



September 2015

## Summary Report - The 2014/2015 Influenza Season

### Main Findings:

#### Laboratory Surveillance:

- During the 2014/2015 winter season, the surveillance network numbered 24 clinics distributed throughout Israel. The sentinel clinic network operated from the first week of October 2014 (Week 40) until the first half of April 2015 (Week 16).
- Approximately 29% of the specimens were positive for influenza; 13% of the specimens were positive for RSV.
- Most of the influenza-positive specimens were positive for type A influenza (91%), 92% of which were sub-type A/H3.
- The influenza virus isolation rate in the sentinel clinics reached a peak of approximately 74% in Week 8 of the year 2015.

#### Clinical Surveillance:

- In the 2014/2015 winter season, influenza-like morbidity in the community was seen relatively late as compared to the multi-annual average, with lower rates than for the previous two influenza seasons.
- Similarly to the two previous winter seasons, during this season also, influenza-like morbidity rates in the community were highest for infants, children and youths up to the age of 18, and were low for the elderly aged 65 and over.
- The rate of visits to "Maccabi Healthcare Services" clinics for persons aged 65 and over due to pneumonia was high as compared to the two previous influenza seasons, peaking at 437 visits per 10,000.
- Pediatric emergency room visits due to pneumonia were mostly below the multi-annual average during the 2014/2015 winter season.
- Adult emergency room visits due to pneumonia varied around the multi-annual average during most of the 2014/2015 winter season.
- Throughout the entire 2014/2015 winter season, the average hospital bed occupancy rate in internal medicine departments of general hospitals exceeded 100%.
- In pediatric departments, the average hospital bed occupancy rate exceeded 100% from Week 50 of 2014 (first half of December 2014) until Week 1 of 2015 (first week of January 2015).



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- During the 2014/2015 winter season, the percentage of deaths due to pneumonia varied around the seasonally expected level, with the exception of two occasions when the epidemic threshold was exceeded: Week 7 (first half of February 2015) and Week 10 (beginning of March 2015).



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### Immunization against Influenza:

- In the 2014/15 winter season, two types of vaccine were in use in Israel: inactivated trivalent vaccine (against 3 strains of influenza) and live attenuated quadrivalent vaccine (against 4 strains of influenza).
- The inactivated vaccine is recommended for the overall population from age 6 months; infants from age 6 months to age two years may only receive the inactivated vaccine, while the population aged 2 to 49 years may receive either the live attenuated vaccine or the inactivated vaccine (the live inactivated vaccine being the preferred one for children and youth aged 2-17 years). From age 50 and over, only the inactivated vaccine is recommended.
- In the 2014/15 winter season, some 1,700,000 people were immunized against seasonal influenza (approximately 21% of the total population of Israel). Immunization coverage in the elderly group, of persons aged 65 years and over, reached approximately 64%. Immunization coverage for infants and children aged 6-59 months reached approximately 26%.



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- **Background:**

The influenza surveillance system in Israel is administered by the Israel Center for Disease Control (ICDC) in the Ministry of Health, and comprises two branches: a laboratory branch and a clinical branch. The laboratory surveillance is based on nasal and pharyngeal swab specimens collected from patients presenting to one of the sentinel clinics with influenza-like illness, and tested for the presence of influenza virus at the Central Virology Laboratory of the Ministry of Health. The clinical surveillance is primarily based upon information regarding patient visits to clinics in the community and to hospital emergency rooms due to influenza-like illness, upper respiratory tract inflammation and pneumonia.

All the information collected from the various information sources is analyzed by the staff of the infection Disease Unit of the ICDC, and summarized in weekly reports during the influenza season and distributed to the management of the Ministry and to specific groups of physicians. The reports may be viewed on the Ministry of Health's website in Hebrew and in English<sup>1</sup>.

The objectives of the influenza surveillance system are to present an up-to-date picture of morbidity from influenza and its complications, to describe the burden on the health system and to describe the active influenza strains. The surveillance is usually conducted from October until April of the following year<sup>2</sup>.

### **1. Laboratory Surveillance**

Starting from the winter of 1996/97, the ICDC has been operating a network of sentinel clinics in the community to identify the influenza viruses that are active during the influenza season. In the 2014/2015 winter season, the surveillance network numbered 24 clinics distributed throughout Israel, from Dimona in the South to Akko in the North. The medical staff in these clinics have been instructed to take nasal and pharyngeal swabs from patients who are in the first or second day of their illness and meet the definition of influenza-like illness (temperature of 37.8°C or higher accompanied by one or more of the following signs: cough, sore throat, muscle pain, runny nose, chills, etc.). The nasal and pharyngeal swabs are stored under refrigeration, and are transported once per week to the Central Virology Laboratory of the Ministry of Health (Public Health Services), where they are tested for the presence of influenza virus and of RSV (Respiratory Syncytial Virus). In the laboratory, the influenza viruses are characterized at the level of type, subtype and strain; antigenic and genetic changes are identified. The degree of correspondence of the influenza viruses to the seasonal vaccine is also assessed.



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### 1.1 Virological Surveillance via the Sentinel Clinic Network: Winter 2014/2015

The sentinel clinic network operated from the first week of October 2014 (epidemiological Week 40) until the second week of April 2015 (Week 16). Table 1 shows the overall number of specimens received in the laboratory for each of the weeks of the surveillance period, for ages under 18, and 18 and over. The findings of the Central Virology Laboratory's testing of the specimens collected during the above period are shown in Tables 2 and 3. Most of the specimens that were found to be positive for influenza were type A influenza (approximately 91%), 92% of which were sub-type A/H3 (Table 3).



**Table 1: Number of Specimens by Epidemiological Week and Age Group, Winter 2014/2015<sup>1,3</sup>:**

Week	Year	Total No. of Specimens	Number of Specimens from Children (under age 18)	Number of Specimens from Adults (18 years and over)
40	2014	28	20	8
41	2014	15	10	5
42	2014	4	2	2
43	2014	30	19	11
44	2014	25	18	7
45	2014	25	17	8
46	2014	26	15	11
47	2014	36	23	13
48	2014	33	21	12
49	2014	44	27	17
50	2014	32	21	11
51	2014	46	24	22
52	2014	45	29	16
1	2015	42	29	13
2	2015	55	37	18
3	2015	66	43	23
4	2015	72	57	15
5	2015	98	62	36
6	2015	92	59	33
7	2015	70	42	28
8	2015	61	31	30
9	2015	61	34	27
10	2015	40	24	16
11	2015	35	18	17
12	2015	21	9	12
13	2015	24	18	6
14	2015	9	2	7
*15	2015	0	0	0
16	2015	1	0	1
<b>Total</b>		<b>1,136</b>	<b>711</b>	<b>425</b>

\*In that week, specimens were not collected from the sentinel clinics due to the Passover holiday.



