

Monitoring of news, social media and mis/disinformation

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8 April 2021

Multilingual keyword patterns

Patterns for unknown disease comprise:

mysterious+disease

unidentified+disease

неизвестн%+инфекц%

новый+смертельный+вирус

непозната+болест

未知的疾病

بیماری+ناشناس

etc.

Boolean operators (AND, OR, NOT) and proximity



Italian - German



English - French



Spanish - Portuguese



Real-time monitoring

I. Examples of past public health events:

- Dengue
- EHEC (*Escherichia coli*)
- Avian flu
- MERS 2012 (Middle East respiratory syndrome-related coronavirus)
- Ebola
- Covid-19

II. Live presentation: EMM, MEDISYS, Twitter monitoring

Real-time monitoring

- I. Europe Media Monitor (EMM) / MEDISYS
 - News
 - Official websites (Ministries of Health, Public Health Agencies, etc.)
- II. Dashboards based on Twitter Enterprise API
 - hashtags #COVID, users @UNODC, keywords
 - Analysis of shared links
- III. Media Analyser Toolkit (MAT)
 - Unverified sources

Example 1 Dengue on Madeira Island

Early alerting via Portuguese media (October 2012)

Diseases

Most Active Topics

- Airborne
- Bloodborne
- Food- and Waterborne
- Hemorrhagic
- Parasitic
- Sexually Transmitted
- Vaccine Preventable
- Vectorborne
- Zoonosis
- Animal Diseases
- Other Diseases
- ECDC-Focus
- Diseases: A-D
- Diseases: E-I
- Diseases: J-Q
- Diseases: R-Z
- Unknown Disease

External Links

- Wikipedia

Latest News About - Dengue Fever

Page: 1 2 3 4 5 Next

Top Stories

Large dengue fever outbreak in Madeira spreads cases in Europe

Articles: 11, Last update: Nov 21, 2012 6:03:00 PM, Start: Nov 21, 2012 10:22:00 AM
Sources: 11, Peak: 1, Current rank: 1, Previous rank: 1, Change: +83%

Latest articles

Administradora del INAVI acude en auxilio de afectados por lluvias en Imbert

el nacional Wednesday, November 21, 2012 6:54:00 PM CET | info en [en] [other]
La administradora general del Instituto de Auxilios y Viviendas (INAVI), licenciada Maritza López de Ortiz, acudió en ayuda de los residentes en las proximidades de la cañada Naranjito, en el municipio de Imbert, de la provincia Puerto Plata, cuyas viviendas resultaron anegadas producto del.....

Articles published more than 30 minutes ago

El bloqueo contra Cuba debe enfrentarse con medidas más firmes que el voto

avn Wednesday, November 21, 2012 6:27:00 PM CET | info en [en] [other]
EEUU ha creado foros con el fraudulento fin de promover, defender y consolidar la paz, la seguridad y los DDHH en la región y resto del planeta, cuando en realidad son instrumentos de su proyecto de dominación mundial. Tal es el caso de la ONU, donde anualmente se realiza una Asamblea General a la.....

Mais de 900 casos confirmados na Madeira -- diretor-geral da Saúde

rtp Wednesday, November 21, 2012 6:26:00 PM CET | info en
Mais de 900 casos de febre de dengue foram confirmados em laboratório, revelou hoje à agência Lusa o diretor-geral da Saúde, a propósito da atualização semanal do surto que ocorre na Madeira desde 03 de outubro....

Paraguay: Gobierno reporta 69 muertes por dengue

elsalvador Wednesday, November 21, 2012 6:26:00 PM CET | info en [en] [other]
Las autoridades sanitarias de Paraguay informaron el miércoles que en lo que va del año 69 personas han muerto por dengue, infección transmitida por un tipo de mosquito. La oficina estatal.....

Articles published more than 1 hour ago

Surto longo de dengue atinge mais de 1.300 na ilha da Madeira

folha Wednesday, November 21, 2012 6:02:00 PM CET | info en
A Europa está passando por sua primeira transmissão sustentada de dengue desde os anos 1920, com mais de 1.300 pessoas infectadas com a doença transmitida por mosquitos no arquipélago português da Madeira. Em uma rápida avaliação de risco, o Centro Europeu de Prevenção e Controle de Doenças (ECDC).....

Madeiral levivasse viirusesse on nakatunud üle 1300 inimese

postimees Wednesday, November 21, 2012 5:56:00 PM CET | info en [en] [other]
Oktoobrist alates on Madeiral levivasse dengue'i viirusesse haigestunud 1357 inimest, kellest 25 on pärit mujalt Euroopast....

Tools

Wednesday, November 21, 2012
7:03:00 PM CET

RSS | KML | MAP

subscribe | manage

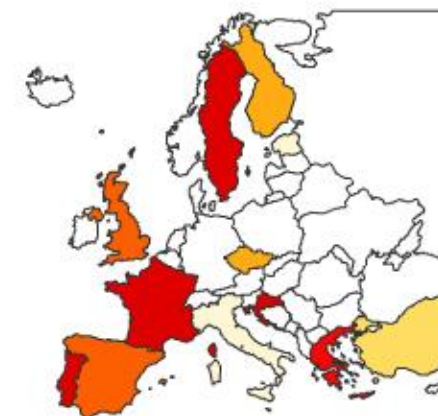
current page | all pages

info | definition ?

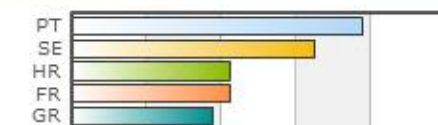
Subject Areas

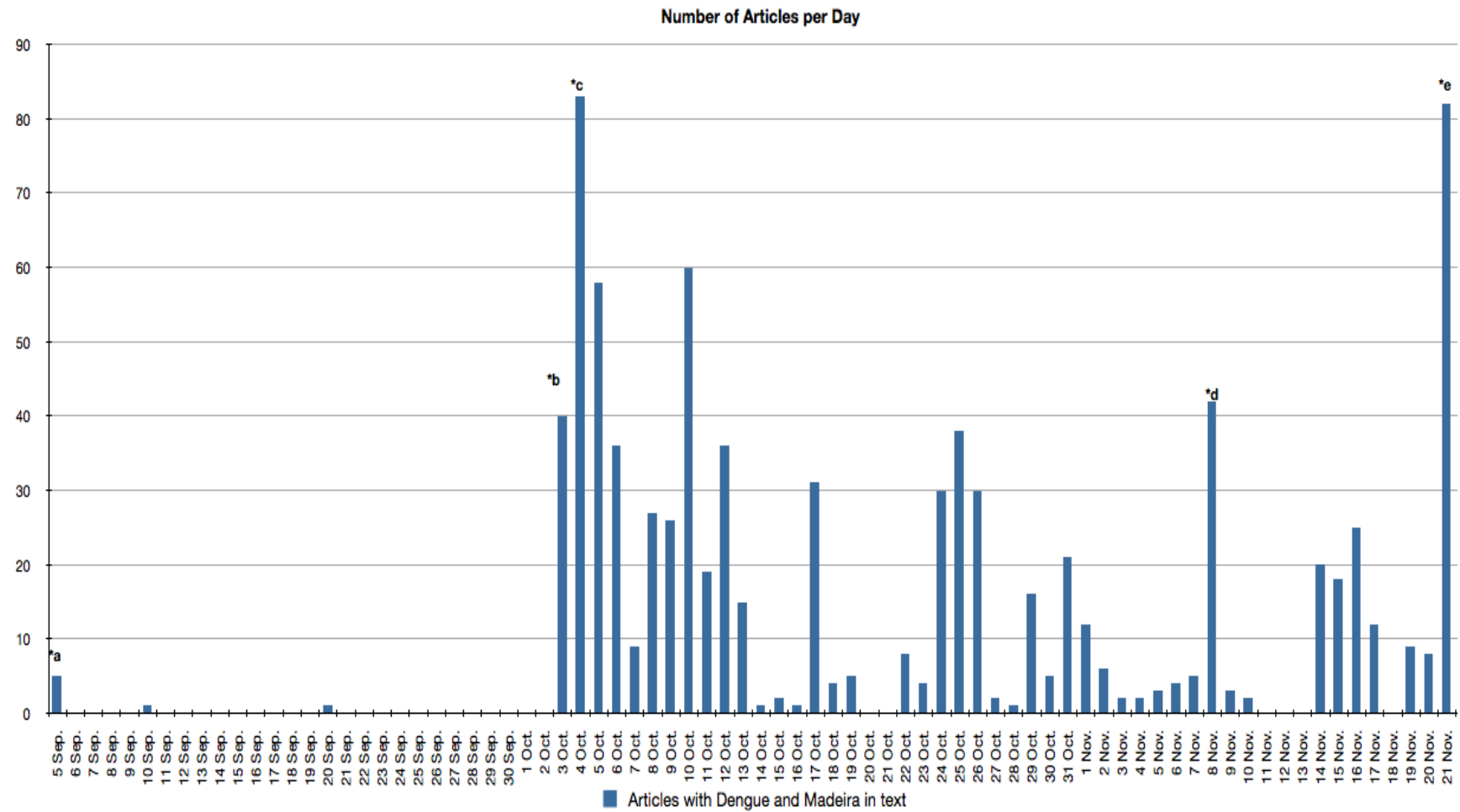
Official Sources (8)
Health News (4)
Unofficial (119)
All (131)

Most reported countries (24h)



