

Pandemic Influenza A (H1N1) 2009 in the English- and Dutch-speaking Caribbean An Epidemiological Overview

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ABSTRACT

Objective: To describe epidemiological trends of pandemic influenza A (H1N1) in the English- and Dutch-speaking Caribbean during the pandemic period.

Design and Methods: Data on laboratory-confirmed cases and deaths associated with pandemic influenza A (H1N1) contained in two regional databases at the Caribbean Epidemiology Centre (CAREC) were analysed. The data sources were epidemiological and laboratory reports from English- and Dutch-speaking countries and the CAREC laboratory information system (LABIS).

Results: In the English- and Dutch-speaking Caribbean, pandemic influenza A (H1N1) was the predominant circulating influenza virus type during the pandemic period. There were three distinct phases: a first pandemic wave during mid-April to end of August 2009 (734 cases), a second pandemic wave during September–December 2009 (570 cases) and a phase of low transmission during January to mid-August 2010 (55 cases). The majority of cases (76%) were aged less than 30 years, with children of school age being most affected. Most cases (89%) presented with symptoms of the respiratory tract and smaller proportions (20–40%) presented with gastrointestinal and other symptoms. No cases tested were resistant to oseltamivir. A quarter of cases required hospitalization and the case fatality rate was 1.8%.

Conclusions: The epidemiological characteristics of the pandemic in the English- and Dutch-speaking Caribbean were consistent with that in other parts of the world. It is important that post pandemic surveillance (epidemiological and virological) for respiratory illnesses continues to be enhanced in order to give a better understanding of seasonality and changing trends in respiratory illnesses and their aetiological agents.

Keywords: Caribbean, A (H1N1) pdm09, pandemic influenza

Pandemia de Gripe A (H1N1) de 2009 en el Caribe de Habla Inglesa y Holandesa: Panorama Epidemiológico

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RESUMEN

Objetivo: Describir las tendencias epidemiológicas de la pandemia de gripe A (H1N1) en el Caribe de habla inglesa y holandesa durante el periodo pandémico.

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Diseño y métodos: Se analizaron los datos sobre casos confirmados por laboratorio y muertes asociadas con la pandemia de gripe A (H1N1), contenidos en dos bases de datos regionales del Centro Epidemiológico del Caribe (CAREC). Las fuentes de los datos fueron los reportes epidemiológicos y de laboratorio de los países de habla inglesa y holandesa, así como del Sistema de Información de Laboratorio del CAREC (LABIS).

Resultados: En el Caribe anglófono y de habla holandesa, la pandemia de gripe A (H1N1) fue el tipo de virus de gripe que circuló predominante durante el periodo pandémico. Hubo tres fases distintas: una primera ola pandémica desde mediados de abril a finales de agosto de 2009 (734 casos); una segunda ola pandémica en septiembre-diciembre de 2009 (570 casos); y una fase de baja transmisión de enero a mediados de agosto de 2010 (55 casos). La mayoría de los casos (76%) tenían menos de 30 años, siendo los niños de edad escolar los más afectados. La mayor parte de los casos (89%) presentaban síntomas de las vías respiratorias, y un número menor (20–40%) presentaban síntomas gastrointestinales y otros síntomas. Ninguno de los casos sometidos a prueba resultó resistente al oseltamivir. Una cuarta parte de los casos requirió hospitalización, y la tasa de letalidad fue de 1.8%.

Conclusiones: Las características epidemiológicas de la pandemia en el Caribe de habla inglesa y holandesa concuerdan con las encontradas en otras partes del mundo. Es importante continuar mejorando la vigilancia postpandémica (epidemiológica y virológica) de las enfermedades respiratorias, con el fin de lograr una mejor comprensión de la estacionalidad y las tendencias cambiantes de las enfermedades respiratorias y sus agentes etiológicos.