**Table 2: Distribution of Influenza and RSV Isolations from Nasal and Pharyngeal Specimens Collected in the Sentinel Clinics, Winter 2014/15<sup>1,3</sup>: Numbers and Percentages**

Total Number of Specimens Sent	N=1,142	%
Influenza-positive specimens	327	28.6
RSV-positive specimens	149	13
Specimens negative for influenza and for RSV*	668	58.5

\*2 specimens during the current season were found to be positive both for influenza and for RSV.

**Table 3: Distribution of Influenza Isolations from Nasal and Pharyngeal Specimens By Type, Winter 2014/15<sup>1,3</sup>: Numbers and Percentages**

Type of Influenza Virus	N	%
<b>Type A influenza</b>	<b>297</b>	<b>90.8</b>
A/H1N1 2009	19	6.5
A/H3	274	92.2
A/H1	0	0
<b>Type B influenza</b>	<b>30</b>	<b>9.2</b>
<b>Total No. of influenza-positive specimens</b>	<b>503</b>	<b>100.0</b>

Figure 1 shows the results of testing by the Central Virology Laboratory of specimens collected at the sentinel clinics during the winter season, by week. RSV morbidity preceded influenza morbidity. The percentage of RSV-positive isolations began to rise from the beginning of November 2014 (Week 45). The percentage of isolations continued to increase until the second week of December 2014, when it reached a peak of 45% of all specimens. From the third week of December 2014, the



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percentage of RSV isolations declined in the sentinel clinics. The percentage of influenza-positive isolations began to rise in the second week of 2015 (the beginning of January 2015), and starting from Week 3 of 2015, the percentage of influenza isolations was higher than the percentage of RSV isolations. In Week 8 of 2015 (the second half of February 2015), the percentage of influenza isolations reached a peak of some 74%, after which the percentage of isolations began to decline. Specimens positive for influenza were found throughout almost the entire surveillance period, until Week 15 of 2015 (the second week of April 2015).

**Figure 1: Nasal and Pharyngeal Specimens Positive for Influenza and for RSV Collected at the Sentinel Clinic Network, By Week of Specimen, Winter 2014/15<sup>1,3</sup>: Percentages**

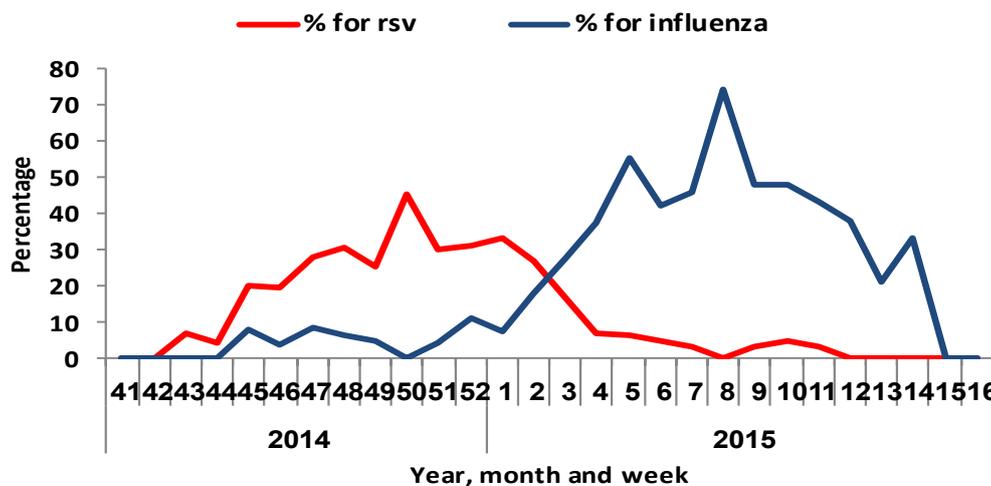
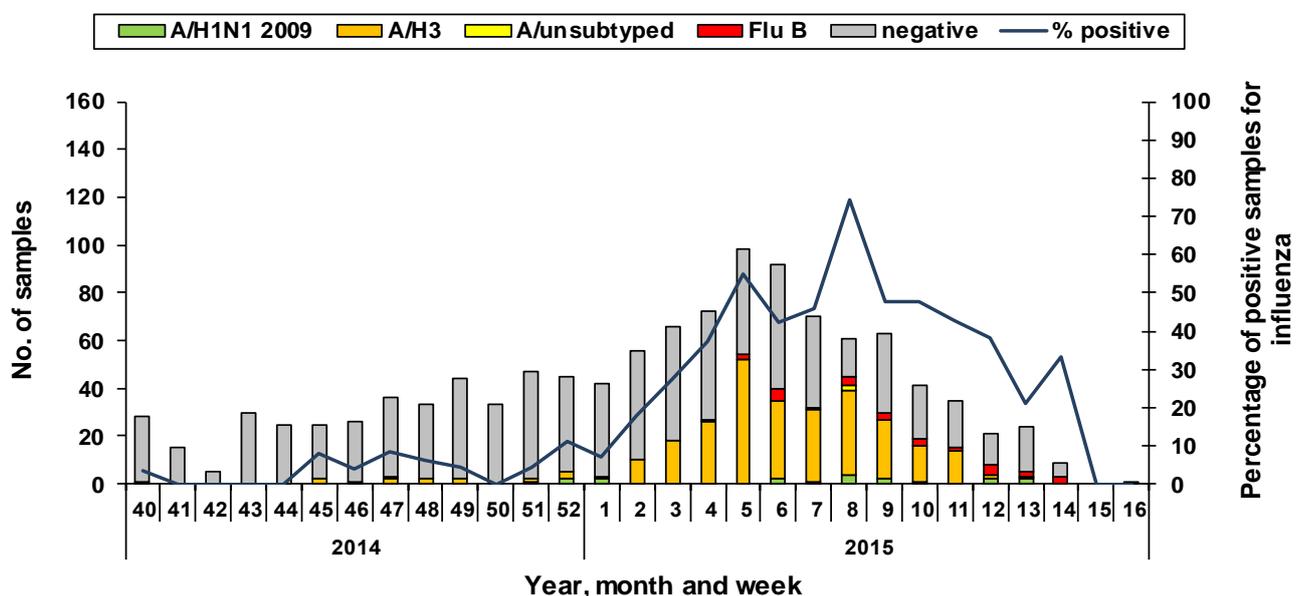


Figure 2 shows the influenza sub-types isolated from specimens in the sentinel network. A similar pattern of activity was also identified in hospitalized patients with respiratory illness diagnosed at the Central Virology Laboratory. The percentage of specimens positive for RSV declined to a few percent only, starting from Week 3 of 2015 (the second half of January 2015), and the percentage of specimens positive for influenza declined to a few percent only, starting from Week 13 of 2015 (end of March 2015)<sup>3</sup>.

