

Do Patients Continue to See Physicians Who Are Removed From a PPO Network?

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In recent years, many employers have varied patient cost sharing at the point of service as a means of altering enrollee choices of treatment and provider to supplement or supplant supply-side controls such as precertification of services or bundled provider payment.¹ An example of this approach used widely by national insurers and some regional insurers is the tiered provider network, which differentiates cost sharing based on the consumer's choice of a specific physician or hospital.^{2,3} Tiered networks provide financial incentives to consumers to select providers who rank higher, typically based on comparisons of case mix-adjusted total cost per episode of care (rather than cost per unit of service) or quality measurements. Some payers have narrowed their preferred provider organization (PPO) or health maintenance organization (HMO) networks based on a "high-performance" network.³

According to recent data from the Kaiser Family Foundation and Health Research and Education Trust,⁴ 15% of employers offered a tiered or high-performance network in their largest health plan. These networks have received attention largely for the methods used to stratify providers into tiers and for the transparency of that process.⁵ Whether tiered and high-performance networks are a useful policy tool will depend not only on how the tiers are designed but also on the effectiveness of differential cost sharing as a mechanism for channeling patients to specific providers.

Because tiered and narrow networks are a recent development in benefit design, there are no published studies to date of their effects on consumer behavior or other outcomes. However, insurers have priced them at a discount to traditional networks. For example, the chief medical officer of PacificCare Health Systems, Inc⁶ testified at a congressional hearing that their narrow network Medicare Advantage plan in southern California reduced total healthcare spending by more than 10%.

Despite the fact that differential cost sharing based on network participation is also a feature of standard HMO and PPO model managed care plans, the price responsiveness of patient choice of physician has not been documented in the peer-reviewed literature to date.

In related research, consumers have demonstrated a willingness to switch health systems (ie, a group of physicians and affiliated hospitals) when faced with quality information and

Objectives: To assess the extent to which excluding physicians from a preferred provider organization (PPO) network causes patients to discontinue using their services and whether the associated changes will result in greater demand for emergency department or inpatient care.

Study Design: Analysis of a natural experiment involving the narrowing of a PPO network operated by the Taft-Hartley Fund. The panel data analysis compared rates of patient discontinuation for excluded physicians before and after the change. The pre-post analysis used matched comparison groups for office visits, emergency department visits, inpatient admissions, and spending for affected patients.

Methods: Claims data analysis used generalized estimating equations and controlled for patient age, sex, health status, and hourly wage. Models examining utilization and spending for 6187 patients who remained with excluded physicians also used a propensity score-matched comparison group identified from among patients who had never seen an excluded physician. Differential response to physician exclusion according to age, health status, and hourly wage was also examined through interaction terms.

Results: The network narrowing reduced the odds of continuing to see an excluded physician (odds ratio, 0.18; $P < .001$). Patients who continued to see excluded physicians reduced their office visits by a mean of 0.9 visits per year, 0.8 visits more than comparison patients ($P < .001$). There were no significant changes in emergency department visits or admissions for patients of excluded physicians compared with a matched cohort.

Conclusions: Substantial copayment differentials may be an effective means of encouraging patients to change physicians. Where they are based on reliable information about provider quality and cost, tiered networks may improve value.

(*Am J Manag Care.* 2009;15(10):713-719)

In this article
Take-Away Points / p714
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see end of text.**

Take-Away Points

We examined the effect of a network change by the Culinary Health Fund in the Las Vegas, Nevada, metropolitan area that effectively raised the out-of-pocket price to their predominantly low-wage enrollees for a few physicians.

- Most patients who had previously seen a physician who was later excluded did not continue seeing that physician, although the degree of responsiveness varied by age and hourly wage.
- Patients who continued using excluded physicians cut back on services.
- There was no evidence of a compensating increase in emergency department use or hospitalization.

see these physicians. Patients were also instructed to contact the Culinary Health Fund for assistance in identifying a new physician. The Culinary Health Fund pays 60% of its discounted fee toward out-of-network care, which may also be billed at a higher rate than the discounted fee schedule accepted by participating physicians. For a simple office

with differential premiums.^{7,8} Such findings support the potential for tiering to alter care-seeking patterns.

