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1997 – A curious year in Sweden

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One of the most important economic problems in Sweden right now is the increasing cost for health care and early retirements. It has been postulated that ideally we should have to stay at work until the age of 79 years or more, if the cost equations are ever to balance.

A look into the statistics on health care and other social security costs clearly shows that the problem started abruptly in the autumn of 1997. A further analysis reveals that several different characteristics of the health of the population also showed a sudden trend-break in that year. In this short letter we will describe the situation, giving examples of the characteristics found, and will point at possible causes and cures.

The Swedish authorities provide plenty of valuable statistics via the Internet. The National Board of Health and Welfare (<http://www.sos.se>) has a database covering the incidence and mortality of most diseases. There are data showing how a disease is distributed over all countries or even communes in the country. We took advantage of that in order to look at statistics from individual diseases, such as cancers, heart disease, etc.

The National Social Insurance Board (<http://www.rfv.se>) provides good information about different health care costs and corresponding characteristics. This data can be followed month by month and is thus a valuable tool in order to identify a precise point in time when a trend-break took place. We used these data to identify the main break points for health degradation in Sweden as well as in all individual counties of Sweden.

The Swedish Work Environment Authority (<http://www.av.se>) follows all work-related injuries and diseases in Sweden. By their support we were able to compare different counties with respect to recovery time from injuries and diseases as well as looking at time-trends. The advantage of work-related injuries for our study is that these are carefully reported.

One statistic used to characterize the health status in a nation is the number of sick-registered over time. An abrupt change from an improving trend to an increasing

number of sick-registered was noticed in the autumn of 1997.

We found that for all individual counties in Sweden there was a similar precise time when their individual graphs broke the downward trend and started to go upwards. By analysing the material in detail taking yearly variations into account, we could specify the month in which any one of the 21 counties started to 'go wrong'. This happened within the time frame of October 1997 to January 1998.

Of special interest is the development of the number of long-term sick people (i.e. registered as sick for more than one year). From a record low level of around 40 000 in 1997 the number increased in just 6 years by 100 000, giving a total close to 140 000 long-term sick.

One of the most commonest reasons for sickness registration is load injury (i.e. pain in the neck, shoulders, back, etc.). It turns out that this type of problem also started to increase in 1997. In the year 2001 the number of registered people who were ill due to load injuries had increased by 100%. Perhaps the ability to recover from normal workloads has been reduced?

Depression and other psychological diseases also increased since 1997. The number of suicide attempts among young people has increased by 30% between 1998 and 2001.

We noticed that cancers have also increased during recent years. For prostate cancer, for example, the number of verified new cases in Sweden has increased by 32% since 1997. The authorities explain this increase to be a consequence of the increasing use of prostate-specific antigen (PSA) tests, which makes it easier to diagnose prostate cancer in the early stages. However, a close look at the development of PSA testing and prostate cancer incidence does not give convincing evidence of this. In Stockholm the new prostate cancer cases suddenly start to increase from 1997 while the number of performed PSA tests has been steadily increasing in the whole country since 1990. Also, the number of detected cases

per 100 000 PSA tests in the total population is increasing.

The number of people severely injured in traffic accidents in Stockholm County has been increasing strongly since 1997. Here, the responsible authority, the Swedish National Road Administration (SNRA, Vägverket), states that the increase is an artefact due to a new reporting system called STRADA. We have not, however, been able to verify this through the police authorities in Stockholm, where the number of seriously injured people has increased from 400 in 1996 to an estimated 1200 in 2004.

