Influenza-associated mortality in 2009 in four sentinel sites in Bangladesh

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Objective To estimate influenza-associated mortality in Bangladesh in 2009.

Methods In four hospitals in Bangladesh, respiratory samples were collected twice a month throughout 2009 from inpatients aged < 5 years with severe pneumonia and from older inpatients with severe acute respiratory infection. The samples were tested for influenza virus ribonucleic acid (RNA) using polymerase chain reaction. The deaths in 2009 in five randomly selected unions (the smallest administrative units in Bangladesh) in each hospital's catchment area were then investigated using formal records and informal group discussions. The deaths of those who had reportedly died within 14 days of suddenly developing fever with cough and/or a sore throat were assumed to be influenza-associated. The rate of such deaths in 2009 in each of the catchment areas was then estimated from the number of apparently influenza-associated deaths in the sampled unions, the proportion of the sampled inpatients in the local hospital who tested positive for influenza virus RNA, and the estimated number of residents of the sampled unions.

Findings Of the 2500 people known to have died in 2009 in all 20 study unions, 346 (14%) reportedly had fever with cough and/or sore throat within 14 days of their deaths. The estimated mean annual influenza-associated mortality in these unions was 11 per 100 000 population: 1.5, 4.0 and 125 deaths per 100 000 among those aged < 5, 5–59 and > 59 years, respectively.

Conclusion The highest burden of influenza-associated mortality in Bangladesh in 2009 was among the elderly.

Abstracts in عربي, 中文, Français, Русский and Español at the end of each article.

Introduction

Data on influenza-associated mortality can help estimate the burden posed by influenza, identify any high-risk age groups, and guide policy-makers in their allocation of scarce resources for related public health interventions. Estimation of influenza-related mortality is difficult,[1] however, as only a small proportion of those with influenza-like illness (ILI) are tested for influenza viruses. In addition, as influenza-associated deaths often occur 1 to 2 weeks after infection with an influenza virus following secondary bacterial infection or the exacerbation of pre-existing chronic illness,[2–6] few such deaths are attributed to influenza on death certificates.[1,7,8]

The information available on the impact of influenza virus infection on mortality in low-income countries such as Bangladesh is particularly limited. The high population densities, chronic malnutrition and inadequate access to health services commonly found in low-income settings may amplify the impact of influenza on morbidity and mortality.[9,10] Bangladesh has not only one of the highest population densities in the world (about 1000 people per square kilometre) but also a modest health infrastructure, with, on average, only one hospital bed available for every 1860 residents.[11] Furthermore, formal records of births and deaths are limited, with most deaths occurring at home.[12] Together, these limitations hamper the use of standard modelling approaches to estimate influenza-attributable mortality.[13,14] In this study we used a combination of hospital-based influenza surveillance and community surveys to estimate influenza-associated mortality in Bangladesh in 2009.

Methods

Hospital-based influenza surveillance

In 2009, the Institute of Epidemiology, Disease Control and Research (IEDCR) of the Government of Bangladesh and the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) conducted influenza surveillance in four sentinel hospitals (one private and three government-run) in four geographically diverse locations in Bangladesh: Kishoreganj, Bogra, Comilla and Barisal. The subdistricts that appeared most frequently in the log books of a study hospital as the places of residence of the patients and that represented at least 75% of the patients seeking care at the hospital were considered to be the catchment area of that hospital. Beginning in January 2009, on 2 days a month, surveillance physicians at each study hospital enrolled inpatients who presented within 7 days of symptom onset, resided in the hospital's catchment area and were either younger than 5 years and had severe pneumonia or were 5 years or older and had severe acute respiratory illness (SARI). Severe pneumonia was defined as cough or difficulty breathing and at least one of the following: chest indrawing, history of convulsion, inability to drink, lethargy and intractable vomiting. SARI was defined as a history of fever with cough and/or sore throat.

Laboratory analysis

Surveillance physicians collected nasal and oropharyngeal swabs from each enrolled patient, placed them in viral transport medium and then stored them at −70 °C or lower

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until testing. At the icddr,b, the thawed samples were tested for influenza A and B virus ribonucleic acid (RNA) in assays based on real-time reverse-transcription polymerase chain reaction (RT–PCR).[15] Any influenza A viruses detected were subtyped for seasonal H1N1, 2009 pandemic H1N1, H3N2 and H5N1, using primers and probes provided by the Influenza Division at the United States Centers for Disease Control and Prevention (CDC).[16]

Community survey

The influenza-associated annual mortality rates in Singapore and the United States of America have been reported to be between 9.0 and 16.7 deaths per 100 000.[17,18] For the present study, we assumed that the corresponding rate in Bangladesh would be about the same, at 10 deaths per 100 000. Based on this assumption, we estimated that a sample size of 420 385 people would be sufficient to estimate the influenza-associated mortality in Bangladesh with a power of 80% and a precision of 5%.