In this study, we examined the effect of narrowing a physician network operated in the Las Vegas, Nevada, metropolitan area by the Culinary Health Fund (a Taft-Hartley Fund that administers benefits for union members). This narrowing resulted in a change in the point-of-service price to patients for a subset of physicians in the network. Our analyses examine whether patients who had a prior-year contact with the excluded physicians eliminated or reduced visits to these physicians after the “price change.” We also examine the consequences of the network narrowing for utilization of out-patient services and possible substitution of emergency department and inpatient care.

visit, out-of-network physicians would be associated with an out-of-pocket price of at least \$50 to \$60 compared with \$15 for in-network physicians, and this price differential would be even greater for visits that involved ancillary services or procedures.

Data and Sources

Our study relied on administrative data from the Culinary Health Fund to examine patterns of physician selection and service use for patients who saw excluded physicians in the year before their exclusion relative to comparison patients.

We obtained deidentified claims and eligibility data from the Culinary Health Fund for 2002-2004. Claims data record in-network and out-of-network care reimbursed by the Culinary Health Fund. Claims and eligibility data included patient demographic information (age and sex), diagnoses, procedures, physician specialty, date of service, place of service, and the US dollar amounts billed to and paid by the Culinary Health Fund. We also obtained a list of the provider identifiers for the physicians excluded from the network in December 2003. Finally, for a subset of our sample, we obtained information on hourly wage that could be linked by unique identifier to the health plan data.

METHODS

Study Setting

We examined a change in network scope in the Culinary Health Fund–administered PPO that insures union members in the Las Vegas metropolitan area. The Culinary Health Fund covers approximately 56,000 primary subscribers and their dependents (a total of roughly 135,000 lives). Members of the Culinary Health Fund are all enrolled in a single benefit plan. The individuals enrolled in the Culinary Health Fund, who are generally employed in the food service and hospitality industries, are 40% Hispanic and have disproportionately low incomes.

In the spring of 2003, members and physicians were informed of the Culinary Health Fund’s intent to narrow its network. Cost and quality data were reviewed for each participating physician in the network using industry-standard measures and claims-based algorithms. After conducting an analysis to ensure adequate geographic and linguistic access to all members, 48 (of 1800) physicians were removed from the network effective December 2003. Excluded physicians included primary care physicians and specialists. The communication to members about the change indicated that a set of physicians was no longer participating in the network and that patients could expect to pay more out of pocket to

Hypotheses

Using the economic theory of demand as our point of departure, we designed our analyses to test a series of hypotheses about the effect of the network narrowing. If patients view physicians as readily substitutable for one another and the price differences are large enough, economic theory would predict that patients who previously saw the physicians who were excluded from the network would switch to an in-network physician. If patients do not switch physicians, then theory and well-accepted empirical evidence suggest that they will cut back on their use of services in the face of an effective price increase.⁹ Cutting back on higher-priced services might take the form of reducing visits to the excluded physicians or reducing the costliness of a visit (eg, by refusing ancillary tests and procedures). In addition, to the extent that some emergency department visits substitute for office

visits, these might increase for patients who continued to see higher-priced (excluded) physicians as the price of emergency department visits falls relative to office visits. Finally, the increase in the effective price of outpatient visits for these patients might affect inpatient use, possibly by increasing hospitalizations that are sensitive to ambulatory care (eg, certain diabetes admissions).¹⁰ However, there is also some evidence that office visits and inpatient admissions are complementary, which would suggest that the network change might reduce inpatient use for patients who continue to see excluded physicians but cut back on outpatient care.⁹

While it is well known that the demand for healthcare overall is sensitive to price changes (although inelastic), patients report that they place a high premium on their relationships with their individual physicians.¹¹ Such loyalty, we anticipated, would be greater for patients who were sicker or older, both of which are proxies for having a more established physician-patient relationship.¹² Therefore, we tested the hypothesis that sicker and older patients would be less likely to discontinue use of an excluded physician than healthier and younger patients.

Analytic Approach

All of our analyses were conducted on continuously enrolled Culinary Health Fund members. Although some of the excluded physicians were specialists, they accounted for few visits (26%). Because of concerns that patient responses might differ for specialists compared with primary care physicians, we restricted our analysis to patient use of excluded primary care physicians (defined as internists, family physicians, general practitioners, and pediatricians [$n = 37$]). Our results were not sensitive to this exclusion.

