Final report for projects funded by the Leibniz Association's Competition Procedures

Project title:
Health care challenges in regions with declining and ageing populations

Project number:
W26/2019-RWI-LWC2

Executive Summary

The Leibniz ScienceCampus Ruhr (LSCR) "Health care challenges in regions with declining and ageing populations" centered at the RWI – Leibniz Institute for Economic Research and the University of Duisburg-Essen has fostered Essen as a recognized center for health economics research in Germany. It is the first research collaboration analyzing the challenges the German health care and long-term care systems face due to the geo-demographic change, i.e. regional variability due to a decline of younger and growth of older age-groups. Together with its research partners – Tilburg University, the University of Paderborn, the Vienna University of Economics and Business and the Otto von Guericke University Magdeburg – the LSCR focused on three main research areas: regional variation in health care and health, sustainable supply of health care, and nursing care for an ageing population. Within these three areas, the LSCR has defined eleven distinct research questions that have been addressed in sub-projects, in which researchers analyzed the causes and consequences of regional differences in health care, derived policy implications to address the impending underprovision of health care and evaluated selected measures in place to improve the efficiency of health care provision. Besides combining the health economic expertise of its research partners, the LSCR collaborated with industry partners such as the statutory health insurance provider Techniker Krankenkasse and BARMER to guarantee policy relevant research and to facilitate the dissemination of academic findings. Moreover, regular meetings with an international scientific advisory board provided relevant input throughout the phases of the projects.

Although the researchers within the eleven research teams worked highly independent and with diverse methods to address a wide range of topics such as the benefits of cancer-screening programs, innovative living and care arrangements for persons with dementia, or loneliness among ageing populations, they also had many things in common. For one, the LSCR network allowed for a variety of synergies, possibilities for collaborations, and opportunities for dissemination through regular meetings of the LSCR researchers, administrative as well as financial support with publication in open access journals, and rigorous standards to safeguard a high research quality. As a result, the research cooperation already published several papers in high-ranking peer-reviewed journals. In addition, LSCR researchers have disseminated their results to the broader public, for example through newspaper articles or participation in workshops and discussion rounds. During the past four years, the LSCR has also organized several scientific events, including academic workshops as well as career-supporting measures for early-career researchers. Throughout all activities, attention has been paid to ensuring equal opportunities for staff working on the sub-projects regarding gender and internationalization.

Despite being highly relevant now and in the future, there has been no comprehensive research program that studied the health and long-term care challenges associated with geo-demographic change in Germany until the establishment of the LSCR in 2016. During the second funding phase from 2020 to 2024, we were able to build on this successful research collaboration. We further expanded the national and international research network, introduced new research projects, and provided much needed policy advice for addressing future challenges in health care.

1. Achievement of objectives and milestones

Given the diversity of the research projects of the LSCR, we report the implementation of the most important objectives and milestones as well as relevant deviations separately for each of the individual projects. Some deviations from the original research plan had to be made due to COVID-19 as well as staff turnover, which are explained in section 2.

Research Area A: Regional Variation in health care and health

Project A1: Effects of regional economic decline on population health.

The analysis of the adapted research question was successfully completed and a working paper was published. A manuscript is currently in the review process at the Journal of Population Economics.

Project A2: Cancer screening, diagnosis and mortality in Europe.

This project has replaced the original project 'Regional differences in prescription behavior: Inducing physicians or demanding patients?'. It aims to analyze the effects of organized breast cancer screening programs on screening rates, incidence, and mortality across Europe. The project has been completed and results were published in the Journal of Health Economics.

Project A3: Who benefits from technological progress?

The project is completed. It has been presented at several conferences and a scientific paper has been finalized, which is currently in the process of being submitted to the Journal of Health Economics.

Research Area B: Sustainable supply of health care

Project B1: Innovative living and care arrangements for people with dementia

All originally planned milestones were realized. Four manuscripts were published in which concepts of innovative living and care arrangements are analyzed and preferences are elicited.

Project B2: The role of online-medical service provision in the effectiveness of care

For all three subprojects, literature reviews have been finished and series of controlled laboratory experiments have been conducted.

Project B3: Fragmentation of health care and health care utilization

The project is divided into two sub-projects, with (i) measuring care fragmentation in the prescription drug market, focusing on off-label and contraindicated drug use at the population level, and (ii) exploring care fragmentation in mental health care with a focus on the break between secondary and primary care. Data access was delayed bus has been completed. A second grant proposal is to be submitted.

Additionally, within research area B, a fourth project (B4) dealing with *closures of general practitioners' practices* has been conducted.

Research Area C: Nursing care for an ageing population

Project C1: Loneliness among ageing European populations

The project aims have been achieved. A paper has been published in PLOS One and another manuscript got accepted at Scientific Reports.

