Valuing Longer, Healthier Lives: Assessing the Productivity of Health Spending in South Korea

KAREN EGGLESTON

SUMMARY

This research studies the link between medical spending and health outcomes in South Korea, providing evidence on the productivity of medical spending over recent decades. I advocate for the Korean government to develop a “satellite account for health” to complement national income and product accounts. Current measures do not account for changing quality nor give providers any incentive for cost-effective substitution between forms of treatment for a given condition. By leveraging existing strengths of Korea’s National Health Insurance and health outcome data, Korea can develop an accurate measure of medical productivity and a more accurate measure of overall economic productivity, while becoming a global pioneer of “health satellite accounts” for overall populations. Such a productivity metric built on condition-specific net value can help Korea increase the “bang for the buck” from medical spending, mitigate wasteful spending, and promote high-value innovations for longer, healthier lives.

Analysis from the East-West Center

No. 158
March 2023

About the Author

Karen Eggleston, who was a POSCO Fellow at the East-West Center October—December 2022, is a Senior Fellow at Stanford University, where she is Director of the Asia Health Policy Program, Shorenstein Asia-Pacific Research Center, Freeman Spogli Institute for International Studies. Eggleston earned her PhD in public policy from Harvard University and MA degrees in economics and Korean studies from the University of Hawai’i at Mānoa. She thanks her previous co-authors Victor Fuchs, Daejung Kim, Chulhee Lee, Sungchul Park; EWC colleagues Andy Mason and Sang-Hyop Lee; and researcher Tina Li.

She can be reached at: karene@stanford.edu.

Papers in the AsiaPacific Issues series feature topics of broad interest and significant impact relevant to current and emerging policy debates. The views expressed are those of the author and not necessarily those of the Center.
Increases in life expectancy and medical spending in the Republic of Korea or South Korea (hereafter Korea) have outpaced those of most other countries over recent decades. But little is known about the link between these two: has increased medical spending contributed significantly to Koreans’ longer, healthier lives?

This Asia-Pacific Issues brief provides an overview of collaborative research developing a “satellite account for health” for Korea to understand the value of medical spending by condition and to monitor the productivity of the health sector. Such research can help to answer the question of how medical spending should be allocated across specific conditions to increase Koreans’ “healthy lifespan” most cost-effectively. Since medical care not only adds years to life but can also add life to years through better quality of life and increased lifetime earnings, I show how including the value of these outcomes further increases the overall productivity of Korean medical spending while highlighting areas of concern, such as mental health. Condition-specific metrics of health and earnings gain per won spent on treatment can help to guide allocation of investments to promote longer, healthier lives and help policymakers pinpoint the best investments for raising healthcare productivity.

The Difficulty of Measuring the Productivity of Medical Spending

Some economic sectors are notorious for lagging in productivity improvement. Medical care is often considered one of the “cost disease sectors” plagued by Baumol’s cost disease: salaries rise without a corresponding increase in productivity.¹

Yet current measures of low or negative productivity of the health sector are misleading. For example, most statistical agencies measure the productivity of the health sector by output of hospital days, doctor visits, medications produced, and other medical services, when these are merely the means to the end of better health outcomes.

Despite long recognition of this problem, analysts have difficulty in quantifying changes in health outcomes and analyzing to what extent those are attributable to medical care instead of other factors. Moreover, a second, related problem arises from national income and product accounts tracking “industries” within the health sector by the location of care rather than medical condition. As Cutler et al. emphasize, this measure omits productivity improvements that involve substitution, such as new drugs reducing hospitalizations.² This mismeasurement potentially leads to significant underestimation of productivity gains.

Rather than simply measuring medical spending, we need to measure the productivity of medical care with the output society values: improvement in survival and quality of life.

