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Consequences and preparedness of pandemic influenza, a national concern.

A study of the effects of the Asian flu on the Swedish military

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Abstract

Background: In 1918, the Spanish flu pandemic killed an estimate number of between 50 and 100 million people worldwide. 40 years later a new influenza pandemic, the Asian flu spread throughout the world. The Asian flu hit a large proportion of the world's population but the case-fatality rate was lower and an estimated number of 2 to 4 million people died in the pandemic. In order for today's governments to formulate good preparedness plan for future influenza pandemics, studying previous pandemics can give better understanding of how the community might be affected.

Aim: The aim of this study was to investigate the effects of the Asian flu pandemic on the Swedish military forces. By seeing if the regiment was affected by the Asian flu one can then assume that the whole society was affected.

Method: Data from Swedish regiments has been collected from the Defence Medical Administration Service at the National Archives and processed trough SPSS.

Result: The findings show that there where an increase of the amount of sick as well as the number of sick leaves during 1957 compared to previous and later years. Because of the increase in sick leaves one can draw the conclusion that the society has a great risk of being influenced. Hence, a preparedness plan will be even more important.

Conclusion: The community is affected by influenza pandemic in both an economical and a societal level. The effects are short in time since infected recover quite quick. However, there are effects which could be better handled if the government is prepared and has conducted a plan for when the next pandemic influenza strikes.

Key words: Asian flu, community effects, preparedness plan,

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1. Introduction

Last week a man dropped dead on a street in California after having been infected by a highly lethal virus. An outbreak of the Motaba virus has occurred in Ceder Creek, USA. The virus is believed to have been carried by a monkey from Africa to the US. It is causing several people severe bleeding and liquefied internal organs, and killing the infected person within 3 days. The Centres for Disease Control and Prevention (CDC) and the US Army Medical Research Institute of Infectious Diseases (USAMRIID) are now looking for the host monkey and trying to find a serum, while more and more people die each minute. Infected people, and even a whole town, have been quarantined, and a specialized medical centre has been set up. No one but medical experts is allowed to go inside the quarantined zone, which the US army is protecting. All new cases of Motaba infected persons are sent to the specialized medical centre in the quarantined area. The US president George W Bush requests people to stay at home and close all windows and ventilation systems.

The above text is not a cited lead paragraph from a known American paper, but merely a plot summery from the movie *Outbreak* directed by Wolfgang Petersen. The film is made up, but when summarized it appears very much like a hypothetical real scenario. In recent years, national and international media has reported of pandemics killing mostly children, adolescents and older men and women (Time archive, 2008; Snaprud, 2005). The avian flu, Severe Acute Respiratory Syndrome (SARS) (which has quite a similar disease pattern as the flu), Ebola, Mad cow disease (BSSE), and Antiviral Immunodeficiency Syndrome (AIDS) are example of pandemics that has terrified the public during the last decades. During spring of 2003 I became aware of the affect a pandemic disease can have on people in the world. As I was going to Bangkok to visit a friend, media reported of a horrible disease called SARS. Even though just a few people was affected and died, people were scared. When queuing to board the plane it was me and three semi Thai couples that were standing in line. Arriving and moving around in Bangkok was a small shock, there were no tourists to be seen. This, I believe, must have damaged the tourist industry enormously. My understanding is that just the notion of a pandemic terrifies people and, therefore affects our actions. Imagine what a great pandemic, such as the Spanish flu, could accomplish in human suffering, physical, social and economical. Cox, Tamblyn and Tam (2003, p 1802) declares that a strong national emergency plan for pandemics can prevent people getting sick or die and can also help ease public fear.

The government is responsible for the security and sense of safety of its population. It is therefore on their part to create a pandemic preparedness plan.

2. Aim

This study aims at investigating the community effects of a pandemic influenza in order to emphasise if an influenza pandemic preparedness plan is of importance. The effects of the influenza on the Swedish armed forces during the Asian flu in 1957-58 will be compared to 1955, 1956, 1959 and 1960. By studying the effects of the Asian flu on the Swedish armed forces, we aim at being able to draw conclusions on the effects on the Swedish society as a whole.

3. Background

3.1 Epidemic and Pandemic

The spread of diseases are depending on the characteristics of the host, the agent and the environment, while the effect of the disease in the host depend on a number of factors particular to the agent or pathogen (Banister, Begg & Gillespie, 2000, p 14). An epidemic is a disease that occur in more cases than would be expected in a community during a given time period (MedicineNet, 2008). A pandemic is an epidemic which has been spread to several countries and continents during a short time. Influenza, plague, cholera and AIDS are the only four communicable diseases that hitherto have caused pandemics (Banister et al., 2000, p 6). More or less severe influenza epidemics occur almost every year and are most often caused by the influenza A virus. During an epidemic, the number of influenza cases in the population seldom exceeds 10 %, but could be as high as 50 % in certain areas. The most severe forms of influenza cases have occurred during pandemics (Banister et al., 2000, p 131).

In 1918, a disease spread over the world causing disaster for humankind. The disease was an influenza pandemic that came to be called the Spanish flu. Influenza pandemics are characterised by their rapid spread. The Spanish flu though, had two unusual features; the intensity of its attack and the fact that a lot of young people died. The case fatality rate was a stunning 25 times higher than during other influenza pandemics (Dehner, 2007, pp. 712-713). Between 50 and 100 million people died during the occurrence (Socialstyrelsen, 2006, p. 14). In more recent years the world has faced two additional influenza pandemics; the Asian flu (1957-1958), and the Hongkong flu (1968-1970), non as holocaustic as the Spanish flu.

