

# **Sentinel Surveillance Network on Infectious diseases in nursing homes (SNIV): Results from weekly incidence surveillance**

## **Surveillance Netwerk Infectieziekten Verpleeghuizen (SNIV): Referentiecijfers Basis surveillance 2012**

M.J. Veldman-Ariesen<sup>1</sup>  
A.P.J. Haenen<sup>1</sup>  
J. Ablas<sup>1</sup>  
A. Meijer<sup>2</sup>  
S.C. de Greeff<sup>1</sup>

Institute: National Institute for Public Health and Environment (RIVM)  
Department : Center for Epidemiology and Surveillance of infectious disease (EPI)  
Center for Infectious disease research, Diagnostics and Screening  
(IDS)

Contact: Marie-José Veldman-Ariesen  
[Marie-Jose.Veldman@rivm.nl](mailto:Marie-Jose.Veldman@rivm.nl) or [SNIV@rivm.nl](mailto:SNIV@rivm.nl)

## Content

Leeswijzer Referentiecijfers .....	3
Uitleg kernbegrippen referentiecijfers.....	4
Samenvatting - Kernpunten .....	5
Summary - Keypoints .....	6
Introduction.....	7
Methodology of Surveillance of Infectious Disease in nursing homes .....	8
General characteristics of participating nursing homes .....	10
Gastro-enteritis .....	11
Influenza-like illness .....	13
Probable pneumonia .....	17
Urinary tract infections.....	20
Mortality.....	22
Relative age distribution reported deaths.....	25
Table 1. Clinical definitions of health care associated infections in SNIV.....	26
Figure 1. Nursing homes participating in SNIV in 2009 - 2012.....	27
Table 2. List of nursing homes participating in SNIV in 2009 – 2012 .....	28
Literature references.....	29

## Leeswijzer Referentiecijfers

Dit document bevat de referentiecijfers 2012 van SNIV. In dit document vindt u de volgende informatie: de incidenties van de infecties geregistreerd in SNIV en de tabellen waarbij de incidenties uitgesplitst zijn per verpleeghuiskenmerk. Deze verpleeghuiskenmerken worden door de deelnemers gerapporteerd in de jaarlijkse SNIV vragenlijst. Deelnemers kunnen dit document vergelijken met de terugrapportage van 2012 waarin hun eigen cijfers gerapporteerd staan en zo kan dit aanknopingspunten bieden voor infectiepreventie in hun verpleeghuis.

### **Pagina 10**    **Karakteristieken verpleeghuizen**

Op pagina 12 vindt u de karakteristieken van alle instellingen die deelgenomen hebben aan SNIV. Deze karakteristieken zijn gebruikt om per infectieziekte incidenties te vergelijken.

### **Pagina 11**    **Gastro-enteritis**

Op pagina 11 vindt u de incidentie van gastro-enteritis gemeten in 2012 (blauw) en de trend van het 4 weeks lopend gemiddelde (zwart). In de tabel eronder worden ook de incidenties van voorgaande jaren weergegeven. Op pagina 12 vindt u de incidentie van gastro-enteritis uitgesplitst per verpleeghuiskenmerk.

### **Pagina 13**    **Influenza achtig ziektebeeld**

Op pagina 13 vindt u de incidentie van influenza-achtig ziektebeeld gemeten in 2012 (blauw) en de trend van het 4 weeks lopend gemiddelde (zwart). In de tabel eronder worden ook de incidenties van voorgaande jaren weergegeven. Op de pagina 14 vindt u de incidentie van influenza-achtig ziektebeeld uitgesplitst per verpleeghuiskenmerk. Op pagina 16 vindt u de resultaten van de aanvullende laboratorium surveillance.

### **Pagina 17**    **Vermoedelijke pneumonie**

Op pagina 17 vindt u de incidentie van vermoedelijk pneumonie gemeten in 2012 (blauw) en de trend van het 4 weeks lopend gemiddelde (zwart). In de tabel eronder worden ook de incidenties van voorgaande jaren weergegeven. Op pagina 18 vindt u de incidentie van vermoedelijk pneumonie uitgesplitst per verpleeghuiskenmerk.

### **Pagina 20**    **Urineweginfecties**

Op pagina 20 vindt u de incidentie van urineweginfecties gemeten in 2012 (blauw) en de trend van het 4 weeks lopend gemiddelde (zwart). In de tabel eronder worden ook de incidenties van voorgaande jaren weergegeven. Op de pagina 21 vindt u de incidentie van urineweginfecties uitgesplitst per verpleeghuiskenmerk.

### **Pagina 22**    **Mortaliteit**

Op pagina 22 vindt u de sterfte gemeten in 2012 (blauw) en de trend van het 4 weeks lopend gemiddelde (zwart). In de tabel eronder wordt ook de sterfte in voorgaande jaren weergegeven. Op de pagina 23 vindt u de sterfte uitgesplitst per verpleeghuiskenmerk. Op pagina 25 vindt u de relatieve sterfte per leeftijdscategorie over de jaren heen.

## Uitleg kernbegrippen referentiecijfers

### Residentweeks / bewonerweken

Jaarlijks wordt van elk deelnemend verpleeghuis de beddencapaciteit nagevraagd. Deze beddencapaciteit wordt gebruikt voor het berekenen van de incidentie. Wekelijks registreren de deelnemers per verpleeghuis het aantal infecties. We nemen aan dat het aantal bedden het aantal bewoners goed benaderd. Met het begrip residentweeks bedoelen we dus het aantal bewoners (bedden) in de deelnemende verpleeghuizen in die week en als we een uitspraak doen over meerdere weken tellen we dus dat aantal bij elkaar op. Om de wekelijkse incidentie te berekenen wordt het aantal infecties in die week gedeeld door het aantal bewoners in de verpleeghuizen die registreerden in die week. Wanneer we een incidentie berekenen over een langere periode tellen we het aantal infecties voor die weken op en ook het aantal bewoners in de huizen die die weken registreerden. Dat laatste getal noemen we het aantal residentweeks.

Rekenvoorbeeld 1:

In week 40 van 2012 werden 10 urineweginfecties geregistreerd. In totaal registreerden 15 verpleeghuizen die week deze 10 urineweginfecties. In deze 15 verpleeghuizen zijn in totaal 1500 bedden. We gaan uit van een bedbezetting van bijna 100% en dus nemen we aan dat het aantal bewoners gelijk is aan het aantal bedden. We berekenden de incidentie door 10 te delen door 1500 en dan te vermenigvuldigen per 1000. De incidentie in week 40 is dan van 6,7 urineweginfecties per 1000 bewoners.

Rekenvoorbeeld 2:

In week 41, 42, 43, 44 van 2012 werden in totaal 59 urineweginfecties geregistreerd. Omdat hier 4 weken meegenomen worden tellen we van de verpleeghuizen die registreerden in die weken het totaal aantal bewoners per week bij elkaar op, dit noemen we residentweeks en in totaal tellen we in deze periode 6176 residentweeks. De incidentie is dan 59 gedeeld door 6176 maal 1000 is 9,6 urineweginfecties per 1000 residentweeks.

Rekenvoorbeeld 3:

Als de jaarlijkse incidentie in een verpleeghuis 8,0 per 1000 resident weeks is. En in het deelnemende verpleeghuis 100 bedden zijn en dit verpleeghuis elke week geregistreerd heeft. Dan betekent dit dat het totaal residentweeks voor dit verpleeghuis 5200 is (100 maal 52). Dan zullen er 8 maal 5200/1000 is afgerond 42 infecties optreden in het verpleeghuis.

### Quarter (Q1-Q4)

Kwartaal. Q1 is week 1-13, Q2 week 14-26, Q3 week 27-39 en Q4 week 40-52 of indien van toepassing week 40-53.

### Facility rooms

Aantal gemeenschappelijke ruimten

### Interchange of personnel between wards

Uitwisseling personeel tussen zorgeenheden (regelmatig versus incidentieel)

### Private rooms versus multiple person rooms

Eenpersoonskamers versus meerpersoonskamers

### Private bathroom versus shared bath room

Eigen badkamer versus gedeelde badkamer

### Influenza vaccination coverage personnel / residents

Influenza vaccinatiegraad van personeel / van bewoners

## Samenvatting - Kernpunten

### Verpleeghuis kenmerken

- In 2012 namen 19 verpleeghuizen deel aan het SNIV netwerk dat is minder dan in de voorgaande jaren (2009 N=25; 2010 N=28; 2011 N=25).
- Verpleeghuizen met een lagere beddenscapaciteit namen deel in 2012 (mediane beddenscapaciteit=134), daarnaast is de beddenscapaciteit van sommige deelnemende verpleeghuizen afgenomen.
- Verpleeghuizen met een hoger percentage eenpersoonskamers en eigen badkamers namen deel in 2012. Daarnaast is door nieuwbouw en verbouwing de capaciteit van eenpersoonskamers en eigen badkamers toegenomen in sommige deelnemende verpleeghuizen. In 71% (versus 58% in 2011) van de deelnemende verpleeghuizen had  $\geq 50\%$  van de bewoners een eenpersoonskamer en in 34% (versus 24% in 2011) van de deelnemende verpleeghuizen had  $\geq 50\%$  van de bewoners een eigen badkamer.
- Influenza vaccinatiegraad van personeel bleef laag in 2012 (mediaan 18%).

### Gastro-enteritis

- In 2012 werden in totaal 276 episodes van gastro-enteritis geregistreerd.
- De incidentie van gastro-enteritis laat een duidelijk seizoenspatroon zien en piekt in de winter (maximum vierweeks gemiddelde begin 2012 7.8 per 1000 bewonersweken) en in week 49-52 van 2012 nam de incidentie weer toe (7.1 per 1000 bewonersweken).
- Verpleeghuizen met regelmatige uitwisseling van personeel tussen afdelingen hadden een hogere incidentie van gastro-enteritis. Een hypothese zou kunnen zijn dat uitwisseling van personeel tussen afdelingen de overdracht van pathogenen die gastro-enteritis veroorzaken bevordert.

