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The Swedish intersectoral national public health policy: effects on child and adolescent health

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Background: To improve health, intersectoral cooperation is often advocated. However, only few studies have reported health effects of this approach. Sweden has adopted a national public health policy (NPHP), which focuses on intersectoral primary prevention of disorders and injuries. **Aim:** To investigate the effects of the NPHP, on child and adolescent health in Sweden during the period 2000–19. **Methods:** In the first step, the most important improvements in disorders and injuries, assessed as DALYs and *incidences*, were identified using the GBD Compare database. In the second step, primary prevention methods for these disorders and injuries were identified. In the third step, the relative importance of various government agents for these preventive measures was assessed using Google searches. **Results:** Out of 24 groups of causes of disease or injury, only two groups demonstrated an incidence decrease: neoplasms and transport injuries. Leukaemia neoplasms might be prevented by reducing parental smoking, reducing outdoor air pollution and having the mother take folate supplements before getting pregnant. Transport injuries might be prevented by speed restrictions, and physically separating pedestrians from vehicle transport. Most of the primary prevention work was done by government agencies, like the Swedish Transport Agency, which worked independently of the National Institute of Public Health. **Conclusion:** Governmental agencies outside the health carried out most of the effective primary preventive efforts, almost independently of the NPHP.

Introduction

In a 1974 document, Marc Lalonde, the Canadian Minister of Health at the time, stated that clinical medicine needed to be paired with changes in the environment and altered behaviours in order to improve public health.[1] If smoking is a major cause of lung cancer, treating lung cancer patients will not be enough to control the disease. Instead, measures to prevent smoking are required. Taxes on tobacco and bans on smoking in public are most effective.[2] Taxes and legislation, however, are not the responsibility of the health care system.

Taxes at the national level are determined by the Ministry of Finance. There is a substantial literature that advocate intersectoral cooperation in order to improve population health.[3–5] However, few studies have reported effects on population health in high-income nations. So, there is no straight line between scientific evidence and a political decision about how much to tax tobacco products. Similar complexity applies to political decisions regarding other health determinants. To support intersectoral health efforts, a government might adopt a public health policy, name a minister of public health and set up a public health agency. It is, however, not given that such efforts are effective. Accordingly, an investigation is justified.

Since it might be hard to get comparable information on the political process in different nations, it is better to look at a single nation. Sweden was chosen because of the author's familiarity with public health in this country. Sweden might be representative of other high-income nations since both health expenditures in total and spending on prevention are close to the OECD average.[6]

Major parts of preventive efforts, in Sweden and elsewhere, take place in the health sector, including immunizations, screening, maternal and child health services and school health services. These efforts, however, won't be considered because they are carried out in the health sector.

It usually takes time between changes in a determinant of health and improvements in health. Children and teens might be the ones who see the effects of preventive measures the soonest. The analysis has therefore been limited to children and young people aged 0–19 years.

In 1997, the Swedish Parliament formed a National Public Health Committee in response to a WHO paper based on Lalonde's conceptualization.[7] The work of this committee resulted in the National Public Health Policy (NPHP), which the legislature approved in 2002.[7] The NPHP focuses on the primary prevention of disorders and injuries and mainly considers intersectoral efforts, i.e. efforts outside the health sector. A National Institute of Public Health (NIPH) was established in 2001 and a Minister of Public Health was appointed in 2002.[7] Later on, the parliament approved two revisions to the NPHP: one in 2008[8] and one in 2018.

In Sweden, the Ministry of Social Affairs (MSA) is responsible for health care. The new NIPH was subordinate to this ministry. The Swedish national administration has some specific features.[9] The government takes joint decisions on all government business at government meetings, which are held once a week. That means that a specific ministry cannot make a governmental decision on its own. All governmental ministries have a total of 249 agencies. The NIPH is such an agency. Most governmental agencies have been given instructions to handle issues in their fields independently. That is, issues that are handled by the government ministry in many countries are handled by a government agency in Sweden.

