Life expectancy in welfare state Finland and post-communist Estonia: a comparison

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Summary

Life expectancy in Estonia has seen different patterns over the years, and has in recent years been rising towards the height of other prosperous OCED countries. This thesis is a comparison of life expectancy in Estonia and Finland. Finland is selected as it is geographically close, and is part of the Scandinavian welfare states. In recent years a convergent trend has been seen between the life expectancy in Estonia and Finland, while from the 1960s to the 1990s a divergent trend has been seen.

The central question arises naturally and is explanatory: *What explains the differences in life expectancy between Finland and Estonia?*

One of the main factors in this research is amenable mortality, this is mortality that is amenable to health care, in other words: with a proper working health care system the mortality would not have happened. Results show that both countries were almost equally successful in fulfilling the first stage of the epidemiological transition model of Vallin & Meslé (2005), in diminishing infectious diseases. Finland was also successful in the second stage of the cardiovascular revolution, while Estonia proved not to be successful in this revolution. The main explanation for this is the failure of the communist health care system to deal with cardiovascular diseases, which proved to be the main contributor of all amenable mortality. The development of life expectancy in Estonia could be described spiky, in a negative way. While Finland has seen a positive upwards pattern ever since overtaking Estonia in life expectancy, and dropping below Estonia in amenable mortality.

Economic development and political context prove to be important factors of life expectancy and health care as well. Countries often adopt policies in groups, while Finland has welfare states Sweden and Denmark close by, Estonia has the much less developed countries of Lithuania and Latvia as neighbors. Although an upwards trend in both economic development and life expectancy has been seen in Estonia since the socioeconomic crisis after the fall of the Soviet Union, it has not caught up with Finland.

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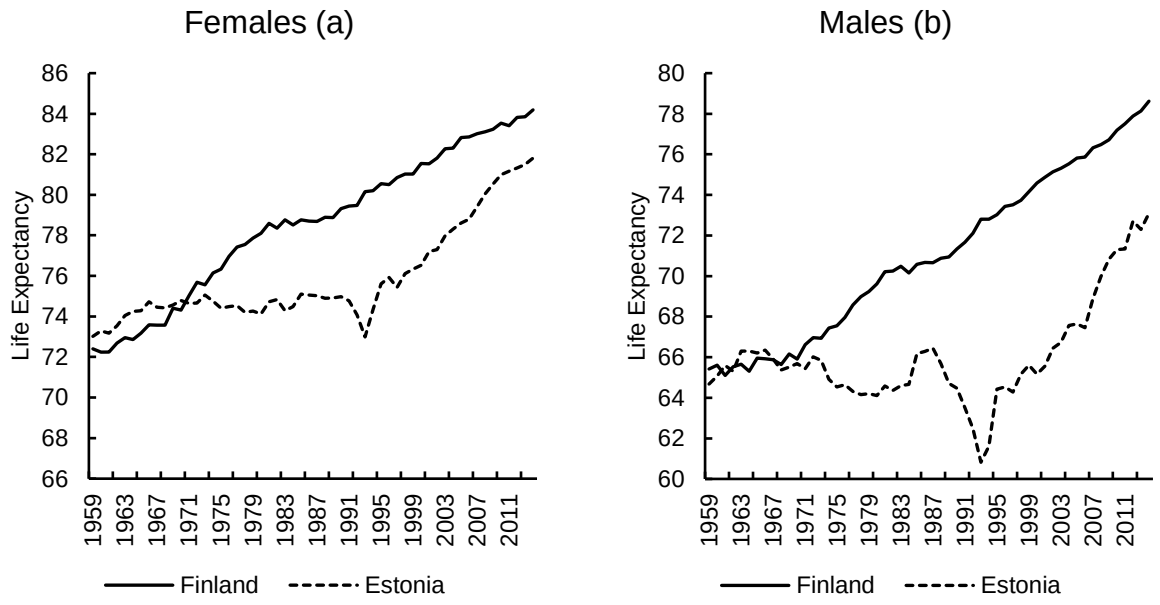
1. INTRODUCTION

1.1 Background

Since the fall of the Soviet-Union in 1991 there has been a rapid increase of the life expectancy in Estonia. It has since approached the life expectancy of Western European countries. The same development has been seen in other post-communist countries. Finland is a neighboring country of Russia and has been in the Russian influence sphere for many years, but it has never been part of the Soviet-Union. It has developed into a welfare state similar to the Scandinavian countries, and thus has not experienced the stagnation in life expectancy that happened in Russia and other Soviet countries. Estonia has always been relatively wealthy for Soviet standards, and is leading in terms of life expectancy compared to the other Baltic states of Lithuania and Latvia. In recent years, a divergent trend has even been seen between Estonia and the other Baltic states (Jasilionis et al., 2011). Estonia has been independent for almost three decades now, yet it has not caught up completely with Finland in terms of life expectancy. Why has that not happened yet? And what holds the future for Estonia compared to Finland? And how come Estonia is performing better than the other Baltic states?

Figure 1: (a) female life expectancy in Finland and Estonia (b) male life expectancy in Finland and Estonia.



Source: Data retrieved from Human Mortality Database (HMD).

