EE108

Novel approaches assessing the value of cancer prevention in Germany

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Background

- In times of escalating healthcare costs, the financial viability of healthcare systems is contentiously at risk.
- Cervical cancer is the second most common female cancer globally, inducing a considerable amount of costs and a tremendous health burden to the patients.[1]
- In the past decades, discussions around investment in preventive interventions focused narrowly on immediate costs, while broader economic and societal impacts where most commonly overlooked.
- The global pandemic underscored the crucial role of health investments in national well-being, economic stability, and growth.[2-10]
- Scientific evidence highlights the interconnectedness of health and economic growth.
- Yet, governmental budget allocation for the health sector still often neglects these dynamics.
- New measures complementing traditional health economic evaluations are needed.

Objective

- We introduce a novel metric assessing economic returns on health investments: the **Health ROI Assessor Framework.** [11]
- For the present study we apply the framework to the example of **investing in a cervical cancer screening prevention program** (Papanicolaou (Pap) testing) in **Germany**.
- Our aim is to illustrate how this intervention generates value within and beyond the health sector, fostering health-related productivity gains to society.

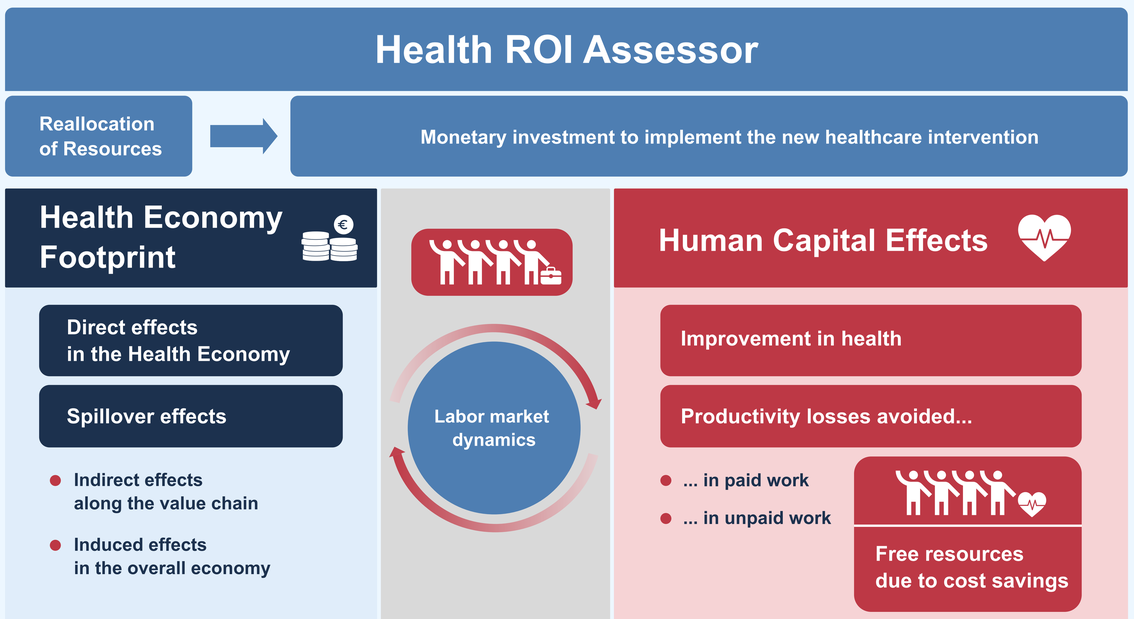


Figure 1. Health ROI Assesor framework[11]

Methodology

The framework builds on two pillars:

1. The Health Economy (HE) Footprint estimates direct effects within the HE (gross value added (GVA), and job creation) and spillovers to other economic sectors (indirect/induced effects).

Building on the concept of value chains, we measure the economic impact of a health investment.

- The aim is to measure the effects of investment into the prevention of cervical cancer on the Health Economy and on the overall economy via spillover effects.
- Time-series estimation to determine the initial effect of the investment injected into the Health Economy. The applied methodology is a Vector-Autoregressive estimator on annual time series of preventive investments and of GVA in the Health Economy. This yields causally interpretable effects of cancer investment on additional GVA and employment in the Health Economy.
- The initial capital injection causes further economic activity along the value chain of health via the procurement of intermediate goods and services in the overall domestic economy.[12] These effects are captured using the methodology of input-output-matrices, where Leontief-type multipliers take into account indirect and induced GVA and employment effects.[13,14]

2. The Human Capital Effect (productivity losses avoided) by **reducing fatal cases** due to Pap testing over the life horizon of a selected cohort

Health effects: extracted from previous research modelling the impact of Pap testing using a Markov cohort simulation[15]

- We consider a patient cohort of 100,000 women entering the model at age of 15 years (around 0.12% of the population and 0.24% of the females in Germany), undergoing cervical cancer screening starting at age 20 years according to the German national cancer screening program.
- Include only homogeneous women with complete adherence to screening and follow-up.
- Comparing no screening at all with different Pap screening scenarios: i) annual, ii) bi-annual, iii) every 3 years, and iii) every 5-years.
- Monetization according to sector-specific average GVA per working hour.