The aim was to investigate the effects of the NPHP and the NIPH on child and adolescent health in Sweden during the period 2000–19.

Intersectoral efforts of agencies outside the health sector are at the heart of NPHP. Therefore, this aspect has been the focus of the study.

Methods

In a first step, the most important improvements in health at ages 0–19 in Sweden during the period 2000–19 were identified. Data from the GBD Compare database (GDB) was used.[10] The information in GDB comes from epidemiological studies that have been published in scientific journals, and public health records from 156 countries and territories. Data relating to Sweden are contributed by the Karolinska Institute in Stockholm, Sweden. GDB categorizes 297 diagnostic groups using ICD-10 diagnoses. These diagnoses are grouped at four levels: level 1, which comprises seven groups of diagnostic groups; level 2, which comprises 22 groups; level 3, which comprises 169 groups and level 4, which comprises 297 groups. GDB presents mortality rates, disability adjusted life years (DALYs) lost, prevalences and incidences for all diagnostic groups. GDB also gives rates for 83 risk factors, both as summary exposure values and as contributions to each diagnostic group. When data on a specific diagnostic group, a specific risk factor or a specific age group are not directly available from an epidemiological study or a registry, algorithms are used to make estimates. That means that the precision of the data provided varies. To help the user assess the precision, 95% uncertainty intervals are given.

In a first step, the most important health improvements were found by looking at the change in DALY rates during the study period. The regression coefficients for the development of DALYs per 100 000 for all 22 level 2 diagnostic groups for the period 2000–19 were calculated in Excel. One level 2 cause was named 'Other non-communicable diseases', which is not very informative. So, it was broken up into parts and the two most important conditions, congenital disorders, and SIDS, were analyzed. Another level 2 cause was 'Maternal and neonatal disorders', which for the same reason was split into maternal disorders and neonatal disorders. Thus, 24 diagnostic groups were identified.

The NPHP mainly aims at the primary prevention of health problems. Primary prevention entails lowering not only DALYs but also the incidence rate. So, to figure out how things have changed, the incidence rate in 2019 was compared with the rate in 2000. If relevant, this analysis was extended to the most important level 3 diagnostic groups. All diagnostic groups that demonstrated a statistically significant ($P < 0.05$) decrease in incidence rate were further analyzed.

In a second step, the primary prevention methods, for the health issues that were found to have decreased in the first step, were identified. With a given search string, relevant review articles were identified in Google Scholar. In these publications, the most important risk or protective factors, that might be used for primary prevention, were identified. Following the NPHP, preventive efforts that were carried out in the health service system were not considered. That means that immunizations, screening, maternal and child health services and school health services were not appraised. Also ignored were the preventive or adverse effects of pharmaceuticals.

In a third step, we assessed the relative importance of the NPHP, the NIPH and the MSA, for the preventive measures that had been identified in the second step. The NIPH is subordinated to the MSA. The National Board of Health and Welfare (NBHW) is also subordinated to the MSA but will not be further discussed since it is only in charge of health services, and not of primary preventative measures. In October 2022, Google searches were conducted in Swedish that included the pertinent risk or protective factor, NPHP, MSA, NIPH, the responsible sectoral ministry and its most pertinent subordinate government agency. Other authors have previously used Google searches to identify actors in the health field.[11,12]

No ethical approval was obtained since only data from publicly available sources were used.

Results

In the year 2000, the total burden of disease in Sweden at ages 0–19 was 7072 DALY/100 000 (see Table 1). Nineteen years later, in 2019, the total burden of disease had dropped by 10% to 6345 DALY per 100 000 people. The total disease burden in this age group in Western Europe in 2000 was 8669 DALY per 100 000 in 2018. In 2019, the burden had dropped by 19% to 7013 DALY per 100 000.

In Sweden in 2000, 15 of 24 diagnostic groups carried a disease burden of ≥100 DALY per 100 000 people. The development of the burden of disease in these 15 groups was further analyzed with regression analysis. The changes in incidence rates in 2000 and 2019 were also compared.