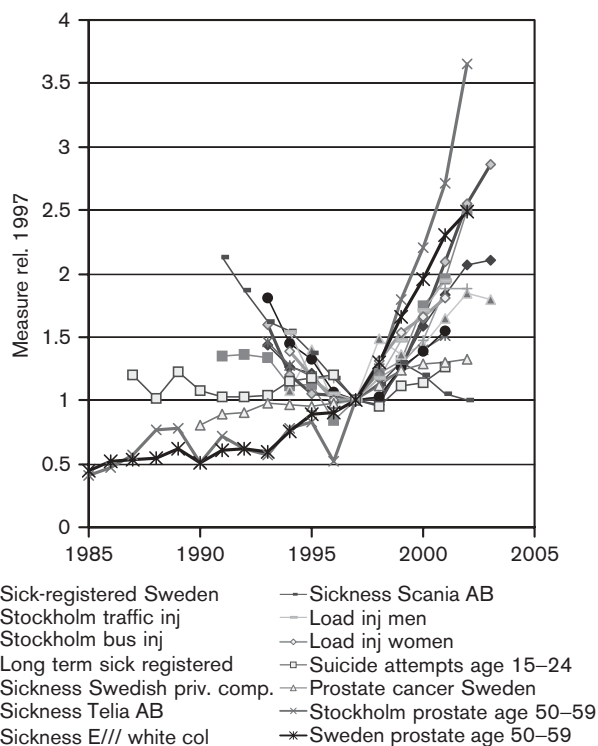
It should be pointed out that the SNRA in a report (<http://www.vv.se/aktuellt/pressmed/2003/bild/mobil.ppt>) about car driving and mobile phone talking has identified a number of risk factors related to mobile phone talking. One example is that the reaction time of a driver talking on a mobile phone is increased by 0.2 s, with or without a hands-free connection (<http://www.vv.se/aktuellt/pressmed/2003/bild/mobil.ppt>). However, after consultations with the Telecommunication Company Ericsson AB, SNRA decided not to suggest any restrictions regarding mobile phone talking while driving a car.

In order to see whether professional drivers are becoming more frequently involved in traffic accidents we looked at the number of people in Stockholm injured in traffic accidents involving bus drivers. It turned out that the same trend is seen here: the number of injured people has increased from less than 150 in 1997 to 250 in 2003.

Since the number of sick-registered people in Sweden started to increase from 1997 we were interested to see whether this trend was the same for private companies in general, a state-owned company and two individual large private companies. The Confederation of Swedish Enterprise provided general data; Telia AB provided data from the former Swedish Telecom Administration and Scania AB and Ericsson AB are two large private companies. The statistics from Ericsson AB relates to white-collar employees while the Scania data also includes blue-collar employees. In total we see that the absence due to sickness increased by 50% from 1997 to 2002. According to statistics from Statistics Sweden (SCB) small companies are in general healthier than large companies. This picture has been unchanged since 1998. The data show that companies with more than 50 employees are twice as sick as small companies.

In order to get a view of the general trend, all preceding graphs were normalized to the measurements done in 1997 (Figure 1). From the graph it is clear that the general trend is for an increasing numbers of sick employees, more injuries, etc. The mean values of all

Fig. 1



All measurements have been normalized to the values in 1997.

these plots were calculated. From that we were able to state that health-related measures in Sweden by 2002 in average have degraded by a factor of 2.2 since 1997.

So, what happened in 1997?

In August 1997 the first digital TV transmitter was launched. This autumn the first 'hot-spots' for mobile connection to the Internet were also introduced to serve travelling executives in hotels, train stations, airports, some petrol stations, etc. But the real big thing that came into practical use by the whole population was the introduction of the dual-band mobile system. The reason was that the number of available connections in cities was too small for the rapidly increasing demand. GSM 1800 offered many more connections in crowded cities and solved the problem. In Sweden, Telia AB got permission to start 1800 MHz transmission by the Post and Telecom Agency (<http://www.pts.se>) in 1996. The first lab tests were done late 1996 and the first public trials started in the spring 1997. In the summer of 1997 relaxed regulations were issued regarding the erection of small transmitter antennas needed for GSM 1800 and a major building programme was launched from the autumn of 1997.

In 1997 many large companies introduced wireless office phone systems. One such is called GSM-in-Office and operates at 900 MHz. This made it necessary to install a number of small transmitters in office buildings, corridors and even in the office work area. The employees had to use the mobile phone for all calls, in many cases for long calls. So, from 1997 many employees became exposed to microwave radiation during all work hours from small base stations, in addition to stronger radiation from their handsets during all their calls. Smaller companies did not introduce this type of office system. Smaller companies also have better health records in general as reported by the SCB (<http://www.scb.se/>) and mentioned before. This also applies to work-related injuries as reported by the Swedish Work Environment Authority (<http://www.av.se>).

All this data led to the suspicion that the degraded health in Sweden might be related to the sudden exposure to microwave radiation at 1800 MHz. Detailed information about the number of subscribers and average speech time per subscriber and year was obtained from the Post and Telecom Agency. From that information it was possible to deduct the total number of mobile phone minutes for different technologies (NMT 450/900, GSM 900 and GSM 1800). The number of spoken minutes using GSM 900/1800 MHz phone has now accumulated to $50 \cdot 10^9$ min in Sweden or about 100 000 years of mobile phone conversation.

