RESEARCH NOTE

Utility of massive open online courses (MOOCs) concerning outbreaks of emerging and reemerging diseases [version 1; referees: 1 approved]

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Abstract
The emergence and re-emergence of infectious diseases such as Ebola, chikungunya, and Zika increase the necessity of knowledgeable and skilled health professionals. Massive open online courses (MOOCs) arise as opportunities that allow people around the world to participate in higher education courses. A search was conducted on specialized MOOC platforms to find courses related to outbreaks, using terms included in the list of the WHO disease outbreaks from January 1st to December 31st, 2016. We found seven courses about Ebola, two about Zika and chikungunya, and only one course about dengue, chikungunya, and malaria. Most of the courses were conducted in English. The courses on Ebola, Zika and chikungunya were released after their last outbreak. MOOCs could be used to learn about health issues of global relevance, and with the necessity of fast divulgation of knowledge and skills. Translating the courses into more languages could give these courses more traction, and allow participation of professionals in regions affected by these outbreaks.
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Introduction

The emergence and re-emergence of infectious diseases is partly due to the climate change, more specifically due to the rise in global temperature, as well as the increased migration and unplanned urbanization. These events of great relevance to global health have turned these unknown diseases into realities many health professionals have to face daily.

Ebola virus causes an acute and severe disease that is usually fatal if left untreated. Its last outbreak in March 2014 was the largest in history, causing a dramatic number of more than 11,000 deaths and 28,000 new infections worldwide. It affected several countries in West Africa, generating much concern worldwide due to its estimated 50% mortality rate. Similarly, diseases such as chikungunya and Zika have shown several reasons to be considered serious infectious diseases.

Given the pandemic potential of these viral diseases, it is important to assess the knowledge and awareness of our health professionals regarding the mode of transmission of these diseases. In this era of globalization and technology, one of the main impacts of the Internet and the web 2.0 have been the acceleration of the process of sharing information, allowing health professionals to have quick and easy access to the latest research in medicine and health.

Massive open online courses (MOOCs) are online classes or lectures accessible for people all around the world that want to participate in higher education courses. MOOCs material includes videos, slideshows, discussion boards, quizzes, audios or any combination thereof. Usually, participants do not pay any fee to take a course. The topics in MOOCs vary widely and include science, engineering, and arts; and are usually developed by well-known figures in the study area.

Methods

From 1st May to 31st May, 2017, we conducted a manual search on several learning platforms that offer MOOCs, including Coursera, edX, FutureLearn, Udacity, Miriada X, Alison, FUN. MOOC, Canvas Network, and Iversity to find courses about disease outbreaks using the terms included in the list of WHO disease outbreaks from January 1st to December 31st, 2016 (Box 1). Information about the learning platform, institution, course length, time required per week, language and subtitles availability for every course were collected and reported using frequencies in the case of categorical data and ranges for numerical data.