Show World Map

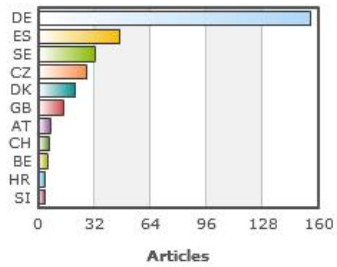




Example 2 EHEC outbreak in Germany

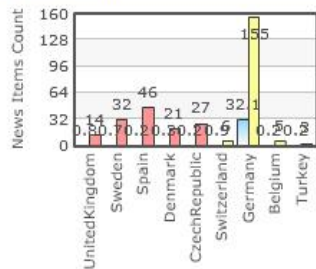
Early alerting via German media (May 2011)

Tracking of a known outbreak with high reporting:
clustering
analysis by country



countries mentioned in the text

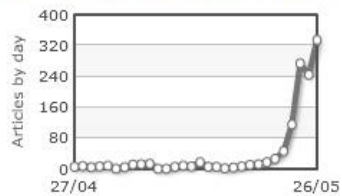
AlertLevel (24h)



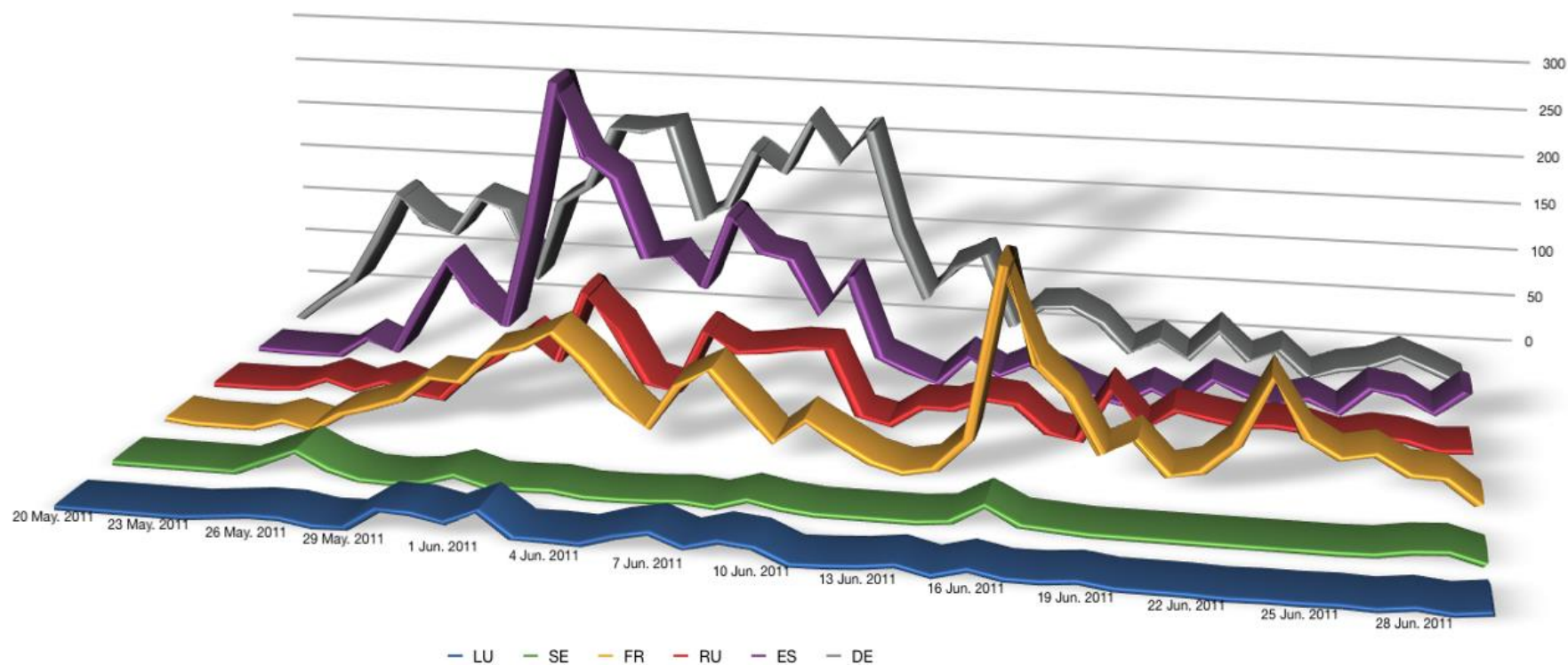
Previous 14 days average
Alert level:
high medium low

statistics on *E.coli*-country combinations
in comparison to 14-day average values

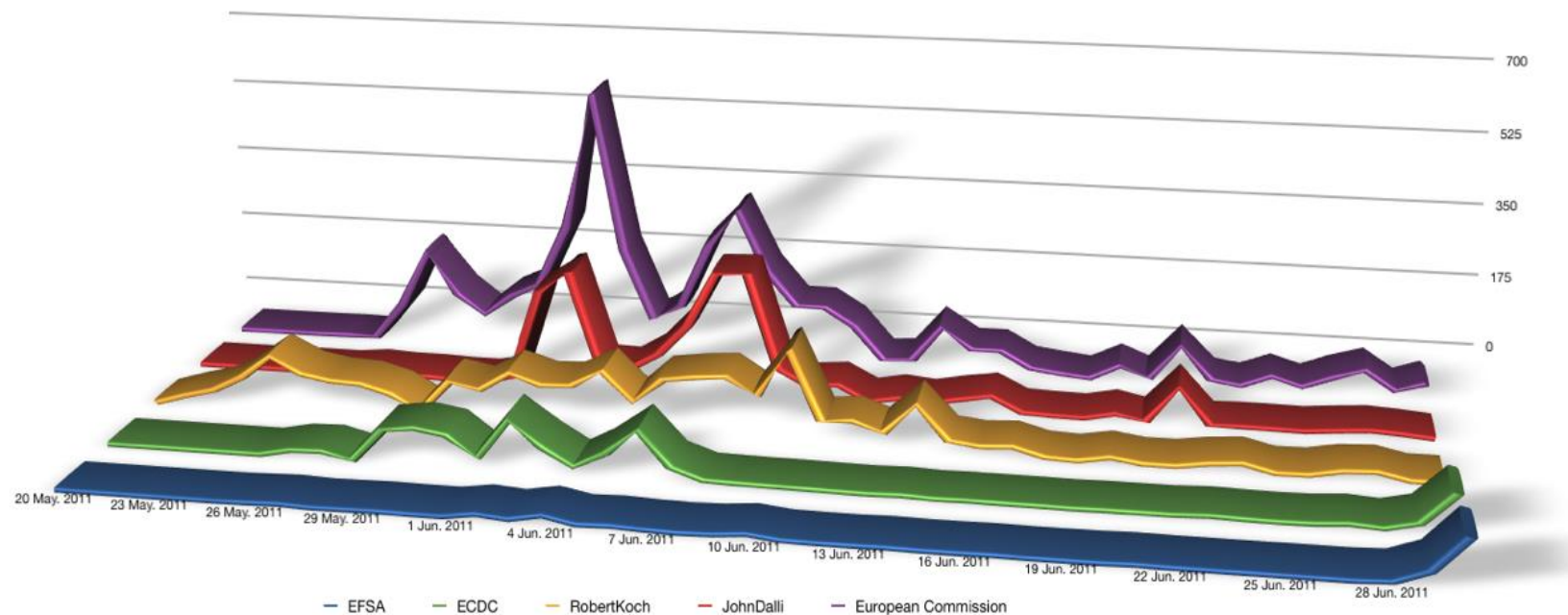
Daily number of articles in this category



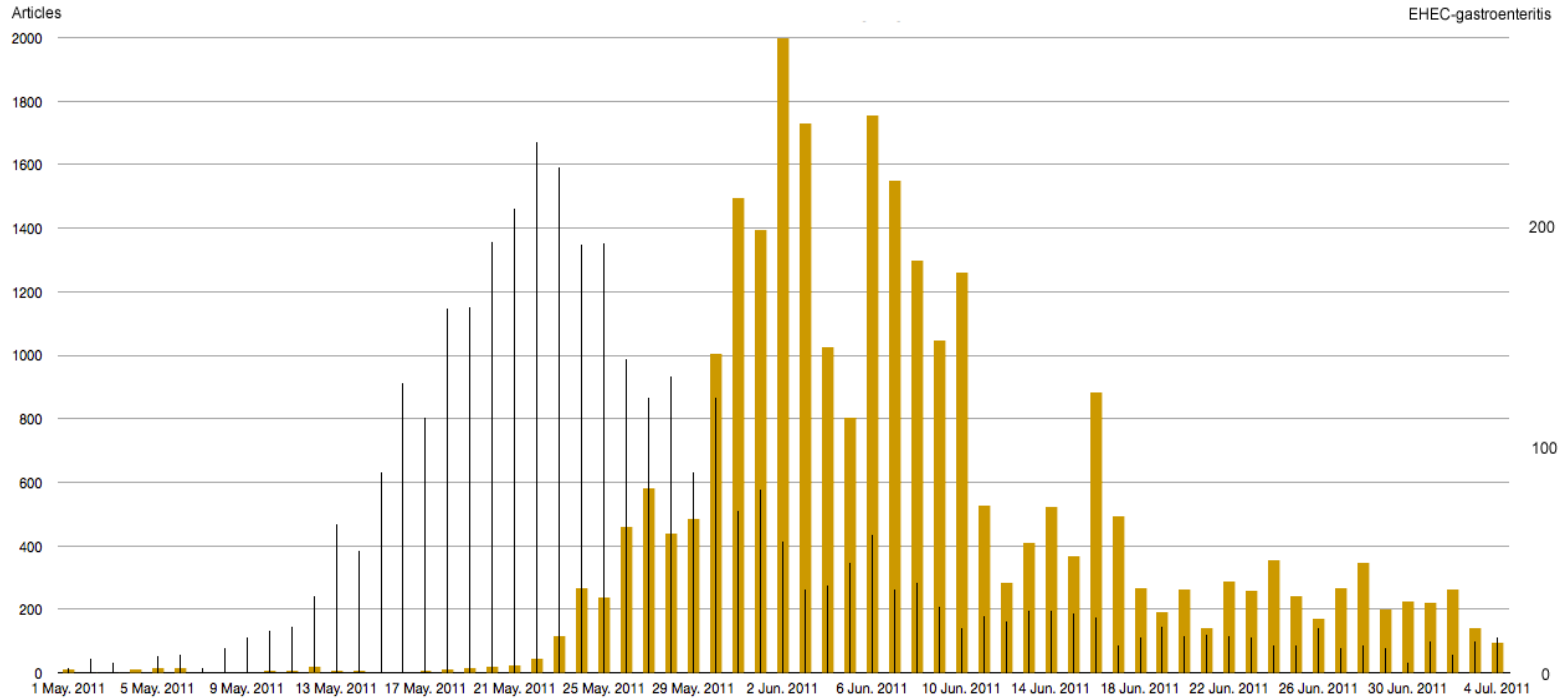
daily number of articles concerning *E. coli*