The earliest studies that estimated medical productivity with health outcomes focused on acute conditions, where the value of a well-defined episode can be measured by the unambiguous outcome of patient mortality.³ Empirical work in this tradition attempts to quantify which medical conditions have seen the greatest “bang for the buck,” and in which conditions spending outstripped gains in health improvement. Several studies have found positive net value for conditions such as heart disease and diabetes.⁴

Only recently have researchers applied this condition-specific approach to overall health systems, accounting for changes in demography, condition incidence and prevalence, and control of risk factors.⁵ For example, Cutler et al. develop estimates of condition-specific net value to create a “satellite account for health” for the US. Their estimates are complementary to the US national income and product accounts that include aggregate health spending with no estimates of quality. The account based on condition-specific, quality-adjusted net value is called a “satellite” because it “orbits around” the national income and product accounts to provide a clearer picture of productivity in the health sector.⁶

To date only the United States has been studied in this way. Moreover, Americans aged 65 and older were the only population for which Cutler et al. (2022) had sufficient data to study condition-specific and overall productivity. Yet such “satellite accounts for health” would be of great value to many economies, perhaps especially Asia’s OECD countries (Korea and Japan) confronting rapid population aging and slow economic and productivity growth, with systems of universal health coverage and health outcome data that can support population-wide assessments.
**Korea Can Be a Pioneer**

By linking National Health Insurance (NHI) and health outcome data, Korea could develop an accurate measure of medical productivity and a more accurate measure of overall economic productivity, while pioneering development of "health satellite accounts" for overall populations.

**Korea’s health system at a crossroads**

With steep, prolonged fertility decline to below-replacement levels, Korea is among the most rapidly aging societies globally, implying myriad economic challenges. Korea is among global leaders in another metric of the “longevity transition” emphasized in Fuchs and Eggleston (2012): the share of gains in life expectancy at birth realized after age 65. This share grew rapidly to reach 82 percent in Korea during 2003–2018, higher than the average of 16 other high-income countries.

Convergence is also evident in health spending. Korea’s healthcare expenditures have grown substantially faster than the economy for several decades. Higher spending would be expected as the services covered by NHI expanded and living standards rose. Yet for healthcare expenditure to increase by 1.5 percentage points of GDP every five years would be unsustainable.

This convergence of Korea’s healthcare expenditures with the average of its OECD peers brings Korea’s health system and economy to an important crossroads. Will Korea stabilize health spending as a share of the economy? If not, Koreans will face an ever-increasing opportunity cost of health spending, leading to a smaller share of the “economic pie” to devote to other vital arenas.

**Improve value—don’t just control cost**

Improvements in medical treatment contribute to rising health spending. Substantial expenditure increases can be justified if they significantly reduce mortality and morbidity, such as decreasing the likelihood a stroke will be fatal or increasing the quality of life for the mentally ill. Yet evidence remains thin on whether spending increases are “worth it” in the sense of producing better health outcomes of commensurate value (Eggleston et al. 2020). Constraining spending growth without stifling health improvement requires differentiating wasteful or low-value spending from the high-value spending contributing to longer, healthier lives.

In Korea’s case, health outcomes have also converged with and overtaken those of other high-income countries (Figure 1). Large increases in life expectancy stem from several factors, including...
better nutrition and living standards, less smoking, and improvements in other social determinants of health. More advanced, accessible, and affordable medical care no doubt also played a role. If medical spending accounts for a nontrivial fraction of Korea’s large health gains, then medical spending would be highly productive, implying a decline in the quality-adjusted price of medical care.

Korea cannot accurately measure economy-wide productivity if a sector accounting for almost one-tenth of the economy lacks a true measure of productivity. For example, a recent IMF study shows low or negative productivity in Korea’s “non-market sectors.” But this could be because of mismeasurement. By creating a national satellite account for health, Korea could remedy this problem plaguing productivity statistics as well as contribute to evidenced-based health policy.

Now is an opportune time for Korea to consider innovating for healthy aging in this way. Korea has already implemented a system for health technology assessment, one of the first in Asia, to evaluate the clinical and economic value of new medications, procedures, and medical devices. A recent OECD report on health system metrics also singles out Korea for praise: “Although monitoring and reporting of hospital-level performance is becoming increasingly important in the Asia-Pacific, only the Republic of Korea is regularly reporting hospital-level performance.” Korea’s relative success in navigating the Covid-19 pandemic underscores the importance of evidence-based health policy.

Population-level Medical Spending Productivity

To develop an estimate of the net value of Korean medical spending, I compare the gains in life expectancy at birth to the increases in medical spending for 2000–2019. Data comes from Korean lifetables and medical expenditures per capita available from the Korean Statistical Information Services (KOSIS).