We first identified the study cohort of Culinary Health Fund members who saw at least 1 excluded physician on at least 1 occasion in 2003 and compared their characteristics with those of all other Culinary Health Fund members with at least 1 office visit. We also ran our analyses using the following 2 alternative ways of identifying the study cohort: (1) the subsample of patients who had seen a specific excluded physician for most of their office visits (as a way of focusing on patients for whom the excluded physician was their primary physician) and (2) patients who had at least 2 visits to the excluded physician (as a way of identifying patients who had returned to the excluded physician at least once in the past). These alternative thresholds were defined identically for the study and comparison groups. In both cases, we found no qualitative difference and little quantitative difference in our results. Details are available from the author. Patient characteristics that we examined in our models were age, sex, and the index of comorbidities by Elixhauser et al.¹³ Statistical significance of differences between the 2 groups was exam-

ined using 2-tailed t tests for continuous variables and χ^2 tests for dichotomous variables.

The remaining analyses were conducted using multiple regressions. In each analysis, the change in behavior for the group of patients affected (either all patients who had seen an excluded physician at least once in 2003 or patients who had continued using excluded physicians in subsequent analyses) was compared with the change in behavior for a group of unaffected patients (a difference-in-difference approach). For the analyses that examined whether patients eliminated or reduced visits to an excluded physician seen in the prior year, the comparison group was the set of patients who had gone to the excluded physicians in 2002. We opted to focus on the behavior of these patients in 2003 compared with 2002 rather than a contemporaneous comparison group because we had reason to believe (based on the Culinary Health Fund's decision to exclude them) that the excluded physicians differed from other physicians in the network and might have systematically different rates of patient turnover. Qualitatively, our results were the same when we used a contemporaneous comparison group of unaffected patients (those who never saw an excluded physician in 2003), although the magnitude of the effect was larger in the latter analysis (suggesting that excluded physicians did in fact have higher patient turnover than others even before they were excluded). For the analyses relating to consequences of the effective price increase for patients who continued to use the excluded physicians, matching was performed to select a contemporaneous comparison group from among the patients who had never seen an excluded physician. Propensity score matching was undertaken on the basis of sex, age, prior-year spending, and the Elixhauser comorbidity index. Each patient in the study cohort was matched to the nearest comparison group observation based on the propensity score; residual differences between the 2 groups were controlled for through multiple regressions.

To test the hypotheses regarding patient care seeking from excluded physicians, we used logistic regression models with adjustments to account for the clustering of observations and repeated observations. We modeled the probability of the following 2 events: returning to a physician seen in the previous year for at least 1 visit and returning to a physician seen in the previous year for more than 1 visit. The latter analysis was conducted because of the possibility that, despite the Culinary Health Fund's written communication to members, patients may only have become aware of the price change as a result of visiting an excluded physician. Generalized estimating equations with negative binomial link functions were used to analyze office visits, emergency department visits, and inpatient admissions (because there were few hospitalizations overall, we did not limit the analysis to ambulatory care-sensitive admissions).

The final model examines the intensity of use along a further dimension, namely, spending per visit, using generalized estimating equations with a log-link function. Note that we do not use a 2-part model for the spending analysis because our samples are defined in such a way that all have spending greater than zero and we are analyzing the mean amount allowed per visit.

For the logistic regression analyses, inference focused on a variable that indicated a patient was part of the study group, namely, a patient who saw an excluded provider in 2003. We also investigated the interaction between this variable and measures of patient age, health status, and hourly wage. In the models examining utilization and spending, the key independent variable of interest was an interaction term that designated an observation as belonging to the affected group (those patients who continued to see excluded physicians) in the post-network change period. Explanatory variables included in all of the multiple regression models were age at baseline, sex, and an indicator that an individual had 2 or more comorbid conditions using the Elixhauser comorbidity index. We also considered including a measure of prior-year healthcare spending, but it was highly correlated with the Elixhauser comorbidity index, leading to concerns about multicollinearity.

For the logistic regression analyses, we report odds ratios (ORs) and *P* values. We also report the absolute difference in discontinuation rates for the study and comparison groups for the main analysis (ie, the model without interaction terms). For ease of interpretation, we report predicted values from the utilization and spending models and the differences in these predicted values between affected and comparison patients. Estimates with *P* < .05 were considered statistically significant.

