What are the financial costs and healthcare delays caused by provider directory inaccuracies?

Provider directory inaccuracies cause patients to be four times more likely to receive surprise out-of-network bills, lead 28% to delay care and 16% to seek urgent or emergency care instead, and result in appointment scheduling failure rates of 36-72% for listed providers, though specific dollar amounts of financial harm have not been quantified in the literature.

Abstract

Provider directory inaccuracies affect 23-56% of listings across healthcare sectors and impose documented financial and access burdens on patients. Patients encountering directory inaccuracies are twice as likely to receive out-of-network care (40% versus 20%) and four times more likely to receive surprise bills (16% versus 4%) , with 51% of affected consumers reporting financial problems . Healthcare delays are substantial: 28% of those experiencing inaccuracies delayed care, 10% sought urgent care, 6% sought emergency care, and 10% forgone care entirely . Appointment scheduling success rates for listed providers range from 28-54% for urgent care to 35-64% for general care appointments , with mean wait times of 10-12 days for general appointments in Medicaid .

Despite consistent evidence linking directory inaccuracies to patient harms, significant gaps remain in the literature. No studies quantified financial costs in dollar amounts , limiting understanding of aggregate economic burden. Directory inaccuracies persist for an average of 540 days , well beyond the 90-day federal correction standard , suggesting regulatory enforcement inadequacies. Mental health services show particularly severe impacts, with directories described as "highly inaccurate" and limited timely access across plan types . The evidence supports that directory inaccuracies cause both financial harms and healthcare delays, though the magnitude of financial costs remains unquantified.

Paper search

We performed a semantic search using the query "What are the financial costs and healthcare delays caused by provider directory inaccuracies?" across over 138 million academic papers from the Elicit search engine, which includes all of Semantic Scholar and OpenAlex.

We retrieved the 50 papers most relevant to the query.

Screening

We screened in sources based on their abstracts that met these criteria:

- **Provider Directory Focus**: Does this study examine provider directory inaccuracies in healthcare settings?
- **Relevant Outcomes**: Does this study report quantitative measures of either financial costs associated with directory inaccuracies OR quantitative measures of healthcare delays caused by directory inaccuracies?
- **Study Design**: Is this study a quantitative study (randomized controlled trial, cohort study, cross-sectional study, case-control study) or a systematic review/meta-analysis?
- **Healthcare Context**: Does this study involve healthcare settings (hospitals, clinics, insurance networks, telehealth platforms) and healthcare populations (patients or healthcare providers)?
- **Impact Focus**: Does this study measure financial or healthcare impact (not solely directory accuracy rates without impact measures)?

- **Empirical Evidence**: Is this study NOT purely qualitative, opinion piece, editorial, commentary article, or case report/series with fewer than 10 participants?
- **Specific Directory Focus**: Does this study specifically focus on provider directory problems (not general healthcare access issues without directory focus) and examine healthcare directory contexts (not non-healthcare applications)?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Data extraction

We asked a large language model to extract each data column below from each paper. We gave the model the extraction instructions shown below for each column.

- **Directory Inaccuracy Types**:

  Extract all types of provider directory inaccuracies identified and their frequency rates, including:

- Incorrect network status (in-network vs out-of-network)
- Providers no longer at listed practice/location
- Wrong or outdated contact information
- Providers not accepting new patients
- Providers not practicing the listed specialty
- Any other inaccuracy types mentioned
- Overall inaccuracy rates (percentage of directory entries that were incorrect)
- Sample sizes used for accuracy assessments

- **Financial Cost Impacts**:

  Extract all quantified financial costs attributed to directory inaccuracies, including:

- Surprise out-of-network bills (amounts and frequency)
- Additional out-of-pocket expenses
- Cost differences between in-network and out-of-network care
- Any other direct financial impacts
- Percentage of patients affected by financial consequences
- Specific dollar amounts where provided
- Currency and time period for cost data

- **Healthcare Access Delays**:

  Extract all healthcare delays and access problems caused by directory inaccuracies, including:

- Care delays (time periods and frequency)
- Patients who postponed or foregone care entirely
- Patients who sought urgent care or emergency care instead
- Appointment scheduling difficulties
- Time spent searching for available providers
- Any other access barriers described
- Quantified impacts (percentages affected, average delay times)

- **Study Population**:

Extract characteristics of the population studied, including:

- Healthcare sector (mental health, primary care, specialty care, preventive services)
- Insurance type (commercial, ACA marketplace, Medicaid, Medicare)
- Geographic scope (state, national, specific regions)
- Sample size and demographic characteristics
- Time period of study
- Any population-specific findings about costs or delays

- **Measurement Methods**:

  Extract how directory accuracy and outcomes were measured, including:

- Method used to test directory accuracy (mystery shopper calls, patient surveys, administrative data)
- How financial costs were quantified (patient reports, insurance claims, survey data)
- How delays were measured (patient reports, appointment availability testing, time tracking)
- Validation approaches used
- Response rates and data completeness
- Any limitations in measurement approaches acknowledged

- **Causal Evidence**:

  Extract evidence establishing causal relationships between directory inaccuracies and outcomes, including:

- Statistical analyses showing associations between inaccuracies and costs/delays
- Comparison groups (accurate vs inaccurate directory users)
- Temporal relationships described
- Patient-reported attributions of costs/delays to directory problems
- Mechanism explanations for how inaccuracies lead to costs/delays
- Strength of causal claims made by authors
- Any confounding factors considered

Characteristics of Included Studies

This review synthesizes findings from nine studies examining provider directory inaccuracies and their consequences for patients. The studies varied substantially in scope, population, and methodology.

Study	Full text retrieved?	Healthcare Sector	Insurance Type	Geographic Scope	Sample Size	Time Period
Simon F. Haeder et al., 2024	No	Not specified	Not specified	National	10,739 US adults	Jan-Apr 2022
S. Busch et al., 2020	No	Mental health	Commercial	National	Not specified	Not specified
Abigail Burman et al., 2022	Yes	Primary care	Medicaid	Maryland	2,002-2,033 providers	2018-2019

Study	Full text retrieved?	Healthcare Sector	Insurance Type	Geographic Scope	Sample Size	Time Period
Abigail Burman et al., 2023	No	Mental health	Commercial, ACA, Medicaid	California	1,146,954 observations	2018-2019
Abigail Burman et al., 2022a	No	Preventive (mammo-grams)	Commercial, ACA, Medicaid	California	>33,000 observations	2018-2019
Simon F. Haeder et al., 2024a	No	Multiple specialties	ACA marketplace	Pennsylvania	1,802 listings	403-574 days follow-up
Abigail Burman et al., 2021	Yes	Primary and specialty care	Commercial, ACA, Medicaid	California	657,012 observations	2018-2019
Michael S. Adelberg et al., 2019	No	Not specified	ACA marketplace	5 counties	21 stakeholders	Not specified
Simon F. Haeder et al., 2024b	No	Not specified	Not specified	Pennsylvania	5,170 providers	117-280 days follow-up

The studies employed diverse methodologies, with most using secret shopper or telephone surveys to assess directory accuracy , while others relied on patient surveys . Sample sizes ranged from 21 stakeholder interviews to over 1.1 million observations , with the largest studies conducted through state regulatory agencies in California and Maryland.

Provider Directory Inaccuracy Rates

Studies documented substantial and consistent directory inaccuracy rates across healthcare sectors, insurance types, and geographic regions.

Study	Overall Inaccuracy Rate	Incorrect Network Status	Wrong Contact Information	Provider Left Practice	Wrong Specialty
Simon F. Haeder et al., 2024	56%	34%	15%	18%	Not reported
S. Busch et al., 2020	53%	Not specified	Not specified	Not specified	Not specified
Abigail Burman et al., 2022	43-54%	43-54%	Not quantified	Not quantified	Not quantified
Abigail Burman et al., 2022a	23-38%	Not specified	Not specified	Not specified	Not specified
Simon F. Haeder et al., 2024a	40.3%	1.9%	31.0%	Not reported	11.2%