Number of articles in the *E. coli* category that also mention one of the countries
Luxembourg (LU), Sweden (SE), France (FR), Russia (RU), Spain (ES) and Germany (DE)



Number of articles in the *E.coli* category that also mention one of the entities Robert Koch Institute, Commissioner John Dalli, European Commission, ECDC and EFSA.



Articles per day (shown in orange) and cases of EHEC-gastroenteritis (shown in black) in the period 1st of May 2011 till 4th of July 2011 (data taken from Robert Koch Institute 2011 and Linge et al. 2011).

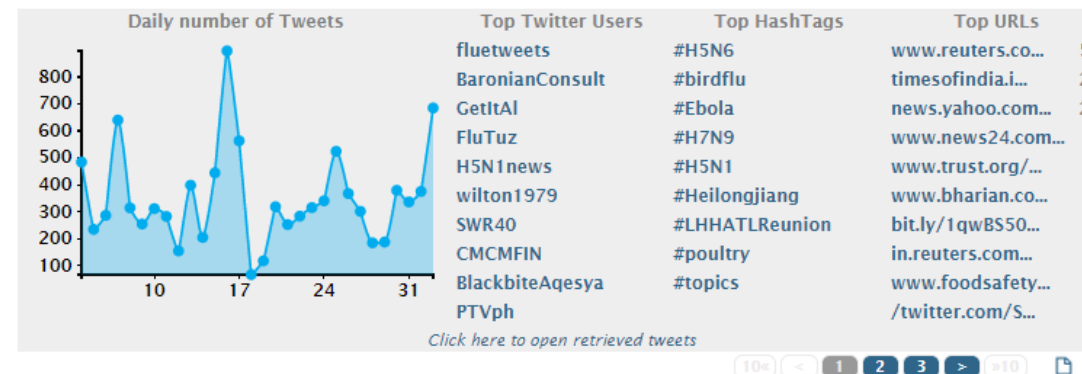
The media attention reached its peak on 2nd of June with over 2000 articles per day.

Example 3 Avian flu

Chinese language support

- Top Stories
- Event Extraction
- Recent Disease Incidents
- Alert Statistics >
- Communicable Diseases >
- Symptoms >
- Bioterrorism >
- Nuclear >
- Chemical >
- ECDC >
- EFSA >
- Other >
- Continents >
- Official Sources >
- Sources List

Latest News About - Avian flu



Articles published more than 1 hour ago

Live chicken imports to resume soon

info-gov-hk-en Wednesday, September 3, 2014 3:02:00 PM CEST | [info](#) [\[other\]](#)

Secretary for Food & Health Dr Ko Wing-man says he hopes live chicken imports from the Mainland can resume before the Mid-Autumn Festival. Speaking to reporters today, Dr Ko said although he cannot announce an exact resumption date yet, a lot of work has been done and some Guangdong chicken farms.....

Articles published more than 3 hours ago

CHP notified of two cases of human infection of avian influenza A(H7N9) in Mainland

dh-hk-en Wednesday, September 3, 2014 1:05:00 PM CEST | [info](#) [\[other\]](#)

Press Release CHP notified of two cases of human infection of avian influenza A(H7N9) in Mainland 3 September 2014 The Centre for Health Protection (CHP) of the Department of Health (DH) today (September 3) received notification from the National Health and Family Planning Commission (NHFPC) of two.....

Articles published more than 4 hours ago

香港暫停黑龍江省一鄉村食用家畜產品進口

hkcn Wednesday, September 3, 2014 10:48:00 AM CEST | [info](#) [\[en\]](#) [\[other\]](#)

香港中通社9月3日電 香港特區政府食物環境衛生署食物安全中心(中心)3日宣佈, 根據國家農業部通報, 黑龍江省哈爾濱市雙城區周家鎮東躍村發現一宗高致病性H5N6亞型禽流感個案。故此, 中心依據既定的高致病性禽流感應對措施方案, 並在參考世界動物衛生組織相關建議後, 決定即時暫停從上述地區半徑3公里疫區範圍內進口食用家畜和畜產品(包括禽蛋)90日, 以及禁止半徑13公里範圍內進口食用家畜和畜產品21天, 以保障香港公眾衛生。中心發言人表示, 中心已根據國家農業部資料並與國家質量監督檢驗檢疫總局確證, 是次禽流感疫情不涉及任何供港註冊食用家畜養殖場。他繼續說, 國家質量監督檢驗檢疫總局確證, 現時亦無供港備案禽肉或.....

Hong Kong 暫停黑龍江省一鄉村食用家畜產品進口

Hong Kong, the September 3 provision Hong Kong zone Government food SDA boundary Frederick Wai Department of Health Food Security Center (center) 3rd propaganda in, in KWOK KA 農 Yip-Chinese, Black Dragon River, the J 濱 city on city zone Chow Ka Chun s York village again product a

Tools

Wednesday, September 3, 2014 4:18:00 PM CEST

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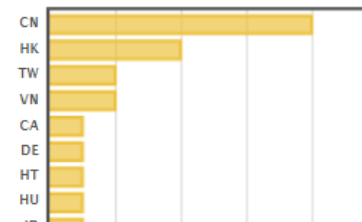
[info](#) | [definition](#)

Languages [+](#) [?](#)

Select your languages

Most reported countries (24h)

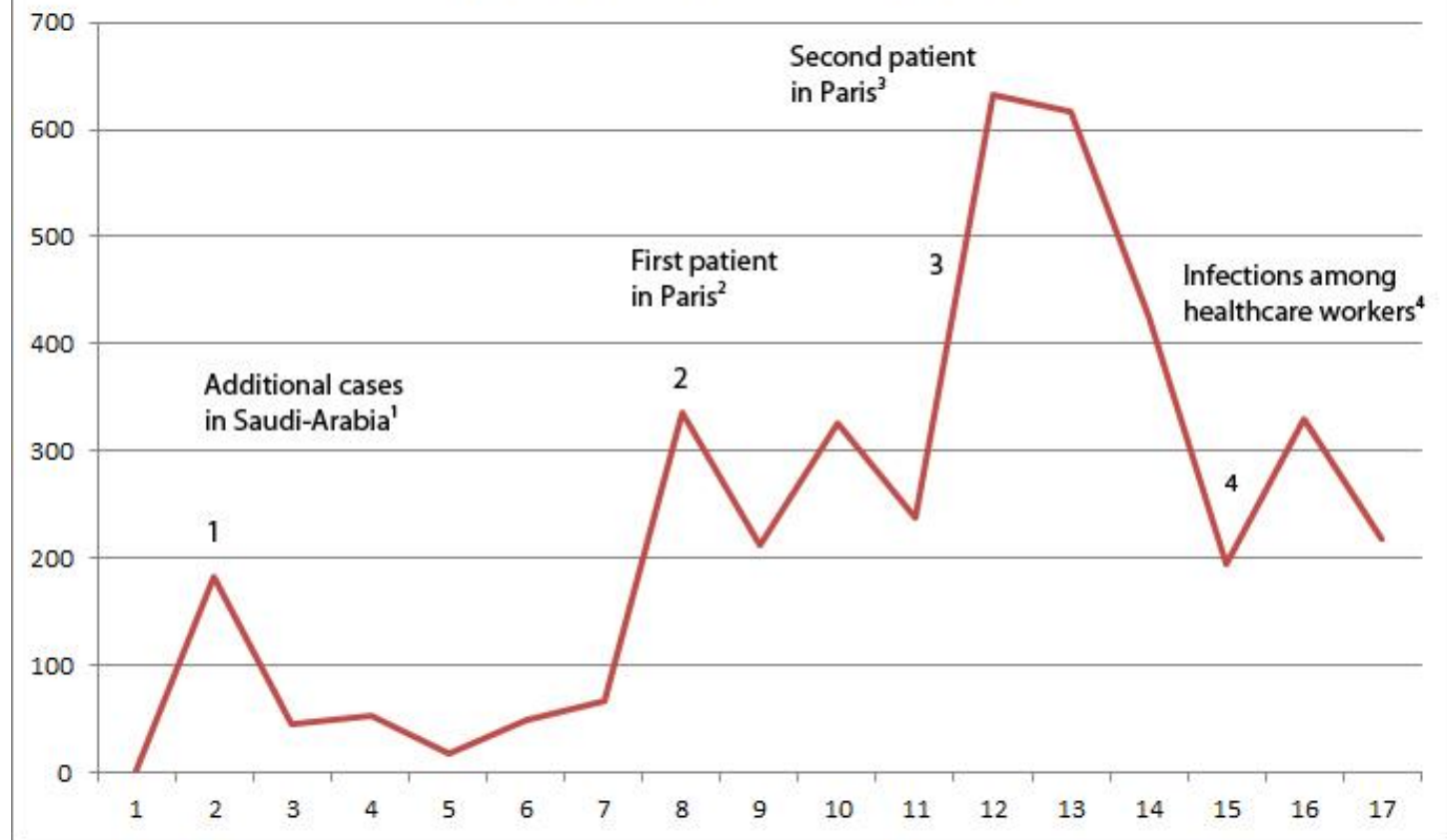
Asia



Example 4 MERS / NCoV since 2012

Twitter support

Reports on NCoV in May 2013



Twitter analysis

We collect and score URLs which are mentioned frequently in the tweets, relevant to an event using several criteria:

- Number of retweets
- Number of times the URL was mentioned in a conversation thread
- Number of times the URL started a conversation thread
- URL from video and photo sharing services, blogs, Facebook, or URL to images and video, are scored higher



I think my girlfriend has the ...