Only two groups of disorders demonstrated a burden of disease of ≥100 DALY per 100 000 in 2000, a decrease in the burden of disease and a statistically significant decrease in the incidence rate: neoplasms and transport injuries.

Neoplasms

In the year 2000, neoplasms accounted for 311 DALY/100 000. The two most important neoplasms in the year 2000 were brain and central nervous system cancer, which accounted for 89 DALY per 100 000 people, and leukaemia, which accounted for 88 DALY per 100 000 people. The incidence rate of brain and central nervous system cancer did not change significantly. Leukaemia incidence, on the other hand, had decreased significantly from 8.52/100 000 in 2000 to 6.22/100 000 in 2019.

A Google Scholar search for 'leukaemia prevention' turned up a review of risk and protective factors for childhood leukaemia.[13] Changes in some of these factors might theoretically have contributed to Sweden's decrease in childhood leukaemia. The risk factors were parents who smoked, outdoor air pollution and the mother not getting enough vegetables and fruits during her pregnancy. Three protective factors were the mother taking folate supplements before getting pregnant, breastfeeding and the child getting common childhood infections.

Parental smoking

The summary exposure value for tobacco use at parental age (15–49 years) decreased from 20.1/100 in 2000 to 17.7/100 in 2019. The difference is statistically significant ($P < 0.05$). Taxes on tobacco products and bans on smoking in public places are the main ways to cut down on tobacco use.[2] After adjusting for inflation, taxes on tobacco had increased by 16%.[14]

The Ministry of Finance and the Swedish Tax Agency are in charge of taxes on tobacco products. The number of hits from Google searches that combine an intervention with an agency is presented in Table 2. When 'tobacco tax' was included as the intervention, most hits were found when the Swedish Tax Agency was included in the search string.

The Swedish Environmental Protection Agency and the Ministry of the Environment are the relevant sector agencies and ministries, respectively, for smoking in public places. Table 2 shows the number of hits from Google searches that include both the intervention and the agency. For this intervention, most hits were obtained when the strings included the NIPH, MSA and NPHP.

Exposure to outdoor air pollution

In Sweden, in the period 2000–19, the level of air pollution more than halved.[10] Relevant sector agencies and ministries are the Swedish Environmental Protection Agency and the Ministry of the Environment. The number of hits from Google searches, that combine the intervention with an agency, is presented in Table 2. Google searches for 'reduce pollution' yielded the most results when the relevant sectoral agency, the Swedish Environment Protection Agency, was included in the search string.

Table 1 DALY/100 000 at age 0–19 in Sweden by cause in 2000 and 2019 and according to regression equation for this period

Cause level	Cause code id	Cause text	DALY—recorded		DALY—regression equations 2000–19				Recorded incidence change 2000–19
			Year 2000	Year 2019	Year 2000	Annual change	R^2	Annual change/DALY 2000 (%)	
0	294	Total Sweden	7071.80	6345.00	7381.00	−52.59	0.89	−0.71	ns
3	380	Neonatal disorders	674.01	599.61	703.55	−3.10	0.29	−0.44	ns
2	386	Nutritional deficiencies	107.83	100.94	106.78	−0.80	0.59	−0.75	ns
2	410	Neoplasms	311.41	231.92	703.52	−4.51	0.90	−0.64	Decrease $P < 0.05$
2	491	Cardiovascular diseases	103.84	73.86	109.68	−0.02	0.92	−0.02	ns
2	508	Chronic respiratory diseases	267.62	298.85	237.53	12.47	0.49	5.25	ns
2	542	Neurological disorders	498.47	482.54	534.74	−2.56	0.50	−0.48	ns
2	558	Mental disorders	1199.71	1183.24	1271.93	−5.97	0.54	−0.47	ns
2	626	Musculoskeletal disorders	459.11	408.37	519.67	−5.25	0.60	−1.01	ns
3	641	Congenital birth defects	673.58	506.88	687.41	−8.54	0.94	−1.24	ns
2	653	Skin and subcutaneous diseases	808.52	817.01	81.54	0.20	0.08	0.25	ns
3	686	Sudden infant death syndrome	110.50	63.35	110.05	−2.62	0.91	−2.38	ns
2	688	Transport injuries	311.98	139.08	330.91	−10.90	0.96	−3.29	Decrease $P < 0.05$
2	696	Unintentional injuries	408.91	344.77	431.64	−4.34	0.80	−1.01	ns
2	717	Self-harm and interpersonal violence	208.35	174.94	247.09	−2.89	0.36	−1.17	ns
2	956	Respiratory infections and tuberculosis	204.30	184.33	202.92	−0.93	0.91	−0.46	ns