3.2 The Asian flu

The Asian influenza first appeared in 1957 China. In May the same year, the Department of Influenza at the WHO reported that they had isolated a new type of the influenza A virus. An antigen shift had occurred and the earlier H1N1 virus causing the Spanish flu now had gone through an antigen shift becoming a H2N2 virus (Dehner, 2007 p. 715). During the summer it spread over Asia and in July it reached the Middle East and Africa by land, infecting millions along the way. In the latter parts of the summer of 1957 the influenza spread to America by sea and to Europe and Africa. In the end of August the Swedish Bacterial Laboratory (Statens Bakteriologiska Laboratorium, SBL) found infected people in Sweden. A group of Swedish scouts came back from an international camp in Great Britain and another group of youths returned from a music festival in the Soviet Union. It took another two months before the influenza hit the Swedish community and culminated in November of 1957. Many people became ill and several social functions were affected. Postal offices, the Telecommunications Administration, health and social insurance offices and schools lacked personnel. The hospitals were overcrowded and hospital staff became ill with the infection. From September 1957 to April 1958 over 1 million (15.2 %) of the Swedish population had had the flu and about 16 thousand (0.25 %) had died. Worldwide more than 2 million people died due to the flu (Rimbakusumo, 2006; Socialstyrelsen, 2006). Data show that the Asian flu fully reached Sweden in the end of 1957. In October, 22 389 cases of influenza was reported to SBL and in November the number of cases was 32 624, which is about 32 times higher than during the same months 1958 and 1959 (figure 1) (Epidemiologiska sektionens arkiv, 1954-1959).

Figure 1, Cases of influenza

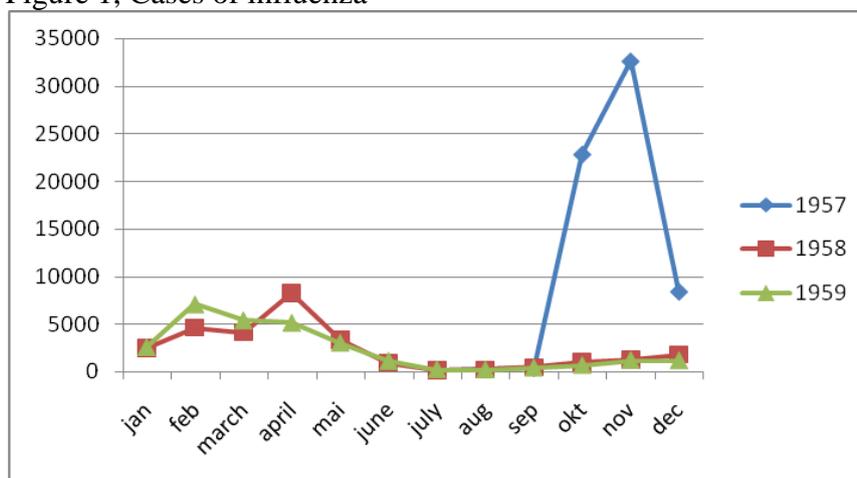


Figure 1: The amount of reported cases of influenza in Sweden each month in the year 1957, 1958, 1959. Source: SBL, Epidemiologiska sektionens arkiv, 1954-1959.

Each year Sweden, like other countries, have influenza epidemics infecting the population and sometimes killing elderly or people with immune deficiency diseases. Whether a pandemic or an epidemic, the time from becoming infected with influenza until the first symptoms presents themselves is about three days. The influenza transmits through body contact or droplets. The symptoms of influenza are high fever, headache, sore throat and cough, leaving one in bed rest for about five to six days until one starts feeling better again. The respiratory tract is the most effected and can cause considerable morbidity and sometimes death among the population. However, during a pandemic the symptoms can be worse, last for a longer time and the virus will more easily transmit between humans (Banister et al., 1996, pp. 1, 131-132, Iwarson & Norrby, 2004, p 163-164). Pandemics appear in two waves, the second being less contentious as the first wave (Cox et al., 2003). The antigen shift that occurs before a pandemic influenza makes it possible for the influenza virus to penetrate the human immune defence system. People do not carry any antigens for this newly developed influenza virus and the risk of becoming infected is increased (Banister et al, 1996, pp. 15, 131-132; Iwarson & Norrby, 2004, p 163).

4. Theory

Historically, pandemics have been located to Eurasia. For about 5000 to 1000 years ago the Incas, the Mayans, the Aztecs, and the Australian aborigines were isolated from the rest of the world in comparison to Asia and Europe which had an active barter exchange. Due to traffic of trade diseases such as smallpox, measles and influenza were common among the population of Eurasia. Europeans and Asians therefore had quite good herd immunity to infectious diseases. Later, in the 16th century, when the Americas were colonised by the Europeans, the indigenous population was almost wiped out by infectious diseases like smallpox and measles, due to lack of immunity (Lindstrand, Bergström, Rosling, Rubenson, Stenson, & Tyllskär, 2007, p. 27). Nowadays there are a very limited amount of isolated populations that lacks immunity against common communicable diseases. The risk of spreading devastating epidemics is instead due to improved communications which makes it possible for a virus to spread quickly over long distances. Epidemics, that previously took a long time to spread over Eurasia, now transports from one side of the globe to another in merely a few hours. The World Health Organization (WHO) has said that infectious diseases are travelling faster now than at any time earlier in history (United States Government

Accountability Office [GAO], 2007, p. 2). Pandemics put a greater pressure on both the national and the international authorities to be prepared for when they arrive.