I think my girlfriend has the new sars virus.

Directions: [To here](#) - [From here](#)

I think my girlfriend has the ...

Lincoln

Brayford Pool

Ballast Holes

Swan Pool

New Boultham

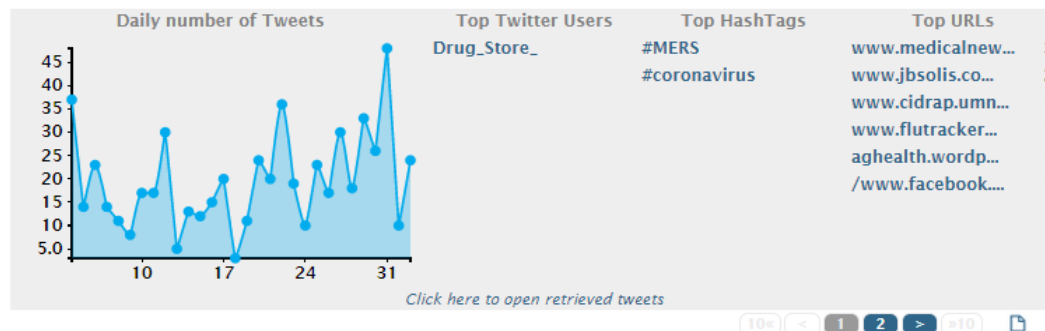
Usefulness of Twitter data

Twitter data can be used to give additional information on events extracted from traditional media:

- additional sources that we don't cover (yet)
- news items which are often cited
- social media items which are often cited

- Top Stories
- Event Extraction
- Recent Disease Incidents
- Alert Statistics >
- Communicable Diseases >
- Symptoms >
- Bioterrorism >
- Nuclear >
- Chemical >
- ECDC >
- EFSA >
- Other >
- Continents >
- Official Sources >
- Sources List

Latest News About - Coronavirus Infection



Articles published more than 20 minutes ago

Philippines: Nurse returning from Saudi Arabia tests positive for MERS

[blog_crofsblogs](#) Wednesday, September 3, 2014 3:46:00 PM CEST | [info](#) [\[other\]](#)

Via [philstar.com](#): DOH: Nurse who arrived in Philippines tested positive for MERS-CoV. Excerpt: The Department of Health (DOH) announced Wednesday that a Filipino nurse who came home from Saudi Arabia was tested positive for the Middle East Respiratory Syndrome Coronavirus,.....

Articles published more than 1 hour ago

Submit to MERS-CoV exam, DOH tells Pinay nurse's fellow passengers

[gmanews](#) Wednesday, September 3, 2014 2:39:00 PM CEST | [info](#) [\[other\]](#)

When the Filipina nurse arrived in the country last Friday, she showed no symptom of MERS-CoV, according to health authorities. She also has a normal temperature according to the thermal scanner. However, MERS-CoV has an incubation period of one to two weeks, and the nurse may not have the symptoms just yet when she arrived in the Philippines....

الصحة: حاجتنا ليس لديهم ثقافة الكمام ولا يوجد اي عقار شافي لمرض كورونا

[\[sotaliraq\]](#) Wednesday, September 3, 2014 2:37:00 PM CEST | [info](#) [\[en\]](#) [\[other\]](#)

Wed Sep 03 2014 13:19 | (صوت العراق) - السومرية نيوز / بغداد اكدت وزارة الصحة، الاربعاء، ان الحجاج العراقيين ليس لديهم ثقافة الكمام، مشيرة الى انه لا يوجد اي عقار شافي لمرض كورونا. وقال وكيل وزارة الصحة ستار الساعدي في حديث لـ"السومرية نيوز" ان "الحجاج العراقيين ليس لديهم ثقافة الكمام لحمايتهم من.....

Articles published more than 2 hours ago

Philippines checks passengers for Mers

[gulfnnews](#) Wednesday, September 3, 2014 2:10:00 PM CEST | [info](#) [\[other\]](#)

Manila: The highly contagious respiratory disease Mers-COV has arrived in the Philippines and health authorities are moving quickly to prevent the possible spread of an illness that has killed more than 250 people worldwide. Health department officials have asked passengers on a recent flight from.....

DOH Nurse from Saudi returns to PH positive with MERS-CoV

[irishsun](#) Wednesday, September 3, 2014 1:24:00 PM CEST | [info](#) [\[other\]](#)

MANILA, PhilippinesThe Department of Health said in a press briefing Wednesday that a Filipina nurse who has returned to the country from Saudi Arabia has tested positive for?Middle East

Filipino Nurse From Saudi Arabia Positive for MERS

[ABCnews](#) Wednesday, September 3, 2014 1:18:00 PM CEST | [info](#) [\[other\]](#)

Tools

Wednesday, September 3, 2014 4:11:00 PM CEST

RSS | KML | MAP

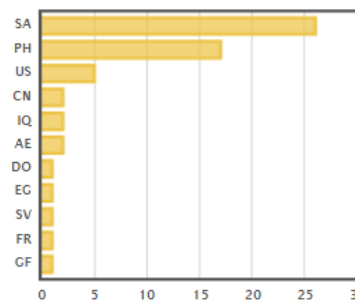
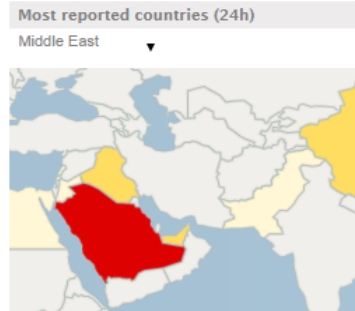
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Languages + ?

Select your languages



Example 5 Ebola in West-Africa

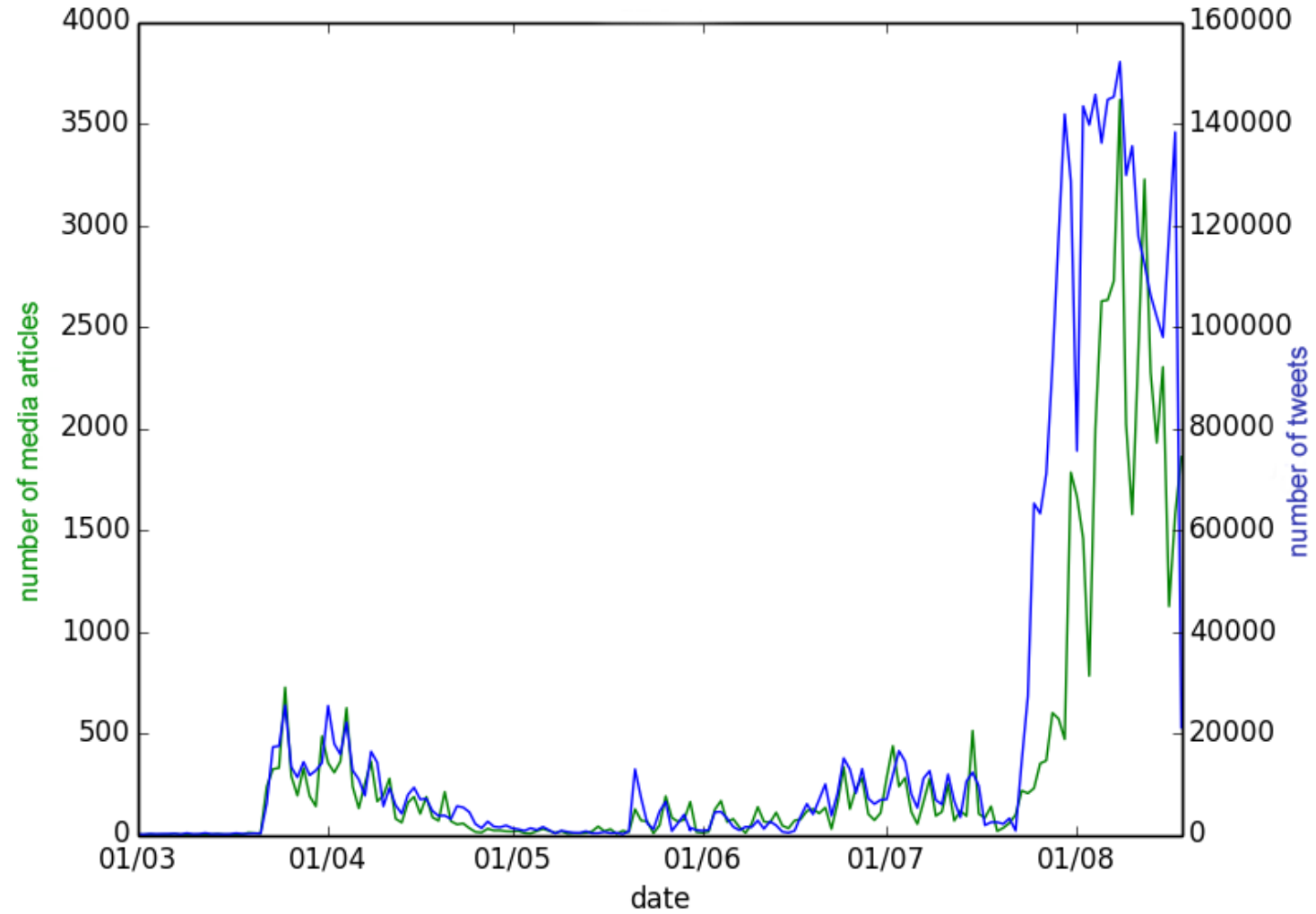
Events in March 2014:

14/3 Une étrange fièvre fait 8 morts à Macenta

=> triggered UnknownDisease

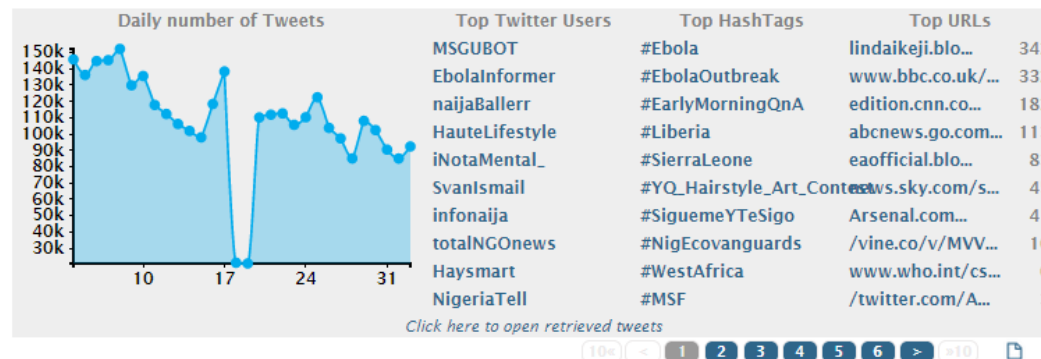
18/3 Mystery hemorrhagic fever kills 23 in Guinea

=> triggered EbolaHemorrhagicFever



- Top Stories
- Event Extraction
- Recent Disease Incidents
- Alert Statistics
- Communicable Diseases
- Symptoms
- Bioterrorism
- Nuclear
- Chemical
- ECDC
- EFSA
- Other
- Continents
- Official Sources
- Sources List

Latest News About - Ebola Hemorrhagic Fever



Top Stories

Ebola Survivor William Pooley Discharged from Hospital after Successful ZMapp Treatment

Articles: 6 | Last update: Sep 3, 2014 3:29:00 PM | Start: Sep 3, 2014 11:50:00 AM | Sources: 6 | Peak: 2 | Current rank: 2

Articles published more than 10 minutes ago

Γιατροί Χωρίς Σύνορα: «Ο ιός Έμπολα κερδίζει... η ανθρωπότητα χάνει τη μάχη»

[inews-gr](#) Wednesday, September 3, 2014 3:58:00 PM CEST | [info](#) [\[en\]](#) [\[other\]](#)

Οι Γιατροί Χωρίς Σύνορα καταγγέλλουν τη διεθνή αδράνεια στην αντιμετώπιση του Έμπολα στις πληγείσες χώρες της Αφρικής. Τα κράτη πρέπει να αναπτύξουν τώρα εξειδικευμένα ιατρικά εργαλεία. Οι παγκόσμιοι ηγέτες αδυνατούν να αντιμετωπίσουν τη χειρότερη επιδημία του ιού Έμπολα που έχει ξεσπάσει ποτέ, και.....

Enfermero británico se recupera de ébola

[laverdad-VE](#) Wednesday, September 3, 2014 3:57:00 PM CEST | [info](#) [\[en\]](#) [\[other\]](#)

William Pooley, de 29 años, contrajo la enfermedad cuando trataba enfermos de ébola en Sierra Leona. El brote, que afecta también a Liberia, Guinea, Nigeria y Senegal, ha matado a más de 1.500 personas. El enfermero fue atendido trasladado a Gran Bretaña donde recibió la medicina experimental ZMapp...

В России приняты меры в связи с обострением лихорадки Эбола в мире

[newsbomb](#) Wednesday, September 3, 2014 3:56:00 PM CEST | [info](#) [\[en\]](#) [\[other\]](#)

Специальная рабочая бригада создана для того, чтобы предупредить распространение вируса по территории РФ, если в стране окажутся инфицированные. "В ее состав входят врачи-инфекционисты, эпидемиологи, реаниматологи и лаборанты - всего 16 человек. Специалисты обучены и способны обеспечить полный цикл.....

Chocolatiers offered 'some release' as ICCO extends cocoa surplus

[foodnavigator](#) Wednesday, September 3, 2014 3:52:00 PM CEST | [info](#) [\[other\]](#)

The International Cocoa Organization (ICCO) has revised its estimate for the 2013/14 cocoa season and now expects a slightly larger supply surplus....

Articles published more than 20 minutes ago

Dan de alta a paciente británico que tenía ébola

[eluniversal-MX](#) Wednesday, September 3, 2014 3:46:00 PM CEST | [info](#) [\[en\]](#) [\[other\]](#)

William Pooley, de 29 años, fue tratado en una unidad especial de aislamiento después de contraer la mortal enfermedad en agosto mientras trabajaba como enfermero voluntario en Sierra Leona.

Tools

Wednesday, September 3, 2014
4:11:00 PM CEST

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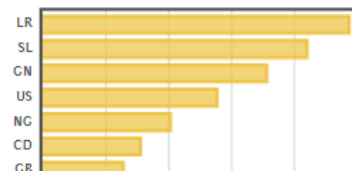
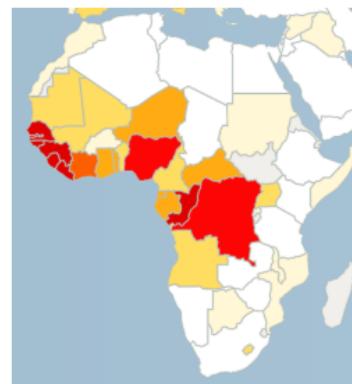
[info](#) | [definition](#)

Languages [+](#) [?](#)

Select your languages

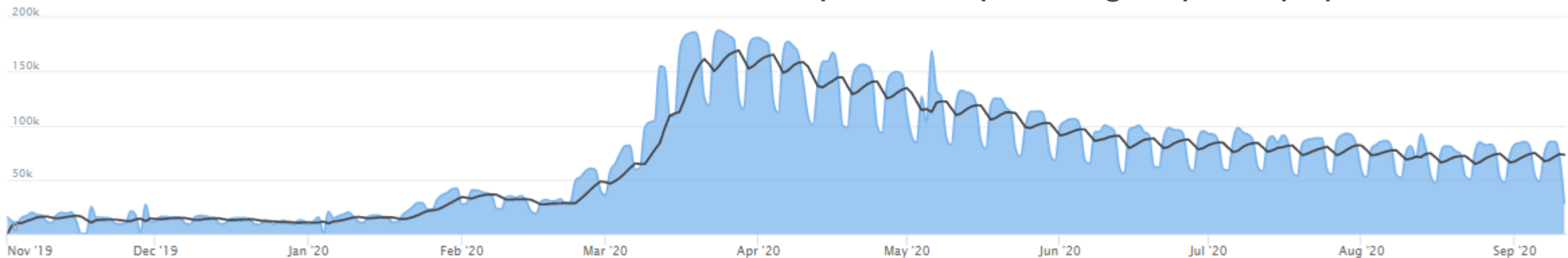
Most reported countries (24h)

Africa



COVID-19 crisis

- First signal picked up at 03:14 UTC on the 31st of December 2019
- Number of articles started to grow since human-to-human transmission was confirmed: **up to 2 Coronavirus-related articles per second** in April 2020
- Used to monitor **each stage of the pandemics** and **measures taken by countries**: travel and trade restrictions, importing of cases in countries, local transmission, lockdown and deconfinement measures, impact on specific groups or populations



Article

網傳中國7人染SARS 疾管署查證訊息真偽

Fetch Date: 31/12/2019 03:15
Import Date: 31/12/2019 03:18
Source: cnataiwan CNA Taiwan News
Subject: General News
Language: (zh) Chinese
Source Country: Taiwan, China
Associated Categories: Coronavirus SARS
Mentioned Countries: Taiwan, China
EMM Id: cnataiwan-c862dd46d3e45dbec0ada2fd18279465

Read By: [redacted] 03 Feb 19:09 [redacted]

Full Article Mentioned Locations Related Boards Comments 0 Similar Articles Duplicated Articles 2