Palabras claves: Caribe, pandemia de gripe A (H1N1) pdm09

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INTRODUCTION

In April 2009, the first cases of pandemic influenza A (H1N1) [A(H1N1) pdm09] were identified in Mexico and the United States of America [USA] (1–4). On June 11, 2009, due to the subsequent global spread of this new strain of influenza virus, the first influenza pandemic of the 21st century was officially declared by the World Health Organization (5). The first case of A(H1N1) pdm09 in the English- and Dutch-speaking Caribbean¹ occurred on May 18, 2009 in Jamaica. This case had a history of recent travel to the USA. Later that month, cases were identified in six additional countries: The Bahamas, Barbados, Bermuda, Cayman Islands, Dominica and Trinidad and Tobago; with all cases having had a history of travel to an affected area in the USA. By the middle of July 2009, 20 of the 21 English- and Dutch-speaking Caribbean countries had reported cases; and by the end of November 2009, local transmission had occurred in all countries (6). This paper describes the epidemiology of 1517 A (H1N1) pdm09 cases in the English- and Dutch-speaking Caribbean during the pandemic period.

¹During 2009–2010, the total population was approximately 7 million and consisted of 21 countries, namely Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, Netherlands Antilles, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Suriname, Trinidad and Tobago and Turks and Caicos Islands.

²A centre of the Pan American Health Organization/World Health Organization (PAHO/WHO) which includes the main reference laboratory for the English- and Dutch-speaking Caribbean.

METHODS

Study period and case definition

The period under review in this paper is from the first occurrence of A(H1N1) pdm09 on April 19, 2009 to August 10, 2010, when the pandemic was declared over [*ie* epidemiological week (EW) 16, 2009 to EW 32, 2010] (7). Cases of A(H1N1) pdm09 that were identified during this period and laboratory confirmed by real-time polymerase chain reaction (PCR), regardless of clinical presentation, were included in analyses. At the start of the period, all suspected cases were tested. As the virus was confirmed in a country, the strategy changed to testing only a sample of suspected cases. Case confirmation was initially done at the US Centers for Disease Control and Prevention. In early May, upon receipt of specific primers for A(H1N1) pdm09, confirmatory testing commenced at the Caribbean Epidemiology Centre (CAREC)² laboratory and later a National Influenza Centre in Jamaica also began this testing.

Data sources and analyses

In April 2009, a Microsoft Access database (C-FLU) was developed to capture information on specimens submitted to the CAREC laboratory for testing for pathogens causing respiratory illness. Data were uploaded weekly from the CAREC Laboratory Information System (LABIS) to C-FLU. A few countries that had respiratory specimens tested at other reference laboratories routinely submitted line listings of positive results to CAREC, which were added to the C-FLU database. Data validation was done in collaboration with

countries as necessary. As part of routine communicable disease surveillance, CAREC coordinates and maintains a regional Microsoft Excel database of syndromic data for the English- and Dutch-speaking Caribbean on selected syndromes, including acute respiratory infections (ARI). In this system, countries submit national weekly reports of aggregate numbers of syndromes to CAREC. Data from C-FLU and the syndromic database were analysed using Microsoft Access and Excel.

RESULTS

Trends over time

During the pandemic period, April 19, 2009 to August 10, 2010, a total of 10 003 cases from the English- and Dutch-speaking Caribbean were tested for pathogens causing respiratory illnesses and 1517 cases (15%) were laboratory-confirmed as A(H1N1) pdm09 [Table 1]. There was wide variation among countries in both sampling strategies as well as the proportions of cases tested for respiratory illnesses that were positive for A(H1N1) pdm09, ranging from 3.8%–49% [Table 1]. During this period, A(H1N1) pdm09 was the

predominant circulating influenza virus type. Seasonal influenza viruses (seasonal H1N1, seasonal H3N2 and influenza B) were also circulating, but at much lower levels, 1% or less of all cases tested (Table 1, Fig 1).