Culinary Health Fund members in all characteristics that we examined (Table 1). Most notably, they were on average 8 years older and were more likely (21% vs 12%) to have 2 or more comorbid conditions (*P* < .001 for both).

Of 6187 patients who had seen an excluded physician, 5000 (81%) did not continue seeing those physicians in 2004 (data not shown). An additional 7% of patients returned to their excluded physician only once (data not shown). Our regression analysis comparing the likelihood of seeing the excluded physician at least once in a subsequent year showed that patients affected by the network narrowing had significantly lower odds of continuing to see an excluded physician than patients who saw those physicians a year earlier and faced no differential pricing (OR, 0.18; *P* < .001) (Table 2). In absolute terms, after adjusting for age, sex, and comorbidities, the network change was associated with patients discontinuing use of a physician at a rate 27 percentage points higher than that of the comparison group (data not shown).

Older age (OR, 1.00), female sex (OR, 1.19), and poorer health status (OR, 1.41) (*P* < .001 for all) were associated with higher odds of continuing to see the same physician over time (Table 2). Relative to the comparison group, older patients whose physician was excluded had lower odds of continuing to see the same physician (OR, 0.91; *P* < .001). In other words, the network narrowing was associated with increased odds of older patients discontinuing use of a physician relative to the odds of discontinuing use among younger patients.

Including hourly wage information in the analyses substantially reduced our sample size and somewhat altered the mix of patient characteristics in the data. Enrollees for whom we had hourly wage data available were more likely to be female (86% vs 57%), healthier (0.69 vs 0.86 comorbid conditions), and older (43 vs 39 years) (*P* < .001 for all). When we include hourly wage information in the analysis (*n* = 2886), we find that higher wages are associated with greater odds of continu-

RESULTS

Culinary Health Fund members who saw a subsequently excluded physician were significantly different from other

■ **Table 1.** Characteristics of Patients of Excluded Physicians and All Other Patients in the Culinary Health Fund

Characteristic	Patients Who Saw an Excluded Physician for ≥1 Visit in 2003 (n = 6187)	All Other Patients With ≥1 Visit (n = 42,255)	<i>P</i>
Age, mean (SD), y	40 (18)	32 (20)	<.001
Female sex, %	63	59	<.001
No. of major health conditions or comorbidities, % ^a			
0	53	67	<.001
1	26	22	<.001
≥2	21	12	<.001
Hourly wage, mean (SD), \$	12.38 (1.04)	12.66 (0.94)	<.001

^aUsing the index of comorbidities by Elixhauser et al.¹³

Patient Response to Physicians Removed From a PPO Network

Table 2. Variables Associated With Patients Continuing Use of a Physician Seen in the Prior Year^a

Explanatory Variable	Model					
	No Interaction (n = 21,241)		Interactions With Age and Health Status (n = 21,241)		Interaction With Hourly Wage (n = 2886)	
	OR	P	OR	P	OR	P
Age, continuous	1.01	<.001	1.00	<.001	1.02	.07
Female sex	1.19	<.001	1.18	<.001	1.17	.35
Health status indicator	1.41	<.001	1.02	<.001	0.71	.11
Study group ^b	0.18	<.001	0.07	<.001	14.8	.13
Study group-x-age	—	—	0.91	<.001	1.01	.47
Study group-x-health status	—	—	1.43	.30	1.28	.31
Hourly wage	—	—	—	—	1.26	.01
Study group-x-hourly wage	—	—	—	—	0.63	<.001

^aOdds ratios (ORs) are for continuing use of the same physician and are from generalized estimating equations using a log-link function.
^bDenotes an observation for a patient in 2004 with regard to continuing use of an excluded physician seen in 2003 (at which time the physician was in network); the comparison group is composed of patients who saw a physician in 2002 who was later excluded.

ing to see the same physician (OR, 1.26; $P = .01$) (Table 2). However, there was a significant negative interaction effect of hourly wages on the odds of continuing to use an excluded physician following the network change (OR, 0.63; $P < .001$). That is, enrollees with higher hourly wages were more likely to discontinue use of an excluded physician in the period after the network change.