Note: Recorded incidence changes for this period have also been added.

Table 2 Primary preventive interventions, by cause that was addressed and the number of hits in Google searches of an intervention combined with different governmental actors

Cause level 2	Cause level 3	Risk factor (*R*)	Intervention (*I*)	Sectorial Ministry (SM)	Sectorial Agency (SA)	Number of hits in Google searches				
						I+NPHP	I+MSA	I+NIPH	I+SM	I+SA
Neoplasms	Leukaemia	Parental smoking	Increase tobacco tax	Ministry of Finance	Swedish Tax Agency	2090	4020	5870	9170	26200
Neoplasms	Leukaemia	Parental smoking	Reduce smoking in public places	Ministry of Environment	Swedish Environment Protection Agency	12 400	11 800	13 200	1260	9
Neoplasms	Leukaemia	Outdoor air pollution	Reduce pollution	Ministry of Environment	Swedish Environment Protection Agency	3700	1840	11 700	4220	18 000
Neoplasms	Leukaemia	Low folic acid	Folic acid supplementation	Ministry of Agriculture	Swedish Food Agency	9	65	524	86	1390
Transport injuries	Motor vehicle road injuries	Vehicle speed	Motor vehicle speed limitations	Ministry of Infrastructure	Swedish Transport Agency	2770	2980	49 100	876	75 900
Transport injuries	Pedestrian road injuries	Built environment	Separate pedestrians from vehicle traffic	Ministry of Infrastructure	Swedish Transport Agency	7940	714	13 700	5020	93 400

Note: All searches were done in Swedish.

Preconceptual maternal folate acid supplementation

Four Swedish studies show that the number of women taking folic acid supplements before they got pregnant went from 0.01% in 2007 to 29.41% in 2015.[15] This change might have contributed to a decreased incidence of leukaemia. The Swedish Food Agency is the responsible sector agency and the Ministry of Agriculture is the responsible ministry. The number of hits from Google searches that combine the intervention with an agent is presented in Table 2. Most hits were found when the Swedish Food Agency was part of the search string.

Transport injuries

In the year 2000, transport injuries accounted for 311.98 DALY per 100 000. The incidence rate fell, from 624.47 per 100 000 in 2000 to 259.55 per 100 000 in 2019. In the year 2000, the two most common causes of transport injuries were motor vehicle road injuries (174.03 DALY per 100 000) and pedestrian road injuries (46.89 DALY per 100 000).

The Swedish Transport Agency is the responsible sector agency, which is subordinated to the Ministry of Infrastructure. Table 2 shows the number of Google hits that come up in searches that include both an intervention and an agency. When searching for 'speed limits for motor vehicles', most results were found when the Swedish Transport Agency was included in the search string. The same was true of the other intervention, 'Separate pedestrians from vehicle traffic'.

Discussion

During the period 2000–19, the total burden of disease in children and adolescents in Sweden decreased by 10%. Any effective primary preventive intervention ought to result in a decrease in incidence. A decrease in incidence, however, was only found in 2/15 groups: neoplasms and transport injuries.

Literature reviews suggest that the two groups of causes may have decreased as a result of primary prevention efforts. So, the drop in leukaemia might partly be caused by fewer parents smoking, which in turn might be caused by higher taxes on tobacco products and more bans on smoking in public places. In all, six potentially effective primary preventive interventions were identified. The important question is, however, whether the NPHP played a significant role in these interventions.