### Influenza-achtige ziekte

- In 2012 werden in totaal 197 episodes van influenza-achtige ziekte geregistreerd.
- De incidentie piekte begin 2012 met een vierweesgemiddelde van 5.7 per 1000 bewonersweken) en in het laatste kwartaal van 2012 nam de incidentie weer toe tot 3.0 per 1000 bewonersweken.
- Verpleeghuizen met een hogere influenza vaccinatiegraad van het personeel hadden een lagere incidentie van influenza-achtig ziektebeeld.

### Vermoedelijke longontsteking

- In 2012 werden in totaal 388 episodes van vermoedelijke longontsteking geregistreerd, wat deze infectie de tweede meest gerapporteerde infectie binnen het SNIV netwerk maakt.
- Er werden geen duidelijke pieken in incidentie waargenomen.
- Verpleeghuizen met een hoger percentage eigen badkamers hadden een hogere incidentie van vermoedelijke longontsteking. Een hypothese kan zijn dat eigen badkamers minder vaak gebruikt worden dan gezamenlijke badkamers en dat ze daarom mogelijk een bron van Legionella zouden kunnen zijn. Nader onderzoek naar pathogenen bij bewoners met vermoedelijk pneumonie kan hier verder inzicht in verschaffen.

### Urineweginfecties

- In 2012 werden in totaal 805 episodes van urineweginfecties geregistreerd, dit maakt urineweginfecties de meest gerapporteerde infectie binnen het SNIV netwerk.
- Er werden geen duidelijke pieken in incidentie waargenomen, maar de registratie begon pas in het tweede kwartaal van 2011.

### Sterfte

- In 2012 werden in totaal 388 sterfgevallen geregistreerd.
- Het sterftcijfer in 2012 lag hoger dan die van de voorgaande jaren en was het laagst in het derde kwartaal van 2012.
- De associatie tussen sterfte en infectie incidentie is onderwerp van verdere analyses.

## Summary - Keypoints

### General characteristics

- Less nursing homes participated in the SNIV network in 2012 (N=19) than in the previous years (2009 N=25; 2010 N=28; 2011 N=25).
- Nursing homes with lower bed capacity (median 134) tended to participate in 2012 and furthermore, the bed capacity of some of the participating nursing homes decreased.
- Nursing homes with higher percentage of private rooms and private bathrooms tended to participate in 2012 and furthermore, the capacity of private rooms and private bathrooms increased in some of the participating nursing homes due to renovation.
- Seasonal influenza vaccination coverage of personnel stayed low in 2012 (median 18%).

### Gastro-enteritis

- In 2012 in SNIV participating nursing homes registered in total 276 episodes of gastro-enteritis.
- Incidence showed a clear seasonal pattern with peaks in winter. In 2012 the maximum four week average was 7.8 per 1000 resident weeks.
- Nursing homes with regular interchange of personnel between wards had higher incidences of gastro-enteritis. A hypothesis might be that interchange of personnel facilitates the spread of pathogens that cause gastro-enteritis.

### Influenza-like illness

- In 2012 in SNIV participating nursing homes registered in total 197 episodes of influenza-like illness.
- Incidence showed in 2012 a clear seasonal pattern with peaks in winter. In 2012 the maximum four week average was 5.7 per 1000 resident weeks.
- The peak at the beginning of 2012 coincided with detections of A(H3N2) influenza virus in swabs taken from residents with influenza-like illness or another acute respiratory infection.
- The peak at the end of 2012 no influenza viruses were detected. However, in one nursing home a small outbreak of RSV-B infections was detected, which accounted also for the peak in number of swabs in week 50 of 2012.
- Nursing homes with a higher seasonal influenza vaccination coverage among personnel had lower incidences of influenza-like illness.

### Probable pneumonia

- In 2012 in SNIV participating nursing homes registered in total 388 episodes of probable pneumonia, which makes probable pneumonia the second most reported infection within the SNIV network.
- No clear peaks in incidence were observed.
- Nursing homes with a higher percentage of private bathrooms had higher incidences of probable pneumonia. A hypothesis might be that private bathrooms probably are less often used and therefore might be a possible source of legionella. Further study of pathogens in residents with probable pneumonia is necessary to gain more insight.

### Urinary tract infections

- In 2012 in SNIV participating nursing homes registered in total 805 episodes of urinary tract infections, which makes urinary tract infections the most reported infection within the SNIV network.
- No clear peaks in incidence were observed, but registration started in the second quarter of 2011.

### Mortality

- In 2012 in SNIV participating nursing homes registered in total 388 deaths.
- The mortality rate in 2012 exceeded that of previous years and was lowest in the third quarter of 2012.
- Association with infection incidence will be subject of further analyses

## Introduction

After 2011, a proportional rise in the aging population is expected as from 2011 the first post-war 'baby boomers' reach the age of 65.(1) In the Netherlands, the top of this growth will be reached in 2050 with at that time an estimated 25% of the population over the age of 65 and 40% of them being 80 years or older.(2) Immunosenescence, the state of dysregulated immune function with aging, is felt to be a significant contributor to the increased risk and severity of infections in the elderly.(3) Especially frail elderly in long-term care facilities have unique risks for infectious diseases.(4)

In the U.S.A. prolonged attention is drawn into the increased risk of infection of elderly people and infection control programs for long term care facilities have been developed. In the SHEA/APIC guideline published in 2008 the importance of infectious disease surveillance in the long term care facilities is stated as an essential part of infectious disease prevention and control.(5)

In the last years also in Europe joint initiatives have been established to survey antimicrobial consumption (European Surveillance of Antimicrobial Consumption (ESAC))(6) and healthcare-associated infections in long term care facilities (Healthcare-Associated infections and related practices in European Long-Term care facilities (HALT)).(7) In the Netherlands the PREZIES project surveys since 1996 the occurrence of infections in acute care hospitals and in 2009 a prevalence module was developed for the long term care setting.(8) Prevalence is a measure to study the total number of cases of disease in a population. Incidence rates give insight in the rate of new cases per time interval and make it possible to study seasonal fluctuations in infections and are usually more useful than prevalence in understanding the disease etiology. In Europe several other prevalence studies have been performed with different results, but until now no results from ongoing sentinel incidence surveillance in nursing homes are reported.(9-11)

In 2007 the Dutch Centre for Infectious Disease Control (CIDC)(12) took the initiative to set up a national sentinel surveillance network for infectious diseases in nursing homes (SNIV). In the Netherlands, since 1970 routine surveillance of influenza-like illness in the community is conducted by general practitioners.(13) A similar network structure for nursing homes was preferred to provide weekly incidence rates for the infectious diseases under surveillance. The aim of the SNIV network is to provide systematic year-round surveillance data for local interventions and national policy making and for the development of infection control guidelines for the nursing home setting.

# Methodology of Surveillance of Infectious Disease in nursing homes

## *Design and sample size calculation*

The network was designed as a sentinel active surveillance network involving nurse practitioners and/or elderly care physicians who weekly report infectious diseases in their nursing home. In addition patient material is collected for virological and/or bacteriological surveillance. This design is similar to the design of the Dutch Continuous Morbidity Registration (CMR), a network of general practices initiated in 1970 by The Netherlands Institute of Health Service Research (NIVEL).<sup>(13, 14)</sup>

A total number of 29 nursing homes was found to be necessary in order to obtain a sufficiently accurate estimate of the national incidence rate of an infectious disease in the Dutch population of nursing home residents. This number was calculated assuming random sampling without replacement from the total number of nursing homes in the country (330), using the average number of residents per nursing home (175) and an estimate of the standard deviation (based on pilot data) of the number of cases per nursing home, and by requiring the 95% confidence interval for the true incidence rate to have a width of about 0.02.<sup>15, 16</sup>

## *Recruitment*

Initial recruitment of the nursing homes took place via the regional networks of nursing homes for education of elderly care physicians. Alongside an announcement of the set-up of the network was published in journals: Dutch Journal for Elderly Care Medicine (readers: Elderly care physicians), the Dutch Journal for Hygiene and Infection prevention (readers: infection control nurses) and the Dutch Infectious Disease bulletin (readers: Infection control physicians appointed at Municipal Health Services). Furthermore, a website with information on the SNIV network ([www.SNIV.net](http://www.SNIV.net)) was launched.

We provided detailed documentation about the SNIV network to each nursing home that was interested to participate and an on the site presentation was planned to inform the manager, elderly care physicians and nurse practitioner. Afterwards, the manager signed a form in which they oblige themselves to participate in the network until further notice, but preferably for a year.

Only nursing homes with more than 50 residents could participate in the network. When a participating nursing home wished to participate with a second location with less than 50 beds this was allowed. In addition, an effort was made to recruit nursing homes from all parts of the Netherlands. Nursing homes with only a revalidation function were excluded from the network.

## *Protocols and procedures*

The standardized form for weekly data collection and the methodology of the surveillance was previously tested in two pilot studies performed in a subset of eight nursing homes in 2008. In the first pilot, the feasibility of systematic data collection via a paper registration form was tested. Main recommendations were: to collect data via a web-based application to facilitate the registration process, to send reminders to enhance complete data collection and paper registration forms should stay available at each ward to facilitate internal data collection. In the second pilot, data registration via a web-based internet application was tested. The second pilot was used to further fine tune the digital registration form and process. In each participating nursing home a Private contact person was appointed who was responsible for weekly data collection. One confidential login and password were e-mailed to each of the contact persons. Since January 2009, full data registration started and all weekly data are collected online for all nursing homes.

Privacy of residents and nursing homes and safe data collection was an important issue in the set-up of the network and was addressed in a data regulation form. Only aggregated data will be published, no individual nursing home data. Weekly count data is not traceable to individual residents.

An advice committee meets up at least once a year to give the project team advice on which infectious diseases to survey. All Dutch parties involved in infection prevention and control were asked to designate a representative.

Feed back reports are sent twice a year to the nursing homes that participate in SNIV. This



report with an overview of individual results versus the national results provides an indication whether their infection incidence is above or below the national average. During the influenza season weekly national incidence data from SNIV is published on the website of the [Dutch Institute for Public Health and the Environment](#). Once a year a meeting is organised for participants with state-of-the-art lectures on the infectious disease under surveillance. Four times a year, news letters are sent to all persons involved with an update of the national nursing home infection incidence and information about the infectious disease under surveillance and related projects. The newsletters are published on the website together with an overview of the data collected in each year.