Top 10 similar articles out of 374793 in the last 6 months

<div>GPHIN 31 Dec 03:23</div>	zh	Network transmission of SARS outbreak in Wuhan DISEASE Control Agency: in the investigation with the land side	Communicabledisease, Coronavirus, Pneumonia, SARS ... +2.	China, Taiwan, China	<div>🚩 ✓ ⚙️ 📄 💬</div>
<div>Communicabledisease Coronavirus Pneumonia SARS Travel Restrictions Unknown disease China 1 Taiwan, China 1</div>					
Mainland microblogging has spread the outbreak of atypical pneumonia coronavirus (SARS) cluster infection in Wuhan, there have been 7 cases of infection. The CDC said today that it had contacted the land side in the morning and was waiting for the results of the inspection. As soon as there is a new message, a press release will be sent.					
<div>GPHIN 31 Dec 08:18</div>	zh	Internet crazy spread mainland China explosion "SARS" outbreak CDC response	Communicabledisease, Pneumonia, SARS, Travel Restrictions	China, Taiwan, China	<div>🚩 ✓ ⚙️ 📄 💬</div>
<div>chinatimes 31 Dec 13:52</div>	zh	網傳武漢爆發SARS疫情 疾管署即起展開登機檢疫	Coronavirus, Pneumonia, SARS	Hong Kong Special Administrative Region, Taiwan, China	<div>🚩 ⚙️ 📄 💬 📄 1</div>

monde en 2011 va rejoindre en prêt le club masculin de Hayabusa Eleven. 2020-09-11 09:02 L'odore magico dell'Incensum" in attesa della mostra su Chanel 2020-09-11 09:02 The best news of 2020? Humanity may never hit the 10 billion mark 2020-09-11 09:02 Anpassung Schwellenw...
na l'Orchestra Rai e lo fa al completo 2020-09-11 09:02 Эксперты ждут дальнейшего роста цен на золото 2020-09-11 09:02 أوروبا يلجأ إلى تقليل الحجر الصحي رغم انتشار كورونا.. وتحذيرات من العودة للحياة الطبيعية 2020-09-11 09:02 Irish League Premium NI Football League draw up funding plan to keep Ir...
don-governmental organizations adapt to survive 2020-09-11 09:02 Federal health minister fires back at Ford, says provincial police can enforce quarantine rules too 2020-09-11 09:02 وزارة التعليم تفتي 4 شلحات أبرزهم إلغاء أفعال السنة في المدارس 2020-09-11 09:02 Irish Open Graeme McDowell explain



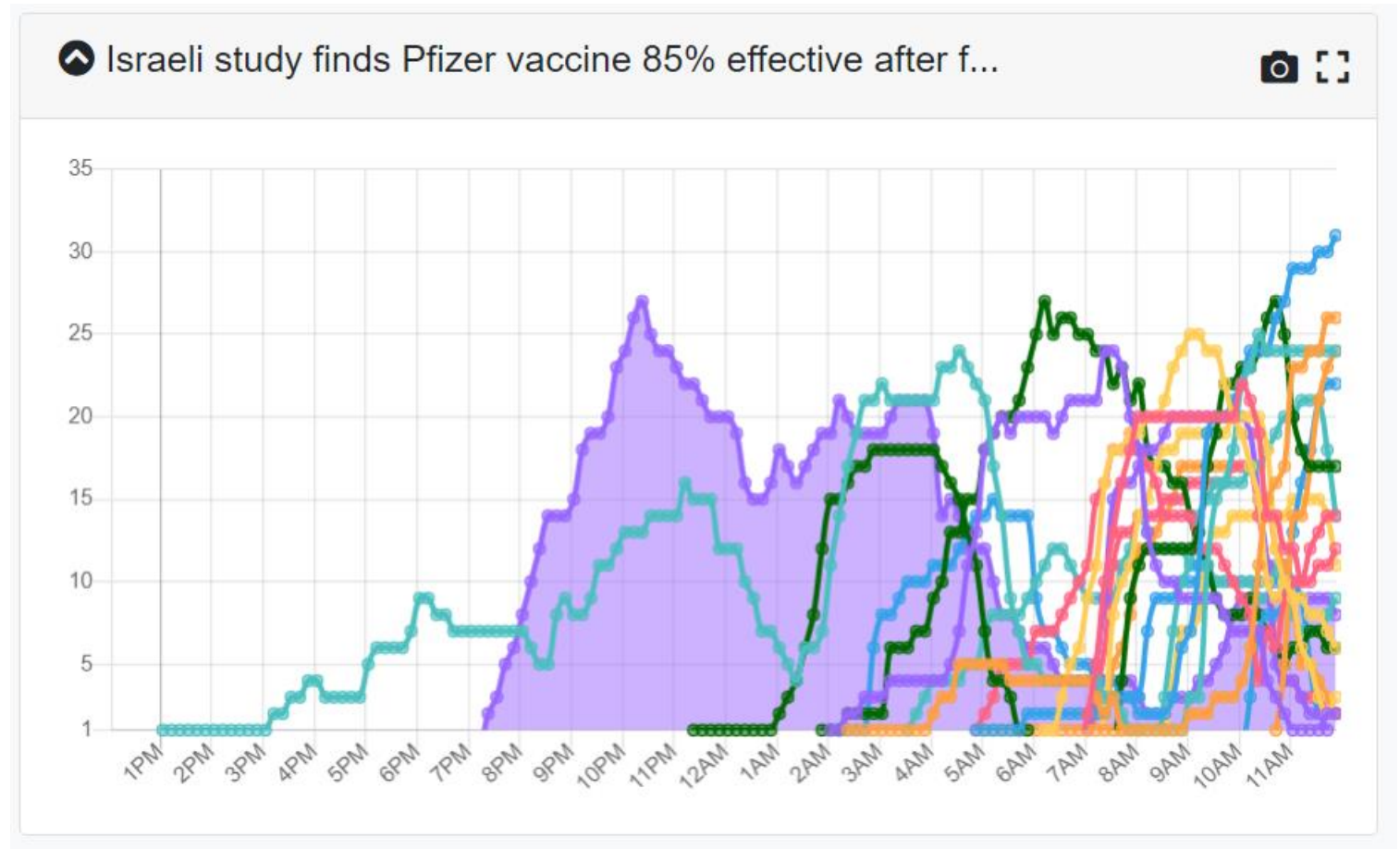
Publicly available dashboard (official WHO map material)

<https://portal.who.int/eios-bigscreenmap/>

Coronavirus
Sport Nagasato, 1ère joueuse professionnelle dans un club masculin La championne du monde en 2011 va rejoindre en prêt le club masculin de Hayabusa Eleven.
30e Congrès de la «Société européenne des maladies respiratoires»
Ozil Knows Fate This Premier League Season Out Of His Hands
L'odore magico dell'Incensum" in attesa della mostra su Chanel
Suona l'Orchestra Rai e lo fa al completo
Crisis in Venezuela: Non-governmental organizations adapt to survive
The best news of 2020? Humanity may never hit the 10 billion mark
Эксперты ждут дальнейшего роста цен на золото
Federal health minister fires back at Ford, says provincial police can enforce quarantine rules too
Anpassung Schwellenwerte der SwissCovid App

Dealing with the Covid-19 infodemic

- Clustering
- Filtering
- Geolocating



Misinformation can lead to tangible, often immediate consequences



News ▾ AJ Impact AJ Go ▾ Documentaries ▾ Shows ▾ Investigations

Iran: Over 700 dead after drinking alcohol to cure coronavirus

More than 700 people died in Iran after ingesting toxic methanol, erroneously thinking it can cure the new coronavirus.

At least 20 UK phone masts vandalised over false 5G coronavirus claims

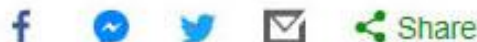
Industry body assures people in open letter there is no link between 5G and pandemic

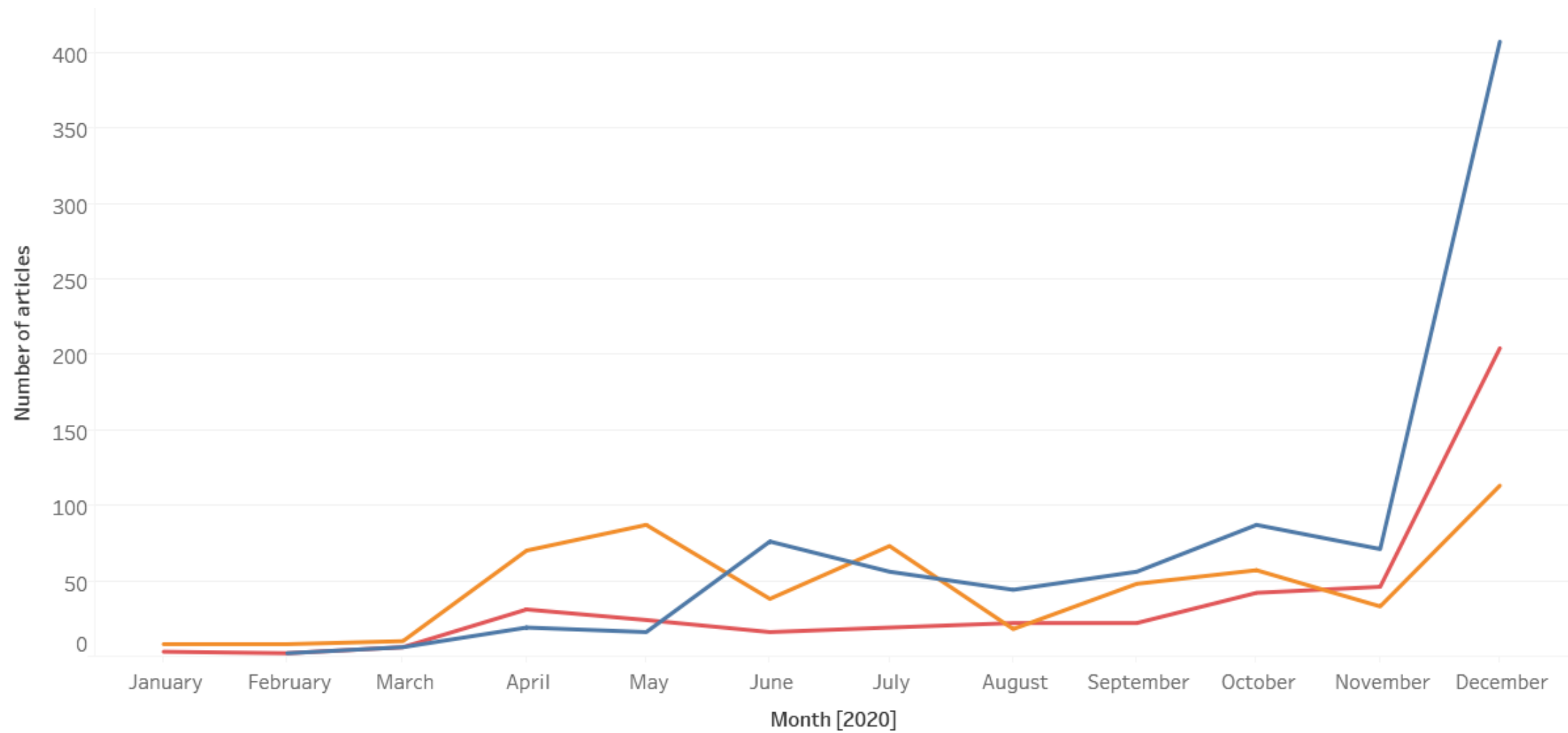
How Covid-19 myths are merging with the QAnon conspiracy theory