Project C2: Staffing regulation and quality of care in nursing homes

Due to staff turnover regarding two of the three research team members, the resources of this project have been used to establish a research cooperation with Prof. Annika Herr (University of Hannover) to work on this research question.

Project C3: Opportunities, norms and informal care provision

A hand-collected data set on all nursing homes between 1950 and 2020 in NRW and Bavaria has been set up, which has not existed before. Unfortunately, analyses exploiting this data did not yield results and the project was replaced by project B4.

2. Activities and obstacles

The LSCR brought together a large number of both junior and senior researchers. Whilst the LSCR encompasses many different projects, the results as a whole have expanded our knowledge on how to address current and future health care challenges, in particular in regions with declining and ageing populations. Due to its organizational structure, normal staff turnover occurred due to junior researchers completing their dissertation/bachelor's or master's thesis

or senior researchers taking on a new professorship. These changes represented successes for the LSCR but sometimes also led to challenges within the individual projects. Besides, data availability was sometimes a problem.
For example, in project **A1**, it was not possible to carry out the planned project because the data was not available. The research question was therefore adapted and administrative data from the Netherlands was used. Similarly, part (i) of project **B3** shifted focus to the US, analyzing prescription drug use and its impact on health care use and costs. Initial plans to study German ambulatory care fragmentation were abandoned due to denied access to sickness fund data, as data centers deemed the effort too high or did not allow for work in data centers by the project team. For part (ii) of project **B3**, data access was delayed due to legal checks. A challenge was finding machine-readable marketing authorization data for the US. Concerns about using French data (Thériaque) in the first rounds of review led to additional work with US data from DrugCentral.org.
Between 2020 and 2024, the LSCR also faced challenges due to COVID-19. For project **B2**, it was not possible to conduct the planned experiments under controlled laboratory conditions for a long time. There were two main reasons for this - firstly, a different selection of subjects in the laboratory was to be expected, and secondly, a change in behaviour could not be ruled out due to the altered laboratory conditions. After the pandemic we faced the problem that students were very reluctant to return to universities in attendance. This also had a significant impact on the subject pool for experiments, which could not be sufficiently replenished at many universities and also in Magdeburg. We therefore conducted the main part of our laboratory experiments at the WISO Experimental Lab, University of Hamburg.
Since project **C2** could not be continued due to staff turnover, the established research cooperation led to a joint project funded by the German Research Foundation, which addresses the topic of staff shortage and nursing home quality within the larger context of “ensuring quality and supply in professional long-term”. For project **C3**, the estimation results showed no significant effects of this expansion on the provision of informal care. Thus, we did not further analyze the effects of this expansion on health and labor force participation. Instead, we introduced project **B4**, which studies closures of general practitioners’ practices on health care provision.
Positive deviations occurred at **A3**, as in this project not only heterogeneities could be described, but also an economic framework was built that aims to assess allocative efficiencies in the health care sector. This brought along a new estimation method that needed to be implemented and that advances current research in this area.
Concluding, the LSCR was able to overcome hurdles and obstacles, win new staff and get access to alternative data sources from other data providers to deepen our understanding of geo-demographic change.

3. Results and successes

The successes of the LSCR include scientific publications, the completion of theses by junior LSCR researchers, the acquisition of third-party funding as well as the dissemination of research results to an academic and non-academic audience.
During the four years of the second funding phase, a substantial number of publications have been published as part of the LSCR. 13 publications emerged directly from campus projects, eight of which were published in high-ranking peer-reviewed journals, while the remaining publications were published in working paper series that serve to disseminate research results to the international scientific community. Peer-reviewed publications are expected to follow from the working papers in the near future.
In addition, three doctoral theses, one master's thesis and one bachelor's thesis were completed on topics of the campus and extensive third-party funds have been raised over the course of the second funding period. Funding agencies comprise the German Research Foundation, the US National Institute of Health, the Deutscher Akademischer Austauschdienst, the Information Technology and Innovation Foundation, the support association of the

University of Duisburg-Essen, and the Connex WiWi-Netzwerk Förderung. In total, the third-party funds amount to a total funding volume of more than € 4.7 million.
Lastly, transfer activities by LSCR researchers included, e.g. a talk to the German Actuarial Society, the participation as panelist in a webinar series organized by the German-American Trade Chamber Midwest on the Future of Transatlantic Collaboration in Biopharma and MedTech, an exchange with long-term care experts on how to address future challenges of long-term care provision ("PKV trifft Wissenschaft", March 2024, Berlin), and the presentation of project results at the forum of the Deutsche Gesellschaft für Demographie in November 2023 in Cologne.