We first listed all the unions – which are the lowest administrative units in Bangladesh – that lay within the catchment area of each study hospital. As each union in Bangladesh has a mean population of about 28 000,[11] we estimated that we would need to investigate deaths in 15 average-sized unions to reach the desired sample size. To allow for unions with smaller-than-average populations, however, we decided to select 20 unions for study (i.e. five randomly selected unions from each of the four catchment areas investigated). Data collected in the catchment area of each study hospital were used to estimate the influenza-associated mortality rate for 2009 in Bangladesh.

Between February and May of 2010, the local administrative officer in each union selected for study was asked for a list of deaths from any cause that occurred in the union in 2009. In Bangladesh, such formal lists of deaths are incomplete and the causes of death that they record are assigned by lay individuals.[19] The field teams therefore used informal group discussions in 2010 to collect additional information on the deaths that had occurred in 2009 in each study union. Such discussions, which had already proven to be a relatively low-cost method of estimating the incidence of Japanese encephalitis in Bangladesh,[20] took place among small groups of community residents in different key gathering points such as tea stalls, local markets, mosques and schools. The household of any person who had died in a study union in 2009 from causes other than injury, homicide or suicide was then visited by a field team. In each visited household, a field team collected information from "proxy respondents" – the household member or members who had been involved in caring for the person who had died in 2009 and who had been present throughout that person's last episode of illness. The proxy respondents were asked if the person who had died in 2009 had shown the symptoms of ILI (defined as the sudden onset of fever with cough and/or sore throat) within 14 days of his or her death. Further information on any person who had reportedly died with ILI in 2009 (demographics, medical history and care-seeking behaviour before death) was also collected from the proxy respondents.

Ethical issues

Swabs were only collected from an inpatient after written informed consent had been obtained from the patient (if aged at least 18 years) or his or her parents or guardians (if aged < 18 years). Field teams obtained written informed consent from each proxy respondent. The study protocol was approved by the ethical review committees at both the icddr,b and the CDC.

Data analysis

Influenza-associated mortality in various age groups in Bangladesh was estimated, for the year 2009, using the following equation:

$$I = \frac{df}{ps} \qquad (1)$$

where I is the age-specific influenza-associated mortality (in deaths per 100 000 population), d is the age-specific number of ILI-associated deaths in 2009 (as identified in the formal lists and informal group discussions in the surveyed unions), f is the age-specific number of inpatients found positive for influenza virus in any study hospital, p is the age-specific projected population of the surveyed unions in 2009, and s is the age-specific number of inpatients who were tested for influenza virus in any study hospital.

The values for p were estimated using data from the 2001 national census.[21] The annual growth rate between the census and 2009 was estimated at 1.5% by using crude birth rates, assuming minimal net migration and estimating a national crude death rate.[21] Three broad age groups were considered in estimating I: < 5, 5–59 and > 59 years. Non-parametric bootstrapping[22] was used to calculate 95% confidence intervals (CIs) for each estimated incidence.

We used similar methods to estimate the deaths occurring in Bangladesh in 2009 that were associated with H1N1 2009 pandemic influenza. Since 2009 pandemic influenza was first identified in Bangladesh in June 2009,[23] we included in our analysis only those ILI-associated deaths that occurred during July–December 2009, the number of respiratory samples collected from the study hospitals during the same period, and the number of those samples found positive for A(H1N1)pdm09 RNA.

Population mortality estimates

Together, the data collected in the four study hospitals and their catchment areas were assumed to be representative of Bangladesh as a whole. Our estimates of the age-specific influenza-associated mortality rates in 2009 in the study unions were therefore extrapolated, using data on the total population of Bangladesh in 2009,[21] to give estimates of the age-specific influenza-associated mortality rates throughout Bangladesh in that year.