For patients who continued to see an excluded physician in 2004, we found significant decreases in utilization and spending per visit compared with a matched contemporaneous comparison cohort (Table 3). Patients of excluded physicians reduced their office visits by a mean of 0.9 visits per year, 0.8 visits more than comparison patients ($P < .001$). We note that what would appear to be a high mean number of visits is

Table 3. Changes in Office Visits and Intensity of Services for Loyal Patients of Excluded Physicians Compared With Matched Patients Who Never Saw an Excluded Physician^a

	2003	2004	Difference	P
Office visits				
Patients of excluded physicians	5.8	4.9	-0.9	<.001
All other patients	4.2	4.0	-0.1 ^b	.21
Difference between groups	1.6	0.9	-0.8 ^b	<.001
Mean allowed amount per visit, intensity, \$				
Patients of excluded physicians	88	72	-16	<.001
All other patients	79	78	-0.5 ^b	.82
Difference between groups	11 ^b	-6	-16 ^b	<.001
Emergency department visits				
Patients of excluded physicians	0.73	0.90	0.16 ^b	.04
All other patients	0.70	0.81	0.11	<.001
Difference between groups	0.03	0.09	0.06	.49
Total hospital admissions				
Patients of excluded physicians	4.1	3.8	-0.3	.74
All other patients	3.5	3.4	-0.1	.60
Difference between groups	0.6	0.4	-0.2	.80

^aComparisons are made using a propensity score-matched sample and regression-based adjustments for any remaining differences in age, sex, and health status.
^bValues may differ slightly because of rounding.

likely explained by the fact that our samples are defined based on having at least 1 visit in 2003 (to identify patients of an excluded physician and the matched sample), thus excluding members with no visits. The mean allowed amount per visit for patients seeing excluded physicians also declined by approximately \$16 relative to the trend in the comparison group ($P < .001$). Emergency department visits increased slightly for both groups between 2003 and 2004, with a larger increase among patients of excluded physicians. However, this difference was not significant. Hospitalizations declined slightly for the patients of excluded physicians and for the matched comparison group; neither the within-group differences nor the difference-in-differences were significant for hospitalization.

DISCUSSION

In this study, we observed the effect of narrowing a PPO network on patient selection of primary care physicians in a context with no choice of plan (and thus no mechanism for avoiding the policy change other than seeking coverage from another source such as a spouse's health plan). Similar to the introduction of a tiered network, the Culinary Health Fund's action created an effective price change to patients for continuing to see a newly excluded physician relative to the rest of the network. Our analysis found that this price change substantially altered care-seeking behavior of patients.

The response of patients previously seen by excluded physicians in the face of the selective price increase varied among subgroups of the Culinary Health Fund's membership. Older patients were more likely to respond to the network change by discontinuing use of an excluded physician. Counterintuitively, patients with lower hourly wages were significantly less likely to eliminate use of a physician in response to the network change.

Consistent with the literature on price sensitivity of the demand for healthcare,¹⁴ we found significant decreases in office visits and visit intensity among patients who remained loyal to excluded physicians and experienced a 3-fold or more increase in out-of-pocket price. Such decreases might raise concerns about a reduction in access to needed care. However, we found that patients who continued using the excluded physicians at this lower frequency of use did not experience significant increases in emergency department use or hospitalization. Because the risks and benefits of diminished service use might take more time to manifest, long-term effects remain unknown.

Our findings have several implications for policies that channel patients to preferred providers through financial incentives. In a population offered a single plan such as the one we studied, price differentials can be effective in causing patients to change their source of physician care. Such changes

may be beneficial if the physicians excluded (or placed in a lower tier) were high cost, low quality, or both. Moreover, if physicians became aware of the potential loss of patients, they might improve their performance.

The fact that enrollees with lower hourly wages were less likely to discontinue use of excluded physicians was unexpected and may indicate that these patients have lower access because of geographic or linguistic factors. Alternatively, it may corroborate other evidence from the social science literature that lower-income Americans tend to stay loyal to known service and product offerings.¹⁵ Given that lower-income patients are less likely to discontinue use of excluded physicians (although most switch) and instead reduce their utilization, efforts may be needed to ensure that these groups do not underuse beneficial services, as previous investigations have found.¹⁶ Potentially offsetting the risk of underuse is the fact that most network narrowing eliminates physicians who tend to rank unfavorably in terms of overuse and high rates of "supply-sensitive services." Low-income patients may face additional access barriers that could be addressed through outreach and deliberate efforts by payers to connect them with culturally and linguistically appropriate alternative physicians.