By Marianna Spring and Mike Wendling
BBC Anti-disinformation unit

🕒 3 September 2020

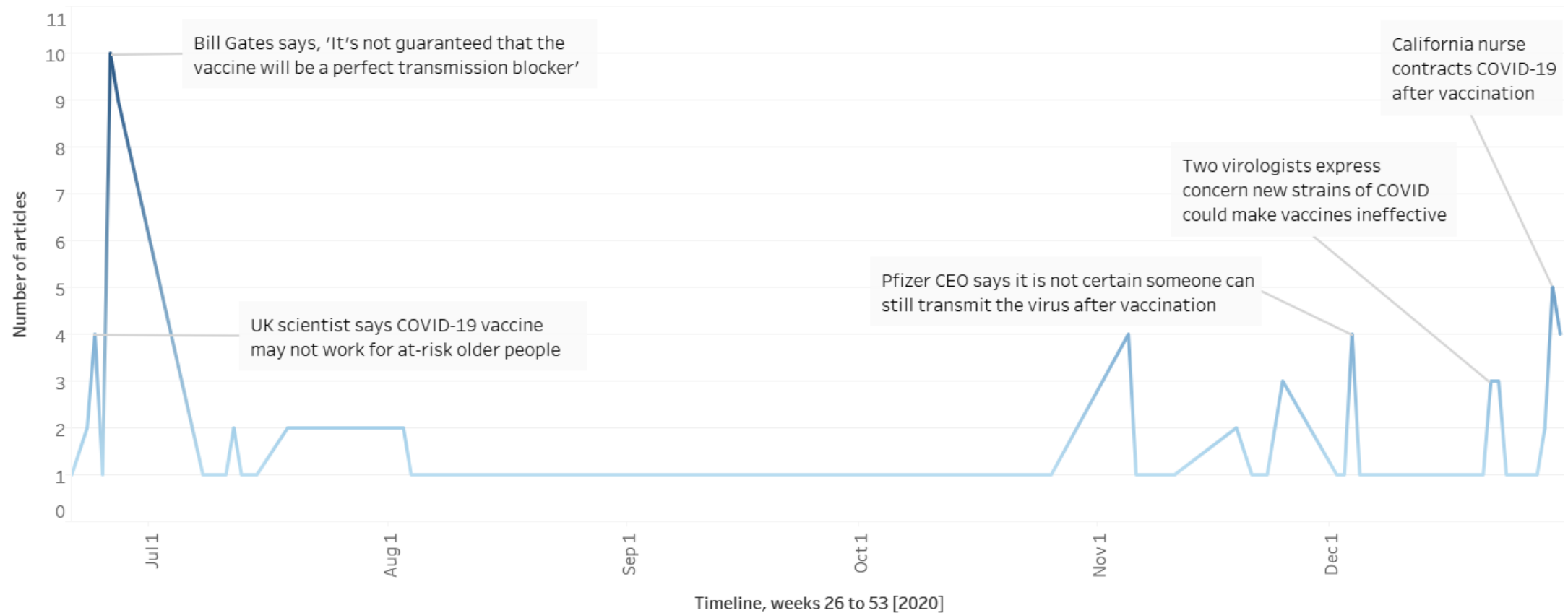




Narrative

- Anti-vax narratives
- Anti-vax conspiracy theories
- Anti-mandatory vaccination narratives

Trend analysis



Broad range of Covid-19 narratives

Downplaying the pandemic

Fearmongering

Authoritarianism and dystopia (freedom, censorship), corona demonstrations

Criticism of national authorities

Anti-EU narratives

Anti-WHO narratives

Anti-lockdown

Anti-facemask

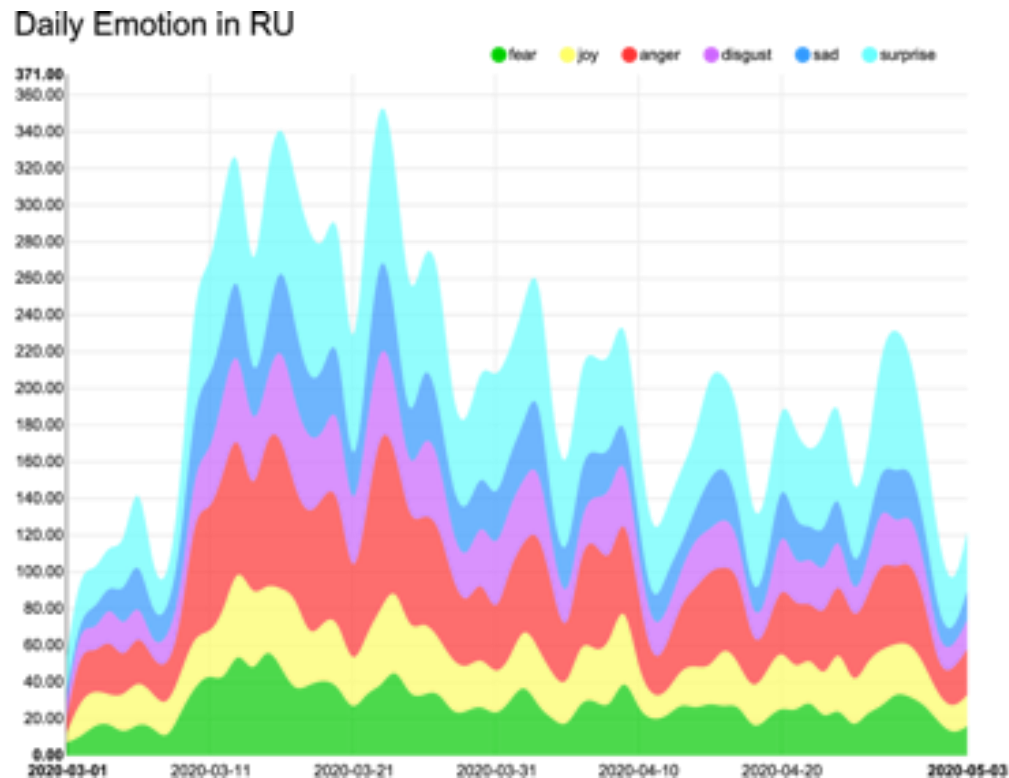
Anti-vax (linking to ongoing vaccination hesitancy movements)

Health-related claims (miracle cures, etc.)

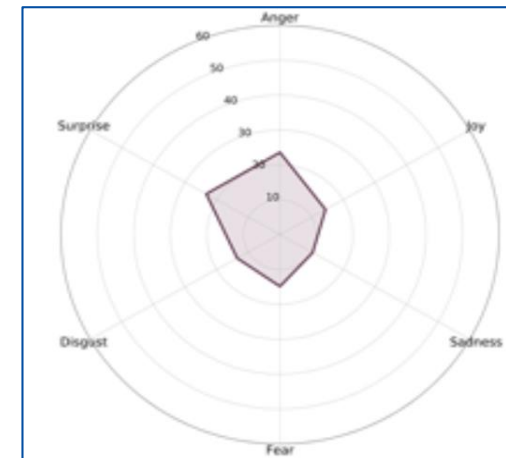
Anti-immigrant and anti-muslim narratives

Conspiracy theories (origin of the virus, Bill Gates, George Soros, etc.)