As seen in figure 1 above, many Swedes became ill with the influenza in the end of 1957 and, consequently essential community functions were effected (Socialstyrelsen, 2006, p 7). Once a new influenza A virus has been developed through an antigen shift and spread from man to man and from country to country it will already be too late to address the many key measures required to minimize the impact of the pandemic (Cox et al., 2003, p. 1802). By looking at the political and economical effects of a pandemic one can increase one's understanding of the community effects and the importance of a preparedness plan.

4.1 The political ecology of pandemics

In an article written by Salehi and Ali (2006), the authors stated that the 2002 SARS outbreak in the Toronto region in Canada was poorly handled. Because of the ineffectual interference by the government, many people were unnecessarily infected and the costs were large. Salehi and Ali (2006, pp. 376-378) declared that the SARS outbreak in Toronto, Canada, became a much bigger hazard than it would have been if the Toronto Public Health (TPH), the municipal governmental agency responsible for disease surveillance, had been prepared. The main factors found were an initially weak surveillance, lack of surge capacity, and inadequate capacity for epidemiological investigation. The number of employees at the TPH was not enough to be able to handle a crisis like the SARS and the computer systems were substandard. Consequently, the personnel at the local hospital were overloaded with work caring for contagious patients. Several nurses and doctors became ill and those who were not sick had to make up for the staff being at home. The anticipating reason for the inadequate preparedness of the outbreak is the fiscal exiguity, according to Salehi and Ali.

Pandemics are a global matter and, hence, close international collaboration is of importance. In 1999, the WHO published its first preparedness plan for pandemics and updated it in 2005, *WHO global influenza preparedness plan – The role of WHO and recommendations for national measures before and during pandemics* (Cox et al., 2003, p. 1802; WHO, 2005). In Sweden, both national and regional plans have been formed, elucidating that in case of an influenza pandemic the Swedish Social Welfare Agency (Socialstyrelsen) should summon the National Pandemic Group (Nationella pandemi gruppen, NPG) which contains representatives from the Swedish municipal and county councils (Sveriges kommuner och landsting, SKL),

the Swedish Institute for infectious diseases (Smittskyddsinstitutet, SMI), the Medical Product Administration (Läkemedelsverket), the Swedish Emergency Management Agency (Kris- och beredskapsmyndigheten) and the Swedish Work Environment Authority (Arbetsmiljöverket) (Socialstyrelsen, 2007, pp. 15, 29-30). Both the Swedish national and regional plans are focusing on the medical and health care aspects, but say little about the community as a whole. Glass, Glass, Beyeler and Min (2006, pp. 1671, 1679-80) have made a study of how targeted social distancing could minimize the effect of a pandemic influenza. The result shows that by reducing contact between people by taking them from their social networks, local progression of pandemic influenza could be mitigated. This could be carried out by closing schools, cinemas, working places and churches. This suggests that societies and the national economy could be affected through loss of work force and production. Hence, the government needs to be prepared on both a medical and health care level as well as on a social level.

Blendon et al. (2008) agrees with Glass et al. (2006) that social distancing is part of the solution in minimising pandemic influenza mitigation. However, Blendon et al. has gone further to investigate the effect social distancing could have on the public as well as on the individual. Most respondents in their study would cooperate with community recommendation in case of a pandemic influenza (Blendon et al., 2008, p. 782). But, they would be challenged to comply with the recommendation if doing so meant risking their income or job. Governmental preparedness will increase public compliance to follow the pandemic influenza mitigation recommendations (ibid. p. 783). Hence, people active in social distancing will need access to food supply, medicines, at-home care, knowledge of transmission and how to care for influenza and vaccines. Parents will need help taking care of their children when school and day-care is closed down.

4.2 The economical effects

The World Bank believes that an influenza pandemic would have a great impact on global economy, with the financial repercussions lasting longer than the influenza. They estimate that the loss in Gross National Product (GNP) during an influenza pandemic will be US\$ 800 billion (The World Bank, 2005). In an article the leading World Bank economist for East Asia and the Pacific region, Milan Brahmbhatt, says that the economic effect from the avian flu is not merely local, affecting the agricultural sector among producers of poultry. The effects are much wider, affecting distributors as well as producers of feed and other inputs for poultry.

Additionally, except the effect on agricultural production, a pandemic flu could have a devastating impact on the tourist industry. Brahmhatt says that:

“[a] severe global flu pandemic could also entail a sizeable loss of potential world output through a reduction in the size and productivity of the world labor force, due to illness and death, as well as heavy medical and hospitalization costs”

(The World Bank, 2005)

Hence, as Brahmhatt declares it is not only the ones infected that will be affected by a pandemic influenza, but the whole community. The economical effects are not individual but will spread like a ripple through water. That is, there will be loss of salary, a fall in production, and further on a reduction of national export. On a national economy level, a country could make substantial losses if not prepared for a pandemic.

Except the effects on people's health caused by the flu, a pandemic could be financially devastating for all countries, whether within low-, middle-, and high- income. Pennisi (1995, p. 1916) writes that the pandemics of 1957 and 1968 together cost about 32 billion American dollars (in 1995 value) in lost productivity and medical expenses. In 1995 Doctor Bengt Körlof at the SBL calculated the costs of the Asian flu pandemic in Sweden to 130 million Swedish crowns. The Körlof amount is based on data of sick leave registered at the Swedish Public Health Insurance agency (Försäkringskassan). Körlof claims that if more people had been vaccinated in advance the costs consequently would have been lower (Socialstyrelsen, 2006, p.18). That is, if the Swedish state had been prepared.