Results

We found seven courses about Ebola, two about Zika, three about the dynamics of epidemics and pandemics, and only one course about dengue, chikungunya, and malaria. The duration of the courses ranged from 2 to 10 weeks. 11 out of 13 courses were held only in English, with the possibility to select subtitles in English or other languages; there was one in English and Chinese, and only one exclusively in Spanish. Most courses (5 out of 13) originated from USA centers including Emory University, University of Pittsburgh, The Pennsylvania State University, Harvard University and University System of Maryland. The information provided with the courses included audiovisual material, papers, and self-assessments. All the courses presented information about epidemiology and lessons about the outbreaks and prevention activities for a possible new scenario of transmission of infectious diseases. The courses on Ebola, Zika and chikungunya were released after the last outbreaks of these diseases, respectively (Table 1).
Table 1. Characteristics of the massive open online courses (MOOCs) about disease outbreaks of 2016, offered by learning platforms.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Title</th>
<th>Institution (Country)</th>
<th>Duration in weeks</th>
<th>Hours per week</th>
<th>Language (Subtitles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FutureLearn</td>
<td>Ebola in Context: Understanding Transmission, Response and Control</td>
<td>London School of Hygiene and Tropical Medicine (United Kingdom)</td>
<td>2</td>
<td>Self-paced</td>
<td>English (English)</td>
</tr>
<tr>
<td>FutureLearn</td>
<td>Ebola: Symptoms, History and Origins</td>
<td>Lancaster University (United Kingdom)</td>
<td>2</td>
<td>3</td>
<td>English (English)</td>
</tr>
<tr>
<td>FutureLearn</td>
<td>Preventing the Zika Virus: Understanding and Controlling the Aedes Mosquito</td>
<td>London School of Hygiene and Tropical Medicine (United Kingdom)</td>
<td>3</td>
<td>4</td>
<td>English (English)</td>
</tr>
<tr>
<td>Coursera</td>
<td>Ebola: an evolving epidemic</td>
<td>Emory University (USA)</td>
<td>6</td>
<td>Self-paced</td>
<td>English (English)</td>
</tr>
<tr>
<td>Coursera</td>
<td>Ebola: Vaincre ensemble!</td>
<td>University of Geneva (Switzerland)</td>
<td>5</td>
<td>Self-paced</td>
<td>French (French, English)</td>
</tr>
<tr>
<td>Coursera</td>
<td>Ebola: Essential Knowledge for Health Professionals</td>
<td>University of Amsterdam (Netherlands)</td>
<td>9</td>
<td>Self-paced</td>
<td>English (English, Arabic)</td>
</tr>
<tr>
<td>Coursera</td>
<td>In the footsteps of Zika… approaching the unknown</td>
<td>University of Geneva (Switzerland)</td>
<td>8</td>
<td>5</td>
<td>English (English, French, Portuguese, Spanish)</td>
</tr>
<tr>
<td>Coursera</td>
<td>Epidemics, Pandemics and Outbreaks</td>
<td>University of Pittsburgh (USA)</td>
<td>4</td>
<td>3–4</td>
<td>English (English)</td>
</tr>
<tr>
<td>Coursera</td>
<td>Epidemics - the Dynamics of Infectious Diseases</td>
<td>The Pennsylvania State University (USA)</td>
<td>8</td>
<td>2–3</td>
<td>English (English)</td>
</tr>
<tr>
<td>edX</td>
<td>Lessons from Ebola: Preventing the Next Pandemic</td>
<td>Harvard University (USA)</td>
<td>4</td>
<td>3–4</td>
<td>English (English)</td>
</tr>
<tr>
<td>edX</td>
<td>Global Health – The Lessons of Ebola</td>
<td>University System of Maryland (USA)</td>
<td>6</td>
<td>2–3</td>
<td>English (English)</td>
</tr>
<tr>
<td>edX</td>
<td>Epidemics</td>
<td>The University of Hong Kong (Hong Kong)</td>
<td>10</td>
<td>2–3</td>
<td>English, Chinese (English, Chinese)</td>
</tr>
<tr>
<td>edX</td>
<td>ETV: Paludismo, Dengue y Chikungunya</td>
<td>The Ministry of Education of Mexico (Mexico)</td>
<td>2</td>
<td>10</td>
<td>Spanish (Spanish)</td>
</tr>
</tbody>
</table>

Discussion

Finding MOOCs about Ebola, chikungunya, and Zika after the start of their last outbreaks demonstrates the interest of institutions in offering information to the public. The vast majority of courses are offered in English, with a few having subtitles in other languages. MOOCs offer a recent and emerging form of education. There is a continuous increase in the number of courses offered in this format and, by 2015, a total of 35 million participants in 4,200 MOOCs were counted, with 8.27% of these courses corresponding to health and medicine.

The spread of diseases makes it necessary to invest in alternative methods of spreading knowledge, to improve the capabilities of health professionals in topics that affect people worldwide. MOOCs could be used to learn about health issues of global relevance, and with the necessity of fast divulgence of knowledge and skills. Because the countries most affected by these diseases do not have English as the native language, promoting the translation of content into more languages could give these courses more traction, and allow participation of professionals in regions affected by these outbreaks.
Data availability
Dataset 1: Data on 2016 massive open online courses about disease outbreaks, offered on learning platforms, retrieved from manual searches. The dataset contains information on the learning platform, institution, course length, time required per week, language and availability of subtitles. DOI, 10.5256/f1000research.12639.d177854.

Competing interests
No competing interests were disclosed.

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References
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This is a nice short report from the study conducted by Bendezu-Quispe G et al. about the existence of MOOCs with focus on emerging and re-emerging diseases. The idea is simple, and so is the methodology. However, I have concern regarding the time frame selected for the study which was limited to the year 2016. Some of the outbreaks highlighted in the background started in earlier years and were terminated in 2016. I think that more valid and strong data could have been provided if there were no time limits thus allowing for exploration of MOOCs presented at the time of epidemics. Otherwise, authors have properly presented their data. I believe their work would be a good start for further exploration of this area.

Is the work clearly and accurately presented and does it cite the current literature?  
Yes

Is the study design appropriate and is the work technically sound?  
Yes

Are sufficient details of methods and analysis provided to allow replication by others?  
Yes

If applicable, is the statistical analysis and its interpretation appropriate?  
Yes

Are all the source data underlying the results available to ensure full reproducibility?  
Yes

Are the conclusions drawn adequately supported by the results?  
Yes

Competing Interests: No competing interests were disclosed.

Referee Expertise: Medical education, oncology

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.