Results

Hospital- based influenza surveillance

In 2009, surveillance physicians collected 340 respiratory samples from inpatients and 60 (18%) of them were found positive for influenza virus. Twenty-nine (48%) of the positive samples contained RNA from A(H1N1)pdm09, 26 (43%) from the influenza A/H3 virus and four (7%) from the influenza B virus. Five (5%) of the 104 samples from children aged < 5 years with severe pneumonia, 45 (25%) of the 177 samples from patients aged 5–59 years with SARI and 10 (17%) of the 59 samples from the older patients with SARI were found positive for influenza virus.

Between 1 July 2009 and 31 December 2009, A(H1N1)pdm09 was detected in one (2%) of the 50 samples collected

Table 1. **Total mortality and mortality associated with influenza-like-illness (ILI) and influenza in four study sites, by age group, Bangladesh, 2009**

Characteristic	Study site (five unions per site)			
	Kishoreganj	Bogra	Comilla	Barisal
Children aged < 5 years				
No. of ILI-associated deaths	7	5	6	3
Total no. of deaths	11	22	32	28
Population	10 040	17 150	25 000	19 298
Influenza-associated mortality[a]	3.5	1.5	1.0	0.8
People aged 5–59 years				
No. of ILI-associated deaths	22	25	26	34
Total no. of deaths	254	197	362	185
Population	62 533	108 481	156 861	120 233
Influenza-associated mortality[a]	8.0	5.5	4.0	7.0
People aged > 59 years				
No. of ILI-associated deaths	38	42	60	78
Total no. of deaths	289	285	477	358
Population	5 409	7 721	12 432	9 960
Influenza-associated mortality[a]	126	98	87	141

[a] Estimated, in deaths per 100 000, from the proportion of inpatients with ILI who were tested and confirmed to be infected with influenza virus at the hospital whose catchment area included the given study site.

from children aged < 5 years and in 28 (23%) of the 122 samples from patients aged 5–59 years, but in none of the 30 samples from inpatients aged > 59 years.

Patients with influenza-like illness

In 2009, the 20 unions surveyed had a combined estimated population of 555 118 (about 23 000 per union on average), equivalent to 23% of the total estimated population of the four catchment areas investigated. The field teams identified 2646 deaths as having occurred in the 20 unions in 2009, which amounts to a crude annual rate of about five deaths per 1000 population. Of these deaths, 146 (5.5%) were attributed to injury, homicide or suicide. The proxy respondents reported that 346 (14%) of the 2500 people who died in the study unions in 2009 of causes other than injury, homicide or suicide had experienced a sudden onset of fever with cough and/or sore throat (i.e. ILI) within 14 days of their death (Table 1). Of the 346 people who appeared to have had influenza when they died, 21 (6%), 78 (22.5%) and 247 (71%) were aged < 5, 5–59 and > 59 years, respectively. Of these people, 212 (61%) were male, 183 (53%) were smokers and 272 (79%) had co-morbidities identified before death: 162 (47%) had asthma, 43 (12%) had pulmonary tuberculosis, 69 (12%) had cancer, 38 (11%) had heart disease and 26 (7.5%) had diabetes. More than 70% (196) of the decedents with known co-morbidities were aged > 59 years.

Health-seeking practices

Of the 346 people who died in the study unions in 2009 within 14 days of developing ILI, 273 (78.9%) had reportedly sought treatment from a health-care provider and had done so within a median of 1 day (interquartile range, IQR: 1–2) of the onset of their final illness. Nine (47%) of the 19 patients aged < 5 years, 46 (61%) of the 57 patients aged 5–59 years and 88 (45%) of the 196 patients aged > 59 years had first sought treatment from a registered medical practitioner or a hospital. The rest (51%) had initially sought treatment from a local informal health practitioner, a pharmacy or a traditional healer.

Of the patients who died within 14 days of developing ILI, only 76 (28%) were hospitalized for their last illness and only 38 (11%) died while hospitalized. The cause of death of 20 (53%) of the 38 who died in hospital was identified as pneumonia or respiratory illness by the attending physician. The other 18 in-hospital deaths among patients with ILI were attributed to cardiac failure, cerebrovascular disease or cancer. The median age of the 308 people with ILI who died at home was 70 years (IQR: 56–80). According to the proxy respondents, the most common causes of death among those dying at home within 14 days of developing ILI were respiratory failure (36%), fever (19%), cancer (12%) and pneumonia (7%).