**Figure 2: Nasal and Pharyngeal Specimens Collected at the Sentinel Clinic Network, By Laboratory Finding and Week of Specimen, Winter 2014/15<sup>1,3</sup>:** Numbers and percentage positive for influenza



## 2. Clinical Surveillance

The clinical surveillance is based on a number of information sources:

- Data regarding persons insured by the two largest HMOs in Israel ("Maccabi Healthcare Services"<sup>4</sup> and "Clalit" Health Services<sup>5</sup>) who presented to community physicians and were clinically diagnosed as having influenza or influenza-like illness, acute upper respiratory tract infection or pneumonia. Detailed non-identified information about these patients is transferred to the ICDC daily, and stored in a dedicated database.
- Daily data regarding the number of patients who presented to the emergency rooms of "Clalit" Health Services' 8 general hospitals and were diagnosed with pneumonia.
- Daily data regarding hospital bed occupancy in the general hospitals.
- Data regarding deaths in the community and in hospitals.
- Weekly data regarding overall deaths in Israel due to all causes and due to pneumonia that were reported to the Division of Epidemiology in the Ministry of Health.



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## 2.1 Surveillance of Influenza-Like Morbidity in the Community

Figure 3 shows weekly influenza-like morbidity rates, based upon patient visits to "Maccabi Healthcare Services" physicians in the community during the period May 2012 to May 2015. This period includes the three last winter seasons. The average is also plotted, demonstrating seasonal influenza activity in Israel from multi-annual data (1998-2014, excluding the 2009/10 winter season, which deviated from the norm due to the appearance of a new strain of A/H1N1 influenza, which caused a pandemic). This season we have included in the figure, for the first time, a baseline level, which is intended to indicate the beginning of the influenza season. This baseline level was calculated using an algorithm that was developed in the framework of the European influenza surveillance project (EuroFlu), and is based on past data accumulated at the ICDC regarding visits to "Maccabi Healthcare Services" clinics due to influenza-like illness. Morbidity rates exceeded the baseline level for the first time in Week 2 of 2015 (the first half of January 2015), and remained above it until Week 11 of 2015 (the first half of March 2015).

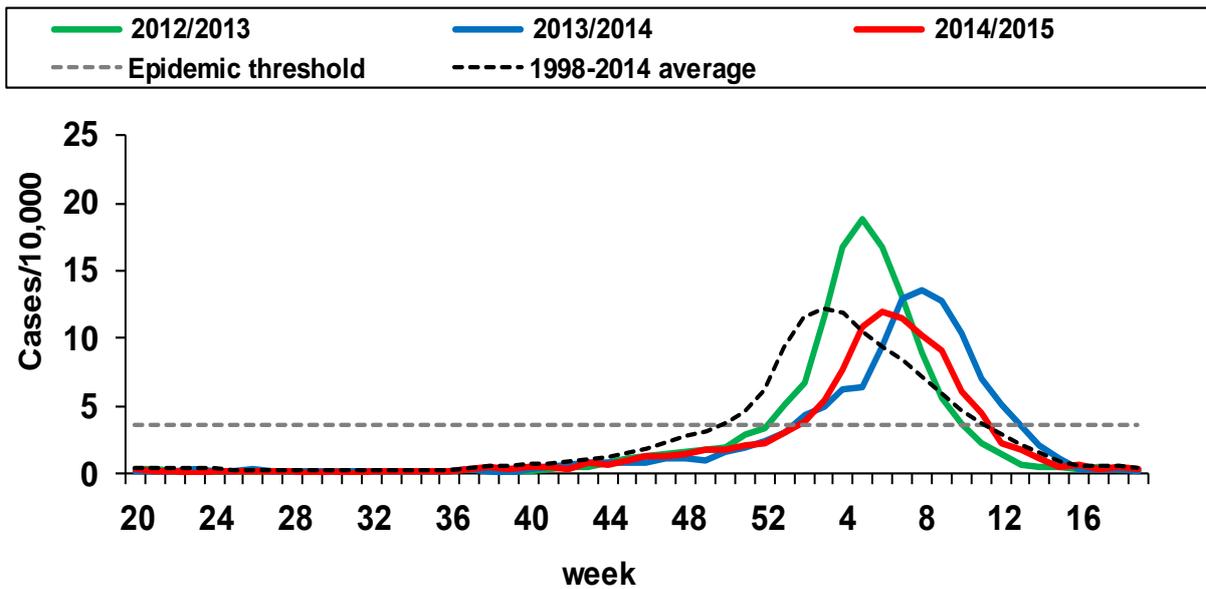
During the 2014/2015 winter season, morbidity was observed late as compared to the multi-annual average, with lower rates than in the two preceding winter seasons. The highest morbidity rates observed were for infants, children and youths up to the age of 18 years, similarly to the previous two years. Morbidity rates for the 65-and-over age group were similar to those for 2012/2013, and slightly higher than for 2013/2014 (Figure 4).