1.2 Research problem

In the 1960s Estonia was on a similar level as Finland in terms of life expectancy (see figure 1). Yet from the start of the 1970s there was a clear divergent trend in life expectancy between Estonia and Finland. Especially just after 1990 there has been an extra clear drop in life expectancy in Estonia, while Finland has kept on rising steadily. After the peak drop Estonia recovered and has started to catch up with Finland and even began to approach Finland in terms of life expectancy. This research aims to find

out why Estonia has fallen behind Finland so much and still has not caught up completely. This will be done by answering the following research question: *What explains the differences in life expectancy between Finland and Estonia?* This will be answered by the following sub-questions (i) what are the developments in life expectancy in both countries in a historical view? (ii) how has the troubled history influenced life expectancy in Estonia? and (iii) What are and have been the cause-specific amenable death rates in the two countries?

Research on life expectancy in Eastern and Western countries has been done, however this research is unique in the way of comparing two converging countries and the way of comparison with a focus on amenable diseases.

1.3 Structure

The thesis is structured as follows: first a theoretical framework is constructed, in which relevant literature is discussed and a conceptual model is designed to form a basis for the analyses and result section. After this the methods section is included, the description of the datasets and the quality and use of data are discussed. Then the results are discussed, for which the data analyses and the literature review form a strong basis. Finally the conclusion is drawn which answers the main research problem and questions of the thesis. The aim of this explanatory thesis is twofold, on the one hand it tries to explain the given fact of difference in life expectancy in Finland and Estonia based on literature and historic developments in similar contexts. On the other hand analytical data is used, trying to give more depth to the literature review. Combined these two methods make the thesis as a more integral whole.

2. THEORETICAL FRAMEWORK

2.1 Literature review

Vallin and Meslé (2005) developed three alternative phases to the well-known epidemiologic transition which was developed by Omran (1971). They identified three waves from the eighteenth century to the present. The first wave is the *vanquishing of infectious diseases*, the second wave is *a cardiovascular revolution* and the third wave is *the fight against ageing* (Vallin & Meslé, 2005). The first wave spans from the eighteenth century until the middle of the twentieth century. Usually the more developed countries manage the successful fight against infectious diseases, which puts them ahead of less developed countries, thus creating a divergence in life expectancy (Gerry et al. 2018). When the less developed countries catch up a convergence in life expectancy is noticed. The second wave developed in the second half of the twentieth century during which the death rate caused by cardiovascular diseases dropped. A second wave of divergence in the world has been noticed in this period, especially between the Western countries and the communist bloc (Vallin & Meslé, 2005). The third wave is the slowing of the ageing process, a trend that has been happening in recent years, mainly in developed countries. These developed countries are countries of economic wealth. Preston (1975) compared life expectancy to national income. He found that people in richer countries live longer than people in poorer countries.

In the Preston-curve it is shown that the curve is much steeper at lower levels in the first part of the twentieth century, but it still holds at higher levels as well (Looman & Mackenbach, 2013). Looman & Mackenbach (2013) followed up on the research of Preston and looked at the link between national income and life expectancy in Europe in the period of 1900 to 2008. Their findings for the period of 1930 to 1960 were mostly similar to the findings of Preston, in that the increase in life expectancy in that time period was accompanied by a strong upward shift of the relation between national income and life expectancy. The recent life expectancy growth in European countries seems to be linked to the economic growth (Looman & Mackenbach, 2013) as well. This can be explained by the fact that the diffusion of knowledge and technology for cardiovascular disease control is dependent on a country's economic growth. This might also explain the life expectancy gap that still seems to exist between West and Eastern Europe, and the gap might not be closed without more economic equity.

Finland can be seen as part of the more economically developed countries in Europe since its membership of the OECD in 1969. And with that it has developed into a welfare state. Finland is similar to the other Scandinavian countries in that it is a social democratic welfare state. In this thesis, Finland is seen as part of the Scandinavian welfare countries thus in a more political sense, which could culturally and geographically be disputed. The social democratic states have shown to have a better population health status compared to other types of welfare states like liberal welfare states such as the United Kingdom and United States (Chung & Muntaner, 2007). Results are similar to the findings of Navarro & Shi (2001), who look into the relation between politics and health status. Policies linked to the social democratic parties, seem to be more successful in improving the health of populations such as reducing infant mortality. These politics are also linked to geography. Countries, as groups, seem to adopt similar policies in order to achieve a similar level of health status (Chung & Muntaner, 2007). Finland is part of the social democratic Scandinavian welfare states while Estonia is part of the much less developed Baltic States, suggesting that through its economic historic development geography Finland has also gained an advantage in terms of health status compared to Estonia.