4. Equal opportunities, career development and internationalisation

Since 2011 RWI – Leibniz Institute for Economic Research (RWI) holds the certificate "audit berufundfamilie", reflecting its strong commitment to implement family-friendly measures in the workplace. Further, the equal opportunity commissioner at RWI supports all respective measures and, e.g., participates in job interviews. Diversity was actively promoted at all levels of the LSCR in line with the career guideline of the Leibniz Association.
The University of Duisburg-Essen (UDE) was the first university in Germany to establish a pro-rectorate (Pro-Rektorat) for diversity management. The rectorate aims to enhance opportunities for families, women, disabled persons, migrants, people from low-income households etc. (see https://www.uni-due.de/diversity/). Similar diversity initiatives are in place at Tilburg University, Paderborn University and Otto-von-Guericke-University Magdeburg.
When recruiting personnel at the participating institutions, attention is paid to ensure equal opportunities concerning gender and internationalization. Eight of the researchers involved in the LSCR are group leaders (20%), 16 are senior scientists (38%), and 14 are PhD-students (38%). Eighteen employees are female (45%), while 22 are male (55%). Finally, 35 employees are German (88%), and one employee each is French, Greek, Ghanian, American/German, Italian, and Indian.

5. Structures and collaboration

The LSCR has been established mainly on a regional basis, integrating the Leibniz-Institute RWI and the UDE in Essen. The work dimensions, responsibilities and options are organized and completed by different bodies of the LSCR, which proved to provide efficient and lean management structures. The decentral organization of the single projects has proved to be a significant advantage during the pandemic as it allowed a relatively uninterrupted work within the different research projects. Nevertheless, limitations due to the pandemic occurred when access to data centers or the possibility to conduct experiments was discontinued. The respective PIs then turned to alternative data sources or restructured the project timeline.
While the single research projects were conducted largely independently, the LSCR included many elements for exchange of ideas between research groups and collaboration. For this reason, the board of directors, managing directors, steering group (project leaders incl. partners), and scientific advisory board regularly met (virtually during the pandemic but otherwise in person in Essen) to provide different platforms for an inter-team exchange. Moreover, the PhD students also organized social gatherings like lunches and team events.

6. Quality assurance

An extensive quality assurance strategy has ensured the quality standards of the LSCR. Besides the senior lead researchers who assume the responsibility for quality assurance of the scientific work within their LSCR projects, the LSCR reports to an international scientific advisory board. Its members include Prof. Hendrik Jürges (expert in health economics and economics of aging, University of Wuppertal), Prof. Les Mayhew (expert in geography and public health from Bayes Business School, London), Prof. Tor Iversen (expert in health

economics, University of Oslo), Prof. Thomas Mayrhofer (expert in medical decision making, Hochschule Stralsund), and Prof. Susanne Moebus (expert of epidemiology from the University Hospital in Essen). The LSCR members reported regularly to the scientific advisory board, and received advice for the future direction of their research.
Further, the work at the LSCR is embedded in the infrastructure of the RWI, which itself is annually evaluated by an additional international scientific advisory board. Both RWI and the University of Duisburg-Essen publish open-access and free-of-charge working paper series to publish research results early. At the same time, submissions to peer-reviewed journals are standard layouts for final articles. LSCR researchers are aware and make use of project DEAL. There has not been conducted animal testing.

7. Additional resources

All partnering institutions contributed substantial additional resources to guarantee the success of the LSCR.
The main applicant, RWI, contributed a post-doc position (100%) as well as several doctoral positions (150%). Besides, the institute contributed administrative resources (LSCR secretary 50%, graphic designer (50%), IT technician (25%)) as well as resources for the operation of the LSCR website. In addition, the main university partner, the University of Duisburg-Essen, contributed two junior-professorships (including equipment) and several doctoral positions (250%). Moreover, the PhD students at RWI and UDE could take part in the doctoral program of the Ruhr Graduate School, which provides rigorous economic training but also connections between the RWI, UDE, and other universities within the Ruhr area.
In addition, the further university partners (Tilburg University, the University of Paderborn, the Vienna University of Economics and Business and the Otto von Guericke University Magdeburg) contributed by substantial research time allocation, equipment, and in the case of the University of Paderborn additional research time by a doctoral student.
Besides, significant resources were invested by the additional partners: as an industry partner, the health insurance companies BARMER and TK provided assistance with questions regarding data access as well as on practical and regulatory details of the health care system Commitments for co-funding of partners who have dropped out of the LSCR network due to staff turnover (Joint Research Committee, Mathematica) were upheld by the joining institutions (Otto von Guericke University Magdeburg) or compensated by the remaining partners. Overall, the additional resources provided totaled over 3 million Euros.

8. Outlook

The LSCR helped to strengthen the cooperation between the RWI, UDE, and other partnering universities, both on an institutional level as well as among the LSCR researchers. Currently, several joint proposals for third-party as well as joint research projects are underway. These projects will build research results established within the LSCR and continue to broaden our understanding on economic consequences of ageing populations and to inform policymakers how to address the challenges in this field.
In addition, the increased visibility of Essen as a center for health economics research will be used to attract international visiting researchers and to form new research collaborations.