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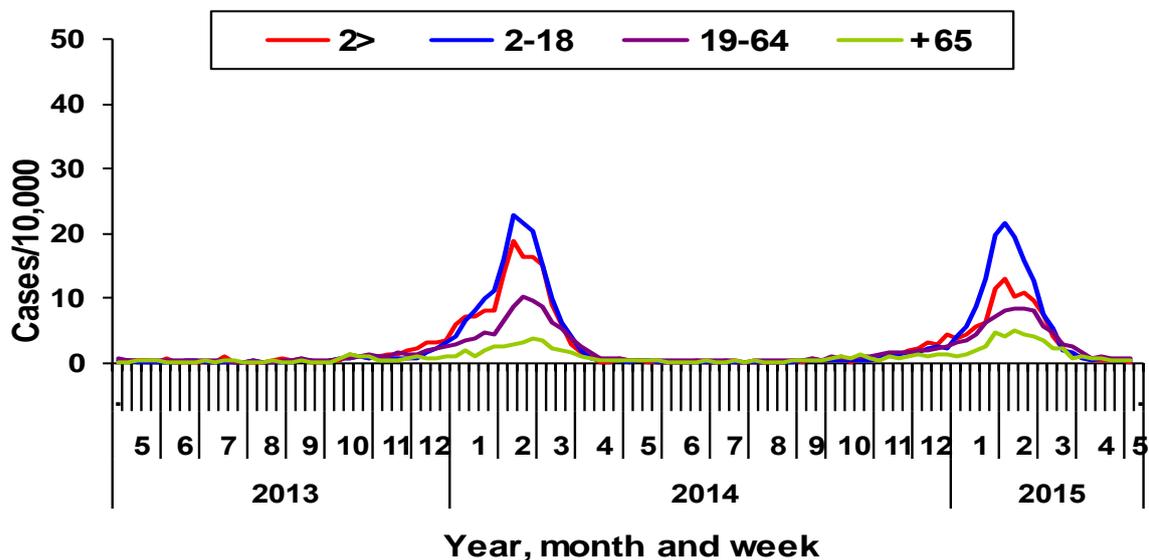
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Figure 3: Visits per Week to "Maccabi Healthcare Services" Clinics that concluded with a diagnosis of Influenza-Like Illness\*<sup>1,4</sup>: Rates per 10,000



\* The multi-annual average does not include the 2009/10 winter season.

Figure 4: Visits per Week to "Maccabi Healthcare Services" Clinics that concluded with a diagnosis of Influenza-Like Illness, by Age Group<sup>1,4</sup>: Rates per 10,000





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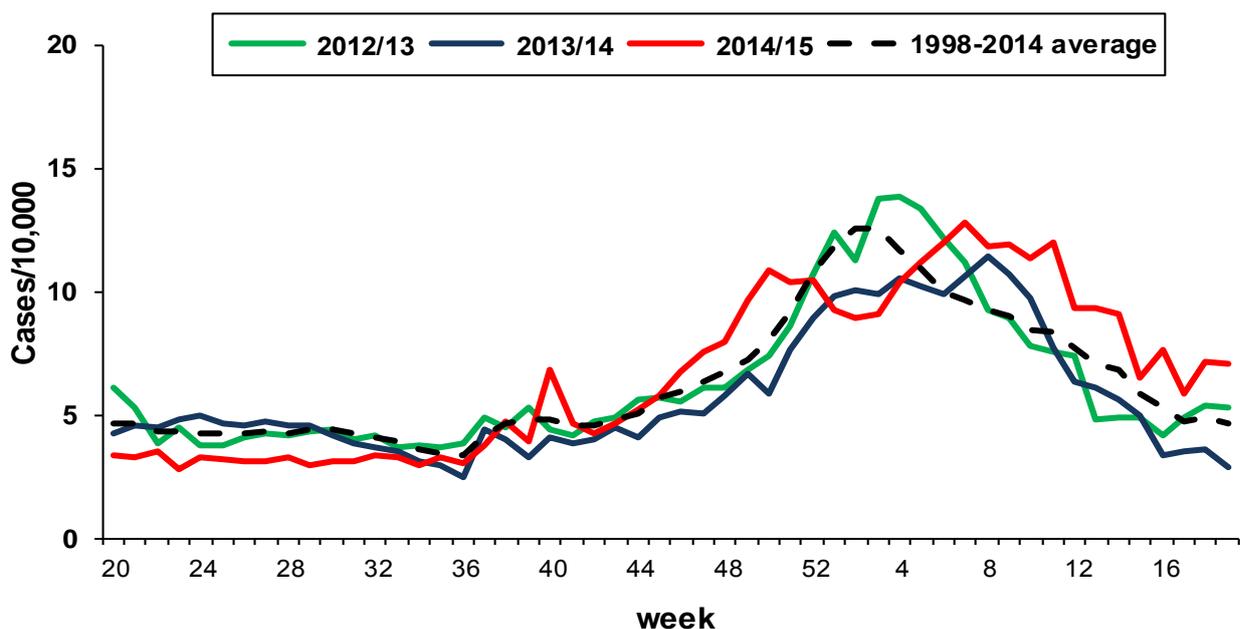
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## 2.2 Surveillance of Pneumonia Morbidity in the Community

Figure 5 shows weekly visit rates to "Maccabi Healthcare Services" physicians that concluded with a diagnosis of pneumonia, during the period May 2012 to May 2015, as compared to the multi-annual average, excluding the 2009/10 winter season. In Weeks 47-52 of 2014 (from the second half of November 2014 until the end of December 2014), clinic visit rates were above the multi-annual average. In Weeks 1-4 of 2015 (the month of January 2015), the visit rate was below the multi-annual average, and in Weeks 5-16 of 2015 (the end of January until the end of the season), the rates reverted to being higher than the multi-annual average (Figure 5).