Because influenza is a disease with a changing virological pattern a vaccine could never be prepared in advance, which means that we cannot hinder people from becoming ill. A community preparedness plan is therefore important in order to lower the economical and societal effects (Socialstyrelsen, 2006, p. 9)

With the knowledge of how an influenza pandemic could affect the community in a virological, social and economical way, we set out at locking on the level of which Sweden was affected by the Asian flu in 1957-1958. By measuring the number of infected we can see

if the level of diseased increased during the Asian flu and, hence, if the community was effected. If the level of sick increased during the end of 1957 and beginning of 1958 it indicates that the community was affected according to the theories above. From the results and the theories the effect of the Asian flu will be discussed and analysed later.

5. Method

This study is based on data from the Defence Medical Administration Service (in Swedish: Försvarets sjukvårdsstyrelse) at the Swedish armed forces during the time of the Asian flu in the end of the 1950ies. By using data of the number of sick soldiers, the number of influenza diagnoses and the number of sick days at the Swedish regiment from 1955 to 1960, I like to compare the effects a pandemic could have on the Swedish community. Data from 1957 and 1958 will be compared to the reference years of 1955, 1956, 1959, and 1960. My assumption is that the data concerning the military soldiers will reflect if the Swedish community was virological, economically and socially effected by the Asian flu pandemic. The Swedish military has detailed data of sick soldiers for the period of years covered in this study.

The regiments are viewed up on as small societies. The soldiers eat, sleep, work and live at the regiment and seldom leave the area, much like the community as a whole. The difference is that the population at the regiments are homogenous, mostly healthy males in their youths, which need to be taken in consideration throughout this study.

5.1 Data collection

In order to answer the aim of the study and probate the hypothesis, data of the number of sick soldiers, the number of influenza cases, the number of sick days, the ratio of sick days per 100 working days, and the number of deaths has been gathered from the Defence Medical Administration Service. The material has been collected from the original documents from the period 1955 to 1960 at the National Archives and the Regional State Archives of Sweden. The documents were found at the Swedish National Archives, were I had sought and received access to read and copy the material necessary for this study.

5.2 Material

The material used is based on data records from Swedish regiments ($n_0 = 72$). The geographical distributions of the regiments are due to military priorities. Some regiments were excluded in order to present equal data for each year. Only the regiments that existed throughout the whole period of time are presented in the study. Regiment F18 prevailed during the years 1955 to 1960 but has missing data and is therefore removed from this study. The navy is ablated since its data is irregular and might influence the diatribe. Solely the enlisted soldiers are included and not the staff. Data of influenza infected soldiers on a monthly basis did not exist and is therefore not included in this study. Monthly data of diseased soldiers are only presented for 1957 to 1959 in order to clarify the distribution of sick over the year during the critical year of the Asian flu and an additional year for comparison.

However, in order to process and calculate the relationship between the number of influenza cases, the total sum of sick, the number of deaths, the number of sick days, and the ratio of sick days per 100 working days through SPSS (Statistical Package for the Social Sciences), data has been summarised for respective years 1955, 1956, 1957, 1958, 1959 and 1960. For each year the same regiments has been used. The summarized figures for each year forms the cases used for the SPSS calculation, which changes the case number to 6 ($n = 6$).

5.3 Analyse

Spearman's rank correlation coefficient (r_s) has been used to calculate the association between the number of influenza cases per year from 1955 to 1960 and the total number of sick soldiers reported, total sick days as well as the ratio sick days per 100 working days. To be considerate as a significant association, p -value less than 0.05 has been used. The data collected are on the ordinal scale; therefore Spearman's has been used in the analyses. SPSS has been used in order to analyse the data.

5.4 Ethical approach

The data collected does not include any names of the soldiers merely figures, therefore, no ethical approval have been applied for. I contacted the Swedish National Archives that gave me permission to go through and copy the documents necessary to complete the study.

6. Results

Data from the Swedish armed forces show that 67 404 soldiers became sick during 1957, which was slightly more than the reference years 1955 (61 294), 1956 (51 371), 1959 (55 968) and 1960 (61 799) and that 58 646 soldiers in became sick in 1958, which shows no remarkable changes compare to the other years (Figure 2). (Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b) . From 1956 to 1957 the reported number of sick soldiers increased with 16 033 reported cases, that is 23.7 %.

Figure 2, Number of sick soldiers

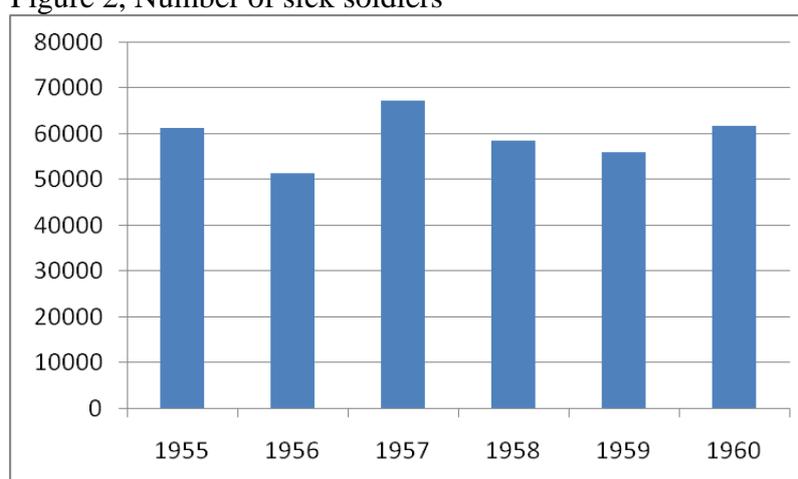


Figure 2: The yearly number of sick soldiers at the Swedish regiment during the years 1957 – 1960 Source: Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b

When looking at the number of soldiers reported sick each month during 1957, 1958 and 1959 one can see that in October 1957, 20 124 soldiers were reported sick. That was almost four times more than during the same month 1958 (5 150) and 1959 (4 811) (figure 2). In November 1957 the amount of sick soldiers had decreased (7 010) but was slightly higher than in 1958 (4 755) and 1959 (4 927). During December 1957 and January 1958 there was no noteworthy difference of diseased soldiers. However, in February 1958 the second wave of the Asian flu emerged resulting in a slight increase in the number (8 165) of soldiers reported sick compare to the reference years 1957 (5 821) and 1959 (6 614) (Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b).