#### *Data collection and analysis*

Each year general facility characteristics are gathered; age distribution of residents, resident mix (e.g. somatic, psychogeriatric), size of the facility, size of the wards, availability of private bathroom and/or toilet facilities, interchange of personnel between wards, influenza vaccination uptake among residents and personnel, and availability of infection control protocols. As from 2010, these data are collected online for all nursing homes.

To minimize the weekly workload for the participants a maximum of five infections can be registered in the surveillance. In focus groups with elderly care experts and infectious disease experts we discussed which infectious diseases should be under surveillance in this sentinel network. Of major importance were influenza-like illness, gastro-enteritis and lower respiratory tract infection, for which count data are registered since January 2009. Urinary tract infections are under surveillance since 2011. All cause mortality is registered since January 2009.

Infections were registered based on clinical definitions conform medical practice in the nursing home setting. The definitions of the infectious diseases are stated in figure 1. For gastro-enteritis the definition was chosen that was previously used in nursing home setting for research into outbreaks of gastro-enteritis.(15) For lower respiratory tract infection the definition was based on previous research on pneumonia in the elderly.(16, 17) For influenza-like illness the definition of [the European Influenza Surveillance Network](#) (EISN) was chosen. In addition nursing homes were asked to send in nose/throat swabs of residents with influenza-like illness or acute respiratory tract infections for the weekly virological surveillance of influenza. In the second pilot we also evaluated the application of these definitions and the way the elderly care physicians diagnose infectious disease in their nursing home.

Weekly incidence rates were calculated by dividing the total number of cases in one week by the total number of residents in the participating nursing homes in that week (resident-weeks). 95% Confidence intervals were calculated for the annual incidence rates. To study trends in infections the running average technique was used and 5 weeks-running averages were calculated.

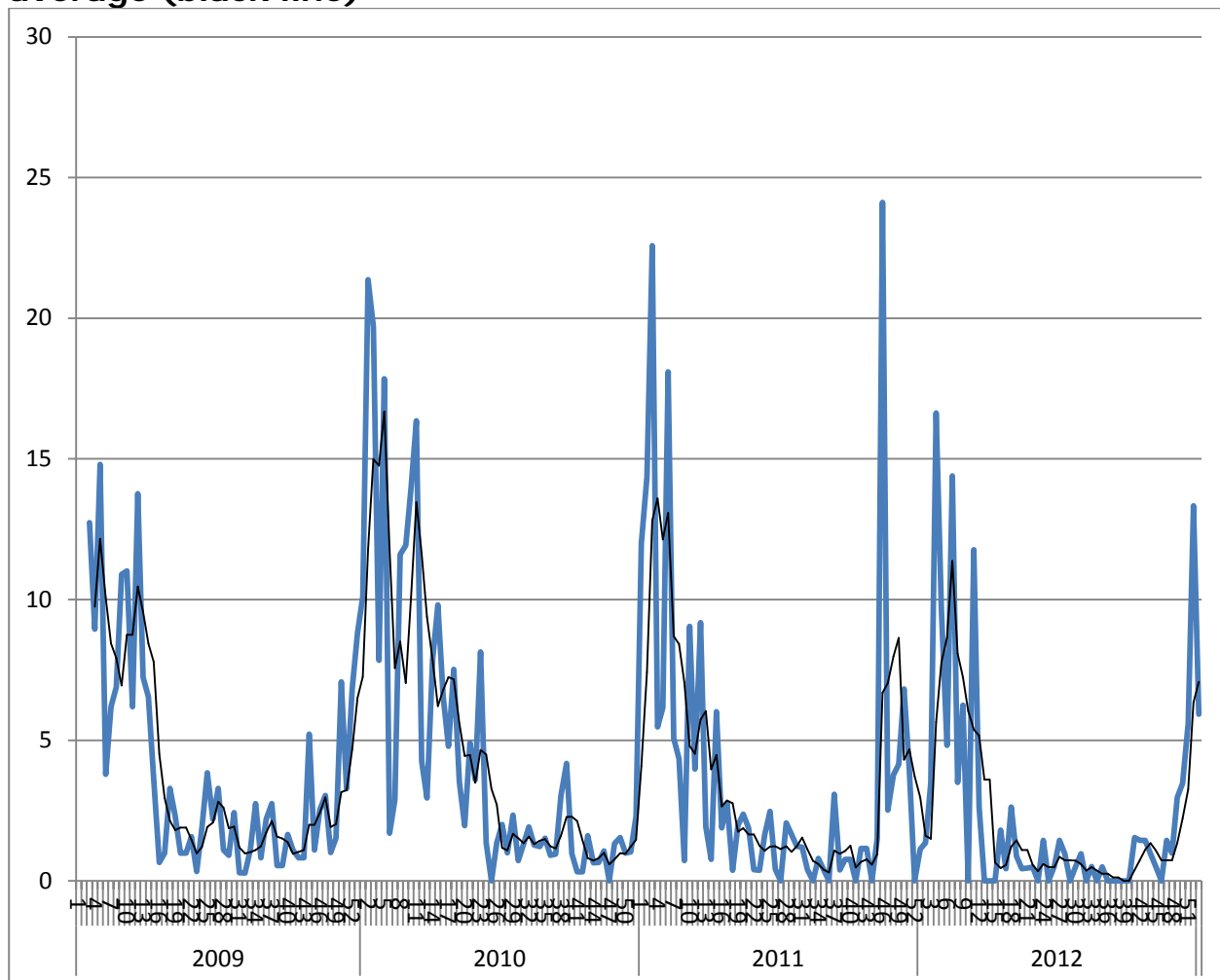
## General characteristics of participating nursing homes

In the Netherlands, there are in total approximately 400 nursing homes, with in total 61,000 residents. The average Dutch nursing home bed capacity is approximately 152 beds. In the table below the general characteristics of the in SNIV participating nursing homes are listed.

Institutional Characteristics	2009	2010	2011	2012
Nursing homes (N)	25	28	25	19
Resident weeks	177677	158628	136746	106888
Bed capacity (median, range)	158 (62-284)	130 (41-234)	128 (56-234)	124 (56-199)
Number of residents (median, range)	156 (62-280)	130 (41-230)	128 (56-230)	106 (56-199)
Number of personnel (median, range)	296 (70-680)	292 (20-619)	200 (64-451)	189 (64-529)
Private rooms ( $\geq 50\%$ )	18%	50%	58%	71%
Private bathrooms ( $\geq 50\%$ )	0%	10%	24%	34%
Presence of infection control committee (%)	88%	85%	79%	94%
Interchange of personnel between wards (%)	41%	30%	16%	31%
Influenza vaccination coverage residents (median, range)	92% (70%-99%)	95% (70%-98%)	95% (70%-100%)	95% (70%-100%)
Influenza vaccination coverage personnel (median, range)	16% (4%-52%)	20% (5%-50%)	17% (4%-65%)	18% (5%-50%)
Facility rooms (median, range)	4 (1-13)	5 (1-18)	5 (1-20)	6 (1-20)

## Gastro-enteritis

Incidence per 1000 residentweeks (blue line), four week running average (black line)



	Average incidence per 1000 residentsweeks				Absolute numbers	Resident weeks
	2009	2010	2011	2012	2012	2012
week 1-4	11.7	16.8	12.1	7.8	71	9080
week 5-8	6.9	7.2	7.1	7.2	63	8804
week 9-12	9.6	9.3	6.0	3.7	32	8656
week 13-16	2.9	7.3	2.9	0.6	5	8936
week 17-20	1.9	4.5	1.6	1.1	10	9064
week 21-24	2.0	3.3	1.2	0.5	4	8268
week 25-28	1.9	1.7	1.0	0.7	6	8192
week 29-32	1.0	1.3	0.7	0.5	4	7888
week 33-36	2.1	1.2	1.1	0.1	1	8204
week 37-40	1.0	2.1	0.5	0.4	3	7928
week 41-44	2.0	0.8	1.0	1.1	9	8192
week 45-48	2.0	1.0	8.6	1.3	11	8204
week 49-52	7.2	4.1	3.0	7.1	57	8036
<b>Total</b>	<b>3.8</b>	<b>4.6</b>	<b>3.7</b>	<b>2.5</b>	<b>276</b>	<b>109452</b>

## Gastro-enteritis and nursing home characteristics

Q	Bed capacity ≥ 130 beds						Bed capacity < 130 beds					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	9.7	10.2	9.0	6.8	114	16872	6.5	12.2	5.4	4.4	52	11953
Q2	2.2	4.6	2.4	0.9	15	16872	1.5	3.5	0.5	0.7	8	11141
Q3	1.3	1.3	1.2	0.4	7	16476	1.3	2.5	0.6	0	0	9757
Q4	3.2	2.1	4.0	1.7	29	16740	7.1	1.0	3.8	5.3	51	9641
Y	3.7	4.5	4.4	2.5	165	66960	4.2	5.0	2.5	2.6	111	42492

Q	Facility rooms ≥ 5 rooms						Facility rooms < 5 rooms					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	6.6	10.4	5.1	4.5	75	16586	10.9	11.4	10.5	7.4	91	12239
Q2	2.0	4.7	2.4	1.1	18	16530	2.1	3.7	1.0	0.4	5	11483
Q3	1.7	1.6	0.9	0.3	5	16078	0.9	1.7	1.1	0.2	2	10155
Q4	4.1	1.4	3.9	2.4	39	16286	3.5	2.5	3.8	4.1	41	10095
Y	3.4	4.5	3.1	2.1	137	65480	4.2	4.7	4.4	3.2	139	43972