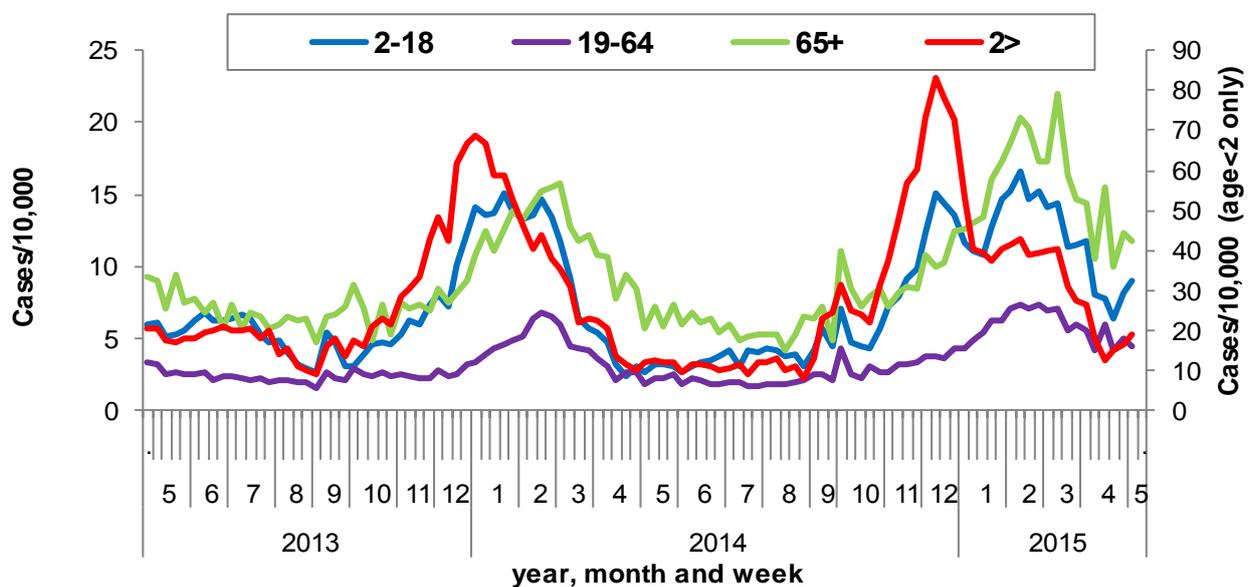
The rate of visits due to pneumonia was particularly high in comparison with the two previous seasons for the 65-and-over age group. The visit rate reached a peak of 437 visits per 10,000 in the first half of March 2015. For the 19-64 year old age group, visit rates due to pneumonia were lower than the rates for the remaining age groups (Figure 6).

**Figure 5: Visits per Week to "Maccabi Healthcare Services" Clinics that concluded with a diagnosis of Pneumonia<sup>1,4</sup>: Rates per 10,000**



\* The multi-annual average does not include the 2009/10 winter season.

**Figure 6: Visits per Week to "Maccabi Healthcare Services" Clinics that concluded with a diagnosis of Pneumonia, by Age Group<sup>1,4</sup>:** Rates per 10,000 (the y-axis for infants up to the age of two years is on the right hand side of the Figure, and the y-axis on the left hand side of the Figure is for all the remaining age groups)



### 2.3 Surveillance of Emergency Room Visits that concluded with a diagnosis of Pneumonia

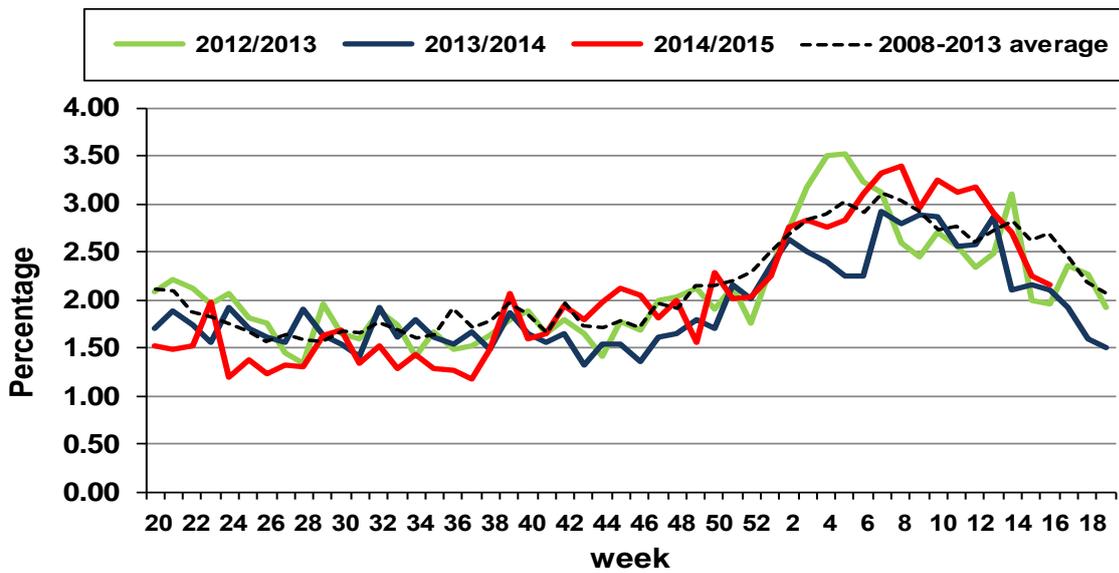
Influenza morbidity is generally accompanied by increased emergency room visits due to pneumonia. Figures 7 and 8 show visits that concluded with a diagnosis of pneumonia, as a percentage of all visits that concluded with any diagnosis, to adult and pediatric emergency rooms of the 8 general hospitals of "Clalit" Health Services. From Week 20 of 2014 until Week 5 of 2015 (the end of January 2015), the percentage of visits to adult emergency rooms in which pneumonia was diagnosed varied around the multi-annual average. From Week 6 of 2015 (the beginning of February 2015) until Week 13 of 2015 (the end of March 2015), the percentage of visits was above the multi-annual average (Figure 7)<sup>5</sup>. For visits to pediatric emergency rooms due to pneumonia, this percentage was lower, for most of the season, than the multi-annual average (Figure 8)<sup>5</sup>.



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**Figure 7: Visits to (Adult) Emergency Rooms in Hospitals of "Clalit" Health Services that concluded with a Diagnosis of Pneumonia, May 2012 - April 2015, and the Multi-Annual Average\*<sup>1,5</sup> (expressed as a percentage of all visits that concluded with any diagnosis)**