Following standard estimates of the value of a statistical life, other researchers in this field (e.g., Cutler et al. 2022), and the multiple of per capita GDP used by the World Health Organization, I assume $100,000 for the value of a life-year (in 2019 purchasing power parity US$), comparing this to estimates when using alternative values of a life-year of $50,000 or $150,000. I explore sensitivity to crediting medical care with different shares of the health gains, starting with the Cutler et al. (2022) baseline assumption of 50 percent. I also explore how estimates change when attributing only 10 percent of survival gains to medical care. This conservative assumption may be justified for baseline net value, given that Korea has experienced substantial cohort changes in living standards, educational attainment, and recovery from the devastation of the Korean War.

Estimates of the net value of Korea’s medical spending

As shown in Figure 2, even with the most conservative assumptions ($50,000 per life-year and only 10 percent of health gains due to medical care), the net value of Korean medical spending is positive and substantial. Korean life expectancy at birth increased from 76 in 2000 to 83.3 in 2019. Inflation-adjusted per capita health spending increased from $888 to $3,521, a three-fold increase; this implies that lifetime medical spending increased by over $19,000. The value of 7.3 additional years of life far outweighs even this rapid increase in spending: $345,000 at $100,000 per life-year and 50 percent due to medical care, and still over $53,000 if medical care is responsible for only 10 percent of additional life-years. Figure 2 shows estimates varying the share attributable to non-medical factors for different values of a life-year.

To compare to the Cutler et al. (2022) estimate for the US, I also estimate net value for Korea’s population aged 65 and older. Data on medical spending by age from NHI statistical yearbooks shows that this age group absorbed an increasing share of spending (from slightly over 20 percent to 41.6 percent by 2019). Inflation-adjusted per capita spending increased more than six-fold (from $203 in 2000 to $1,464 in 2019). But since life expectancy at age 65 increased substantially from 16.4 to 21.3 years, the value net of spending is still significantly positive (e.g., $42,509 even if only 10 percent of the years gained were due to medical care).

Productivity growth in Korea’s health sector

These net value estimates imply substantial productivity growth in Korea’s health sector. For example, assuming $100,000 per life-year and 50 percent of health gains due to medical care leads to a 45.9 percent aggregate productivity improvement 2000–
2019, or 2.3 percent annual productivity growth. Depending on assumptions about baseline medical productivity (for which there is little evidence for Korea), I find annual productivity growth varying from about 1 percent to over 7 percent for the Korean overall population.

To compare to the US, we must focus on those aged 65 and older, for which Cutler et al. (2022) estimate 1.5 percent annual productivity growth during 1999–2012. Productivity was higher for Koreans over age 65, according to my rough estimates (varying from 1.6 percent to 8.2 percent productivity growth over the 2000–2010 period).12

**Accounting for improved quality of life**

Medical care also can improve quality of life and increase lifetime earnings. Including the value of these would increase the estimated productivity of Korean medical spending, already positive based solely on reducing mortality.

A source of data on changes in morbidity that allows global comparisons is the Global Burden of Disease, Injury, and Risk Factor (GBD) data.13 According to GBD estimates, Health-Adjusted Life Expectancy (HALE) in Korea increased 0.14 years annually between 1990 and 2019, a large cumulative improvement. For comparison, Cutler and co-authors estimate that medical care contributed 1.7 years to quality-adjusted life expectancy for elderly Americans, corresponding to an annual increase of 0.12 years for 1999–2012.

These aggregate estimates suggest that when net value by medical condition can be measured, it will reveal substantial productivity gains for conditions that account for a large share of Koreans’ burden of disease.

**Toward a “Satellite Account for Health” for Korea**

Evidence on condition-specific spending changes and health improvements suggest that Korea’s rapid spending increases may be yielding significant net value. Condition-specific metrics of health gain per won spent on treatment can help to guide allocation of investments to promote longer, healthier lives.

**Heterogeneity in health gains**

Improvements in survival for key conditions afflicting Koreans, such as stroke and cancer, point to
productivity gains. Korea’s age-standardized rate of cardiovascular disease per 100,000 declined from 175 in 2000 to 74 in 2016, comparing favorably with the OECD average, which declined from 221 to 128 over the same period. Korea’s cancer mortality rate, virtually identical to the OECD average in 2000, declined to 15 percent lower than the OECD average by 2016 (OECD 2021). Korea’s age-standardized five-year survival rates for breast cancer (87 percent), colon cancer (72 percent), and lung cancer (25 percent in 2010–14), were higher and grew faster over the most recent decade for which data is available.