Figure 3, Number of sick soldiers per month

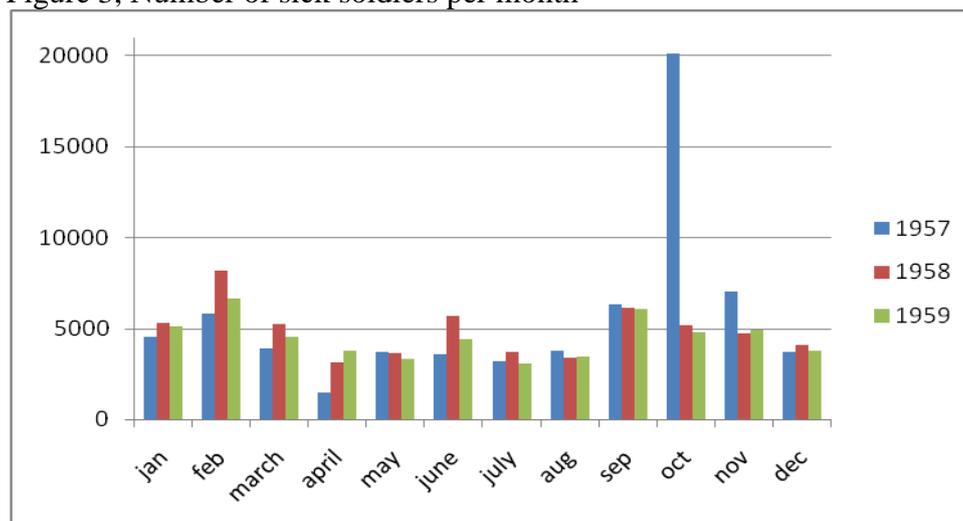


Figure 3: The monthly number of sick soldiers at the Swedish regiment during the years 1957, 1958 and 1959 Source: Försvarets sjukvårdstyrelse 1958, 1960 and 1961:a.

During 1957 the total number of soldiers reported sick to the Defence Medical Administration service by the army surgeon was higher than the reference years, reaching 67 404 diseased (Table 1). During the same time the number of diagnosed cases of influenza among the Swedish military was 22 percent of the total number of sick soldiers while in 1955, 1956, 1958 and 1959 that number was not higher than 1 percent and in 1960 it was 7 percent. 14 788 soldiers were diagnosed with influenza in 1957, that is, 90 times more soldiers had influenza in 1957 than in 1955. When considering the second wave in the beginning of 1958, one can see that merely 760 cases of influenza were reported that year, which is slightly higher than 1955, 1956 and 1958 (Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b). No report that can explain the increase of influenza cases in 1960 has been detected.

Table 1: Percentage of influenza cases 1955 to 1960

	Total number of sick soldiers:	Number of diagnosed cases of influenza:	Percentage of influenza cases (%):
1955	61 249	166	0
1956	51 371	271	0
1957	67 404	14 788	22
1958	58 646	760	1
1959	55 968	669	1
1960	61 799	4 484	7

Source: Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b

There is a strong correlation between the total number influenza cases and the total number sick soldiers, however this association is not significant ($r_s = 0.657$, $p = 0.078$). The correlations between the number of influenza cases and the variables total number of deaths, total number of sick days and the sick day ratio are relatively weak and show no signification (table 2).

Table 2: Correlation between the numbers of influenza cases during each year and the total number of sick soldiers reported, total sick days as well as the ratio sick days per 100 working days presented by means of r_s (p).

	Number of influenza cases r_s (p)	Total number of sick soldiers r_s (p)
Total number of sick soldiers	0.657 (0.078)	-
Total number of deaths	0.086 (0.436)	0.143 (0.394)
Total sick days	0.429 (0.198)	0.943 (0.002)
Sick days per 100 working days	0.257 (0.311)	0.771 (0.036)

Source: Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b

In 1957, the soldiers reported sick reached 67 404 (tabel 1). During the same year, the reported number of sick days (days out of work) was 461 417 days which was between 100 000 and 150 000 more sick days than the reference years 1955 (350 637), 1956 (302 824), 1958 (320 597), 1959 (307 495) and 1960 (329 602) (Figure 4). The average number of days that each respective soldiers was reported as sick, was about 7 days in 1957. That is an additional avarage number of days of 31 to 52 percent in 1957 compared to 1955, 1956, 1958, 1959 and 1960 (Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b).