Of the ILI-associated deaths that reportedly occurred in the study unions at some time in 2009, 178 (51%) occurred after 1 July in that year (i.e. after the emergence of the A(H1N1) 2009 pandemic in Bangladesh).[23] According to the proxy respondents, of those dying with ILI after 1 July 2009, five (50%) of the 10 who were aged < 5 years at death, 22 (41.5%) of the 53 aged 5–59 years and 38 (33%) of the 115 aged > 59 years had sought treatment from a licensed physician but none of these people had received oseltamivir as part of their treatment.

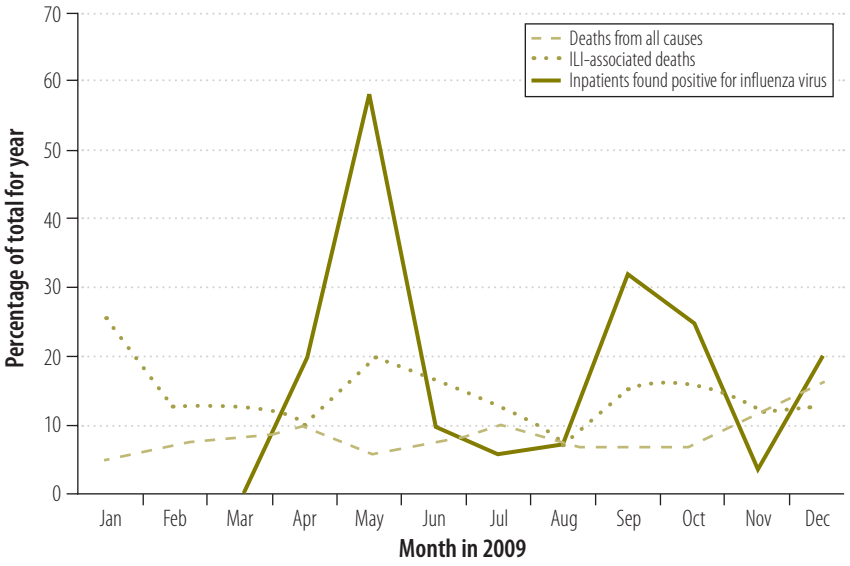
Influenza-associated mortality

The estimated influenza-associated mortality rates during 2009 in the 20 study unions combined were 1.5 (95% CI: 0.9–2), 4.0 (95% CI: 3.5–5) and 125 (95% CI: 110–126) per 100 000 among those aged < 5, 5–59 and > 59 years, respectively. The corresponding all-age mortality was 11 (95% CI: 10–12) deaths per 100 000 population. The age-specific influenza-associated mortalities for the study unions in each of the four catchment areas investigated are presented in Table 1. The monthly data on identified deaths, ILI-associated deaths and the proportion of tested swabs found positive for influenza virus RNA are summarized in Fig. 1. Extrapolation of the results from the study unions to the whole of Bangladesh indicated that about 34 300 influenza-associated deaths occurred throughout the country in 2009: 300 among children aged < 5 years, 4000 among people aged 5–59 years and 30 000 among those aged > 59 years. The corresponding estimated mortality rates associated with A(H1N1) pdm09 are 0.3 (95% CI: 0.1–0.4), 3.0 (95% CI: 1.6–3) and zero per 100 000, respectively. These values indicate that the deaths of about 6000 people in Bangladesh in 2009 were associated with A(H1N1) pandemic influenza. The all-age mortality with pandemic influenza was about 4.0 per 100 000.

Discussion

Our findings indicate that, in 2009, influenza-associated deaths were frequent among the elderly living in Bangladesh, although > 60% of the people

Fig. 1. **Monthly proportions of identified deaths, deaths associated with influenza-like illness (ILI) and inpatients found positive for influenza virus, Bangladesh, 2009**



aged > 59 years who died within 14 days of developing influenza also had known co-morbidities, such as chronic lung or heart disease. Advanced age and chronic medical conditions independently increase the risk of hospitalization and death from influenza in both low- and high-income countries.[2,8,18,24–26] In the present study, influenza-associated deaths occurred at a lower rate among young children than among older age groups. Despite this, acute respiratory infection, including pneumonia, is the leading cause of childhood death in Bangladesh[27] and influenza is an important contributor to childhood pneumonia and hospitalization.[28]

We estimate that A(H1N1)pdm09 killed approximately 6000 people in Bangladesh in 2009, and that the mortality associated with this pathogen in Bangladesh was higher among those aged 5–59 years than in younger or older people. Similar observations on the age-specific mortality associated with the 2009 A(H1N1) pandemic were made in Mexico, the United Kingdom of Great Britain and Northern Ireland and the United States, where confirmed fatal cases were concentrated among young adults.[29–31] Our study is, however, based on only one year of data and takes no account of waves of infection with A(H1N1)pdm09 that occurred, or will occur, after 2009. Our estimates of the mortality in Bangladesh associated with this pathogen must therefore be considered preliminary.