Disability and premature mortality are measured in GBD data with disability-adjusted life years (DALYs). One DALY represents the loss of the equivalent of one year of full health. A decline in DALYs means an increase in years of full health, either because of longer lives, or a lower rate of disability, or both. According to the GBD, Koreans aged 50-69 experienced a 23 percent decline in DALYs per 100,000 for cardiovascular disease (which includes stroke and heart disease) and a 20 percent decline for cancer during 2010–2019. However, for the same population and period, there was little change in DALYs for mental disorders, an issue of concern; for example, Korea’s suicide rate among older adults is several times the OECD average, and one of the few in Asia that has not improved over the last few decades. This critical challenge of mental health and suicide highlights the importance of understanding condition-specific outcomes and spending, so that resources can be prioritized effectively on medical care and the broader social determinants of health.

Measuring spending effectiveness for major conditions afflicting Koreans
In joint research with Sungchul Park, I apply a complementary approach that utilizes the GBD to measure health outcomes, following the US analysis of Weaver et al.14 We estimate healthcare spending effectiveness ratios for Korea to quantify spending per unit of health gained overall and for four major categories of disease, drawing on data from the NHI Database (NHID).

NHI is the single insurer in South Korea, covering the entire population of over 51 million. We analyze age- and sex-specific medical spending overall and for four major categories of disease (heart disease, stroke, cancer, and mental disorders) from 2010 to 2019.

Much of Korea’s condition-specific increases in health burden as measured by DALYs over that decade stem from increases in population and especially changes in the age-sex structure of the population, i.e., population aging. For many medical conditions, cases per person have declined.

For assessing the contribution of medical spending, DALYs per case is most relevant. We find that DALYs per case decreased 14 percent for all causes, 25 percent for cardiovascular disease, and 22 percent for cancer, whereas for mental disorders DALYs per case slightly increased. Health spending per case increased for all the conditions, almost doubling in real terms over just a decade, with variation by age group and condition.

Consistent with our decomposition analysis showing large reductions in DALYs per case for cardiovascular disease and cancer, we find the best spending effectiveness for those conditions. By contrast, mental health showed relatively poor spending effectiveness, reinforcing the need to study why Korea’s healthcare system has lagged behind others in addressing the key issue of mental health. These findings suggest that the growth in Korean health spending led to commensurate health improvements, with variation in the magnitude of spending effectiveness by medical condition.

Further research extending the analysis to all medical conditions and exploring spending effectiveness by age group would be valuable. Regular analysis of condition-specific productivity could help pinpoint which areas of the health sector are performing well and which ones are lagging, such as mental health.

The Labor Productivity Impact of Medical Productivity
Korea can pioneer in another respect as well: accounting for increased lifetime earnings from better health as a second important outcome of medical care. Since Koreans aged 65 and older absorbed between one-third and 45 percent of national medical spending over 2000–2019, the majority of medical spending has benefited working-age Koreans. Accordingly, more robust lifetime earnings may comprise a nontrivial component of the social value of medical spending, even if the primary benefit is longevity.
Expected labor force participation (XLFP) is the number of years an individual would be in the labor force if adhering to average age- and sex-specific rates of survival and labor force participation in each year. Estimating XLFP for Korea, I find that almost three-quarters (72 percent) of the overall increase of 8 years between 1970 and 2020 was due to improved survival. For Korean men, improved survival accounts for more than 100 percent of the actual increase in XLFP; increased schooling significantly reduced young-male LFP; and better survival to older ages more than offset the decrease in age-specific LFP. For men, the only increase in LFP comes among older adults (55 and older), and especially among those aged 65 and older; these added years in the labor force may arise in part because of better health (i.e., lower morbidity).

Although health gains have raised Koreans’ years in the workforce, life expectancy at birth has outpaced these gains. The resulting fall in the share of life expectancy in the workforce may strain the economy as the population ages, further underscoring the need to measure and improve the contribution to lifetime earnings from medical care and better health.