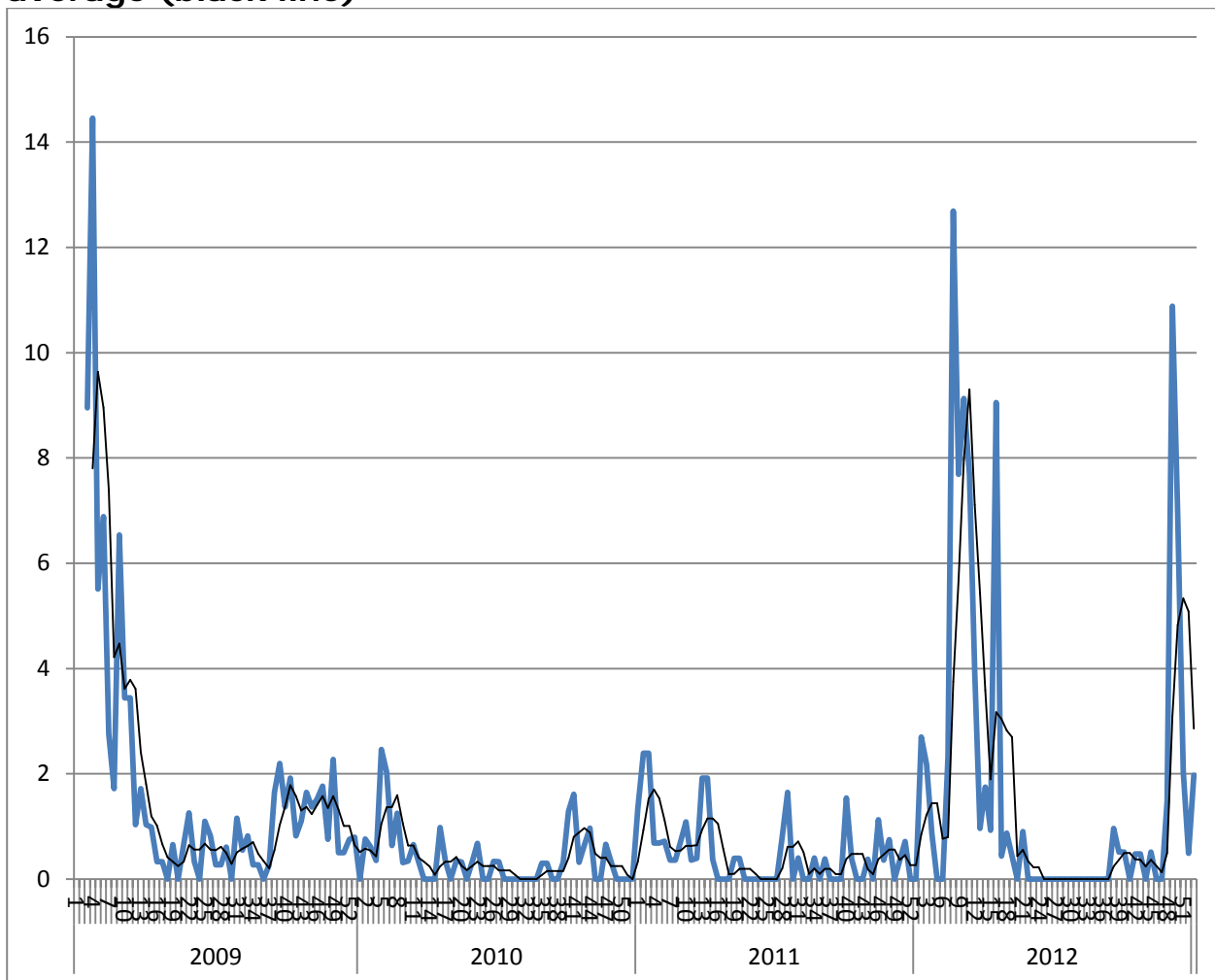
Q	Regular interchange of personnel between wards						Incidental interchange of personnel between wards					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	12.3	15.9	3.2	8.5	68	7956	4.9	8.9	7.2	5.1	98	19285
Q2	2.8	4.3	1.1	2.1	17	7956	1.2	4.6	2.0	0.3	6	18473
Q3	0.9	2.2	0.6	0.3	2	7956	1.7	1.0	1.1	0.3	5	17089
Q4	4.3	1.6	1.7	2.8	22	7956	3.3	2.0	4.3	3.0	51	16973
Y	4.9	5.9	1.6	3.4	109	31824	2.7	4.1	3.6	2.2	160	71820

Q	Residents with private rooms ≥ 50%						Residents with private rooms < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.5	12.0	8.0	4.7	94	20145	9.7	10.4	4.4	8.3	72	8680
Q2	1.1	6.2	2.7	1.1	22	19785	2.2	2.7	0.7	0.1	1	8228
Q3	0.3	2.0	1.3	0.4	7	19349	1.5	0.9	0.4	0	0	6884
Q4	5.4	3.0	4.2	2.5	49	19293	3.6	0.8	3.5	4.4	31	7088
Y	2.8	5.8	4.0	2.2	172	78572	4.0	3.7	2.3	3.4	104	30880

Q	Residents with private bathroom ≥ 50%						Residents with private bath room < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	21.6	4.1	5.0	43	8645	9.0	10.2	7.1	6.1	123	20180
Q2	-	6.6	2.9	1.2	10	8589	2.1	4.3	1.5	0.7	13	19424
Q3	-	1.4	1.3	0.4	3	8533	1.3	1.4	0.9	0.2	4	17700
Q4	-	5.8	8.1	2.9	25	8477	3.8	1.4	2.4	3.1	55	17904
Y	-	8.6	4.3	2.4	81	34244	3.8	4.3	3.0	2.6	195	75208

## Influenza-like illness

Incidence per 1000 residentweeks (blue line), four week running average (black line)



	Average incidence per 1000 residentsweeks				Absolute numbers	Resident weeks
	2009	2010	2011	2012	2012	2012
week 1-4	8.7	1.1	1.5	1.4	13	9080
week 5-8	4.4	1.0	0.5	5.7	50	8804
week 9-12	2.4	0.3	0.9	5.4	47	8656
week 13-16	0.7	0.3	0.6	3.0	27	8936
week 17-20	0.3	0.2	0.2	0.6	5	9064
week 21-24	0.7	0.3	0.0	0.0	0	8268
week 25-28	0.5	0.2	0.6	0.0	0	8192
week 29-32	0.6	0.0	0.1	0.0	0	7888
week 33-36	0.2	0.2	0.2	0.0	0	8204
week 37-40	1.8	0.8	0.5	0.5	4	7928
week 41-44	1.2	0.5	0.1	0.4	3	8192
week 45-48	1.6	0.2	0.6	3.0	25	8204
week 49-52	0.5	0.3	0.3	2.9	23	8036
<b>Total</b>	<b>1.6</b>	<b>0.4</b>	<b>0.5</b>	<b>1.8</b>	<b>197</b>	<b>109452</b>

## Influenza-like illness and nursing home characteristics

Q	Bed capacity ≥ 130 beds						Bed capacity < 130 beds					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	5.0	0.7	0.9	2.7	45	16872	3.4	0.9	1.6	5.8	69	11953
Q2	0.4	0.2	0.1	1.4	23	16872	0.9	0.5	0	0.4	5	11141
Q3	0.7	0.2	0.4	0.2	4	16476	0.9	0.1	0.4	0	0	9757
Q4	1.1	0.6	0.2	1.3	21	16740	1.3	0.1	0.4	3.1	30	9641
Y	1.6	0.4	0.4	1.4	93	66960	1.6	0.4	0.6	2.4	104	42492

Q	Facility rooms ≥ rooms						Facility rooms < rooms					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.1	0.9	1.5	5.2	86	16586	5.0	0.5	0.7	2.3	28	12239
Q2	0.3	0.2	0.2	0.5	8	16530	0.8	0.4	0	1.7	20	11483
Q3	1.0	0.1	0.5	0	0	16078	0.5	0.3	0.3	0.4	4	10155
Q4	1.2	0.4	0.4	2.7	44	16286	1.0	0.5	0.2	0.7	7	10095
Y	1.4	0.4	0.6	2.1	138	65480	1.7	0.4	0.3	1.3	59	43972

Q	Regular interchange of personnel between wards						Incidental interchange of personnel between wards					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	6.3	0.9	1.1	4.0	32	7956	2.6	0.7	1.1	3.6	70	19285
Q2	0.6	0.1	0	0.5	4	7956	0.4	0.3	0.1	1.3	24	18473
Q3	0.5	0	0	0	0	7956	0.9	0.2	0.5	0.2	4	17089
Q4	1.4	0.2	0	0.6	5	7956	0.8	0.5	0.4	2.6	44	16973
Y	2.1	0.3	0.3	1.3	41	31824	1.1	0.4	0.5	2.0	142	71820