An important factor that relates to the quality of health care is amenable mortality. Amenable mortality is described as :

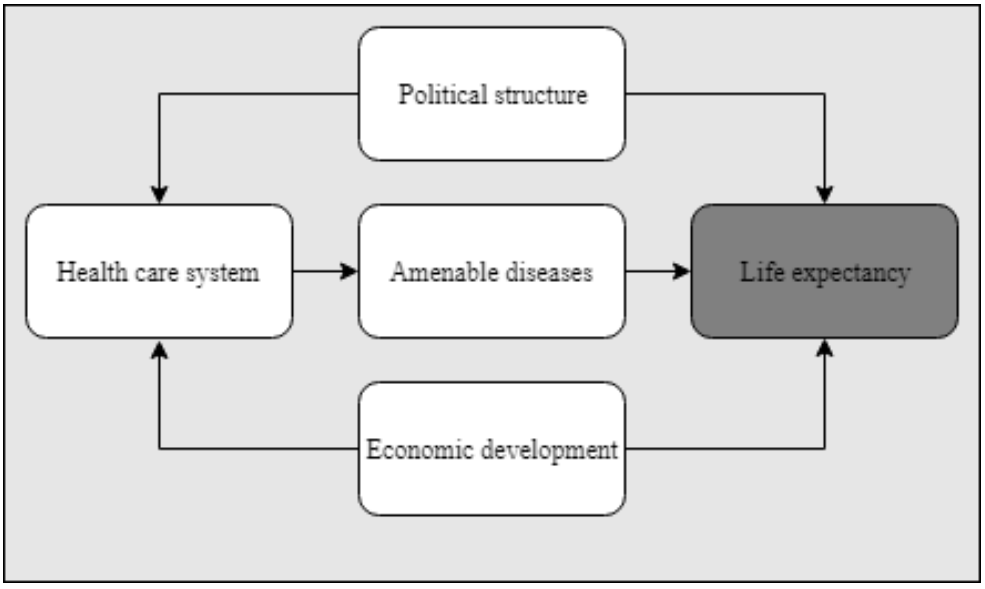
> A death is amenable if, in the light of medical knowledge and technology at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided through good quality healthcare (ONS, 2011).

Amenable mortality is a good way of measurement and comparison, as a high number of amenable deaths indicate that a country has a not properly working health system, which is caused by social, political and economic factors. The concept was first introduced by Rutstein et al. (1975) and has been widely used ever since. It is used as a concept by many governments and international organizations as an indicator of health system performance (Karanikolos et al., 2018).

Amenable mortality and health care is an important link in this thesis, especially since the Soviet Union had a very peculiar health system compared to the Western countries. In theory the health care system in the USSR was very ambitious or even utopian. The goal was to provide high quality health care for free. Plans for the health care included annual physical examination of all citizens, immunizations and 30 days of vacation leaves at certain mineral baths and spas (Moody, 1992). In theory this health care systems looked inclusive, but in practice the resources did not exist for these plans. Since the middle of the 1960s the annual spending on the health care system was roughly around 4% of the gross national product (GNP) compared to the United states with 12% of the GNP (Schultz & Rafferty, 1990; Moody, 1992). The reality was even more different, since next to the public health system a closed health care system developed in the Soviet Union, maintained by certain elite ministries. This closed system supposedly had better quality of health care (Schultz & Rafferty, 1990), drawing doctors to this system, as the paycheck was higher and the workload lighter. Not only did a closed health care system exist, the public health care system was in reality not free either, informal payments 'under the table' were expected at hospitals (Schultz & Rafferty, 1990). All in all, it proved to be a not properly functional health care system.

2.2 Conceptual model

Figure 2: Conceptual Model



With the problem statement and theoretical framework in mind, a conceptual model (figure 2) has been developed. In the model *political structure, health care system, amenable diseases* and *economic development* are the explaining variables which influence life expectancy. These variables are also able to explain the difference in life expectancy that exists between Finland and Estonia. For political structure one has to think of the existence of communism, which has been proven to be a negative factor for life expectancy after the 1960s, or the presence of a welfare state, which has been proven to be a positive factor for life expectancy (Navarro & Shi, 2001). Similarly economic development can both

positively and negatively influence life expectancy, in which a high economic development probably indicates a higher life expectancy (Preston, 1975; Looman & Mackenbach, 2013). Furthermore are amenable diseases a factor, if a high number of amenable diseases exist, this has a negative effect on the life expectancy. The amount of amenable diseases depends on the health care system, which is dependent on political structures and economic development as well.

2.3 Hypotheses

Based on literature I expect a clear link between the communist history of Estonia and the lower life expectancy compared to Finland, which is part of the social democratic welfare states. I also hypothesize that a clear link will be seen between amenable mortality and life expectancy in the two countries. Furthermore I expect that the epidemiological transition as described by Vallin & Meslé (2005) will be different in Estonia compared to Finland, where Finland is the more successful country in this transition, and thus has been reaching the stages earlier than Estonia.

3. METHODOLOGY

3.1 The background dataset

Multiple datasets are used in this thesis. The first dataset is the Human Mortality Database (HMD), which will provide precise historical data suited for life expectancy and death rates for both Finland and Estonia. For cause specific data relating mortality two datasets will be used: The World Health Organization (WHO) dataset, which includes cause of deaths on a national level. Which will provide a dataset for Finland. The other dataset that is used is the Human Cause-of-Death database (HCD), which is a dataset based on WHO data. This will provide the dataset for Estonia. Reason that the HCD is picked over the WHO dataset is that the WHO data can be severely disrupted by periodical changes in the diseases classification (HCD, 2019). The HCD has made transitions in the WHO classification which results in a more continuous dataset. The WHO dataset is discontinuous because of this change in ICD classifications, therefore the HCD is a more consistent and precise dataset, however, the dataset also has limitations as it is only available for a small number of countries, of which Estonia is one. Therefore this dataset will be used for Estonia, but is it not possible to use it for Finland. This means that two different datasets will be used, from which one dataset is more precise than the other, therefore one needs to be careful in the conclusions drawn from some numbers. Other data has been drawn from the World Bank as well, for the statistics of GDP per capita in six selected countries.