Figure 4, Number of sick days

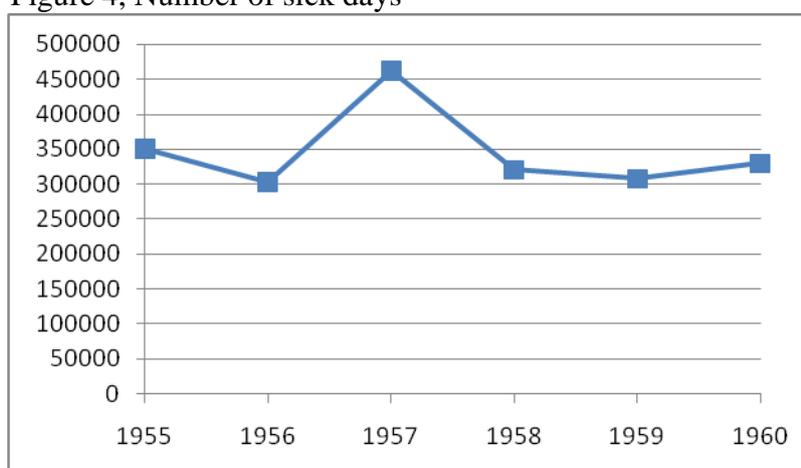


Figure 4: Total number of sick days during the years 1955 to 1960 Source: Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b

The Swedish Defence Medical Administration Service has calculated the ratio of the reported sick days per 100 working days. The ratio reached 2.46 in 1957 (Figure 5), which is between 1.12 and 1.35 times higher than the reference years 1955 (2.17), 1956 (1.95), 1959 (1.79) and 1960 (1.95). In 1958 there were no substantial changes (1.89) (Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b).

Figure 5, Sick days per 100 working days

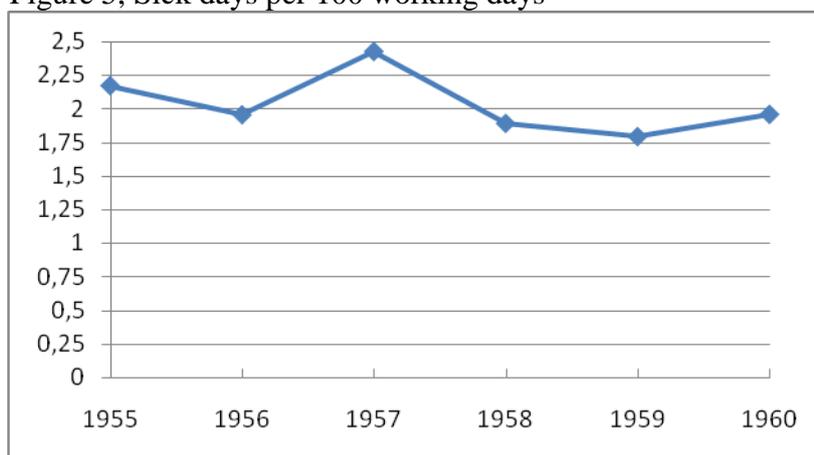


Figure 5: Ratio of sick days per 100 working days during the years 1955, 1956, 1957, 1958, 1959 and 1960 Source: Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b

The total number of deaths was slightly increased during 1957 (22) and 1958 (26) compared to 1955 (19) and 1956 (18). In 1959 and 1960 the number of deaths dropped to 13 respectively 10 deaths (Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b). As seen in table 2, the number of deaths has no correlation to the number of influenza cases or the total number of sick soldiers.

Figure 6: Number of deaths

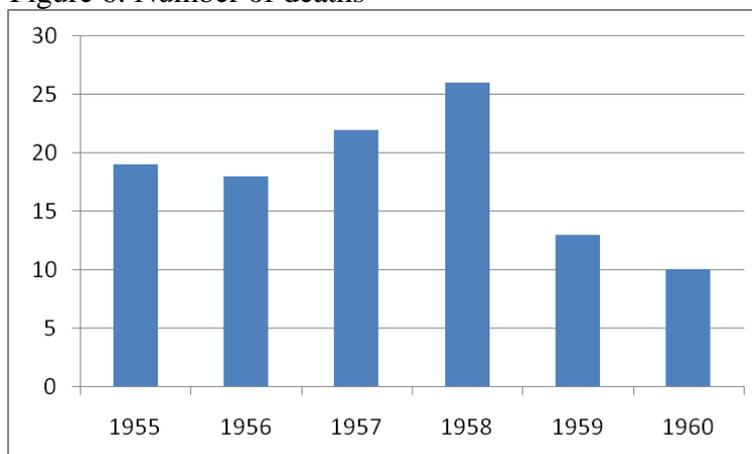


Figure 6: Total number of deaths during 1955, 1956, 1957, 1958, 1959 and 1960 Source: Försvarets sjukvårdstyrelse 1956, 1957, 1958, 1960, 1961:a and 1961:b

7. Discussion

The Asian flu struck the Swedish community in October 1957 holding its strings until spring of 1958, slowly diminishing by each month. All together some 300 000 cases of influenza was reported by Swedish physicians during that period of time. However, after a more detailed calculation from the Swedish Medical Board the number of diseased was corrected to nearly 1 million, which was about 15 % of the Swedish population in 1957 (Socialstyrelsen, 2006, p. 17) (see figure 1 above). The time during which the Asian flu was at its most infectious stage was longer in the country as a whole (October – December 1957) than at the Swedish regiments, where it stretched for merely one month (October 1957) (see figure 1 and 3 above). From interpreting the data collected in this study we found that a country, during a period of time, could have a high level of its population infected by influenza. During 1957, the year of the Asian flu, the Swedish regiments had a higher level of diseased registered compare to previous and later years. If you look specifically at October, the number of sick soldiers was many times higher than during the same time 1958 and 1959. The peak disease incidence seen among the soldiers at the Swedish military in October 1957 correlates well with the top of disease incidence among the whole Swedish population (see figure 1 and 3 above). The study shows us that during the influenza pandemic the number of sick days and the sick days per 100 working days ratio increased at the regiments. More soldiers had to deviate from work, stay at home and recover in bed, which indicates that the activities at the regiments must have gone down. The conclusions drawn are that a country could be quite vulnerable during an influenza pandemic. A great amount of the population might become ill and in need to curate in their homes or be compelled to take care of sick relatives. Less people will be available on the labor market, and important social services, businesses and infrastructure could be affected.