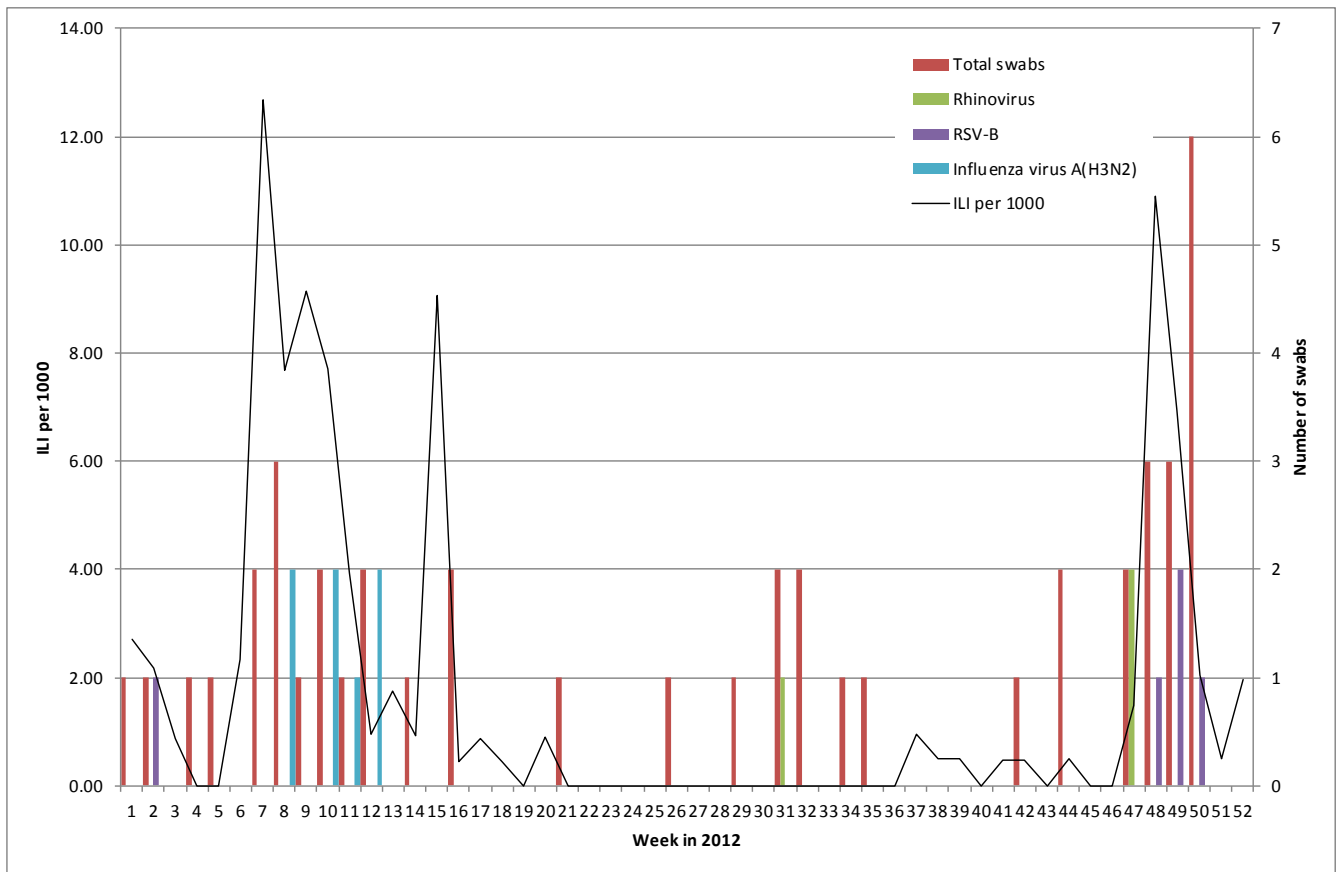
Q	Residents with private rooms ≥ 50%						Residents with private rooms < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	1.1	0.8	1.8	4.1	83	20145	5.2	0.8	0.2	3.6	31	8680
Q2	0.8	0.2	0.2	1.4	28	19785	0.5	0.3	0	0	0	8228
Q3	0.5	0.3	0.7	0.2	4	19349	0.8	0	0	0	0	6884
Q4	1.3	0.8	0.4	2.5	49	19293	1.1	0.1	0.2	0.3	2	7088
Y	0.9	0.5	0.7	2.1	164	78572	1.7	0.3	0.1	1.1	33	30880

Q	Residents with private bathroom ≥ 50%						Residents with private bath room < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	2.1	1.4	8.2	71	8645	4.7	0.7	1.0	2.1	43	20180
Q2	-	0.3	0.4	0.8	7	8589	0.5	0.2	0	1.1	21	19424
Q3	-	0.6	1.1	0.4	3	8533	0.7	0.1	0.2	1.0	1	17700
Q4	-	3.3	0.5	4.7	40	8477	1.1	0.1	0.2	0.6	11	17904
Y	-	1.5	0.8	3.5	121	34244	1.6	0.3	0.4	1.0	76	75208

Q	Influenza vaccination coverage personnel $\geq$ 17%						Influenza vaccination coverage personnel $<$ 17%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	1.5	0.6	1.8	1.0	13	13564	6.5	1.1	0.6	6.6	101	15261
Q2	0.5	0.1	0.2	1.5	21	13568	0.5	0.6	0	0.5	7	14445
Q3	0.6	0.2	0.7	0.1	1	13332	0.8	0.1	0.2	0.2	3	12901
Q4	1.1	0.6	0.6	1.5	20	13216	1.2	0.3	0.1	2.4	31	13165
Y	0.9	0.4	0.8	1.0	55	53680	2.1	0.5	0.2	2.5	142	55772

Q	Influenza vaccination coverage residents $\geq$ 95%						Influenza vaccination coverage residents $<$ 95%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.1	0.8	0.9	2.7	46	17316	5.1	0.6	1.4	5.9	68	11509
Q2	0.4	0.2	0.1	1.2	21	17260	0.6	0.4	0	0.7	7	10753
Q3	0.9	0.2	0.5	0.2	4	17204	0.6	0.1	0	0	0	9029
Q4	1.1	0.3	0.3	1.3	22	17148	1.1	0.7	0.3	3.1	29	9233
Y	1.5	0.4	0.5	1.3	93	68928	1.7	0.4	0.5	2.6	104	40524

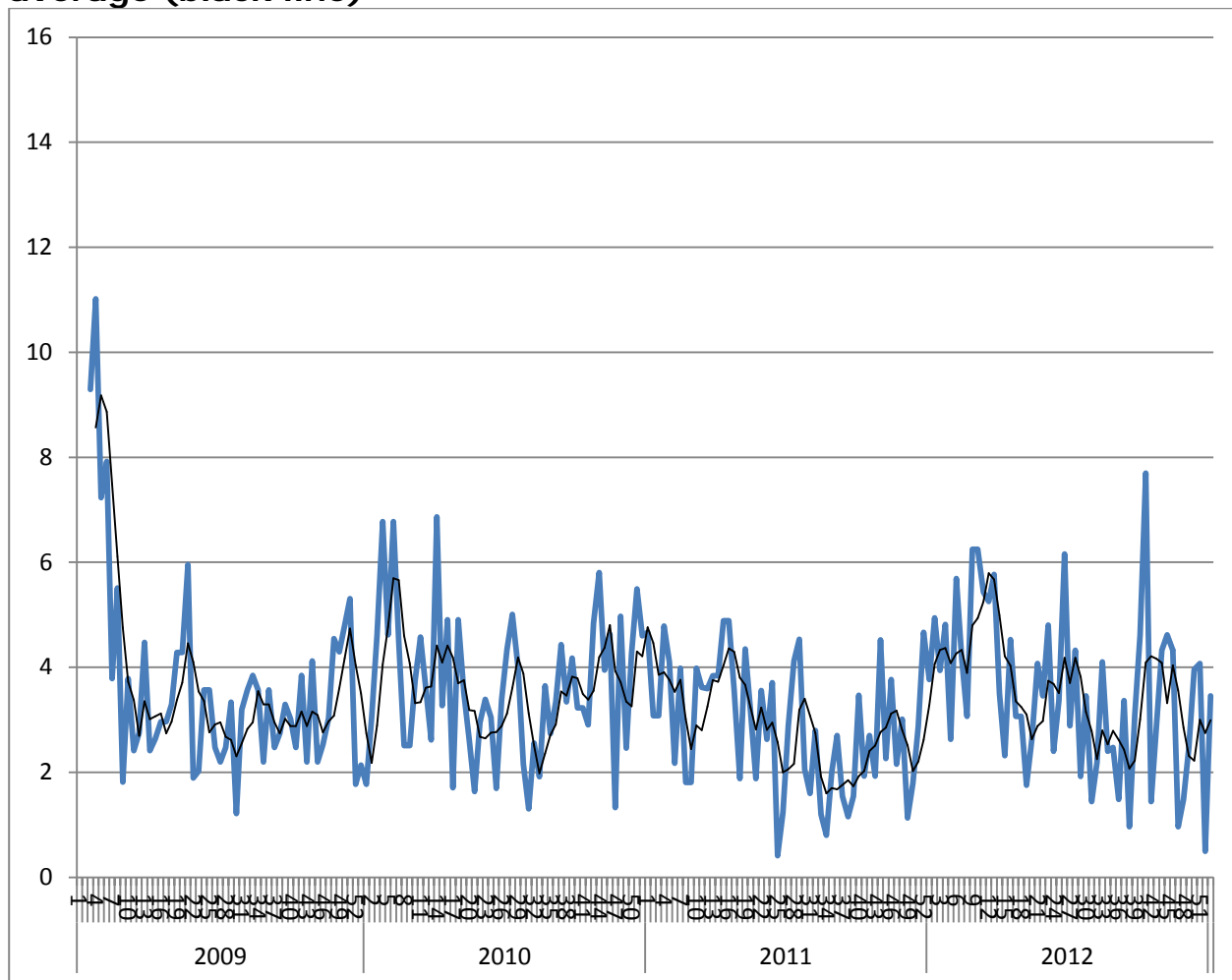
**Influenza virus, respiratory syncytial virus (RSV), rhinovirus and enterovirus detections in swabs taken during 2012. Rhinovirus and enterovirus detections were included since week 40 of 2012.**





## Probable pneumonia

Incidence per 1000 residentweeks (blue line), four week running average (black line)



	Average incidence per 1000 residentsweeks				Absolute numbers	Resident weeks
	2009	2010	2011	2012	2012	2012
week 1-4	8.8	4.8	3.8	4.1	37	9080
week 5-8	4.8	4.0	2.4	4.8	42	8804
week 9-12	3.4	3.6	3.8	5.7	49	8656
week 13-16	2.7	4.2	4.3	3.4	30	8936
week 17-20	4.5	3.2	2.8	2.9	26	9064
week 21-24	2.8	2.8	2.6	3.5	29	8268
week 25-28	2.6	4.2	3.2	3.8	31	8192
week 29-32	3.0	2.0	1.9	2.8	22	7888
week 33-36	3.0	3.5	1.8	2.4	20	8204
week 37-40	2.9	3.5	2.0	4.0	32	7928
week 41-44	3.1	4.4	2.9	3.3	27	8192
week 45-48	3.6	3.3	2.5	2.3	19	8204
week 49-52	3.2	4.8	3.3	3.0	24	8036
<b>Total</b>	<b>3.6</b>	<b>3.7</b>	<b>2.9</b>	<b>3.5</b>	<b>388</b>	<b>109452</b>