3.2 Selection of cases and variables

Part of this research includes amenable mortality in Estonia and Finland, compared over a period from the 1950s until now. The list of ICD codes (table 1) is based on Nolte & McKee (2004, 2008) and the Office of National Statistics (2011). Multiple ICD versions have been used. ICD 7 for the period 1952-1968, ICD8a for the period 1969-1986, ICD9 for the period 1987-1995 and ICD 10 for the period 1996-2014. The HCD codes are used for the period of 1955-2012. For both datasets data was provided by sex,

and 5 year age bands. For the WHO, some of the data was transformed to fit the 5 year age bands. The time period of the 1952/1955-2012/2014 was picked to have as much data on the development of amenable mortality in the two countries as possible, in this way trying to get a possible overview of the three stages in the epidemiological transition as described by Vallin and Meslé (2005).

Table 1: Amenable mortality list

Cause of death amenable to health care	Age	ICD 7 code	ICD 8a code	ICD 9 code	ICD 10 code	HCD Code (Estonia)
Infections						
Tuberculosis	0-74	A1-A5	A6-A10	B02	A15-A19, B90	8-11 & 46
Selected invasive bacterial and protozoal infections	0-74	A17, A18, A20, A23, A37, A71	A17, A18, A19, A21, A31, A72,	B035, B06 B038 B052 B220	A38-A41, A46, A48:1, B50-B54, G00, G03, J02, L03	18, 29, 20, 22, 34, 92
Hepatitis C	0-74	A34	A28	B046	B17.1, B18.2	30
Neoplasms						
Malignant neoplasm of colon and rectum	0-74	A47, A48	A48, A49	B093. B094	C18-C21	52 & 53
Malignant melanoma of skin	0-74	A55	A53	B111	C43	61
Malignant neoplasm of breast	0-74	A51	A54	B174	C50	63
Malignant neoplasm of cervix uteri	0-74	A52	A55	B120	C53	64
Malignant neoplasm of bladder	0-74	A57	A58	B126	C67	70
Malignant neoplasm of thyroid gland	0-74	A57	A58	B13	C73	73*
Hodgkin's disease	0-74	A59	A60	B140	C81	76*
Leukaemia	0-44	A58	A59	B141	C91, C92.0	78*
Benign neoplasms	0-74	A60	A61	B15	D10-D36	79*
Neurological disorders						
Epilepsy and status epilepticus	0-74	A73	A69*	B210	G40-G41	100

Cardiovascular diseases						
Rheumatic and other valvular heart disease	0-74	A79, A80	A80, A81	B25	I01-I09	106 & 107
Hypertensive diseases	0-74	A83	A82	B26	I10-I15	108-112
Ischaemic heart disease	0-74	A85	A83	B27	I20-I25	113-115*
Cerebrovascular diseases	0-74	A86	A85	B29	I60-I69	121-124
Respiratory diseases						
Influenza	0-74	A88	A90	B322	J09-J11	130*
Pneumonia	0-74	A89-A91	A91, A92	B321	J12-J18	131-133
Asthma	0-74	A66	A93	B323	J45-J46	136
Digestive disorders						
Gastric and duodenal ulcer	0-74	A99, A100, A101	A098, A099	B341	K25-K28	144, 145
Acute abdomen, appendicitis, intestinal obstruction, cholecystitis/lithiasis, pancreatitis, hernia	0-74	A102, A103, A106	A100, A101, A103	B342, B343, B344	K35-K38, K40-K46, K80-K83, K85, K86.1-K86.9, K91.5	147,148, 155, 156, 157

Source: Nolte & McKee (2004, 2008) & Office of National Statistics (2011)

*HCD sometimes includes more ICD codes for a cause than is given in the ICD coding

3.3 Analyses

The amenable mortality data for both Finland and Estonia was age standardized per 100.000 people. The data for Finland had to be transformed from absolute number of deaths in a year to age-specific death rates. For the mid-year population of Finland the WHO database was used, this way a mortality rate could be calculated. The mortality rate of Estonia was given per 1.000.000 in integer numbers, and was eventually transformed to data per 100.000. For the age standardization a standard population was used. This standard population was the European Standard Population of 2013 (Eurostat, 2013). The age standardization has been done per single disease code, this standardized rate then was multiplied by the standard population and then summed up per 'disease group' (e.g. neoplasms). This allows comparison between Finland and Estonia per 'disease group'. The calculation of age standardization has been done following age standardization techniques (Preston et al., 2001). Data has resulted in multiple graphs which are combined data of the WHO and HCD. Data analysis has been done in Microsoft Excel.

3.4 Quality of the data

Some problems with the data exist. The most obvious one is the change in classification in the WHO database, which means that there can be a discontinuous trend, therefore the data for Finland might be less accurate than the data for Estonia. This has been the case for the cardiovascular diseases in the ICD 7 period. Therefore the period 1952-1968 is not included for the cardiovascular diseases for Finland. Similarly rigorous transitions for neoplasms exist for Finland, because of the classification codes. This makes the data for neoplasms less useful, but a general trend can still be seen.