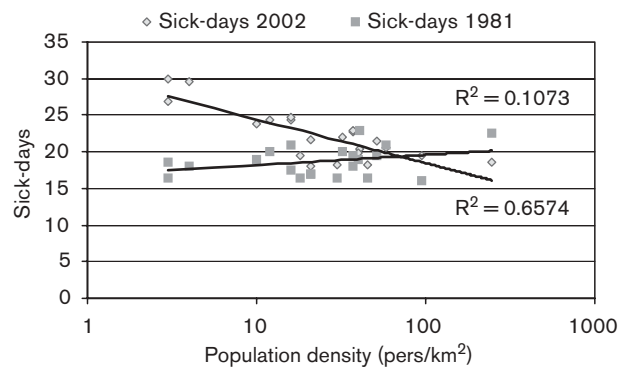
We have noticed that the increase in the number of long-term sick people also fits very well with the annual length of GSM speech time. The number of traffic-injured people in Stockholm follows a similar pattern. The prostate cancer increase, however, did not fit the increase in mobile phone speech time in a convincing way; it simply starts too early.

Radiation from handsets or from towers?

If the results previously described indicate that the degradation in health noted is caused by handset radiation that is disturbing the immune defence system as well as the concentration ability among car drivers, then we should expect that the degradation should be worse in areas with less coverage (= higher output power). These areas are found in sparsely populated counties in Sweden and, of course, inside a car. Figure 2 shows the number of sick-days registered per person in Swedish counties in 1981 and in 2002, respectively. Similar graphs where the x -axis is related to the mobile system coverage or the average mobile phone output power gives even larger correlation coefficients ($R^2 = 0.82$) than shown in this graph.

Even if a specific disease happens to show a trend-break the same year as the GSM 1800 system was rolled out,

Fig. 2



In 1981 the sparsely populated countries were healthier than the large city regions. Today the situation is quite the opposite.

there does not need to be a connection. But if the disease also has a statistically significant correlation with the output power from the phones, one should start searching for possible links. We summarize here our findings in that respect for the diseases we have been looking at.

Short- and long-term sicknesses show a clear trend change during the autumn of 1997 and a very strong correlation ($R^2 = 0.82$; $P < 0.000001$) to the average output power from mobile phones in the different counties.

Deaths due to external causes (accidents, murder, suicide, etc.) started to increase after 1997 and show a strong correlation ($R^2 = 0.51$; $P = 0.00026$) to the average output power from mobile phones in the different counties.

Workplace-related injuries and sickness started to increase in 1997 and they show a strong correlation ($R^2 = 0.63$ and 0.37 , respectively) to the average output power from mobile phones in the different counties.

Prostate cancer among men 50–59 years of age started to increase from the autumn in 1997. However, there is no positive correlation between prostate cancer and the output power from mobile phones ($r = -0.46$). Instead, this disease has increased mostly in the large city counties of Sweden. Here we have found a possible link to the rollout of the digital TV network in Sweden (Hallberg and Johansson, 2004).

The recovery time after breast or heart surgery operation has increased since 1997. In both cases there is also a noticeable correlation ($R^2 = 0.26$; $P = 0.017$ and $R^2 = 0.25$; $P = 0.020$ respectively) to the average output power from mobile phones in the different counties.

Deaths due to diseases in the nervous system started to increase drastically in 1997. There is also here a noticeable correlation ($R^2 = 0.37$; $P = 0.0024$) with the average output power from mobile phones in the different counties. The most noticeable trend is the increasing number of deaths from Alzheimer's disease. No correlation was found for another neuralgic disease, ALS ($R^2 = 0.0072$; $P = 0.71$).

In conclusion, we note that 1997 was a very curious year in that a large number of health-related measures suddenly started to indicate a fast degradation in the health of the Swedish population. Several health

characteristics and diseases seem to correlate with the Swedish introduction of the GSM 1800 MHz system both in time and place. We urge responsible authorities to start an independent enquiry and to assign a scientific task force on a national basis to investigate possible consequences of the results presented here. All health-related data are available at official national registries.

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