According to the theory of Milan Brahmbhatt (The World Bank, 2005), Sweden could, when hit by a pandemic flu, face a substantial reduction in production and a loss in labor force, effecting national as well as once personal economy. It is calculated that up to 25 percent of the working population are expected to be absent from work at almost the same time during an average of eight days in case of a pandemic influenza (Hayward & Tindale, 2007, p. 12). Hayward and Tindale (2007) debate that the whole infrastructure of society, such as fire departments, education, and police, could be effected, even at risk of having to close down. The health care services might become overloaded and there could be a short hand of both out-care and in-care staff (Hayward & Tindale, 2007, p. 10). For future pandemic influenzas,

Sweden could again be economically and socially affected unless we are prepared. The community will have an advantage if the government conducted a preparedness plan. Hayward and Tindale (2007, p. 10) points out the importance of having a preparedness plan, because there will be no time to finalise preparation when the influenza already has start spreading and reached once country. The authors further say that a pandemic plan will reduce the impact of influenza and avoid public panic. People will feel more secure if they know that their country is prepared for an influenza pandemic or a disease outbreak.

Despite a high prevalence rate and the rapid transmission of influenza infecting many people in a short time, the time of which people are sick is quite brief. After a couple of days in bed people can go back to work and after being sick people are immune and in no risk for additional influenza infections. Hence, even though the society will be affected by a high frequency of sick leave, the duration of which the community is affected will be rather short. The result of this study showed that the main infectious affects on the regiment stretched for one month in the end of 1957. Compare to other pandemics, such as HIV/AIDS or tuberculosis, where infected people will be sick for a long time or the rest of their lives, perhaps dying at an early age, the economical and societal effects of influenza are fairly small. Nevertheless, as a matter of fact, this study of the Asian flu effect on soldiers at the Swedish regiment shows us that the community will be affected when the next pandemic influenza arrives.

During the influenza pandemic in 1957 no preparedness plan was accessible. The national board of medicine (in Swedish: Medicinalstyrelsen) was, from 1877 to 1967, the highest agency in Swedish health care and had the responsibility of giving health advices and exhortations to the public and the health care. In August 1957 the first document was send out to local physicians asking them to give extra attention to people just arriving from abroad and show symptoms of influenza ("Medicinalverkets cirkulärskrivelser", 1957). The first line of vaccine was finished in September and strict restrictions were issued (Ibid; Sjöberg, 1959). In September 1957, Ström, Svedmyr och Tunevall wrote in *Läkartidingen* (the Swedish magazine for physicians) that the most important aspect in fighting the influenza was spreading the knowledge about transmission. The daily news later published what Ström, Svedmyr and Tunevall wrote in order to give the public some simple recommendation to limit the risk of being infected. In October the National Board of Medicine published information

in the daily news (in the paper *Dagens Nyheter*) of how infected people should act. As part of the recommendations, the medical board told the public to visit outside and breathe fresh air.

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The infrastructure today differs from that during the Asian flu. One can jump on an airplane and in merely a couple hours later step out in a new country and a new continent. This globalized world increases the microbes and viruses traveling via the massive number of people, commercial shipments, food and other items that cross borders every second (Salehi & Ali, 2006, p. 379). This indicates that a preparedness plan should be organized on local and national levels as well as on an international arena. At present, states have their individual rules and regulatory mechanisms for governing an Emerging Infectious Disease (EID) (Ibid, p 379). But as mentioned above, viruses travel, and to minimize the risk of jeopardizing the health of population in other nations, collaboration on a sovereign level is necessary. A fast travelling influenza could induce an international crisis, causing harm to human life and health as well as to socio-economical stability (Stern, 2006, p. 160). Stern (2006, p. 159) writes that a crisis features three factors: 1, the apprehension that there is a threat to the established world; 2, the small window of time the decision makers have to take suitable measurements; 3, the insecurity of the forthcoming development of the crisis. The author further writes that studies have shown that crises are best handled when the decision-making processes are on both centralized and decentralized levels (ibid, p. 165). That is, on a regional and national level as well as on a global level. Stern (2006, p. 167) points out that crises prerequisite that the decision makers have information and knowledge to be able to make sagacious and rapid assessments. By studying the Asian flu, we have learnt more about the effect it had on the population concerning number of sick and the impact it had on days of work due to recovery. Information gathered that should be useful in constructing preparedness plans for influenza pandemics to come.

Today there is some international collaboration. The European Union (EU) and the European Centre for Disease Control and Prevention (ECDC) has drawn up a preparedness plan that covers the EU area and its member countries (ECDC, 2007). Thus, an EU preparedness plan is a first step to globalize the problem of threatening influenza pandemics to come, but it is far from enough. An EU preparedness plan merely covers the EU member country and does not cover the global problem. The WHO (2005) has, as mentioned above, conducted a guideline for their member state. In the guideline they give recommendations of how nations should act on each of phase of a pandemic influenza, from finding a new virus to the event of a pandemic. With these national recommendations the WHO aims at increasing international coordination and transparency. The WHO emphasize that it is the authority of each state that has the responsibility of creating a preparedness plan with help from the guidelines. Hence,

the guidelines do not make up strategies for international collaboration. Saliencies for collaborations on an international level are often featured with difficulties. Tallberg (2006, pp. 197-198) writes that one main problem with international collaboration is that the governments possibilities to administrate crisis within the country is stunted. The government is bound to follow the interstate regulations even though they are unsuited for the local situation as such, risking transmissions across borders. Hence, all countries will be affected even though one country has taken action to protect its population from the infection.