Other struggles with the data occurred as well. The HCD codes sometimes include more ICD codes than shown in the table, for example the Hodgkin's disease is coded with 76, but this code includes more than just the Hodgkin's disease. The data is still included, but one needs to keep in mind that this makes the data less accurate and less comparable. It also goes the other way around, for example the specific cause of epilepsy falls in ICD 8 under the category psychoses, which is much broader than just the cause of epilepsy, however, I have still included this as in other ICD versions it is more specific, so for some periods the numbers might not be as accurate as for other periods.

4. RESULTS

4.1 Life expectancy and the epidemiological transition

An overview of the age standardized amenable mortality can be seen per disease group in figure 3 (page 13). In these graphs the trajectory through the epidemiological transition can be seen for both countries, though the transition is different for both countries. Looking at the total amenable mortality rate per 100.000 (figure 3, A) for Estonia and Finland there obviously has been a decrease in mortality between 1955 and 2015. However both countries show a much different trajectory to get to their current situation. Although Finland starts with a higher mortality rate in 1969 (and presumably in the 1950s as well – data was of low quality for cardiovascular diseases in ICD 7) it quickly drops during the 1970s and has been decreasing ever since. While for Estonia the total mortality rate amenable to health care has been fluctuating around the same number per 100.000 during much from the 1950s to the 1980s (figure 3, A), with its highest peak in the 1990s. This is much in pattern with the life expectancy trends in the 1990s in other post-communist countries, where life expectancy dropped to the lowest point during the 1990s, just after the fall of communism and restoration of independence for Estonia.

Laying these results next to the epidemiological transition stages it is clear that both countries have successfully 'completed' the first stage with the decreasing amount of deaths amenable to infectious diseases such as tuberculosis. Finland and Estonia show almost exactly the same pattern, although Estonia is constantly above Finland. Also, Estonia has never been successful in almost completely diminishing the deaths amenable to infectious diseases like Finland has. Notable is the small peak just after the 1990s, after the fall of the Soviet Union. This is in line with what can be observed in many other former USSR countries. Estonia, like the other Baltic countries, was unable to adapt from the

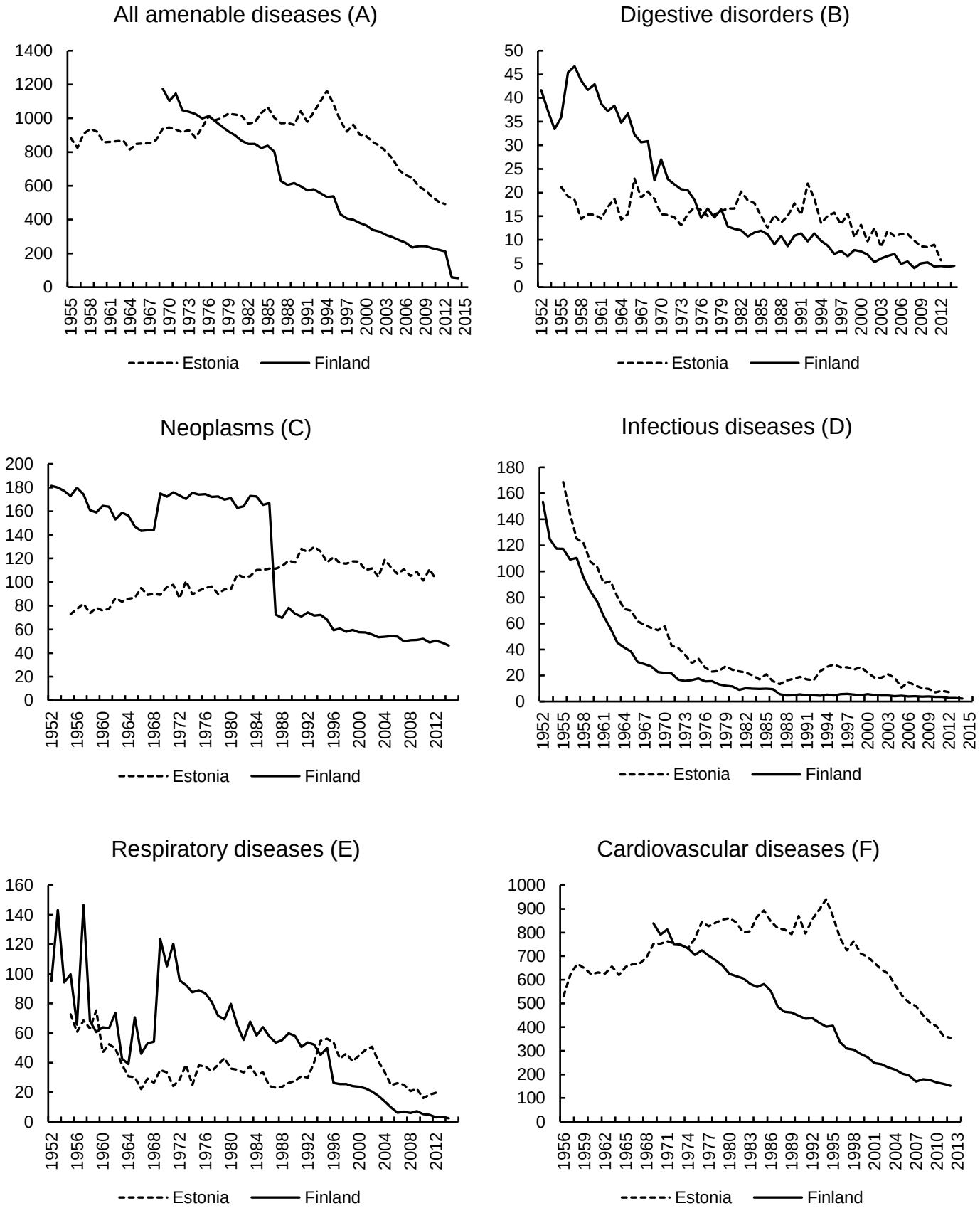
centrally planned hierarchical economy to the rigorous change into the market economy after the collapse of the Soviet regime (Vallin & Meslé, 2017; Habicht et al, 2018).