Finally, unlike other investigations of the effect of changes in cost sharing,¹⁷ our results suggest that consumers were aware of their benefit change because more than 80% of those affected never returned to their physician in 2004. Benefit design changes that affect a regular source of care such as a primary care physician may be more likely to capture the attention of patients than changes in hospital, specialist, or emergency department cost sharing and therefore generate a more substantial response because of increased awareness.

Our results should be viewed in light of several limitations. There are several unique features of the natural experiment that constrain its generalizability. In particular, the out-of-pocket cost differences implicit in the Culinary Health Fund's network change are much more substantial than those in current tiered models ($\geq \$35$ for a simple office visit and much more for visits that include ancillary tests and procedures). In addition, the population we studied was from lower socioeconomic strata, and the Las Vegas metropolitan area is unlikely to be representative of healthcare markets nationally. Finally, the network change we studied cannot necessarily be generalized to situations in which information is simultaneously provided by payers to patients about the cost and quality ratings of physicians at different price levels because such information was not disseminated explicitly or implicitly (eg, by tiering providers) by the Culinary Health Fund. Another limitation is the reliance on administrative data to ascertain patterns of care seeking and access limitations. Our ability to model differences between the affected groups and other patients is

limited by the lack of clinical data. Perhaps most important, we have only crude proxies (emergency department visits and hospitalizations) for the potential adverse and beneficial effects of the policy. Finally, we cannot discern whether patients understood that they would receive coverage (albeit at a lower level) for out-of-network care, despite the Culinary Health Fund's communication effort; some part of the effect we identify might be a result of the misperception that care delivered by excluded physicians would not be reimbursed at all.

Other recent work has demonstrated somewhat mixed effects of differential hospital copayments on patient flows.¹⁸ To our knowledge, the present study is the first to document price responsiveness in the context of a selective price change that disadvantages a current physician, while maintaining prices of a wide set of other physicians. It does not support conventional wisdom that such price changes would disproportionately penalize older and sicker patients because these groups would remain loyal to their physicians. Our findings suggest that using cost sharing to steer patients toward physicians who are preferred based on payer comparisons of physicians on quality and total cost-of-care measures may be an effective tactic in settings where payers are able to compare physician performance validly. Such differential cost sharing might also be used by payers to steer patients toward patient-centered medical homes. For this application, our finding that older and sicker patients responded to price changes is of particular importance because these are the populations with the most to gain from better-organized care.

Although we find no immediate evidence of adverse access consequences, there are inherently positive and negative sides to the interpretation of our results. If network changes cause patients to alter care-seeking patterns, they may be useful tools in value-based purchasing, but in so doing, they may also pose a threat to continuity of care. Payers must weigh the potential benefits of altering patterns of the demand for care across providers and of encouraging providers to improve their performance as a means of maintaining preferred status in the network against the costs of disrupting physician-patient relationships. Attaining this balance on average and within specific populations (eg, lower-income and sicker patients) should be the goal of ethical and effective use of network design to improve the value of health benefits. Further research to map the dose-response relationship between the price differential among physicians and patients' willingness to switch will enable payers to fine-tune the trade-off between access reduction and gains in quality and affordability.⁵

Acknowledgments

This research would not have been possible without the cooperation and assistance of the Culinary Health Fund Board of Trustees, Betsy Gilbertson, Leigh Kost, and Tom Mayer.

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Funding Source: The Commonwealth Fund (grant 20050521) provided financial support for the study.

Author Disclosure: Dr Milstein is an employee of Mercer Human Resource Consulting, the organization that provides human resources consulting services to the benefits fund that supplied the data for this analysis. The other authors (MBR, ZL) report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (MBR, AM); acquisition of data (MBR, ZL, AM); analysis and interpretation of data (MBR, ZL, AM); drafting of the manuscript (MBR, AM); critical revision of the manuscript for important intellectual content (MBR, ZL); statistical analysis (MBR, ZL); obtaining funding (MBR, AM); and supervision (MBR).

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