## Probable pneumonia and nursing home characteristics

Q	Bed capacity ≥ 130 beds						Bed capacity < 130 beds					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.5	4.2	3.2	5.2	87	16872	7.9	4.8	3.8	4.1	49	11953
Q2	3.3	2.8	2.2	3.3	56	16872	2.7	4.0	4.6	3.5	39	11141
Q3	3.1	3.8	1.7	2.3	38	16476	2.4	1.8	3.2	3.5	34	9757
Q4	3.3	4.1	2.3	3.2	54	16740	2.7	3.8	3.6	3.2	31	9641
Y	3.5	3.7	2.4	3.5	235	66960	3.8	3.6	3.8	3.6	153	42492

Q	Facility rooms ≥ 5 rooms						Facility rooms < 5 rooms					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.3	4.8	2.5	5.4	90	16586	5.9	3.7	4.1	3.8	46	12239
Q2	3.4	3.5	2.8	3.8	63	16530	3.1	2.7	3.3	2.8	32	11483
Q3	3.1	3.8	2.5	3.4	54	16078	2.9	2.2	1.9	1.8	18	10155
Q4	4.0	4.2	3.0	3.4	56	16286	2.4	3.8	2.5	2.9	29	10095
Y	3.7	4.1	2.7	4.0	263	65480	3.5	3.1	3.0	2.8	125	43972

Q	Regular interchange of personnel between wards						Incidental interchange of personnel between wards					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.6	2.2	0.8	5.9	47	7956	6.0	5.5	3.1	3.9	76	19285
Q2	3.3	2.0	0.8	4.0	32	7956	3.2	3.7	3.7	2.9	54	18473
Q3	3.5	2.4	0.6	4.1	33	7956	2.5	3.8	2.6	2.2	37	17089
Q4	3.0	3.0	0.9	4.1	33	7956	3.5	4.3	3.1	2.9	50	16973
Y	3.5	2.4	0.8	4.6	145	31824	3.6	4.3	3.1	3.0	217	71820

Q	Residents with private rooms ≥ 50%						Residents with private rooms < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	2.9	6.0	3.4	5.4	109	20145	5.5	2.9	1.8	3.1	27	8680
Q2	1.6	3.9	3.9	3.6	71	19785	3.5	2.6	2.1	2.9	24	8228
Q3	1.3	4.2	2.9	3.0	59	19349	3.2	2.6	1.3	1.9	13	6884
Q4	2.2	5.1	3.5	3.7	72	19293	3.4	2.7	1.6	1.8	13	7088
Y	2.0	4.8	3.5	4.0	311	78572	3.8	2.7	1.7	2.5	77	30880

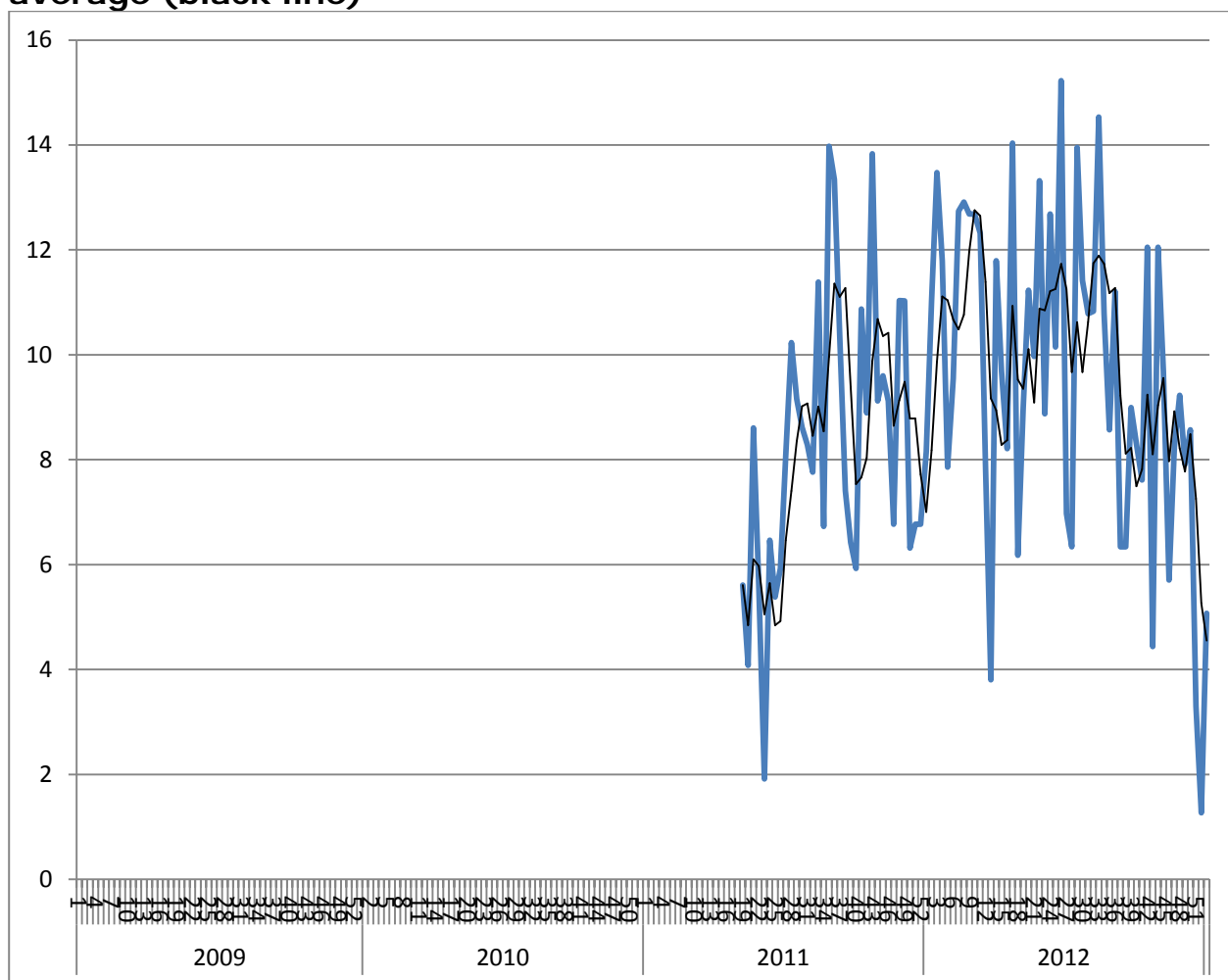
Q	Residents with private bathroom ≥ 50%						Residents with private bath room < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	4.2	4.1	9.3	80	8645	5.2	4.4	2.4	2.8	56	20180
Q2	-	5.8	4.5	4.5	39	8589	3.2	3.0	2.8	2.9	56	19424
Q3	-	3.9	4.1	3.3	28	8533	3.0	3.3	1.6	2.5	44	17700
Q4	-	9.1	4.5	4.5	38	8477	3.2	3.3	2.2	2.6	47	17904
Y	-	5.8	4.3	5.4	185	34244	3.6	3.5	2.2	2.7	203	75208

Q	Influenza vaccination coverage personnel $\geq$ 17%						Influenza vaccination coverage personnel $<$ 17%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	2.8	3.3	2.7	2.8	38	13564	6.6	6.4	3.8	6.4	98	15261
Q2	1.8	2.9	3.6	3.2	43	13568	4.0	3.8	2.6	3.6	52	14445
Q3	3.2	3.1	2.9	2.6	34	13332	2.8	3.5	1.7	2.9	38	12901
Q4	3.9	3.7	3.7	3.0	40	13216	2.7	4.7	2.0	3.4	45	13165
Y	3.1	3.2	3.2	2.9	155	53680	3.9	4.6	2.6	4.2	233	55772

Q	Influenza vaccination coverage residents $\geq$ 95%						Influenza vaccination coverage residents $<$ 95%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	4.4	4.2	2.7	3.8	66	17316	5.8	4.5	4.8	6.1	70	11509
Q2	3.5	3.0	3.2	3.8	65	17260	3.0	3.5	2.4	2.8	30	10753
Q3	3.0	3.4	2.4	3.4	59	17204	2.9	2.9	1.7	1.4	13	9029
Q4	3.8	2.9	2.9	3.7	63	17148	2.8	6.0	2.4	2.4	22	9233
Y	3.7	3.4	2.8	3.7	253	68928	3.5	4.2	3.1	3.3	135	40524

## Urinary tract infections

Incidence per 1000 residentweeks (blue line), four week running average (black line)



	Average incidence per 1000 residentsweeks				Absolute numbers 2012	Resident weeks 2012
	2009	2010	2011	2012		
week 1-4	-	-	-	11.1	78	7064
week 5-8	-	-	-	11.9	81	6788
week 9-12	-	-	-	9.2	61	6640
week 13-16	-	-	-	11.0	76	6920
week 17-20	-	-	6.2	9.1	64	7048
week 21-24	-	-	4.8	11.3	71	6308
week 25-28	-	-	8.2	10.5	65	6176
week 29-32	-	-	9.0	11.9	71	5984
week 33-36	-	-	11.1	9.2	57	6188
week 37-40	-	-	7.7	7.8	46	5912
week 41-44	-	-	10.3	9.6	59	6176
week 45-48	-	-	9.4	7.8	48	6188
week 49-52	-	-	7.0	4.5	28	6188
<b>Total</b>			<b>8.0</b>	<b>9.6</b>	<b>805</b>	<b>83580</b>

## Urinary tract infections and nursing home characteristics

Q	Bed capacity ≥ 130 beds						Bed capacity < 130 beds					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	-	-	11.1	140	12660	-	-	-	10.5	101	9613
Q2	-	-	4.0	10.7	135	12660	-	-	7.1	9.9	88	8857
Q3	-	-	7.8	9.7	119	12264	-	-	11.1	10.1	76	7529
Q4	-	-	6.8	7.6	95	12528	-	-	12.0	6.8	51	7469
Y	-	-	6.4	9.8	489	50112	-	-	10.5	9.4	316	33468

Q	Facility rooms ≥ 5 rooms						Facility rooms < 5 rooms					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	-	-	9.3	148	15858	-	-	-	14.5	93	6415
Q2	-	-	3.4	10.0	159	15858	-	-	8.1	11.3	64	5659
Q3	-	-	8.4	9.6	148	15462	-	-	10.8	10.9	47	4331
Q4	-	-	8.3	6.5	103	15726	-	-	10.5	10.1	43	4271
Y	-	-	7.0	8.9	558	62904	-	-	9.9	11.9	247	20676