In some previous studies, influenza-associated mortality has been estimated using cyclic regression models[18] or the Serfling method.[32] In low-income countries such as Bangladesh, where death registers may be very incomplete and many deaths occur at home and are never recorded by any administrative body, it is easy to underestimate the true influenza-associated mortality from formal reports.[10] Unfortunately, few alternative methods to improve estimates of influenza-associated mortality in low-income countries have been tested.[10]

In the present study, data from four sentinel hospitals participating in a pre-existing system for influenza surveillance were combined with data collected, mostly in group discussions at the community level, on deaths in the hospitals' catchment areas. The collection and analysis of these data had several limitations. First, the data collected refer to a single year; it should be possible to determine the general burden posed by influenza in Bangladesh more accurately when more years of surveillance and vital statistics data become available. Second, most of the data on the number of deaths and final illnesses, including the identification of ILI (which can be caused by a wide range of respiratory viruses),[33] came from proxy respondents – generally relatives of the deceased having no clinical expertise – who were interviewed months after the deaths. Third, fever (as identified by the proxy respondents) was used as a compulsory criterion in identifying ILI, even though children and elderly people with influenza do not always present with this symptom.[28,34] Fourth, some deaths may have gone undetected by the field teams. No attempt was made to perform a house-to-house survey, which might have revealed some more relevant deaths. The tightly knit social networks that are common in rural Bangladesh, however, make it unlikely that community members were unaware of any deaths within their communities.[20] Fifth, our study was conducted in only four sentinel sites and, although these sites were chosen to represent the different geographical regions of the country, the data collected may not be truly representative of the whole of Bangladesh. Encouragingly, despite these limitations, the present estimate of the crude annual death rate in the study unions was close to the estimate of six deaths per 1000 population made by the United Nations Children's Fund for the whole of Bangladesh.[35] The present estimate of the fraction of patients with ILI who die in Bangladesh (13%) is also similar to the World Health Organization's estimated fraction of patients who die with lower respiratory infection in the country across all age-groups (11%).[36]

Our data indicate that seasonal influenza viruses contributed more to mortality among the elderly people of Bangladesh in 2009 than A(H1N1) pdm09. Cost-effective public health interventions that can interrupt the transmission of diverse respiratory pathogens across all age groups may help lower the overall burden of deaths from respiratory ailments. Our method of combining community surveys and influenza surveillance data could be adopted in similar resource-poor settings to provide estimates of influenza-associated mortality where vital registries are not reliable and deaths frequently occur at home. ■

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ملخص

الوفيات المرتبطة بالأنفلونزا في 2009 في أربع مواقع خافرة في بنغلاديش

الغرض تقدير معدل الوفيات المرتبطة بالأنفلونزا في بنغلاديش في 2009.

الطريقة، تم تجميع عينات من الجهاز التنفسي، في أربعة مستشفيات في بنغلاديش، مرتين شهريًا على مدار عام 2009 من المرضى الداخليين المصابين بالتهاب رئوي حاد ممن تقل أعمارهم عن 5 أعوام ومن المرضى الداخليين الأكبر المصابين بعدوى حادة وشديدة في الجهاز التنفسي. وتم فحص العينات للبحث عن الحمض النووي الريبي لفيروس الأنفلونزا (RNA) باستخدام تفاعل البوليميريز المتسلسل. وتم دراسة الوفيات في عام 2009 في خمس وحدات تم اختيارها عشوائيًا (أصغر الوحدات الإدارية في بنغلاديش) في كل منطقة من مناطق المستجمعات بالمستشفى باستخدام السجلات الرسمية والمناقشات الجماعية غير الرسمية. وكان الافتراض أن حالات الوفاة التي تم الإبلاغ عنها خلال 14 يومًا من الظهور المفاجئ للحمى المصحوبة بالسعال و/ أو التهاب الحلق مرتبطة بالأنفلونزا. وتلى ذلك تقدير معدل حالات الوفاة خلال عام 2009 في كل منطقة من مناطق المستجمعات من عدد حالات الوفاة المرتبطة بالأنفلونزا بشكل واضح في الوحدات التي تم أخذ عينات منها، ونسبة المرضى الداخليين الذين تم أخذ عينات منهم في المستشفى المحلي والذين جاءت نتيجة فحص الحمض النووي الريبي لفيروس الأنفلونزا (RNA) الخاصة بهم إيجابية، والعدد المقدَّر للمقيمين في الوحدات التي تم أخذ عينات منها.