During the pandemic period, three distinct phases were observed (Fig. 1). A first pandemic wave occurred during mid-April to end of August 2009 (EW 20–34), with a total of 734 A(H1N1) pdm09 cases and a peak of 101 cases in mid-June (EW 24). The second pandemic wave occurred during September–December 2009 (EW 35–52), with a total of 570 cases and a peak of 69 cases in mid-October (EW 41). The majority of cases (96%) occurred during these two epidemic waves. There was a marked reduction in cases during the last phase of low transmission during January to mid-August 2010 (EW 1–32), with a total of 55 cases.

During the pandemic period, there were also two waves of acute respiratory infections that peaked in the latter halves of June and October (EW 25 and EW 42). These peaks coincided with the peaks in the pandemic influenza waves in EW 24 and EW 41 [Fig. 1].

Table 1: Laboratory confirmed influenza cases in the English- and Dutch-speaking Caribbean (CAREC member countries), epidemiologic week 16, 2009 to epidemiologic week 32, 2010

Country	Number of cases with specimens tested	Cases (percentage of cases with specimens tested)									
		Pandemic (H1N1) influenza		Influenza B		Seasonal influenza A H1N1 [‡]		Seasonal influenza A H3N2		Influenza A (untyped)	
Anguilla	51	14	27.5%					2	3.9%		
Antigua and Barbuda	24	4	16.7%					1	4.2%		
Aruba	406	57	14.0%								
Bahamas	50	24	48.0%					1	2.0%		
Barbados	610	156	25.6%	16	2.6%			9	1.5%	2	0.3%
Belize	207	60	29.0%	2	1.0%			6	2.9%		
Bermuda	80	30	37.5%					1	1.3%		
British Virgin Islands	61	25	41.0%								
Cayman Islands	369	130	35.2%	4	1.1%	10	2.7%	10	2.7%		
Dominica	262	51	19.5%	1	0.4%			1	0.4%	2	0.8%
Grenada	67	28	41.8%					1	1.5%		
Guyana	128	30	23.4%								
Jamaica ^a	5269	202	3.8%	15	0.3%	9	0.2%	9	0.2%	18	0.3%
Montserrat	47	21	44.7%								
Netherlands Antilles ^b	263	128	48.7%								
St Kitts and Nevis	48	10	20.8%								
St Lucia	212	75	35.4%								
St Vincent and Grenadines	68	19	27.9%	1	1.5%						
Suriname	820	139	17.0%	51	6.2%	9	1.1%	4	0.5%		
Trinidad and Tobago	821	269	32.8%	10	1.2%			4	0.5%		
Turks and Caicos Islands	140	45	32.1%	2	1.4%						
Total	10 003	1517	15.2%	102	1.0%	28	0.3%	49	0.5%	22	0.2%

Data source: the CAREC Laboratory and country-submitted reports as at October 14, 2011

Notes:

a: in 2009, five specimens from Jamaica were mixed influenza specimens.

b: of the 128 pandemic (H1N1) lab confirmed cases, 59 were from Curacao, 38 were from Bonaire, 29 were from St Maarten, 1 was from St Eustatius, 1 was from Saba. Three of the cases from Curacao were from a cruise ship.

‡: no seasonal influenza A H1N1 has been identified in cases with date of onset in 2010.