Due to this communist regime, Estonia and with it other post-communist countries, were unable to adapt into the cardiovascular revolution, in which Western countries were successful. Not only did Estonia need to adapt to the change in the structure of the economy, Estonia also needed to adapt to a change in the structure of the health care. During the Soviet period the health care system was based on the USSR sanitary-epidemiological service network (SANEPID), which was very centralized for the whole Soviet Union (Habicht et al, 2018). This then meant that Estonia had to basically completely reform the health care system after the collapse of the USSR, while also being in economic despair. A combination which proved to be a failure and in need of time to regain success.

Figure 3 very clearly shows this failure of adapting to the cardiovascular revolution (F) in which Finland proved to be successful. While Finland had a mortality rate of ca. 406 deaths per 100.000 people amenable to cardiovascular diseases in 1995, numbers were almost twice as high for Estonia with ca. 806 deaths amenable to cardiovascular diseases. This can be seen in the general life expectancy trend around 1990 to 1995. For males life expectancy dropped from 64,47 in 1990 to 60,82 in 1993 (figure 1) and for females life expectancy dropped from 74,97 in 1990 to 72,99 in 1993 (figure 1). Meanwhile Finland's life expectancy kept rising steadily during this same period, largely due to the decline in cardiovascular mortality (figure 1). This Estonian failure in the cardiovascular transition proved to be at its peak in the 1990s, but during the 1960s and beyond the cardiovascular mortality also had been rising, while it was declining in Finland (figure 3, F). This is related to the quality of health care in the Soviet Union, which was in practice not as successful as the inclusive utopian philosophy that was developed under the communist regime (Schultz & Rafferty, 1990; Moody, 1992). Not only did Estonia see a rise in amenable diseases, similar trends in the whole Soviet Union happened at the end of the 1980s with the abolishment of the anti-alcohol campaign of Gorbachev (Jasilionis,et al., 2011), which obviously also impacted life expectancy in Estonia.

The third wave in the epidemiological transition is the slowing of the aging process (Vallin & Meslé, 2005). When considering all amenable mortality in 2012, only 211,3 people died of amenable diseases per 100.000 people in Finland, compared to 491,77 in Estonia (figure 3, A). While amenable mortality is not the only factor influencing mortality rate and life expectancy, it is important to be able to diminish amenable mortality as much as possible to achieve the slowing of the aging process. As amenable mortality is in fact unnecessary, and the lower this number is, the bigger the chance of slowing the aging process is.

Figure 3: Trend in age standardized amenable mortality rates, calculated per 100.000



Source: WHO and HCD

4.2 The 'spiky' history of Estonia

A peak in the amenable mortality rate in the 1990s in Estonia also happened for other diseases than cardiovascular diseases, such as respiratory diseases (figure 3, E) , which is a notable one. Before the fall of the USSR in 1991 Finland actually consistently had a higher mortality rate in mortality amenable to respiratory diseases, but after the fall of the USSR the tables turned. This post-communist change really seems like a crucial event for Estonia and the other Baltic countries, which have always been influenced by a troubled history and sudden events like the fall of the USSR. I would describe the life expectancy of Estonia as spiky, with positive 'spikes', as well as negative ones. Before becoming part of the USSR during the WWII, Estonia was performing rather well in terms of life expectancy. To illustrate: in the late 1930s life expectancy in Estonia and Latvia grew faster than the life expectancy in France, which is generally seen as one of the leaders in terms of life expectancy. For a short while Latvia had even a higher life expectancy than France (Vallin & Meslé, 2017). But after the start of the WWII, the Russian occupation meant a fallback in life expectancy for the Baltic countries. The countries fell back to the life expectancy of Russia, which was much lower than that of France – which scored similarly to the Baltic countries just a few years prior the start of the WWII. This change in life expectancy was felt much more in the Baltic countries than in Central European countries such as the Czech Republic, that got pushed into communism, but remained as an independent state in a way. While the Baltic countries got fully integrated into the Soviet Union, a more brutal drop in life expectancy was noticed here (Vallin & Meslé, 2017)

However after this initial fallback in the 1940s, the Communists were actually quite successful in the 1950s and 1960s in terms of life expectancy (figure 1), which was due to the fact that the Soviet Union was very successful in fighting infectious diseases, which can be seen in figure 3 (D), and was mentioned before. However, this proved to be just another spike, as after the 1960s the divergence between Eastern Europe and Western Europe happened with the failure of adapting to the cardiovascular diseases. After overcoming the health crisis in the 1990s, Estonia (and Latvia and Lithuania) noticed a positive 'spike'. This was because of the entry into the European Union (Vallin & Meslé, 2017), after which Estonia was converging towards other Western European countries such as Finland, but diverging from Russia.