The relative importance of various actors was determined by comparing the number of relevant Google search results for each actor. Including a sectoral agency in a search string typically yielded the greatest number of results. A search for 'separate pedestrians from vehicle traffic' and 'the Swedish Transport Agency' yielded 93 400 hits, while a similar search using the NIPH rather than 'the Swedish Transport Agency' yielded only 13 700 hits. Except for the intervention 'Reduce smoking in public places', the sectoral agencies got the most hits when compared with the NIPH. The NPHP and the NIPH did not seem to have had any prominent effect on intersectoral efforts of agencies outside the health sector.

The various government agencies involved seemed to have considered health issues independently of the NPHP. So, the Swedish Transport Agency has adopted the policy that no one should die or get seriously hurt in traffic. The road transportation system should be designed to meet this need. The Swedish parliament adopted this 'Vision Zero Policy for Safety' in 1997.[16] The Swedish Food Agency constitutes another example. In the first paragraph of the instruction to the agency, it is said that the agency should work for the safe consumption of food.[17] Thus, population health is at the core of this agency's responsibility.

The ban on smoking in public places seems distinct from the other interventions in Table 2. For this ban, the NPHP, NIPH and MSA were prominent in Google searches. The reason may be that the MSA and one of its subordinate agencies, the NBHW, have been attempting to reduce smoking since 1963.[18] The number of hits for NPHP, MSA and NIPH was similar, which indicates that all three were equally important.

Why have the NPHP and NIPH not been more prominent?

In the Google searches, NPHP and NIPH only came up in 1/6 of the potentially effective interventions. The Google searches showed that the agency in charge of the sector was often more influential than the NIPH. Thus, the Swedish Transport Agency developed a transport safety programme, Vision Zero Policy for Safety, independent of the MSA, NPHP and NIPH.[16] One reason for the programme's success might be that the Swedish Transport Agency was not only responsible for the development of the Vision Zero Policy for Safety but also for its implementation. In addition to regulating transport issues, this agency also receives government funding for road construction and maintenance.

So, one reason why the NPHP and NIPH don't have much of an impact might be that the government agency in charge, the NIPH, neither has the power nor the money to implement primary preventive interventions outside of the health sector. The most critical factor appears not to be a lack of administrative structures, but rather a limited international scientific knowledge of effective and practicable interventions.

Generalizability

The study covered children and adolescents in one single nation. The finding, that it is hard to achieve effective intersectoral prevention by means of policies and administrative structures, is representative of previous studies in the health field.[3–5] To get all sectors in a society to promote health is highly desirable. More studies are needed to understand how to promote preventive efforts from agencies outside the health sector.

Limitations

The analysis has clear limitations. Data on health from the GDB were used. These data have partly been produced with the help of algorithms that reduce precision. Moreover, a statistically significant decrease in incidence was required. Thus, relevant small improvements might have been omitted. However, it is not likely that such omissions would have changed the overall result.

To figure out how important the NPHP is, the number of hits on Google searches for the MSA and the relevant sectoral agency was counted. These searches build on material that is published and available on the web. Activities that are not reported that way would not be counted. Today, however, most significant decisions are likely to have been reported in publications that Google can find.

Conclusions

Almost independently of the NPHP, the NIPH and the MSA, sectoral governmental agencies, like the Swedish Transport Agency, carried out most of the important primary preventive efforts, independently of the NPHP, the NIPH and the MSA.

Funding

No specific funding had been obtained.

Conflicts of interest

None declared.

Data availability

Data from the GDB were used.[10]

Key points

- Child and adolescent health improved in Sweden during the period 2000–19.
- Only leukaemia and transport injuries showed a decrease in incidence.
- The main governmental actors, that might have been involved in the primary prevention of leukaemia and transport injuries, were sectoral agencies and not the NIPH.
- Primary prevention seems to be limited less by a lack of policies and administrative structures and more by a lack of knowledge about effective and practicable interventions.

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