr>
<th>Demand-side intervention</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost-sharing</td>
<td>- Lower quality of care because of:</td>
<td>- More hospitalization due to substitution effects (16, 24)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Decreasing the utilization of both efficient and inefficient care (preventive care, medication adherence) (21, 45, 47, 54)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Limiting access to necessary health services with increased cost-sharing (21, 44, 45)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Shifting financing burden to the consumers (16, 25)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Increasing total medical costs because of substitution effect from cares with cost-sharing to free or less out-of-pocket care (24, 25, 27, 43)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- More sensitivity of low-income patients (25, 26, 28, 48)</td>
</tr>
<tr>
<td>Medical Savings Accounts (MSA) / Health Saving Accounts (HSA)</td>
<td>- Being suitable for enabling consumption (18)</td>
<td>- Restrictions on the use of funds (67)</td>
</tr>
<tr>
<td>Waiting time</td>
<td>- Increasing savings for the future (18, 68)</td>
<td>- Lower quality of care (70)</td>
</tr>
<tr>
<td></td>
<td>- Reduction in health expenditures (18, 69)</td>
<td>- Patients’ willingness to pay for a reduction in waiting time (70)</td>
</tr>
<tr>
<td>Non-use incentives</td>
<td>- No restriction on the consumption of efficient care (20, 21)</td>
<td>- No welfare gains (70)</td>
</tr>
<tr>
<td></td>
<td>Less optimistic and less justified compared to cost-sharing (74)</td>
<td></td>
</tr>
</tbody>
</table>

Viscous services have lower cost-sharing because of less price elasticity, by shifting services from outpatient to inpatient, a reduction in the quality of services due to inpatient complications is expected. It will also increase the total cost of health. These results are consistent with the results of a study by Yoo et al, where the increase in cost-sharing for outpatient services led to an increase in hospitalization and health costs (24). Fels in a model-based analysis showed that cost-sharing is a nonoptimal method because of the reduction of both essential and nonessential services (because of patients' mistakes in distinguishing between essential and nonessential services) and reduction in access to health services (21). The results of this analysis are in line with the findings of
the following studies about a reduction in the use of preventive care (45, 47, 54) reduction in medication adherence (45), and more sensitivity of low-income patients to cost-sharing for health care utilization (25, 26, 28). In this regard, value-based cost-sharing methods seek to eliminate the shortcomings, which also achieved positive results in this regard (56).

From the financial dimension, the effect of cost-sharing included a small to a significant reduction in health care costs (12, 32, 36). Although the reduction of health costs is one of the most important positive findings of cost-sharing, the exposure to the following side effects in studies criticizes this achievement: shifting the financial burden to consumers (25), increasing the financial burden for consumers (16), and increasing health costs because of increased hospitalization (24). However, the results of empirical illustration showed that shift deductible plans reduce out-of-pocket payment costs (60). Moreover, in response to these shortcomings, value-based cost-sharing schemes were proposed as optimal methods (64-66). As a final point, increasing the profits of insurance organizations because of the reduction of insured claims is another positive and significant consequence of cost-sharing (16, 61).

Savings accounts are one of the means of financing and controlling consumer moral hazard and are also useful for future saving, which is implemented either compulsorily or voluntarily (18). Despite this function, the results of a study showed negative results in reducing health costs and reducing moral hazard in China, which the authors consider a result of the compulsory membership and social participation in the project, being less valuable compared with out-of-pocket payments (67). Furthermore, the results of a study on the effect of health savings accounts on savings and the promotion of preventive behavior showed that the members of this plan do not perform both savings and preventive behavior at the same time (68). In addition, the results of another study showed that savings are reduced in voluntary schemes with generous employers (54).

Generally, the results of studies on the consequences of savings accounts on the consumption of health services and costs were different, which were expected to be like this because of mandatory and voluntary membership and type of administration in different countries.

The waiting list is an alternative to a user fee to reduce costs in countries with national health systems that control unnecessary demand by imposing the cost of time (14). The results of the included studies on the waiting list indicate that this intervention is not desirable from the perspective of patients (70) and is nonoptimal (19, 70, 72). The waiting list reduces health costs by potentially encouraging high-income patients or patients with high waiting costs to select a private setting (72). Although reducing the costs through the choices of private sectors by high-income people is considered an advantage, the result of the analysis by Olivella showed that the presence of the private sector reduces the willingness of public sector providers to reduce waiting time (71).