The point at which the total amenable mortality of Finland dropped below that of Estonia was only after 1976 (figure 3, A), while the life expectancy already outgrew Estonia around 1970 (figure 1). In 1976 the absolute numbers of all amenable mortality were more or less the same: 1012,06 per 100.000 in Estonia and 1012,98 per 100.000 in Finland. The relative share in 1976 of different causes of amenable mortality was different however. The relative share of cardiovascular diseases in 1976 in Estonia formed a share of 83,44% of all amenable diseases, while in Finland this number was 71,50%. As the absolute numbers were equal in 1976, Estonia actually seemed more successful in diminishing other diseases such as respiratory diseases (figure 3, E) and digestive disorders (figure 3, B) than Finland. However after 1976 numbers of cardiovascular diseases continued to drop in Finland and only started to grow in

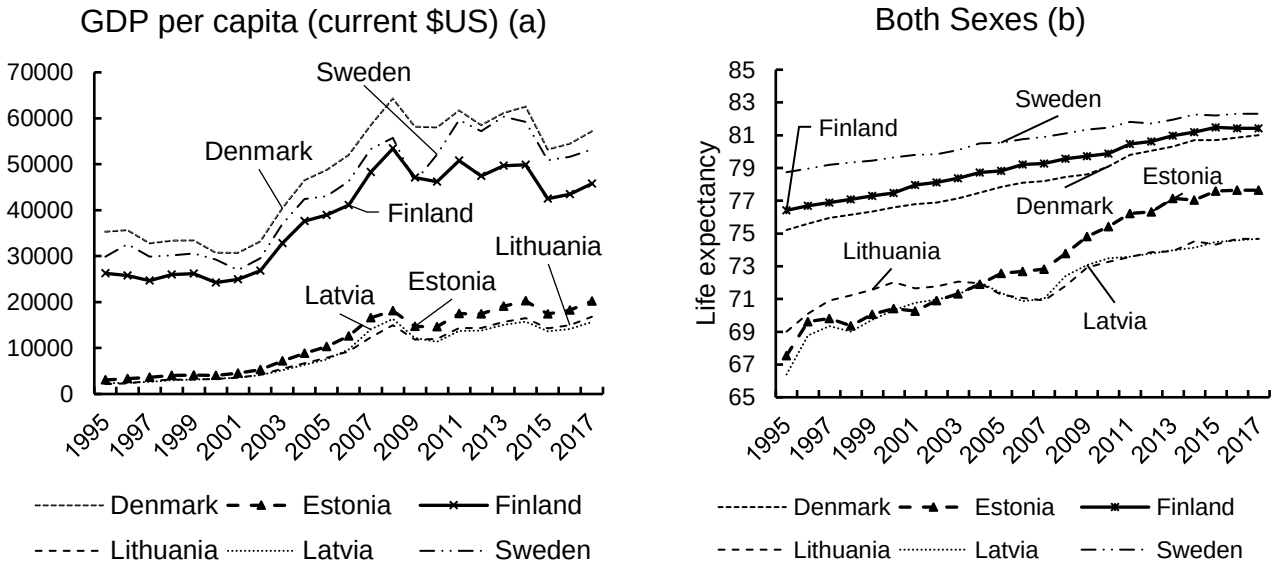
Estonia. This again confirms the general image that in first instance the health care system in the Soviet Union was successful in dealing with most diseases, but was not able to jump on the second wave of the cardiovascular revolution as Finland did.

Looking at the relative share of cardiovascular diseases in more recent years it is notable that in 2012 Finland and Estonia had almost the same share of cardiovascular diseases in the total amenable mortality. For Finland the relative share of cardiovascular diseases on the total amenable mortality was 71,92%, while for Estonia this share was 72,16%. This share would suggest that Estonia has been equally successful in diminishing other diseases such as neoplasms (figure 3, C). However in terms of absolute numbers Estonia scores higher on all disease groups in 2012. Although relatively speaking cardiovascular diseases form an equally big group on both countries, the absolute numbers still prove to be a big part of the explanation why life expectancy in Estonia is lower.

4.3 Economic development and health care expenditure

Figure 1 and 3 prove that in both life expectancy and amenable diseases Estonia is scoring worse than Finland. Amenable diseases prove to be a good indicator of the health care system in a country, results so far suggest that the health care system is therefore worse than that of Finland. There are more indicators that have a link with health care. Such as economic development and political system. Figure 4(a) shows the difference in GDP per capita between the Scandinavian welfare countries (Norway not included) and the Baltic States, in which a clear gap is visible, a similar gap between the two groups of

Figure 4(a): GDP per capita in US dollars in Denmark, Finland, Sweden & Lithuania, Latvia, Estonia; (b): Life expectancy in Denmark, Finland, Sweden & Lithuania, Latvia, Estonia