النتائج تم الإبلاغ عن إصابة 346 (14 ٪) – من إجمالي 2500 شخص عرفت وفاتهم في عام 2009 في جميع وحدات الدراسة العشرين – نتيجة الإصابة بحمى مصحوبة بسعال و/ أو التهاب الحلق خلال 14 يومًا من وفاتهم. وكان معدل الوفيات السنوي المقدَّر المرتبط بالأنفلونزا في هذه الوحدات 11 لكل 100000 نسمة: 1.5، و4.0، و125 حالة وفاة لكل 100000 بين الأشخاص الذين تزيد أعمارهم عن 5 و5 – 59 عامًا والأكبر من 59 عامًا، على التوالي.

الاستنتاج كان أعلى عبء للوفيات المرتبطة بالأنفلونزا في بنغلاديش في عام 2009 بين كبار السن.

摘要

孟加拉国四个前哨地点 2009 年流感相关的死亡率

目的 评估 2009 年孟加拉国流感相关的死亡率。

方法 在 2009 年中每月两次收集在孟加拉国的四所医院内不到 5 岁的重症肺炎住院病人和年龄更大的严重急性呼吸道感染的住院病人的呼吸样本。使用聚合酶链反应检验样本的流感病毒核糖核酸(RNA)。然后使用正式记录和非正式群体讨论调查每个医院的下游区五个随机选择的联盟（孟加拉国最小的行政单元）2009 年的死亡数。假定在伴有咳嗽和/或咽喉痛的突发高烧 14 天内被报告死亡的人为流感相关死亡病人。根据采样联盟中明显的流感相关死亡的数据、检验出流感病毒 RNA 呈阳性的本地医院采样住院病人的比例和采样地区估计的居民数，评估每个下游区 2009 年此类死亡的比率。

结果 2009 年在所有 20 个研究联盟中已知的 2500 例死亡中，报告有 346(14%)例在其死亡前 14 天内发生伴着咳嗽和/或咽喉痛的发烧。这些地区估计的平均流感相关的年死亡率是每 10 万人口 11 例：每 10 万人口中 <5、5 – 59 和 >59 年龄区间分别为 1.5、4.0 和 125 例死亡。

结论 孟加拉国 2009 年流感相关死亡率的最高负担在于年龄较大的人群。

Résumé

Mortalité liée à la grippe en 2009 dans quatre sites sentinelles au Bangladesh

Objectif Estimer la mortalité liée à la grippe au Bangladesh en 2009.

Méthodes Des prélèvements respiratoires ont été collectés deux fois par mois tout au long de l'année 2009 dans quatre hôpitaux du Bangladesh, chez des patients âgés de < 5 ans souffrant de pneumonie grave et chez des patients plus âgés souffrant d'infection respiratoire aiguë. Ces prélèvements ont été testés pour le virus de la grippe à acide ribonucléique (ARN) au moyen d'une réaction en chaîne par polymérase. Les décès en 2009 dans cinq régions sélectionnées aléatoirement (les plus petites unités administratives au Bangladesh) dans toutes les zones couvertes par l'hôpital ont ensuite été analysés au moyen d'archives et de discussions informelles de groupe. Les décès qui seraient survenus dans les 14 jours suivant le développement soudain d'une fièvre avec toux et/ou maux de gorge ont été supposés liés à la grippe. Le taux de ces décès en 2009 dans chacune des zones couvertes a ensuite été estimé à partir du nombre de décès apparemment liés à la grippe dans les unions collectés, de la proportion des patients analysés dans l'hôpital local testés positifs pour le virus de la grippe ARN et du nombre estimé de résidents des unions prélevées.

Résultats Des 2500 personnes décédées en 2009 dans les 20 unions d'étude, 346 (14%) auraient souffert d'une fièvre avec toux et/ou maux de gorge dans les 14 jours précédant leur décès. La moyenne annuelle estimée de mortalité liée à la grippe dans ces unions était de 11 par 100 000 habitants: 1,5, 4,0 et 125 décès par 100 000 habitants parmi les personnes âgées de respectivement <5, 5-59 et >59 ans.