Nonuse incentive schemes or bonus insurance often offers rewards in the form of a reduction in the next year's premiums (13) or generous coverage for the next contract (20). These interventions aim to promote healthy behavior, prevent high-risk behaviors, and control demand from the source (74) without access restricting (21). The findings of the included studies showed positive findings in the direction of the goals of these programs. However, the public acceptance of these methods in a qualitative study showed less justifiability of these methods compared to cost-sharing methods (74).

**Limitations of the Study**

This study had some limitations. The first limitation was the methodological diversity of the studies and their heterogeneity therefore the narrative synthesis approach was used to summarize the results of the studies. The second limitation was the possibility of language bias due to the limitation of non-English articles on publishing or indexing the results and the focus of this study on Persian and English articles which led to the absence of studies in other languages in the analysis of results. Another limitation was that the majority of the studies concentrated on the impacts of cost-sharing, fewer studies looking at the effects of other demand-side interventions. Finally, there was the possibility of researcher bias in favor of a specific intervention, which might have influenced the study's outcomes.

**Conclusion**

Demand-side interventions were designed to reduce consumer motivation for unnecessary consumption. The results of this study showed that each of these interventions has advantages and disadvantages. The most important strengths of these interventions, in general, include reducing the consumption of health services, especially outpatient services, and reducing health costs and third-party payers' costs. The downsides of these approaches include a reduction in service quality, a transfer in a financial burden to consumers, and limited access, particularly for low-income populations. When looking at the outcomes of interventions, it becomes clear that the majority of the benefits, particularly in cost-sharing and waiting list interventions, benefit insurance companies and third-party payers, while the drawbacks of these interventions disproportionately burden consumers. Therefore, in regulating these interventions in health systems and insurance organizations, it is necessary to pay more attention to these consequences and their management, as a lack of attention in this regard may impair the performance of insurance financial protection and health provision as one of the major goals of health systems.

**Acknowledgment**

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**Ethical Approval**

The study was approved by the local ethical committee.
of Iran University of Medical Sciences (code: IR.IUMS.REC.1399.1103).

Conflict of interests

The authors declare that they have no competing interests.

References


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Appendix 1. Search strategy

### PubMed

```
("moral hazard") OR "moral hazards" OR "principal agency problem" OR "principal agent dilemma" OR "principal agent problem" OR "utilization" OR "overutilization" OR "overutilization" OR "overutilisation" OR "over-utilization" OR "over-utilisation"
```

```
AND ("Delivery of Healthcare" OR "Healthcare Deliveries" OR "Healthcare Delivery" OR "Deliveries" OR "Healthcare" OR "Health Care Delivery"
```

```
OR ("Hospital Care" OR "Care (Health)" OR HealthCare OR Healthcare OR "Health Care System" OR "Health Care System" OR "Healthcare System" OR Systems OR HealthCare)
```

```
OR "outpatient visit" OR inpatient OR hospitalization OR hospitalization OR "hospital admission"
```

```
OR "hospital care"
```

### Embase

```
("moral hazard") OR "moral hazards" OR "principal agency problem" OR "principal agent dilemma" OR "principal agent problem" OR "overutilization" OR "overutilization" OR "over-utilization" OR "over-utilisation"
```

```
AND ("Health Care Systems" OR "Health Care System" OR Systems OR HealthCare)
```

```
OR "outpatient visit" OR inpatient OR hospitalization OR hospitalization OR "hospital admission"
```

```
OR "hospital care"
```

### Scopus

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```

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OR ("Hospital Care" OR "Care (Health)" OR HealthCare OR Healthcare OR "Health Care System" OR "Health Care System" OR "Healthcare System" OR Systems OR HealthCare)
```

```
OR "outpatient visit" OR inpatient OR hospitalization OR hospitalization OR "hospital admission"
```