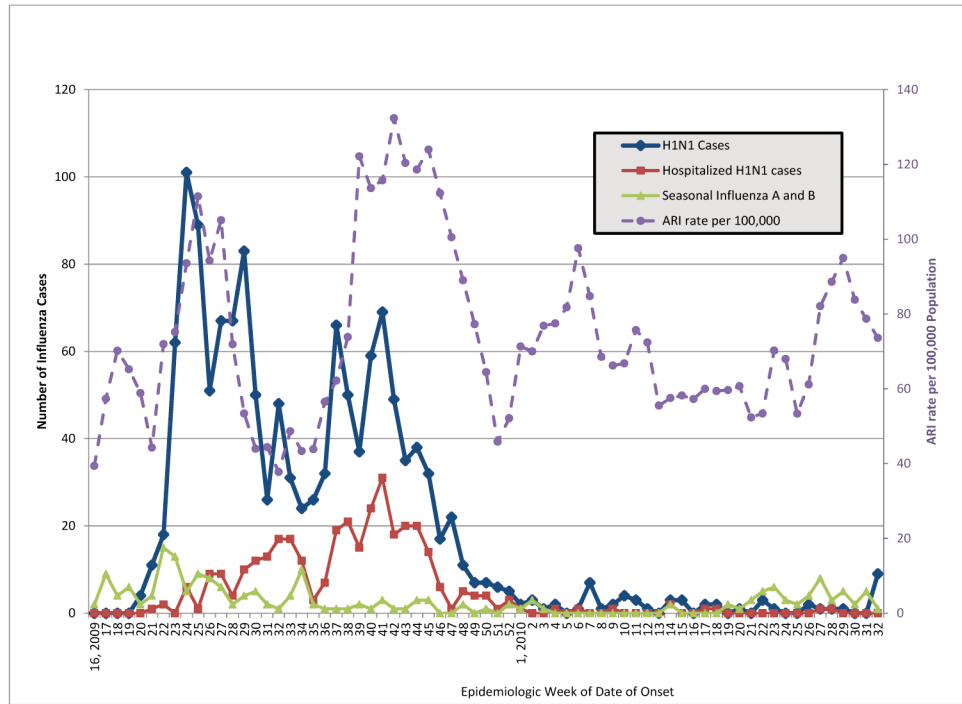


Fig. 1: Laboratory confirmed pandemic (H1N1) cases and seasonal influenza A and B and acute respiratory infections (ARI) incidence rate/100 000 population, epidemiologic week 16, 2009 to week 32, 2010; English- and Dutch-speaking Caribbean (CAREC member countries)

Age and gender distribution

Of the 1473 cases for which data on age were available, the median age was 18 years (range 0–98 years). As was observed in other regions (8), the majority of cases (76%) were < 30 years old and only 31 cases (2%) were aged ≥ 60 years [Fig. 2]. A similar age distribution was observed among cases of seasonal influenza. However, among those

aged 0–14 years, A(H1N1) pdm09 affected a larger proportion of school-aged children (5–14 year olds) compared to those aged < 5 year olds, than did seasonal influenza.

Data on gender were available for 1474 cases, with an overall male to female ratio of 1:1. Among those aged 5–14 years, the larger proportion of cases was male, with a male to female ratio of 1.4:1 [Fig. 2]. However, among adults aged 20–50 years, this trend was reversed and the larger proportion of cases was female, male to female ratio being 1:1.4 [Fig. 2].

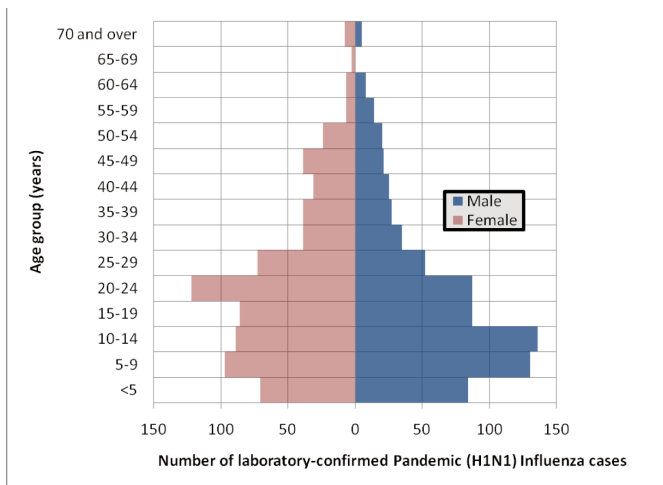


Fig. 2: Age and sex distribution of laboratory-confirmed pandemic (H1N1) influenza cases (n = 1466) in CAREC member countries for the period epidemiologic weeks 16, 2009 to 32, 2010.