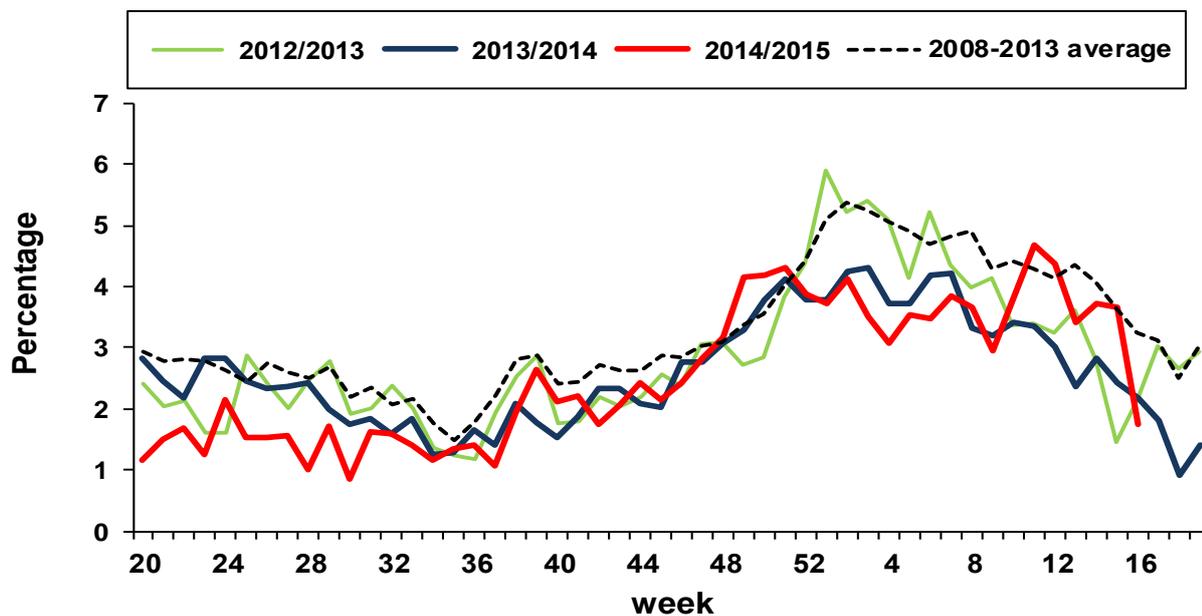
\* The multi-annual average does not include the 2009/10 winter season.



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**Figure 8: Visits to (Pediatric) Emergency Rooms in Hospitals of "Clalit" Health Services that concluded in a Diagnosis of Pneumonia, May 2012 - April 2015, and the Multi-Annual Average\*<sup>1,5</sup> (expressed as a percentage of all visits that concluded with any diagnosis)**



\* The average does not include the 2009/10 winter season.

#### 2.4 Surveillance of (Pediatric) Emergency Room Visits that ended with a Diagnosis of Bronchiolitis

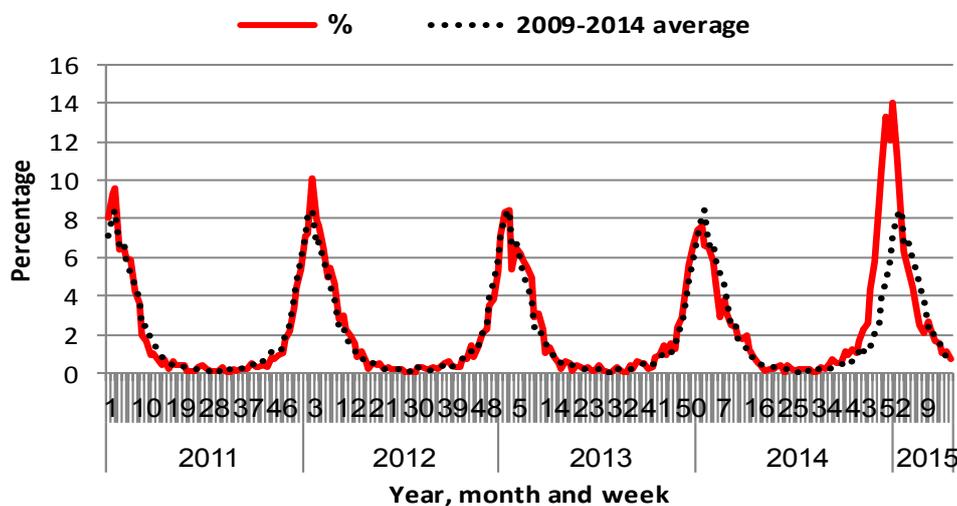
This season, we have presented in the influenza surveillance reports for the first time, a figure showing the percentage of visits of infants under the age of two years to pediatric emergency rooms that are due to bronchiolitis, for the years 2011-2015. It can be seen that the wave of morbidity commenced earlier than expected this year, in Week 47 of 2014, and the percentage of visits was above the multi-annual average until Week 2 of 2015 (the first half of January 2015).



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**Figure 9: Visits to (Pediatric) Emergency Rooms in Hospitals of "Clalit" Health Services that concluded with in a diagnosis of Bronchiolitis, January 2011 - April 2015, and the Multi-Annual Average<sup>1,5</sup> (expressed as a percentage of all visits that concluded with any diagnosis)**



**2.4 Surveillance of Weekly Hospital Bed Occupancy Rates in General Hospitals**

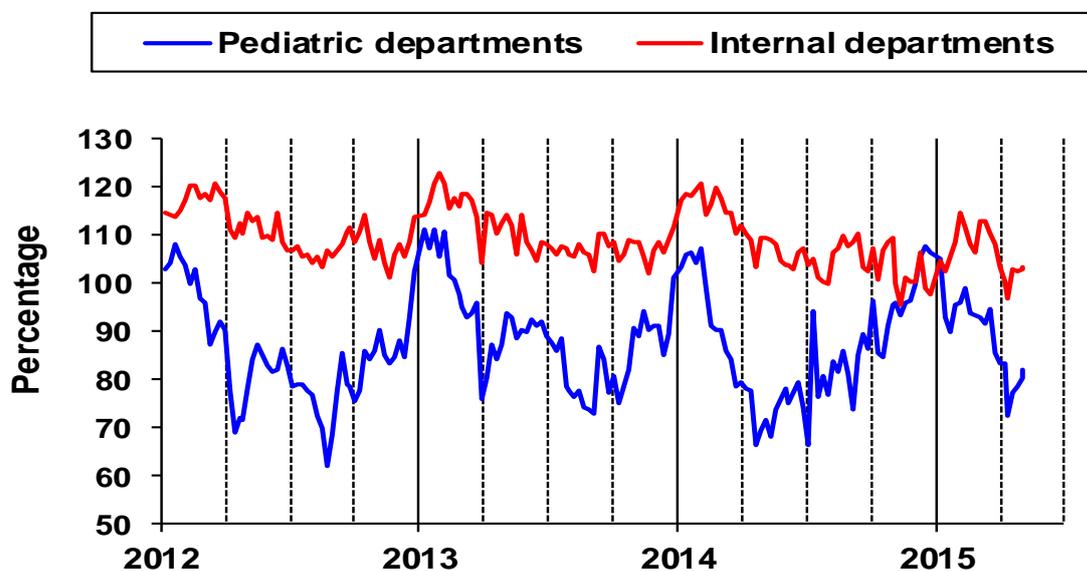
Throughout the entire 2014/2015 winter season, the average hospital bed occupancy rate in internal medicine departments of general hospitals exceeded 100%, and reached a peak of 114% in the final week of January 2015. In pediatric departments, the average occupancy rate was lower than in internal medicine departments. From Week 50 of 2014 until the final week of January 2015, the occupancy rate exceeded 100%, peaking at 107% in Week 51 of 2014. In pediatric departments, the peak occupancy rate this year was similar to that recorded in the previous two influenza seasons. In contrast, the peak occupancy rate in the current season in internal medicine departments was low compared to the peaks recorded in the previous two seasons.