```
OR "hospital care"
```

### Web of Science

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AND ("Delivery of Healthcare" OR "Healthcare Deliveries" OR "Healthcare Delivery" OR "Deliveries" OR "Healthcare" OR "Health Care Delivery"
```

```
OR ("Hospital Care" OR "Care (Health)" OR HealthCare OR Healthcare OR "Health Care System" OR "Health Care System" OR "Healthcare System" OR Systems OR HealthCare)
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OR "outpatient visit" OR inpatient OR hospitalization OR hospitalization OR "hospital admission"
```

```
OR "hospital care"
```

### ProQuest

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(TITLE-ABS-KEY("moral hazard") OR TITLE-ABS-KEY("moral hazards") OR TITLE-ABS-KEY("principal agency problem") OR TITLE-ABS-KEY("principal agent dilemma") OR TITLE-ABS-KEY("principal agent problem") OR TITLE-ABS-KEY("unnecessary use") OR TITLE-ABS-KEY("non-essential use") OR TITLE-ABS-KEY("non-essential utilization") OR TITLE-ABS-KEY("overutilization") OR TITLE-ABS-KEY("overutilization") OR TITLE-ABS-KEY("over-utilization") OR TITLE-ABS-KEY("over-utilisation") OR TITLE-ABS-KEY("over-utilisations") OR TITLE-ABS-KEY("over-utilisation") OR TITLE-ABS-KEY("over-utilisations")
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```
AND ("Hospital Care" OR "Care (Health)" OR HealthCare OR Healthcare OR "Health Care System" OR "Health Care System" OR "Healthcare System" OR Systems OR HealthCare)
```

```
OR "outpatient visit" OR inpatient OR hospitalization OR hospitalization OR "hospital admission"
```

```
OR "hospital care"
```

```
(DOI: 10.1071/jfmr.3669)
```
Quantitative: Cross-sectional

The general characteristics of the included studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Country / Language</th>
<th>Approach &amp; Design</th>
<th>Demand side intervention</th>
<th>Analyzed outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdus S.</td>
<td>2020(47)</td>
<td>USA/ English</td>
<td>Quantitative: Cross sectional</td>
<td>High-deductible health plan (HDHPs), low-deductible health plans (LDHPs), no-deductible health plans (NDHPs).</td>
<td>Health care utilization: ambulatory visit, specialist visit, preventive services</td>
</tr>
<tr>
<td>Alessie RJM, et al 2020</td>
<td>(5)</td>
<td>Netherlands / English</td>
<td>Quantitative: Longitudinal Internet Studies</td>
<td>Voluntary deductible with premium reduction/ rebate</td>
<td>Moral hazard (GP visits, medical specialist visits, number of days spent in a hospital, number of visits to mental health care)</td>
</tr>
<tr>
<td>Agarwal R, et al 2017(45)</td>
<td></td>
<td>USA/ English</td>
<td>Systematic review</td>
<td>High-deductible health plans (HDHPs)</td>
<td>Health care utilization and health care costs</td>
</tr>
<tr>
<td>Bakx P, et al 2015(44)</td>
<td></td>
<td>Germany, Belgium, Switzerland, Netherlands</td>
<td>Comparative study</td>
<td>Cost sharing: Copayments &amp; deductibles - Managed competition: Financial risk and risk adjustment</td>
<td>Effect on access Effect on efficiency</td>
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<tr>
<td>Bardey D &amp; Lesur R. 2005(43)</td>
<td></td>
<td>France/ English</td>
<td>Theoretical approach based on model formulation</td>
<td>Deductible</td>
<td>Optimal health insurance contract</td>
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<td>Beeuwkes Buntin M, et al 2011(54)</td>
<td></td>
<td>USA/ English</td>
<td>Quantitative: Retrospective difference-in difference</td>
<td>High deductible health plans (HDHPs) &amp; consumer directed health plans (CDHPs)</td>
<td>Healthcare spending and use of recommended preventive care</td>
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<tr>
<td>Chen T. 2021(67)</td>
<td></td>
<td>China/ English</td>
<td>Quantitative: Empirically design</td>
<td>Health savings accounts (HSAs)</td>
<td>Medical expenses and moral hazard</td>
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<td>Chernow ME, et al 2000(64)</td>
<td></td>
<td>USA/ English</td>
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### Appendix 2 Continued

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## Demand-side Interventions to Control Moral Hazard

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