Clinical characteristics

The majority (89%) of A(H1N1) pdm09 cases (and all the circulating influenza virus types) presented with symptoms of the respiratory tract (fever, cough, sore throat, coryza), with fever and cough being the predominant symptoms. Gastrointestinal symptoms (vomiting, diarrhoea, nausea) were present in 22% of cases; almost half (45%) presented with other symptoms, such as body pain, myalgia and/or headache [Table 2]. The percentage of A(H1N1) pdm09 cases with underlying medical conditions was 7%. No case on which sensitivity testing was done was identified as being resistant to oseltamivir in any countries.

Hospitalized cases

During the pandemic, there were 361 hospitalized cases of pandemic (H1N1) influenza (24% of total cases/5 per

Table 2: Symptoms reported of laboratory-confirmed pandemic (H1N1) 2009 cases (n = 1498) in CAREC member countries for the period epidemiologic weeks 16, 2009 to 32, 2010

Respiratory symptoms	n	%	Gastrointestinal symptoms	n	%	Other symptoms	n	%
Fever	960	64.1%	Acute diarrhoea	122	8.1%	Myalgia	115	7.7%
Cough	902	60.2%	Chronic diarrhoea	2	0.1%	Headache	255	17.0%
Coryza	360	24.0%	Nausea	30	2.0%	Pain	347	23.2%
Chills	233	15.6%	Vomiting	215	14.4%	Malaise	44	2.9%
Sore throat	239	16.0%				Neck stiffness	3	0.2%
Upper respiratory	311	20.8%	At least one of the above	326	21.8%	At least one of the above	670	44.7%
Lower respiratory	120	8.0%						
At least one of the above	1328	88.7%						

100 000 population) reported from 17 countries [Table 3]. Of those with data on gender available, 183 cases were male and 175 were female, giving a male to female ratio of 1.1:1.

Table 3: Hospitalizations and deaths for laboratory confirmed cases of pandemic (H1N1) CAREC member countries, epidemiologic week 16 2009 to epidemiologic week 32, 2010

Country	Total reported hospitalizations	Total reported deaths
Anguilla	0	0
Antigua and Barbuda	0	0
Aruba	0	0
Bahamas	1	1
Barbados	62	3
Belize	2	0
Bermuda	7	0
British Virgin Islands	2	0
Cayman Islands	30	1
Dominica	13	0
Grenada	2	0
Guyana	7	0
Jamaica	49	7
Montserrat	1	0
Netherlands Antilles	11	0
St Kitts and Nevis	4	2
St Lucia	15	1
St Vincent and the Grenadines	4	0
Suriname	63	2
Trinidad and Tobago	88	10
Turks and Caicos Islands	0	0
Total	361	27

Among the 358 cases for which age was available, the median age of the hospitalized cases was 19 years (range 0–83 years), similar to that of all cases. The majority of hospitalized cases, 239 cases (67%), were aged < 30 years. However, the percentage of cases hospitalized was highest among those aged ≥ 60 years (45%) and those aged < 5 years (47%) [Table 4].

As expected, a much larger proportion of hospitalized cases had underlying medical conditions (24%) compared to non-hospitalized cases (1.6%). Among the 361 hospitalized cases, 26 (7%) were obese and 24 (7%) were pregnant. As with the non-hospitalized cases, the majority (87%) of hospitalized cases presented with symptoms of the respiratory

Table 4: Number and percentage of hospitalizations (n = 358) among laboratory-confirmed pandemic (H1N1) influenza cases (n = 1473) in CAREC member countries for the period epidemiologic weeks 16, 2009 to 32, 2010

Age group (years)	Total H1N1 cases	Number hospitalized	Percentage of hospitalization among H1N1 cases
< 5	159	74	46.5%
5–9	227	52	22.9%
10–14	225	35	15.6%
15–19	175	22	12.6%
20–24	209	31	14.8%
25–29	125	25	20.0%
30–34	75	30	40.0%
35–39	66	19	28.8%
40–44	56	13	23.2%
45–49	60	19	31.7%
50–54	44	14	31.8%
55–59	21	10	47.6%
60–64	15	6	40.0%
65–69	3	1	33.3%
70 and over	13	7	53.8%

Note: Three hospitalized cases with unknown age and gender.
Total hospitalizations = 361

tract. However, a higher percentage presented with gastrointestinal symptoms (33% compared to 18% for those not hospitalized), and a smaller percentage presented with other symptoms (36% compared to 47% for those not hospitalized).