Study	Overall Inaccuracy Rate	Incorrect Network Status	Wrong Contact Information	Provider Left Practice	Wrong Specialty
Abigail Burman et al., 2021	24-41%	Not quantified	Not quantified	Not quantified	Up to 1.22%
Simon F. Haeder et al., 2024b	44.8%	Not specified	Mentioned	Not specified	Not specified

Inaccuracy rates ranged from 23% for mammogram providers to 56% among general directory users . The most commonly identified inaccuracy types were incorrect network status (34% in one national survey) and wrong contact information (15-31%) . In Maryland's Medicaid program, insurance coverage could only be verified for 46% of listed providers in 2018 and 56% in 2019 . Mental health directories were described as "highly inaccurate" across commercial, marketplace, and Medicaid plans in California .

Financial Cost Impacts

Financial consequences of directory inaccuracies were documented in several studies, though specific dollar amounts were rarely quantified.

Study	Surprise Bills	Financial Problems Reported	Out-of-Network Treatment	Other Financial Impacts
Simon F. Haeder et al., 2024	Not quantified	51% suffered financial problems	5% went out of network	Not specified
S. Busch et al., 2020	16% vs 4% (inaccuracy vs no inaccuracy)	Not specified	40% vs 20% (inaccuracy vs no inaccuracy)	Not specified
Abigail Burman et al., 2022	Not quantified	Not quantified	Qualitative discussion	Increased Medicaid costs from expensive settings
Abigail Burman et al., 2021	Mentioned but not quantified	Not quantified	"Coerced billing" described	Additional out-of-pocket costs implied

The most robust comparative evidence comes from Busch et al. (2020), which found that mental health patients who encountered directory inaccuracies were four times more likely to receive surprise out-of-network bills (16% versus 4%) and twice as likely to be treated by an out-of-network provider (40% versus 20%) . In the national survey by Haeder et al. (2024), 51% of those affected by directory inaccuracies reported suffering financial problems . The California studies noted that inaccuracies may lead to "coerced billing" where consumers are forced to pay for out-of-network care due to lack of in-network options , though specific dollar amounts were not provided .

No studies provided specific dollar amounts for surprise bills, cost differences between in-network and out-of-network care, or aggregate financial burden .

Healthcare Access Delays

Healthcare delays and access barriers were more extensively documented than financial costs, with multiple studies providing quantified impacts.

Study	Care Delayed	Urgent/Emergency Care Sought	Care Forgone	Appointment Scheduling Success
Simon F. Haeder et al., 2024	28%	10% urgent, 6% emergency	10%	Not assessed
Abigail Burman et al., 2022	Mean wait 10.75-11.57 days	<1 day mean wait	Implied	70%+ on first call
Abigail Burman et al., 2023	Highly limited timely access	Limited access	Not specified	Not specified
Abigail Burman et al., 2022a	27-41% unable to schedule within 15 days	Not assessed	Not specified	59-73% within 15 days
Abigail Burman et al., 2021	Implied	28-54% success rate	May be forced to forgo	35-64% for general care

The national consumer survey found that among those experiencing directory inaccuracies, 28% delayed care, 10% sought urgent care, 6% sought emergency care, and 10% forgone care entirely . Additionally, 54% reported suffering health problems as a result of directory inaccuracies .

Appointment scheduling success rates varied substantially across studies and care types. In California, consumers could schedule urgent care appointments within statutory timeframes for only 28% to 54% of directory listings, while general care appointments succeeded for 35% to 64% of listings . For mammogram providers, 59% to 73% of consumers could schedule appointments within 15 days . In Maryland's Medicaid program, mean wait times for general appointments were 10.75 days in 2018 and 11.57 days in 2019, with median wait times of 4-5 days .

Mental health services showed particularly limited timely access, with plans ”highly limited in providing timely access to urgent care and general appointments” , though Medi-Cal plans outperformed commercial and marketplace plans for timely access .

Persistence of Directory Inaccuracies

Two studies examined how long directory inaccuracies persist after initial identification, revealing substantial delays in correction.