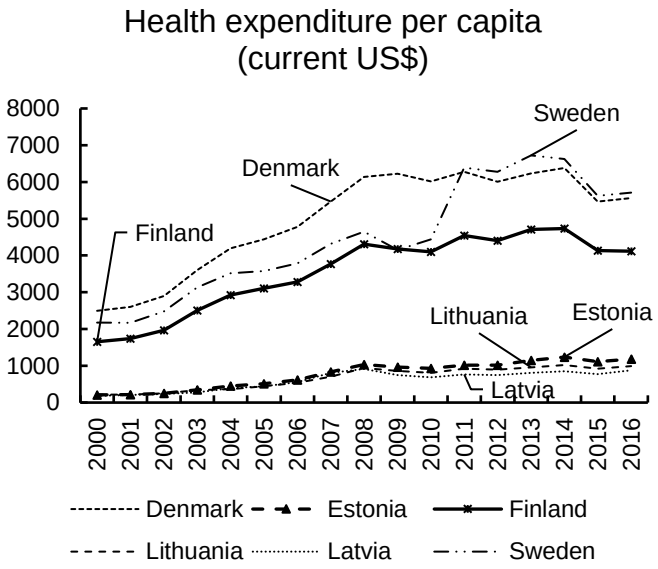
Source: World Bank (2017)

countries is also seen in life expectancy (figure 4b), adding to the literature that suggests that there is a link between a higher life expectancy and a wealthier economy (Preston, 1975; Looman & Mackenbach, 2013). Not only is this in line with economic connections to life expectancy, but is it also in line with

the general thought that life expectancy develops in groups. Chung & Muntaner (2007), suggested that countries as groups seem to adapt the same policies, resulting in more similar life expectancy per group. Figure 4(b) seems to prove this, the Baltic States, which Estonia is part of, have a lower life expectancy than the Scandinavian group with Finland. Although Estonia is the leader of the Baltic country and seems to be diverging from the Batlic countries slowly (Jasilionis et al, 2011).

A link between economic development and health care expenditure also exists. The Scandinavian welfare states of Denmark, Finland and Sweden spend much more on health care per capita than the Baltic countries (figure 5) This is exactly in the same pattern of life expectancy and economic development. Suggesting that ultimately more economic power also allows for higher health care expenditure. Though numbers in the figures are recent, I would state that the trend is not necessarily recent. The USSR (with Estonia) also had less economic power and thus a lower amount of the GNP went to their health care system, as mentioned before this was only 4% in 1965 compared to the 12% of the United States (Schultz & Rafferty, 1990; Moody, 1992). Although currently the Baltic countries in no way have a communist type of government, their spending power is less, which could mean that they are not able to invest as much in health care as the Scandinavian welfare states. However, the data on

Figure 5: Health expenditure per capita in US Dollars in Denmark, Finland, Sweden & Estonia, Lithuania and Estonia



Source: World Bank, 2016

health expenditure does not tell anything about the efficiency of the budget and health care. Finland's health expenditure is much lower than that of Denmark, yet Finland scores higher in terms of life expectancy. Similarly Estonia has nearly the same health expenditure as Lithuania and Latvia, yet Estonia is diverging from the Baltic States in life expectancy with a life expectancy of 77,64 years in 2017 compared to 74,67 and 74,68 in Lithuania and Latvia. This suggests that Estonia is more efficient with their health expenditure than the other two Baltic countries.

5. CONCLUSIONS

The aim of this thesis was to find out *what explains the difference in life expectancy between Finland and Estonia?* This thesis proves that Estonia has had a higher amenable mortality – amenable mortality is an indicator of the quality of health care – since 1977, while Finland has seen a decline in amenable mortality ever since it dropped below Estonia. At first the communist health care system was successful in diminishing amenable diseases in Estonia, much in line with the first stage of the epidemiological transition, but eventually it failed to deal with cardiovascular diseases, in which Finland proved to be much more successful than Estonia. The second stage of the epidemiological transition – the cardiovascular revolution – proved to be a main driver for the divergence between Finland and Estonia. After the fall of the Soviet Union in 1991, a large drop in life expectancy was seen in Estonia and amenable mortality peaked during this time. Estonia had to deal with a huge socioeconomic crisis while also in need to transform its health care system from the communist system towards an independent health care system. A transition which took a while to show a new converging trends towards Finland in more recent years.

Life expectancy in Estonia has proven to be spiky, in mostly a negative way. The troubled history of Estonia has meant that it has seen many negative spikes in the 20th century. Before the WWII, Estonia was doing rather well in terms of life expectancy, on a similar level as France, after becoming part of the Soviet Union the first negative spike was seen, then a new spike happened after the 70s with the failure of diminishing the cardiovascular diseases, and another negative spike after the fall of the Soviet Union. Since Estonia joined the European Union a continuous upwards spiral has been observed, and even a divergence of the other Baltic countries.

Economic development and political systems (e.g. social democratic welfare state), have also proven to be influencers of life expectancy in a positive way. Policies are likely to be adopted in groups, in which Finland is part of the wealthy social democratic welfare states of Scandinavia, while Estonia is part of a poorer area with the Baltic countries. Estonia is, however, leading in terms of life expectancy in the Baltic Countries. A convergent trend towards Finland has been happening, but Estonia has not caught up yet. While Finland might already have entered the third stage of the epidemiological transition – the slowing of the aging process – the cardiovascular diseases are still a big issue for Estonia, which it has to deal with first, which can only happen with better health care. Then Estonia has all the possibilities to catch up with Finland.

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