During the period July–October 2009, one country reported laboratory-confirmed co-infection with dengue fever virus in eight hospitalized patients in whom A(H1N1) pdm09 was subsequently confirmed. Other countries also reported suspected dengue co-infection in a number of hospitalized patients, though these were not confirmed.

Deaths

During the pandemic, there were 27 reported deaths associated with A(H1N1) pdm09 from eight countries [Table 5], a case fatality rate of 1.8%. The first death occurred during the first week of July 2009 (EW 26) and the deaths were spread throughout the first two waves. Almost two-thirds of deaths were female, giving a 1:1.7 male to female

ratio (compared to 1:1 among cases overall). More than half of the 27 deaths (14, 52%) had underlying medical conditions (*eg* asthma, congestive heart failure, diabetes mellitus), with 10 of these 14 cases being female. Also, 10 of the deaths were obese (six of which were female) and three were pregnant. The median age of the fatal cases was 34 years (range 3–65 years), compared to cases overall where the median was much lower (18 years) and the age range was wider (0–98 years). The largest proportion of deaths (60%) occurred among those aged 20–45 years, the age group that contained just over a third of all cases. However, the case fatality rate was highest among older cases aged 65–69 years (33%) and 60–64 years (13%) [Table 5].

Table 5: Number and percentage of H1N1-related deaths ($n = 25$) among laboratory-confirmed pandemic (H1N1) influenza cases ($n = 1473$) in CAREC member countries for the period epidemiologic weeks 16, 2009 to 32, 2010

Age group (years)	Total H1N1 cases	H1N1-related deaths	H1N1-related deaths as a percentage of H1N1 cases
< 5	159	1	0.6%
5–9	227	1	0.4%
10–14	225	0	0.0%
15–19	175	0	0.0%
20–24	209	2	1.0%
25–29	125	6	4.8%
30–34	75	3	4.0%
35–39	66	2	3.0%
40–44	56	2	3.6%
45–49	60	2	3.3%
50–54	44	2	4.5%
55–59	21	1	4.8%
60–64	15	2	13.3%
65–69	3	1	33.3%
70 and over	13	0	0.0%
Total	1473	25	

DISCUSSION

In the English- and Dutch-speaking Caribbean, during the pandemic period, and particularly during the two waves in 2009, the predominant circulating respiratory virus was A(H1N1) pdm09, with other seasonal viruses circulating at much lower levels, as was observed in other countries (9). Very early in the pandemic period, there may have been some bias with respect to specimen collection, as cases with a travel history to an affected area may have been preferentially selected. This quickly changed as local transmission occurred. The two waves of the influenza pandemic also coincided with two waves of ARI. These suggest that the predominance of A(H1N1) pdm09 in the English- and Dutch-speaking Caribbean during the pandemic was real and not an artefact of sampling strategies.

The majority of cases were aged < 30 years. This concentration of cases among children and young adults was also observed in other regions of the world (8–10), as was

persons aged ≥ 60 years being less affected (1, 11, 12). The higher proportion of cases aged < 30 years suggests that children and young adults may be more susceptible to A(H1N1) pdm09 infection than older persons, who may be protected from infection due to previous exposure to influenza virus strains, especially the H1N1 virus that circulated during 1918 to 1957 (13–15).

Studies in other regions have shown that school-aged children were most affected by the pandemic (8, 9, 15). In some English- and Dutch-speaking Caribbean countries, A(H1N1) pdm09 outbreaks were observed in schools. During the first pandemic wave, the initial decrease in cases was observed at the start of July (EW 26), coinciding with the closure of schools. A further decrease was observed at the start of August (EW 30), when holiday camps in the Caribbean usually close. The start of the second pandemic influenza wave coincided with the re-opening of schools in September 2009. This temporal association between occurrence in pandemic cases and the closure of schools was also observed in Europe (9, 16).