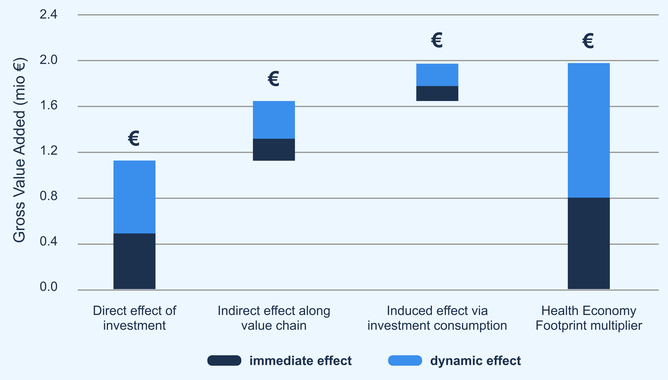
- Prevented fatal cases are distributed across the life horizon of the cohort based on mortality risks of dying in the next 10 years by age for the ICD-10 C53 code in 2018.[16]
- We link all avoided events to the age at middle point of the interval used to report mortality risk (e.g. in the interval 15-24, all fatal events avoided are assumed to accord at the age of 19).
- The life expectancy of a woman as provided by public statistics.[17]
- We consider for paid work a maximum working age of 74 years.
- The results are monetized according to sector-specific average GVA per working hour.

Results

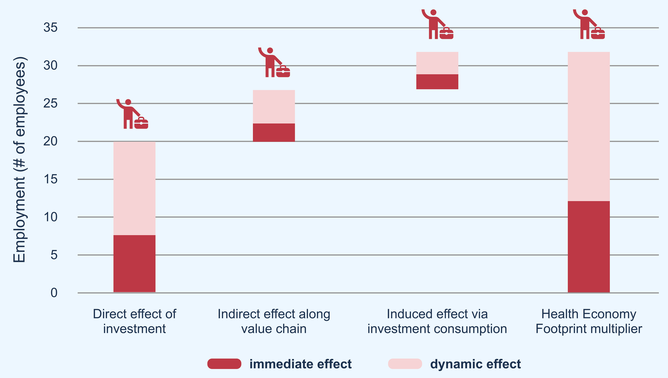
1. Health Economy Footprint:

For every **€1 mio investment in cancer prevention in Germany, almost €2 mio GVA and 32 jobs** are created within and beyond the healthcare sector over three years.

- Every €1 mio additional health investment (general) induces in Germany €1.97 mio GVA contribution over 3 years.
- From this effect, €1.12 mio of GVA are generated within the Health Economy, and 0.85 mio € in the overall economy.
- While the immediate effect in the first year is estimated to be €0.81 mio, the additional dynamic effect over the next three years will be €1.16 mio of GVA to Germany's economy.



- An investment of €1 mio in cancer prevention creates 32 additional jobs in Germany's overall economy.
- This breaks down to 20 jobs in the Health Economy and 12 jobs via indirect and induced effects in the overall economy.
- While in the first year 13 jobs are created overall, 19 more jobs are to be created within the next three years.



2. Human Capital Effects:

The productivity losses avoided due to cervical cancer screening is highly relevant to the German economy. Productivity gains differ across screening programmes. The **highest screening frequence evaluated (yearly) yields highest human capital gains: 33mio hours in paid and 11mio hours in unpaid work** activity which corresponds to a **monetary value of €328mio.**

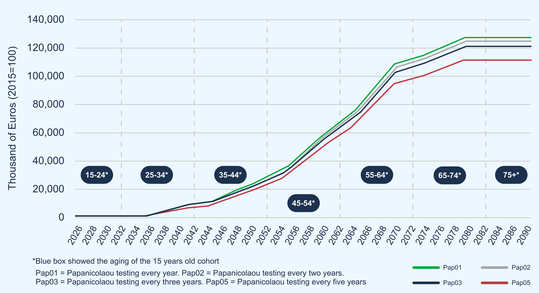
Number of prevented death over the lifetime and productivity gains (paid and unpaid) of prevented deaths over the lifetime of the cohort

		Non-Screening vs.	Screening every year	Screening every two years	Screening every three years	Screening every five years
Estimated fatal cases over the lifetime of the cohort		1004	4	23	53	128
Prevented cases over the lifetime of the cohort			1000	981	951	876
Total Productivity Losses Avoided	Million Hours		44.4	43.6	42.3	38.9
	Million Euros (2015=100)*		327.5	321.3	311.5	286.9
	As % of the 2022 GDP		0.010%	0.010%	0.010%	0.009%

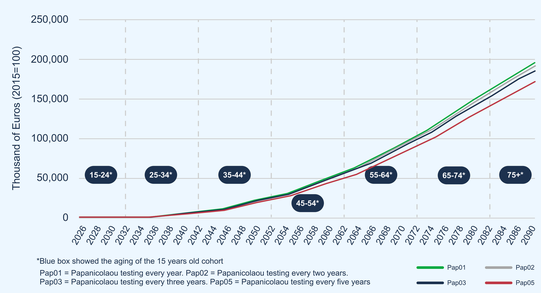
*cohort of 100,000 women entering at age of 15 years

Cumulative Human Capital creation screening strategy

in paid work:



in unpaid work



Outlook

As every first attempt, the present implementation has limitations and will be extended in the next step regarding the following aspects:

1. **Health Economy Footprint:** It translates the general effect of €1 mio health investment to the cost structure of the cancer screening use case.
2. **Human Capital Effect:** It expands the analysis of productivity effects to non-fatal cases.
3. **Labor Market dynamic:** Labor market dynamics are incorporated in the framework to link the two pillars, i.e. labor demand effects in the Health Economy Footprint and labor supply effects due to Human Capital Creation.

Conclusion

The Health ROI Assessor framework opens a new perspective on health economic evaluation. Our results illustrate how investment in cancer prevention in Germany translates into value to society and may support policy decision making about effective resource allocation to as well as within the healthcare sector. Therewith, we contribute to a new understanding of health investments as driver of economic stability and growth.

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