Conclusion La plus grande charge de mortalité liée à la grippe au Bangladesh figurait parmi la population âgée.

Резюме

Смертность от гриппа в Бангладеш в 2009 г. по результатам наблюдений на четырех контрольных участках

Цель Произвести оценку уровня смертности от гриппа в Бангладеш в 2009 г.

Методы На протяжении 2009 г. в четырех больницах республики Бангладеш два раза в месяц брались дыхательные пробы у стационарных больных в возрасте до 5 лет с острой формой пневмонии, а также у стационарных больных старшей возрастной категории с острой формой респираторной инфекции. Методом полимеразной цепной реакции данные пробы были исследованы на предмет наличия рибонуклеиновой кислоты (РНК) вируса гриппа. В 2009 г. путем изучения официальных документов и неформальных обсуждений в группах была исследована смертность в обслуживаемых больницами районах в пяти случайным образом выбранных округах (наименьшие административные единицы в Бангладеш). Предполагалось, что смерть пациентов, которые согласной поступившей информации умерли в течение 14 дней после стремительного развития лихорадки, сопровождающейся кашлем и/или болями в горле, наступила в результате заболевания гриппом. Доля смертей по этой причине в 2009 г. для каждого района, обслуживаемого медицинскими учреждениями, была рассчитана на основании количества смертей, предположительно наступивших в результате заболевания гриппом в исследуемых округах, пропорционально количеству стационарных больных в местных больницах, в пробах которых была обнаружена РНК вируса гриппа, по отношению к расчетному количеству жителей исследуемых округов.

Результаты Из 2500 человек, которые умерли в 2009 году во всех 20 исследуемых округах, 346 (14%), согласно поступившей информации, за 14 дней о наступления их смерти были больны лихорадкой, сопровождающейся кашлем и/или болями в горле. Расчетные значения указывают, что ежегодная смертность из-за гриппа в этих округах была 11 человек на 100 000 населения: 1,5, 4,0 и 125 смертей на 100 000 человек населения в возрастных категориях < 5,5–59 и > 59 лет, соответственно.

Вывод Наибольшее количество смертей в республике Бангладеш в 2009 году по причине заболевания гриппом наступило среди людей старшей возрастной категории.

Resumen

Mortalidad asociada a la gripe en 2009 en cuatro sitios centinela en Bangladesh

Objetivo Calcular la mortalidad asociada a la gripe en Bangladesh en 2009.

Métodos Se recogieron muestras respiratorias de pacientes con edades menores de 5 años con neumonía grave así como de otros pacientes de mayor edad con infecciones respiratorias agudas dos veces al mes en cuatro hospitales de Bangladesh durante el año 2009. Las muestras se sometieron a las pruebas del ácido ribonucleico (ARN) del virus gripal por medio de una reacción en cadena de la polimerasa. A través de registros formales y grupos de debate se investigaron los fallecimientos en el área de influencia de cada hospital de cinco uniones seleccionadas aleatoriamente (las uniones son las unidades administrativas más pequeñas en Bangladesh) en 2009. Se consideraron asociados a la gripe los fallecimientos que, según se informa, habían tenido lugar en los 14 días posteriores a la aparición repentina de fiebre con tos y/o dolor de garganta. La tasa de fallecimientos con esas características en 2009 en cada una de las zonas de influencia se calculó a partir del número de defunciones asociadas al parecer a la gripe en las uniones muestreadas, la proporción de los pacientes muestreados en el hospital local que realizó las pruebas para el ARN del virus gripal y el número estimado de residentes en las uniones muestreadas.

Resultados Según se informa, 364 (14%) de las 2500 personas que fallecieron en 2009 en las 20 uniones de estudio tenían fiebre con tos y/o dolor de garganta en los 14 días anteriores a su defunción. La mortalidad media anual estimada asociada a la gripe en dichas uniones fue de 11 por cada 100 000 habitantes: 1,5, 4,0 y 125 defunciones por cada 100 000 entre los menores de 5, aquellos con edades comprendidas entre 5-59 y entre los mayores de 59, respectivamente.

Conclusión La carga más alta de la mortalidad asociada a la gripe en Bangladesh en el año 2009 se dio entre las personas de edad.

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