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**Figure 10: Weekly Hospital Bed Occupancy Rates in Internal Medicine and Pediatric Departments, General Hospitals, 2012-2015<sup>1</sup>: Average Percentage**



### 2.5 Surveillance of Mortality

In order to assess the severity of influenza during the winter seasons, two measures of mortality were utilized: mortality due to all causes (Figure 11), and mortality due to pneumonia as a percentage of all cases of death in Israel (Figure 12).

The number of deaths during the 2014/2015 winter season was high in comparison with the two previous winter seasons. The number of deceased was higher than the multi-annual average in Weeks 2-11 in 2015 (the months of January, February and the beginning of March).

During the current season, the epidemic threshold was exceeded twice, in Week 7 of 2015 (the first half of February 2015) and Week 10 of 2015 (the beginning of March 2015).



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Figure 11: Number of Deaths per Week, as Compared to the Multi-Annual Average, 2007-2012<sup>6</sup>: Absolute Numbers

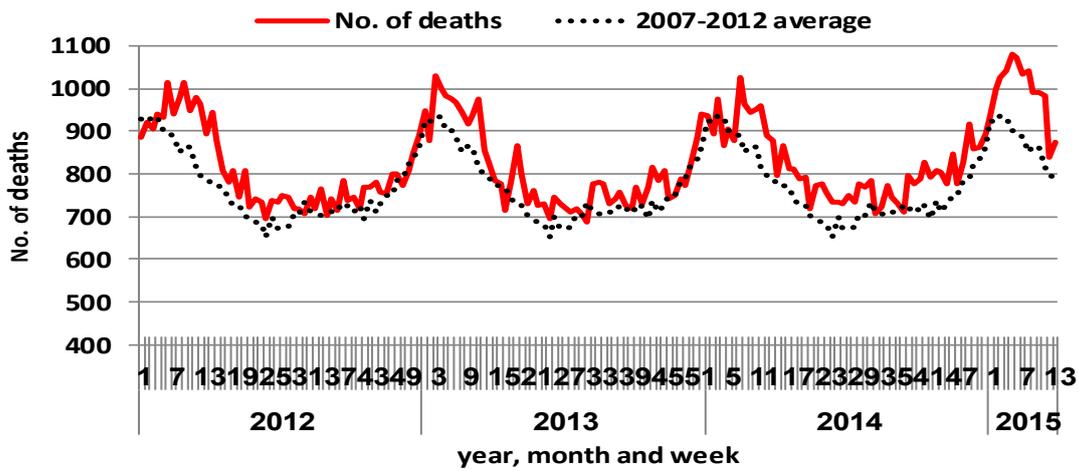
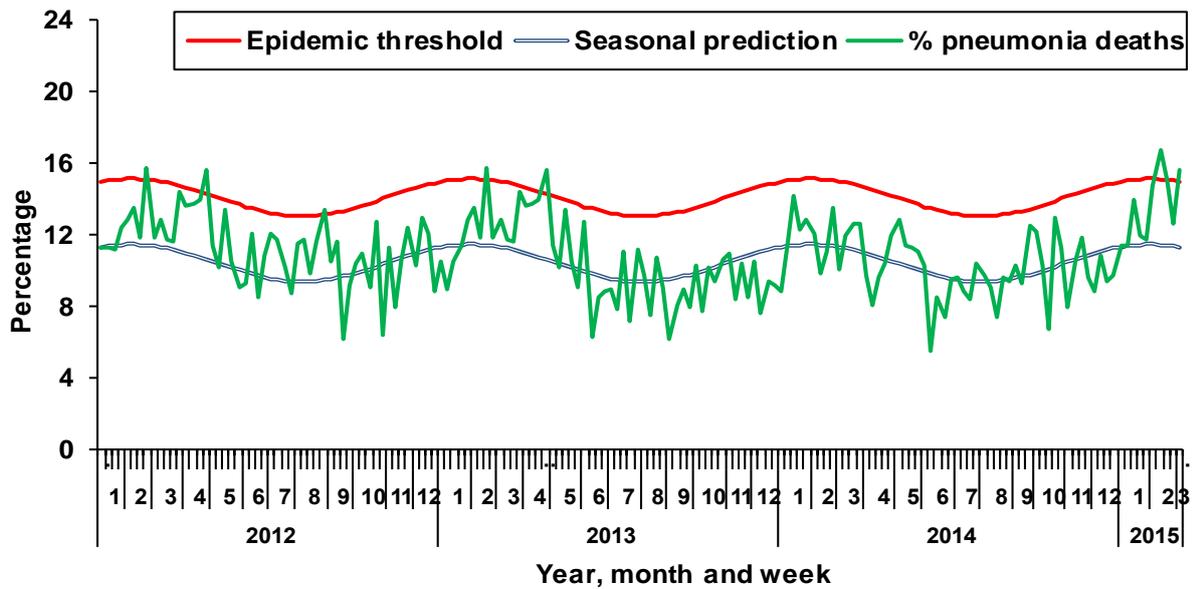


Figure 12: Deaths per Week due to Pneumonia, as Compared to Level Expected from Multi-Annual Data, 2012-2014<sup>7</sup>: Percentage of Total Cases of Death





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### **3. Immunization Against Influenza and the degree to which the Vaccine Corresponds to Influenza Viruses Active during the Season**

Since 2011, there has been a recommendation for the entire population over the age of 6 months to be vaccinated against influenza. There are a number of inactivated vaccines containing 3 influenza strains, and a live attenuated vaccine containing 4 influenza strains, that are currently in use. According to the Vaccination Guide of the Division of Epidemiology of the Ministry of Health, for children from the age of two years to the age of 17 years, the live attenuated vaccine is recommended. Most influenza strains identified this season were of type H3N2. All 22 strains of influenza type H3N2 that were isolated from sentinel clinic specimens that underwent molecular characterization were found to correspond only partially to the vaccine strain.