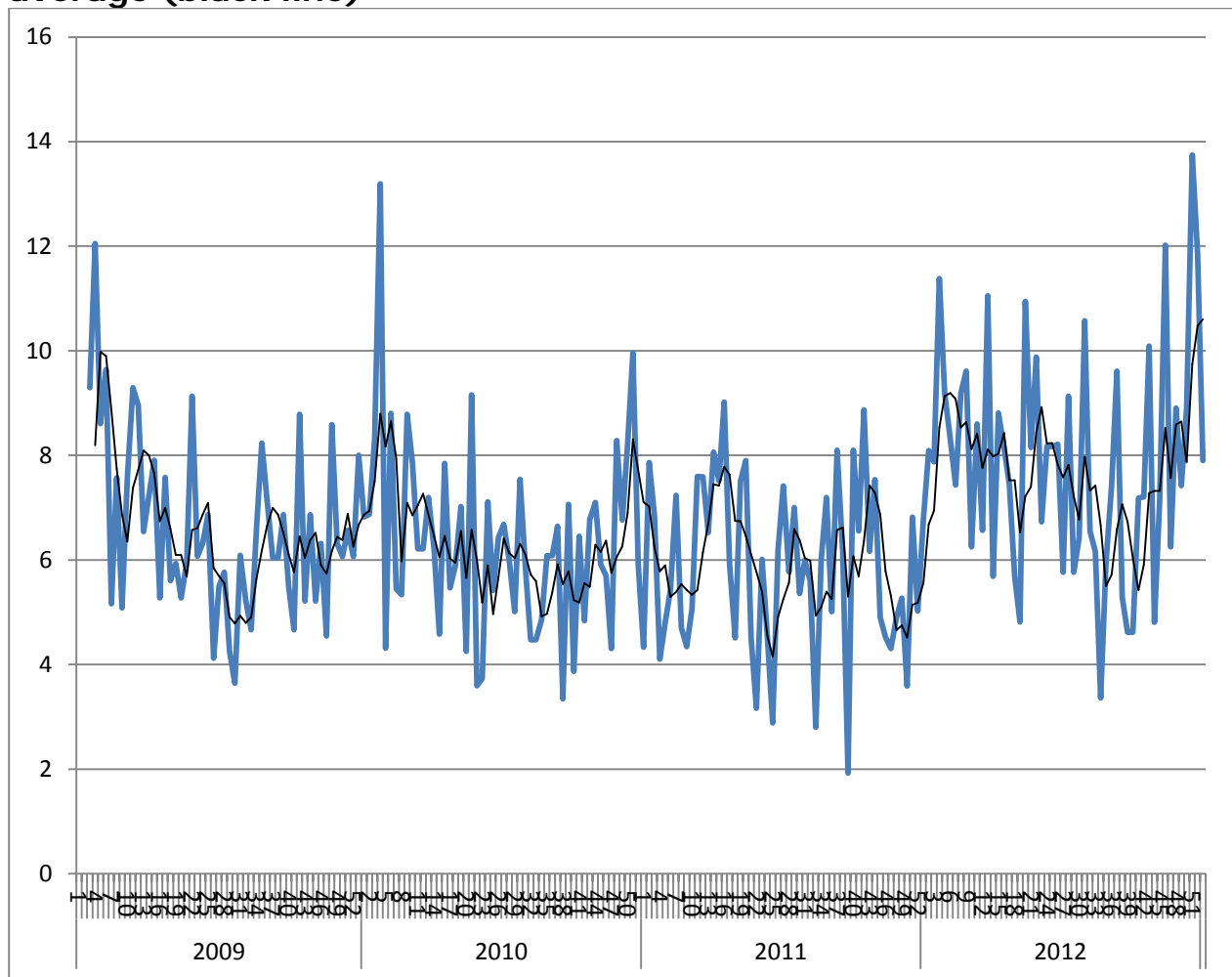
Q	Regular interchange of personnel between wards						Incidental interchange of personnel between wards					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	-	-	12.7	101	7956	-	-	-	10.4	132	12733
Q2	-	-	6.4	13.3	106	7956	-	-	5.2	9.4	112	11977
Q3	-	-	6.0	8.9	71	7956	-	-	10	10.4	111	10649
Q4	-	-	9.6	6.8	54	7956	-	-	9.1	8.4	89	10589
Y	-	-	7.4	10.4	332	31824	-	-	8.4	9.7	444	45948

Q	Residents with private rooms ≥ 50%						Residents with private rooms < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	-	-	11.5	200	17337	-	-	-	8.3	41	4936
Q2	-	-	6.5	11.1	189	17033	-	-	3.9	7.6	34	4484
Q3	-	-	9.9	9.1	152	16653	-	-	8.0	13.7	43	3140
Q4	-	-	10.1	7.6	127	16653	-	-	7.5	5.7	19	3344
Y	-	-	9.1	9.9	668	67676	-	-	6.7	8.6	137	15904

Q	Residents with private bathroom ≥ 50%						Residents with private bath room < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	-	-	10.5	61	5837	-	-	-	11.0	180	16436
Q2	-	-	2.8	13.9	81	5837	-	-	6.0	9.1	142	15680
Q3	-	-	8.4	11.6	68	5837	-	-	9.3	9.1	127	13956
Q4	-	-	14.9	11.8	69	5837	-	-	7.6	5.4	77	14160
Y	-	-	10.0	11.9	279	23348	-	-	7.8	8.7	526	60232

## Mortality

Incidence per 1000 residentweeks (blue line), four week running average (black line)



	Average incidence per 1000 residentsweeks				Absolute numbers	Resident weeks
	2009	2010	2011	2012	2012	2012
week 1-4	9.3	8.1	5.9	9.1	37	9080
week 5-8	6.9	7.1	5.4	8.6	42	8804
week 9-12	8.1	6.9	6.7	8.1	49	8656
week 13-16	7.0	6.0	7.6	7.5	30	8936
week 17-20	5.7	6.6	6.1	7.4	26	9064
week 21-24	7.1	5.0	4.2	8.2	29	8268
week 25-28	4.9	6.0	6.6	7.2	31	8192
week 29-32	4.9	5.5	4.9	7.5	22	7888
week 33-36	7.0	5.9	6.6	6.6	20	8204
week 37-40	5.8	5.2	5.7	5.4	32	7928
week 41-44	6.5	6.2	6.9	7.3	27	8192
week 45-48	6.4	6.3	4.7	8.7	19	8204
week 49-52	6.7	7.1	5.5	10.6	24	8036
<b>Total</b>	<b>6.6</b>	<b>6.3</b>	<b>5.9</b>	<b>7.9</b>	<b>862</b>	<b>109452</b>

## Mortality and nursing home characteristics

Q	Bed capacity ≥ 130 beds						Bed capacity < 130 beds					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	7.7	7.2	5.9	8.9	151	16872	9.1	7.4	6.8	7.6	91	11953
Q2	6.1	6.0	6.0	7.6	128	16872	6.9	5.8	5.8	8.0	89	11141
Q3	6.3	6.3	5.7	7.1	117	16476	3.4	3.3	5.8	5.7	56	9757
Q4	6.4	6.7	6.6	9.1	153	16740	6.5	5.9	4.6	8.0	77	9641
Y	6.6	6.6	6.0	8.2	549	66960	6.4	5.6	5.7	7.4	313	42492

Q	Facility rooms ≥ 5 rooms						Facility rooms < 5 rooms					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	7.5	6.4	5.8	7.8	130	16586	8.4	8.6	6.5	9.2	112	12239
Q2	5.6	5.2	5.0	6.5	108	16530	6.8	7.1	6.9	9.5	109	11483
Q3	5.5	5.7	4.6	5.5	89	16078	6.2	5.0	7.2	8.3	84	10155
Q4	6.2	5.8	5.5	8.5	139	16286	6.6	7.7	6.0	9.0	91	10095
Y	6.1	5.8	5.2	7.1	466	65480	7.0	7.0	6.6	9.0	396	43972

Q	Regular interchange of personnel between wards						Incidental interchange of personnel between wards					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	6.7	4.9	4.9	6.9	55	7956	9.6	8.6	6.7	9.0	174	19285
Q2	6.0	4.8	3.6	5.4	43	7956	6.6	7.0	6.3	9.0	167	18473
Q3	5.6	4.8	4.0	6.7	53	7956	6.2	6.3	6.1	6.7	115	17089
Q4	5.5	5.9	3.0	10	57	7956	7.4	6.9	6.3	7.2	170	16973
Y	5.9	5.1	3.9	6.5	208	31824	7.3	7.2	6.4	8.7	626	71820

Q	Residents with private rooms ≥ 50%						Residents with private rooms < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	7.9	8.7	6.7	8.3	168	20145	8.0	6.1	5.9	8.5	74	8680
Q2	7.2	6.8	5.8	7.2	143	19785	6.1	5.8	5.9	9.0	74	8228
Q3	6.2	6.9	6.6	6.0	116	19349	5.8	4.8	4.6	8.3	57	6884
Q4	8.7	7.6	6.3	8.2	159	19293	6.1	5.6	5.0	10	71	7088
Y	7.5	7.5	6.4	7.5	586	78572	6.4	5.6	5.4	8.9	276	30880

Q	Residents with private bathroom ≥ 50%						Residents with private bath room < 50%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	-	7.5	7.2	7.9	68	8645	8.0	7.4	6.2	8.6	174	20180
Q2	-	6.9	4.8	5.1	44	8589	6.2	6.3	6.2	8.9	173	19424
Q3	-	8.5	6.6	5.0	43	8533	5.9	5.5	5.5	7.3	130	17700
Q4	-	7.7	6.4	8.1	69	8477	6.4	6.4	5.6	9.0	161	17904
Y	-	7.7	6.2	6.5	224	34244	6.6	6.4	5.9	8.5	638	75208