Glass et al. (2006) as well as Blendon et al. (2008) debates in favor for a preparedness plan, saying that they will reduce the consequences of a pandemic influenza. Both their studies suggest a social distancing, where all social activities close down and people isolate themselves in their own homes. These precautions will help lowering the risk of a transmission of the virus (Glass et al., 2006; Blendon et al., 2008). Nevertheless, the social and economical problems will remain or maybe even increase. People will still be absent from work and places where people meet will close. When conducting a preparedness plan, one needs to know beforehand what the aim should be. If stopping the contagiousness is the goal, then perhaps social targeting is what should be in the preparedness plan. However, if the aim is to keep the social and economical effects as limited as possible, then social distasting is devastating and other or additional actions are needed.

From recognizing the first case of influenza until a working vaccine is developed will take up to three to six months. Even when a vaccine has been developed the demand will be greater than the supply (Influenza Vaccine Supply international task force [IFPM], 2005). Nor are there any possibilities to create vaccine for the whole population at once. The preparedness plan should therefore include distribution arrangement listing who and how the vaccine should be dispersed between people. Maybe in the time being, from the discovery until the vaccine is finish, a social distancing as suggested by Glass et al. (2006) and Blendon et al. (2008) is the best way to fight the effects of a pandemic flu. Additional studies are needed regarding the design of the preparedness plan.

The incidence of a pandemic influenza can reach high levels on a short period of time during which time the prevalence is high. However, in comparison to other years, when looking at a whole year the prevalence will appear lower than it actually was. This might have affected the study in the calculation of correlation and significance on a yearly basis. The number of years

studied is only six (n=6) which weakens the external validity of the significance of the findings. In further studies more cases should be included, perhaps including another influenza pandemic. Since influenza is a fast transmitting diseases and has a short duration it would be of importance to investigate the prevalence rate per week. The Swedish military has well documented data if prevalence and incidence during the Asian flu and reference years. In the regiments the military is living as in small isolated communities, where most personnel stay at the base throughout the day. The data could therefore be analyzed as reflecting the community as a whole. However, the soldiers' in the military are often younger, healthier and stronger than, and not as susceptible to the influenza as the average man. Another thing, not calculated for in this study is the absent from work due to care for family which the soldiers living in regiment don't have to do.

8. Conclusion

During a pandemic influenza the community will be affected, the number of sick will increase and, hence, the sick leave from work. Working places might have to close affecting the productivity, and community centres such as churches, schools, day care and public cinemas could shut down. In order to lower the effects on the community, the government need to have a well formulated preparedness plan considering vaccinations as well as community actions. Studies (Salehi & Ali, 2006; The World Bank, 2005) show that a poorly prepared society will have a negative effect on the community, that is, the effects will be of greater magnitude when no preparedness plans are conducted. In this study it has been shown that the number of sick soldiers in the Swedish military increased during October 1957 raising the sick leave ratio for the whole year, indicating that the same scenario could occur in the community as a whole.

For future pandemics, a state with a well designed preparedness plan will have a better starting point to protect its people from getting infected with influenza and from public fears. The state and society will be less affected in case of workforce and production rates. With a preparedness plan the ordinary day will have a better chance to proceed.

9. Summary

Pandemics are global in nature, but their impact is local. When the next pandemic strikes, as it surely will, it is likely to touch the lives of every individual, family and community.

Mike Leavitt, Secretary of Health and Human Services, USA (U.S. Government avian and pandemic flu information, 2006)

In 1957 Sweden and other countries in the world were stroke by a pandemic influenza infecting several people and killing almost 2 million. The influenza virus transmits easily and can in a short amount of time spread throughout the world. Because of the rapid transmission and the short incubation time (Iwarson & Norrby, 2004, pp. 163-164) a large amount of the population can be affected in a short time. People will have to stay at home from work to care for them or their relatives, hospitals will be overcrowded, public places might close and large working places might have to shut down their production. Consequently, as Mike Leavitt states in the citation above, large parts of the society will be affected. Influenza pandemics have been documented to affects the virological conditions as well as the social and the economical structures in the community. Thus, it is of importance to be organized both on a national and an international level when influenza strikes (Socialstyrelsen, 2006, p. 9). From knowing this background this study set out at looking on the community effects of a pandemic influenza in order to look at the effects of a pandemic influenza and to emphasise if an influenza pandemic preparedness plan is of importance.

In Sweden, the military has kept ready records of all medical conditions throughout the years. By using the record from the Defence Medical Administration Service stored at the National Archives the affects of the Asian flu on the Swedish military could be mapped out and analyzed. As the military bases, regiments, are viewed up on as small communities in the society, the results of the study could be illustrative of the community as a whole which has been the case in this study. One should keep in mind that the population in the regiments is somewhat homogenous containing mostly males in their youth.

The results show that as many as 14 788 soldiers were diagnosed with influenza during 1957. The total number of reported sick days at the regiment went up between 100 000 and 150 000 days during 1957 compared to the reference years of 1955, 1956, 1958, 1959 and 1960. The ratio of sick days per 100 working days shows an increase of 1.12 to 1.35 times compare to

the reference years. This tells us that the Asian flu made an impact on the number of working days lost to recover from disease. From the results we drew the conclusion that the Swedish population as a whole were effected trough loss of working days due to sickness. What is not reflected among the soldiers is the loss of working days due to care of sick spouse and relatives or children who has to stay at home from school and kindergarten because of the transmission risks.

It would be of great value if the government conducted a preparedness plan in order to minimize the community effects from a pandemic influenza. Nations need to collaborate to protect the citizens from economical and social effects that could otherwise be devastating. The plan should include interventions and recommendation on virological measures as well as procedures of keeping the social and economical structures at ease and working even if a large amount of people become ill.

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