To probe this lifetime earnings effect further, Korea can leverage the National Transfer Account (NTA) data on labor income by age. NTA is a project that seeks to measure how demographic change influences economic and social outcomes in over 60 countries. NTA estimates are consistent with national income and product accounts, and the NTA labor income profiles by age can account for the impact of improved health-related quality of life on working, including different hours of work by age. NTA metrics for Korea are already estimated regularly and reported by Statistics Korea.

Using the 2010 NTA labor income profile as the central estimate of age-specific earnings over the 2000–2019 period, I examine the contribution to earnings from reduced mortality. In 2019 Koreans were 1.5, 3.0, 6.1 and 13.1 percentage points more likely to survive to ages 40, 50, 60, and 70, respectively, than in 2000. These survival increases raised lifetime earnings by the equivalent of 91 percent of the average earnings of a prime-age worker (age 30-45 in 2010). If medical spending accounts for a nontrivial fraction of survival gains, then earnings add substantially to the net value of medical spending.

Even for those in traditional retirement years, earnings may be important to study, given the fiscal challenges of supporting growing cohorts of older adults. For example, the increase in earnings of Americans aged 65 to 75 due to survival gains would increase the Cutler et al. estimate of net value by thousands of dollars, according to my analysis of age-specific labor income data from the US NTA.

For Korea, focusing on the productivity of older adult employment is important, given the high LFP yet relatively low income of older Koreans. Park and Lee provide a valuable estimate of “health capacity to work” that underscores this point. Analyzing 2006–2016 data from the Korean Longitudinal Study of Aging, Park and Lee find that labor productivity is low and that many older Koreans are already working as much as their health allows: “the unused health capacity to work is concentrated only on wealthy older people.” Accordingly, increases in later life earnings will come about primarily from better health, and increasing the earnings of those who work, rather than from raising LFP.

In the future, condition-specific improvements in survival and morbidity could be linked to earnings, although it will be a challenge to compile accurate data on at-work productivity.

Invest in Productivity Measurement for the Health Sector

As Han and Noland note, “in an era of slowing economic growth, Asian countries face an imperative to boost productivity.” To do so requires an accurate measure of productivity, including of the health sector. Korea could be a pioneer in developing a national health account that accurately measures net value by medical condition. Drawing on data from NHI and other administrative data, we can measure outcomes not only with mortality and morbidity as in US studies, but also with greater lifetime earnings enabled by health-improving medical care.

Preliminary estimates suggest that such analyses will reveal overall productivity improvement in Korea’s health sector, with variation across conditions. Korea’s statistical agencies should consider developing a “satellite account for health.” Such an account can provide valuable evidence for prioritizing investments to address Korea’s most pressing health challenges so that productivity improvement will contribute to longer, healthier lives.
Notes


6 For a short introduction to the satellite account for health for the US, see https://youtu.be/ntdDE881r1s.


11 This includes NHI payment and patient out-of-pocket payments for NHI-covered services and can be scaled up to account for non-covered services.

12 Higher productivity estimates flow from assuming higher values of a life-year and lower baseline share due to medical care (e.g., the 8.2 percent estimate assumes medical care accounts for 10 percent at baseline).

13 The GBD data is publicly available; see https://www.healthdata.org/gbd/2019.


18 Han, Soyoung, and Marcus Noland (2020). Women, leadership, and Asian economic performance. *Asia Pacific Issues* No. 142.

About this Publication

The AsiaPacific Issues series reports on topics of regional concern.

Series Editor: Denny Roy

The contents of this paper may be downloaded and reproduced from the Center’s website. For information about the series, please see the Center’s website or contact:

East-West Center
1601 East-West Road
Honolulu, Hawai`i 96848-1601

Email: Publications@EastWestCenter.org

http://eastwestcenter.org/publications/series/asia-pacific-issues

ISSN: 1522-0966

© 2023 East-West Center

Recent AsiaPacific Issues


No. 156 “Asia’s Push For Monetary Alternatives” by Marcus Noland. December 2022.


About the East-West Center

The East-West Center promotes better relations and understanding among the people and nations of the United States, Asia, and the Pacific through cooperative study, research, and dialogue. Established by the US Congress in 1960, the Center serves as a resource for information and analysis on critical issues of common concern, bringing people together to exchange views, build expertise, and develop policy options. The Center is an independent, public, nonprofit organization with funding from the US government, and additional support provided by private agencies, individuals, foundations, corporations, and governments in the region.

EastWestCenter.org