In the Vaccination Guide of the Division of Epidemiology of the Ministry of Health<sup>8</sup>, details can be found regarding the vaccine's target groups (persons at risk of suffering complications of influenza and medical staff).

During the 2014/2015 winter season, some 1,700,000 people were immunized against seasonal influenza (approximately 21% of the total population of Israel). Immunization coverage in the elderly group, of persons aged 65 years and over, reached approximately 64%. Immunization coverage for infants and children aged 6-59 months reached approximately 25.5%.

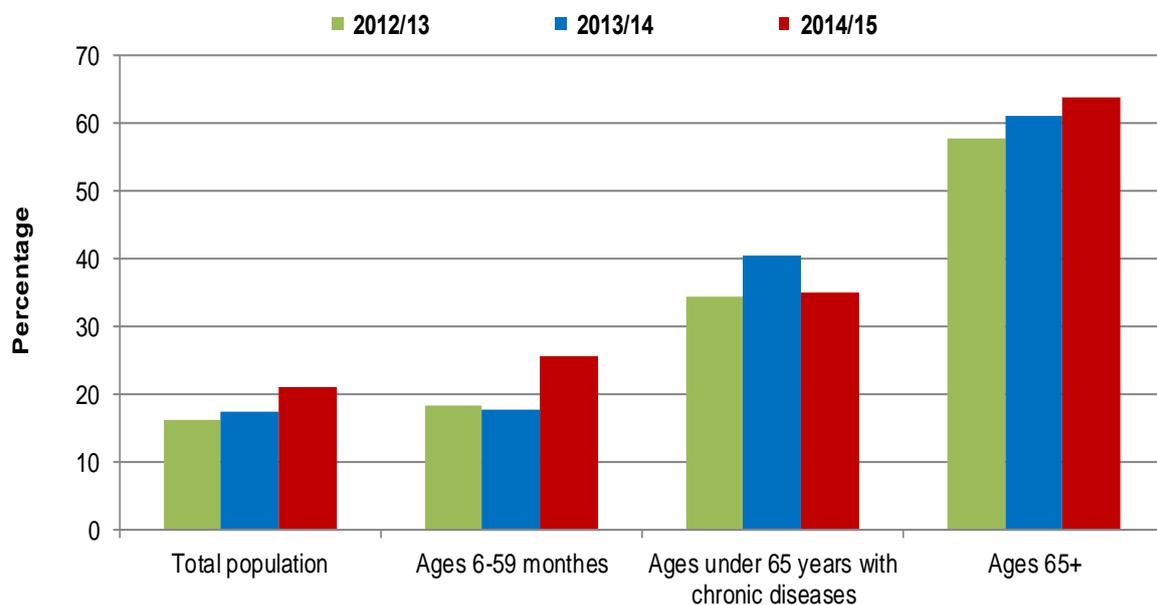


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The percentage of persons immunized in all HMOs was higher than that recorded in the preceding winter seasons (Figure 13).

**Figure 13: Immunization Percentages for the Past Three Influenza Seasons, by Age Group<sup>9</sup>:**



#### 4. International Comparison

**USA:** The increase in the percentage of clinic visits due to ILI in the 2014/2015 winter season commenced in the second half of November 2014, crossed the national baseline level, and remained above it until Week 13 of 2015 (the end of March 2015). The current season commenced early compared to the 2013/14 influenza season, but had similar levels to the 2012/13 influenza season.

Influenza subtype A/H3N2 was the most dominant this season, and the elderly aged 65 and over were found to be severely affected compared to the remaining age groups. The hospitalization rate due to laboratory-diagnosed influenza is high in the elderly aged 65 and over, and the highest since 2005. The age group of the elderly, aged 65 and over, was also linked to high mortality due to pneumonia and influenza.

As of Week 18, ending 9-May-15, a total of 671,734 specimens had been collected. 123,850 (18.4%) were found to be positive for influenza, of which 104,002 (84%) were positive for influenza



type A: 52,119 (50.1%) were found to be positive for influenza H3, 218 (0.2%) were found to be positive for influenza A(H1N1)pdm09 and 51,664 specimens (49.7%) had not yet been subtyped.

Influenza subtype A/H3N2 was found to be antigenically and genetically different from the strain in the season's influenza vaccine, and the efficacy of the vaccine was therefore low in the 2014/15 winter season<sup>10</sup>.

**Europe:** During the 2014/2015 winter season, there was combined activity of influenza A/H3N2, influenza A(H1N1)pdm09 and influenza B; influenza subtype A/H3N2 being the most dominant strain this season.

Additionally, higher mortality was reported among the elderly group, aged 65 and over, in parallel with increased influenza activity and an increase in the percentage of isolations for influenza A/H3N2, in the framework of the EuroMOMO project.

In Europe also, influenza subtype A/H3N2 was found to be antigenically and genetically different from the strain in the 2014/2015 influenza vaccine.

Both in Europe and in the USA, the influenza viruses were found to be highly sensitive to Oseltamivir and to Zanamivir, and highly resistant to Adamantanes<sup>10,11</sup>.

#### Sources of Information:

1. Israel Center for Disease Control. Influenza Surveillance in the 2014-2015 Winter Season in Israel and Internationally.  
<http://www.old.health.gov.il/pages/default.asp?pageid=5323&parentid=507&catid=78&maincat=25>
2. Bromberg, M., Kaufman, Z., Mandelboim, M., Sefty, H., Shalev, V., Marom, R., Mendelson, E., Green, M., Shohat, T. Clinical and virological surveillance of influenza in Israel: implementation during pandemic influenza. Harefuah 2009; 148 (9): 577-82.
3. Data by courtesy of the Central Virology Laboratory, Ministry of Health, 2015.
4. Data by courtesy of "Maccabi Healthcare Services", 2015.
5. Data by courtesy of "Clalit" Health Services, 2015.
6. Data by courtesy of the Computing Division, Ministry of Health, 2015.
7. Data by courtesy of the Division of Epidemiology, Ministry of Health, 2015.
8. Vaccination Guide, September 2014 Update. Division of Epidemiology, Ministry of Health.



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משרד  
הבריאות  
לחיים בריאים יותר

9. Data by courtesy of all 4 HMOs, 2015.
10. Center for Disease Control and Prevention, Seasonal Influenza (Flu): Flu Activity and Surveillance. <http://www.cdc.gov/flu/weekly>
11. Flu News Europe- joint ECDC-WHO/Europe weekly influenza update.  
<http://flunewseurope.org/>