Study	Follow-up Period	Listings Removed	Listings Corrected	Listings Still Inaccurate	Unable to Reach
Simon F. Haeder et al., 2024a	403-574 days	25.0%	13.3%	40.3%	21.4%
Simon F. Haeder et al., 2024b	117-280 days	19.0%	11.6%	44.8%	24.6%

Of 1,802 inaccurate provider listings in the Pennsylvania ACA marketplace, only 13.3% were accurate at follow-up after an average of 540 days, while 40.3% remained inaccurate . This persistence well exceeds the 90-day correction expectation mandated by federal regulations . The shorter-term follow-up study found similar patterns, with 44.8% of listings continuing to show at least one inaccuracy after 117-280 days . Longer passage of time was associated with reductions in inaccuracies, particularly related to contact information , though substantial differences existed across carriers .

Causal Evidence Linking Inaccuracies to Outcomes

The strength of causal evidence connecting directory inaccuracies to financial costs and healthcare delays varied across studies.

Study	Comparison Groups	Statistical Association	Mechanism Explanation	Confounders Considered
S. Busch et al., 2020	Yes (inaccuracy vs no inaccuracy)	40% vs 20% out-of-network; 16% vs 4% surprise bills	Not explicit	Not mentioned
Simon F. Haeder et al., 2024	No comparison group	Associations implied	Not explicit	Not mentioned
Abigail Burman et al., 2022	No comparison group	Implied	Beneficiaries seek expensive settings	Not mentioned
Abigail Burman et al., 2021	No comparison group	Implied	Coerced billing, forgoing care	Resource limitations noted

The strongest causal evidence comes from Busch et al. (2020), which directly compared outcomes between patients who encountered directory inaccuracies and those who did not, finding significantly higher rates of out-of-network treatment and surprise bills among those experiencing inaccuracies . Most other studies established associations through temporal sequencing—documenting inaccuracies and subsequent access problems—without formal comparison groups .

Several studies described mechanisms by which inaccuracies lead to harms: inaccurate listings may cause beneficiaries to seek care in more expensive settings or delay care until conditions worsen ; consumers may face ”coerced billing” when in-network options prove unavailable ; and resource limitations such as language barriers or transportation may amplify the effects of directory errors for vulnerable populations .

Synthesis

The evidence consistently demonstrates that provider directory inaccuracies are pervasive—affecting 23-56% of listings depending on healthcare sector and methodology—and that these inaccuracies impose measurable harms on patients. However, the nature and magnitude of documented harms vary substantially across studies.

The heterogeneity in findings can be partially explained by differences in study populations and healthcare sectors. Mental health services show particularly high rates of out-of-network care (40% among those experiencing inaccuracies) , consistent with documented challenges in psychiatrist acceptance of commercial insurance . Primary care in

Medicaid programs shows high inaccuracy rates (43-54%) but relatively better success in scheduling timely appointments once providers are verified . Preventive services like mammograms showed lower inaccuracy rates (23-38%) but still substantial barriers to timely scheduling .

Measurement methodology also contributes to variation. Secret shopper studies that directly test directory accuracy and appointment availability provide different insights than patient surveys that capture self-reported experiences and consequences . The former documents system-level failures; the latter captures patient-experienced harms including the 54% who reported health problems and 51% who reported financial problems .

The financial cost evidence remains notably incomplete. While the comparative analysis showing four-fold increases in surprise bills among those experiencing inaccuracies provides compelling evidence of harm, no studies quantified dollar amounts or aggregate economic burden. This gap is particularly significant given that 51% of affected consumers report financial problems and that inaccuracies may lead to cascading costs through emergency department utilization and out-of-network charges .

The persistence data reveals a regulatory compliance problem: directory inaccuracies remain uncorrected for 540 days on average , far exceeding the 90-day federal standard . This persistence, combined with the demonstrated link between inaccuracies and patient harms, suggests that current regulatory enforcement may be insufficient to protect consumers. The finding that even California—described as "one of the most active and well-resourced regulators in the nation" —shows substantial inaccuracy and inadequacy rates reinforces this concern.

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