Available data indicate that the clinical spectrum of A(H1N1) pdm09 infection is broad, ranging from mild upper respiratory tract illness to severe complications such as pneumonia, resulting in respiratory failure, multi-organ failure and death (10, 16, 17). The A(H1N1) pdm09 virus has the unique ability to infect cells in the gut. The pattern observed in the English- and Dutch-speaking Caribbean of cases presenting predominantly with symptoms of the respiratory tract, but also 20–40% presenting with gastrointestinal symptoms and/or other symptoms such as body pain, myalgia and/or headache (8, 18) was also observed in other regions of the world (20–23). The proportion of cases in the English- and Dutch-speaking Caribbean that experienced gastrointestinal symptoms (22%) was the same as that reported from Mexico (2) and was also consistent with findings in the USA (1). The proportion of cases with underlying medical conditions (7.3%) was also very similar to that seen in Canada and Europe (8, 10, 24).

Cases of A(H1N1) pdm09 have been shown to have a significantly higher risk of hospitalization than cases of other seasonal influenza A viruses (26). However, uncertainty about the number of unconfirmed cases, especially cases with mild or no symptoms, make it nearly impossible to assess severity accurately. Nonetheless severity is commonly assessed based on the hospitalization rates and deaths among cases or case fatality rate [CFR] (27).

Age distribution of hospitalized cases in the English- and Dutch-speaking Caribbean was similar to that of all cases during the pandemic. As in other regions of the world, hospitalization rates were highest among those aged five years and younger (28). However, unlike other regions of the world, the hospitalization rates were also high among those aged ≥ 60 years (10, 20).

While the CFR was determined to be 1.8%, estimation and interpretation of this rate is difficult, mainly due to the

challenge of accurately estimating the numerator (deaths) and denominator (cases). Aside from the issue of whether a death was caused by A(H1N1) pdm09 infection, determined by whether it was the direct and immediate cause of death, cases tended to be detected initially among severely ill patients with a higher probability of dying. While specimens were more likely to be collected from most severe cases, proportions of hospitalizations and deaths among cases should be interpreted with caution, especially given the low number of deaths reported in this region (11, 27). While the largest proportion of deaths (60%) occurred among young adults, as observed in other regions, the CFR was highest among those aged ≥ 60 years (10, 11, 28).

A main limitation in describing the epidemiological profile of the pandemic in the English- and Dutch-speaking Caribbean was lack of data on asymptomatic or mild cases. Serological survey data and prevalence estimates from other studies have suggested that there were higher levels of asymptomatic infection and persons with milder symptoms in populations than were identified from persons seeking healthcare (11, 12, 15, 25). In the English- and Dutch-speaking Caribbean, the peaks in ARI cases corresponding with the pandemic peaks suggest that there were most likely many cases with mild symptoms for which no specimen was taken. A second limitation was incomplete data on some cases. Due to high numbers of cases during the pandemic waves, local health officials may not have been able to collect data due to limited human resources. Additionally, efforts to collect epidemiological data may have been biased toward more severe disease and hospitalized persons, resulting in bias due to missing data, both epidemiological and virological, for milder cases. A third limitation was a lack of pre-pandemic data on laboratory-confirmed cases with respiratory illnesses. The establishment of respiratory illness surveillance in the English- and Dutch-speaking Caribbean, particularly the virological component, began in 2007 and was in the process of full implementation when the pandemic began. As such, it was not possible to make a comparison of epidemiological and virological trends in respiratory illnesses during the pandemic period with that in earlier periods.

In summary, the epidemiological characteristics of the pandemic in the English- and Dutch-speaking Caribbean were consistent with that in other parts of the world. It is important that post-pandemic surveillance (epidemiological and virological) for respiratory illnesses continues to be enhanced in order to give a better understanding of seasonality and changing trends in respiratory illnesses and their aetiologic agents.

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