Q	Influenza vaccination coverage personnel $\geq$ 17%						Influenza vaccination coverage personnel $<$ 17%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	8.5	8.0	6.4	7.9	107	13564	7.7	5.8	6.0	8.8	135	15261
Q2	6.4	6.5	5.5	9.2	125	13568	6.2	4.7	6.2	6.4	92	14445
Q3	6.2	5.8	5.3	6.4	85	13332	5.6	4.8	6.2	6.8	88	12901
Q4	6.9	7.6	6.1	8.8	116	13216	6.1	4.6	5.5	8.7	114	13165
Y	6.9	7.0	5.8	8.1	433	53680	6.3	5.0	6.0	7.7	429	55772

Q	Influenza vaccination coverage residents $\geq$ 95%						Influenza vaccination coverage residents $<$ 95%					
	Incidence						Incidence					
	2009	2010	2011	2012	2012 N	2012 Resident weeks	2009	2010	2011	2012	2012 N	2012 Resident weeks
Q1	8.7	7.5	6.8	7.7	134	17316	7.4	6.8	4.8	9.4	108	11509
Q2	5.7	5.8	6.2	8.7	151	17260	6.7	6.2	5.2	6.1	66	10753
Q3	6.0	5.8	5.7	7.0	120	17204	5.8	4.9	6.2	5.9	53	9029
Q4	6.9	6.4	6.1	9.7	167	17148	6.1	6.7	4.8	6.8	63	9233
Y	6.7	6.3	6.2	8.3	572	68928	6.4	6.2	5.2	7.2	290	40524



## Relative age distribution reported deaths



**Table 1. Clinical definitions of health care associated infections in SNIV**

---

**Gastro-enteritis**

The resident must have one of the following four conditions:

- a) diarrhoea 3 or more episodes in 24h, deviating from normal for this person
- b) diarrhoea and 2 of the following symptoms: fever, vomiting, nausea, stomach ache, abdominal cramps, blood or mucus in stool
- c) vomiting and 2 of the following symptoms: fever, nausea, stomach ache, abdominal cramps, blood or mucus in stool
- d) vomiting 3 or more episodes in 24h (without other symptoms and vomiting is not related to the use of medication)

---

**Influenza like illness**

The resident must meet the following conditions:  
an acute start of symptoms

*and* at least one of the following systemic symptoms: fever or febrile feeling, malaise, headache, myalgia

*and* at least one of the following three respiratory symptoms: cough, sore throat, shortness of breath

---

**Probable pneumonia**

The resident must have at least one of the following symptoms are suspected of low respiratory infection, probably pneumonia, as they occur as change compared to the former situation and other likely diagnoses are excluded:

tachypnoe, malaise, confusion, shortness of breath, cough (productive or inproductive), fever > 38°C or fever in the last 48 hours, pain in the chest (respiratory)

*and* with new focal (unilateral) abnormalities on auscultation of the lungs

---

**Urinary tract infections**

The resident must have (following is based on the guideline by the Dutch Association of Elderly Care Physicians):

general or urinary-related symptoms (painful, frequent urination, abdominal symptoms, anorexia, increased confusion, drowsiness, fatigue, increased incontinence of urine and reduced mobility, in the absence of a source of infection elsewhere).

*and* signs of inflammation (detected by microscopic examination or by leukocytanestest of urine sediment)

*and* a bacteriuria (determined with nitrite test or urine culture (not applicable to catheter use)).

---

# Figure 1. Nursing homes participating in SNIV in 2009 - 2012

In red nursing homes that participated in 2012, in black nursing homes that participated in previous years but not in 2012.



**Table 2. List of nursing homes participating in SNIV in 2009 – 2012**

Number of weeks in which data was registered per year

Location – Name Nursing home	2009	2010	2011	2012
ALMERE - Zorggroep Almere	34	52	46	-
AMSTERDAM ZUIDOOST - Gaasperdam	52	52	52	-
ASSEN - Anholt	31	51	52	52
ASSEN - Nieuw Graswijk	31	51	52	52
BARNEVELD - Norschoten loc- Klaverweide	52	52	52	16
BARNEVELD - Norschoten loc- Kweekweg	52	52	52	14
BOSKOOP - Zorgcentrum Boskoop	-	-	6	44
BREDA - Elisabeth, afd- Verpleging	-	-	39	46
CAPELLE AAN DEN IJSSEL - Rijckehove	50	42	-	-
DEN HELDER - Buitenveld	-	-	11	52
DEN HELDER - De Zeester	-	-	23	52
DEN HELDER - den Koogh	53	51	52	52
DEVENTER - St- Jozef Verpleeghuis	52	52	52	-
DIEREN - Gelders Hof	32	51	11	-
ECHT - de Egthe	53	9	-	-
ETTEN-LEUR - het Anbarg, afd- Verpleging	53	52	52	52
GOUDA - Bloemendaal	52	26	22	-
GOUDA - de Riethoek	49	2	-	-
HEESWIJK DINTHER - Cunera	9	52	52	52
KRIMPEN AAN DEN IJSSEL - Zorgcentrum Crimpenerstei	52	22	-	-
LEKKERKERK - de Breeje Hendrick	52	27	51	44
MAARSSSEN - Zuwe Snavelenburg	52	52	52	52
MAASTRICHT - Grubbeveld	-	-	18	52
MAASTRICHT - La Valence	40	47	50	52
NAARDEN - Naarderheem	53	50	52	52
NIEUWERKERK AAN DEN IJSSEL - zorggroep Zellingen	-	26	-	-
ROOSENDAAL - Heerma State	-	9	52	52
S GRAVENHAGE - Lozerhof	52	-	-	-
S GRAVENHAGE - Preva Verpleeghuis	52	-	-	-
SLIEDRECHT - Waerthove	52	52	52	52
VEENENDAAL - de Meent	49	48	4	-
VELP GLD - H-A- Lorentzhuis	-	30	-	-
VELP GLD - Oosterwolde	-	30	-	-
VELP GLD - t Jagthuis, Verpleeghuis	-	30	-	-
ZEVENAAR - Verpleeghuis Zevenaar	9	52	52	52

## Literature references

1. Yoshikawa TT. Perspective: aging and infectious diseases: past, present, and future. *J Infect Dis.* 1997;176(4):1053-7. Epub 1997/10/23.
2. van Duin C. More very old people without offspring in 2050. Web magazine Statistics Netherlands2009.
3. Castle SC. Clinical relevance of age-related immune dysfunction. *Clin Infect Dis.* 2000;31(2):578-85. Epub 2000/09/15.
4. Juthani-Mehta M, Quagliarello VJ. Infectious diseases in the nursing home setting: challenges and opportunities for clinical investigation. *Clin Infect Dis.* 2010;51(8):931-6. Epub 2010/09/09.
5. Smith PW, Bennett G, Bradley S, Drinka P, Lautenbach E, Marx J, et al. SHEA/APIC Guideline: Infection prevention and control in the long-term care facility. *Am J Infect Control.* 2008;36(7):504-35. Epub 2008/09/13.
6. Jans BF, L. Hendrickx, E. Muller, A. Vankerckhoven, V. Goossens, H. . Determinants of antibiotic use in nursing homes in 18 European countries: results of the European Surveillance of Antimicrobial Consumption (ESAC) Nursing Homes subproject. . 19th European Congress of Clinical Microbiology and Infectious Diseases; 15 May – 19 May Helsinki, Finland2009.
7. Jans BM, M.L. Fabbri, G. Cookson, B. Mackenzie, D. van de Mortel M. Ronin, V. Fabry, J. and the HALT Project Group. Surveillance of Healthcare-Associated infections and related practices in European Long-Term care facilities (HALT). 19th European Congress of Clinical Microbiology and Infectious Diseases; 15 May – 19 May Helsinki, Finland2009.
8. Geubbels EL, Mintjes-de Groot AJ, van den Berg JM, de Boer AS. An operating surveillance system of surgical-site infections in The Netherlands: results of the PREZIES national surveillance network. *Preventie van Ziekenhuisinfecties door Surveillance. Infect Control Hosp Epidemiol.* 2000;21(5):311-8. Epub 2000/05/24.
9. Chami K, Gavazzi G, Carrat F, de Wazieres B, Lejeune B, Piette F, et al. Burden of infections among 44,869 elderly in nursing homes: a cross-sectional cluster nationwide survey. *J Hosp Infect.* 2011;79(3):254-9. Epub 2011/09/09.
10. Eikelenboom-Boskamp A, Cox-Claessens JH, Boom-Poels PG, Drabbe MI, Koopmans RT, Voss A. Three-year prevalence of healthcare-associated infections in Dutch nursing homes. *J Hosp Infect.* 2011;78(1):59-62. Epub 2011/03/26.
11. Marchi M, Grilli E, Mongardi M, Bedosti C, Nobilio L, Moro ML. Prevalence of infections in long-term care facilities: how to read it? *Infection.* 2012. Epub 2012/05/12.
12. de Boer AS, Coutinho RA. Public health and healthcare-associated infections in the Netherlands. *J Hosp Infect.* 2007;65 Suppl 2:133-8. Epub 2007/08/19.
13. Dijkstra F, Donker GA, Wilbrink B, Van Gageldonk-Lafeber AB, Van Der Sande MA. Long time trends in influenza-like illness and associated determinants in The Netherlands. *Epidemiol Infect.* 2009;137(4):473-9. Epub 2008/09/16.
14. Donker GA. . Continuous Morbidity Registration at Dutch Sentinel Stations 2010. Utrecht: NIVEL, 2011.
15. Friesema IH, Vennema H, Heijne JC, de Jager CM, Morroy G, van den Kerkhof JH, et al. Norovirus outbreaks in nursing homes: the evaluation of infection control measures. *Epidemiol Infect.* 2009;137(12):1722-33. Epub 2009/05/12.
16. Furman CD, Rayner AV, Tobin EP. Pneumonia in older residents of long-term care facilities. *Am Fam Physician.* 2004;70(8):1495-500. Epub 2004/11/06.
17. Muder RR. Pneumonia in residents of long-term care facilities: epidemiology, etiology, management, and prevention. *Am J Med.* 1998;105(4):319-30. Epub 1998/11/11.