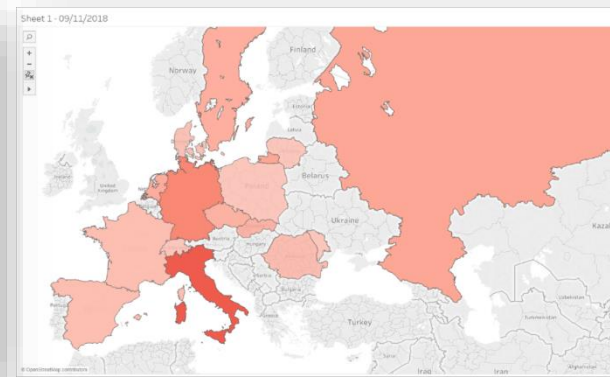
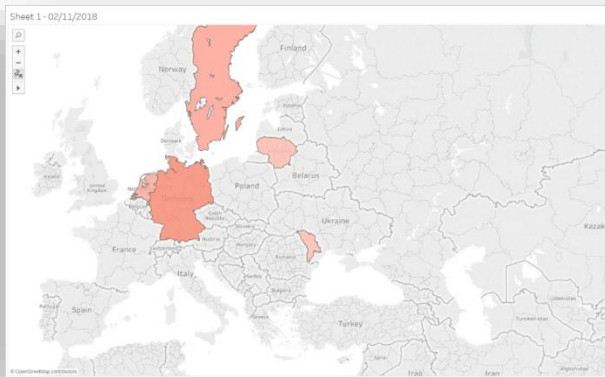
Emotion analysis of disinformation



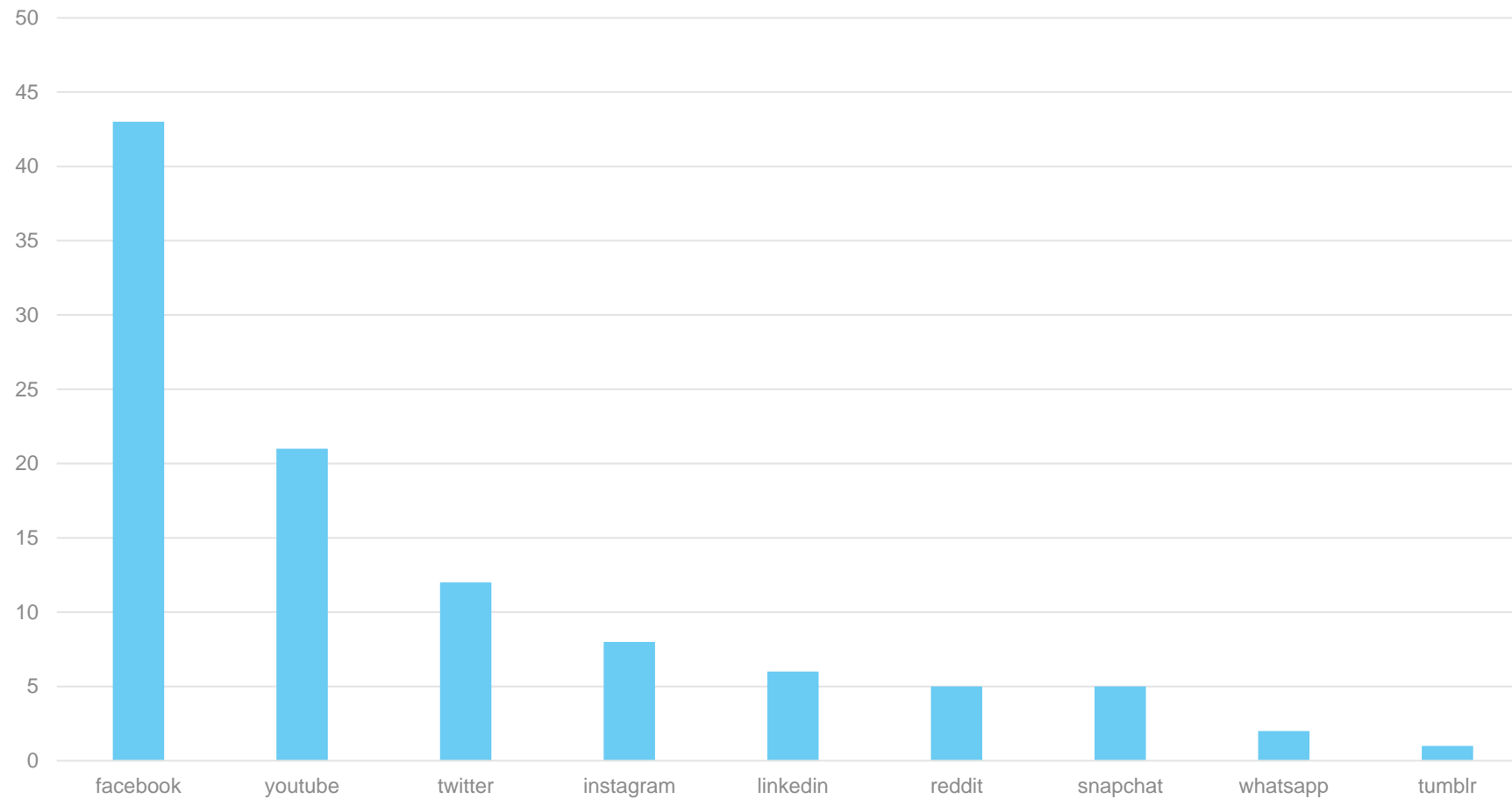
A deeper look into narratives driven by emotion classes



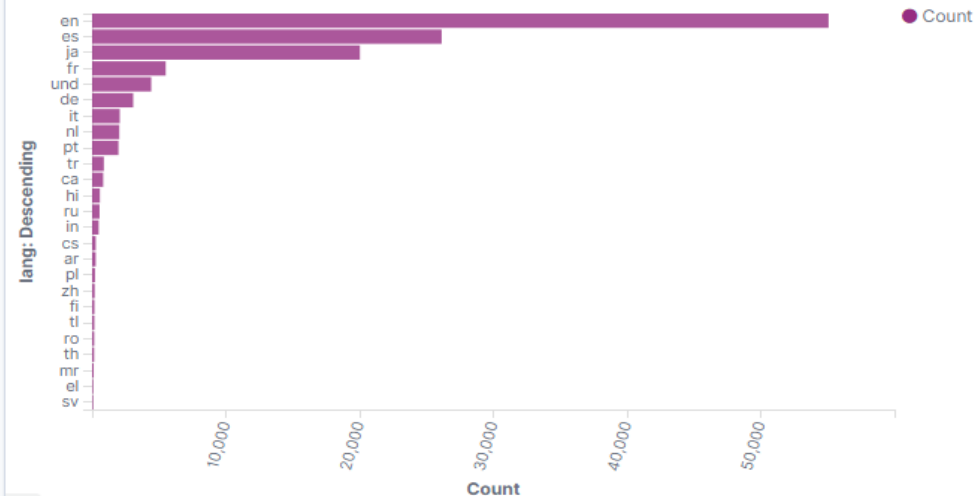
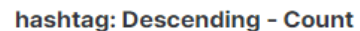
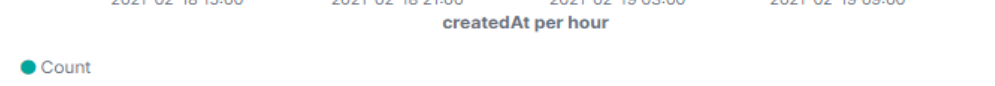
Propagation of narratives



Percentage of US adults who get their news from social media

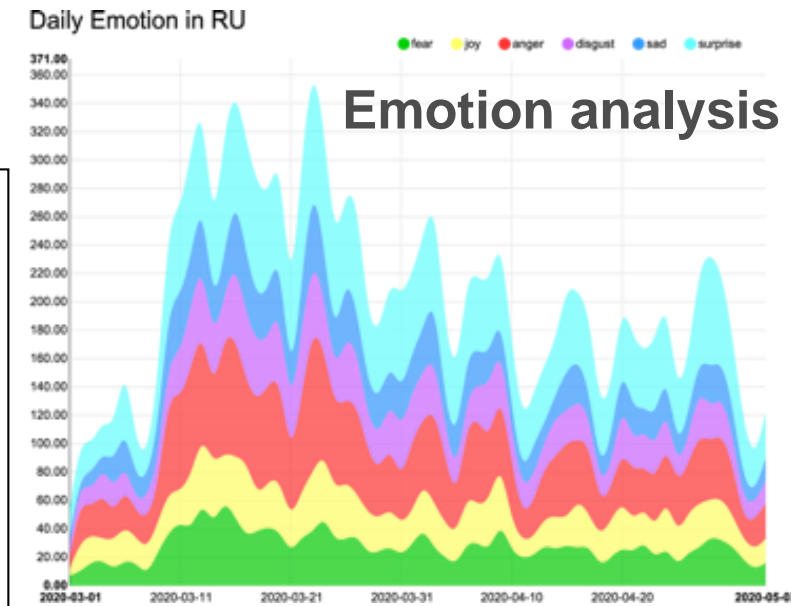
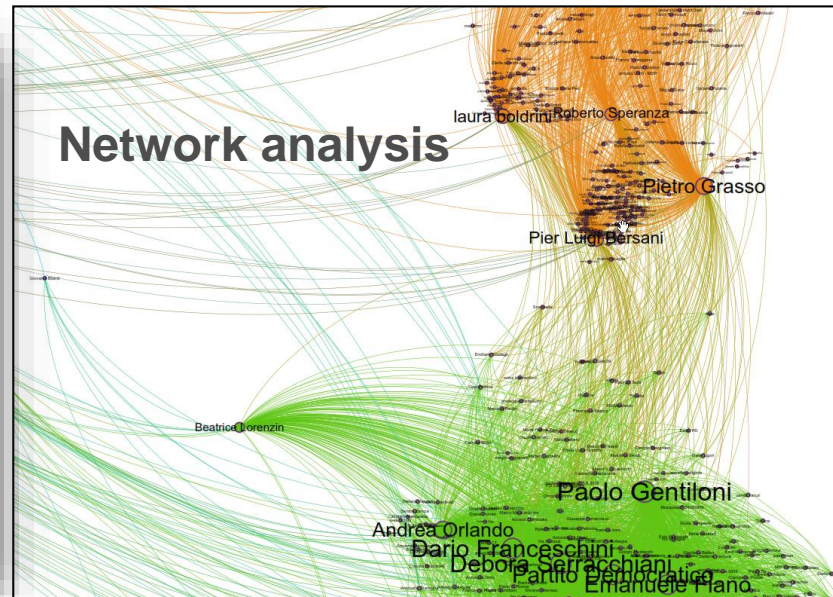
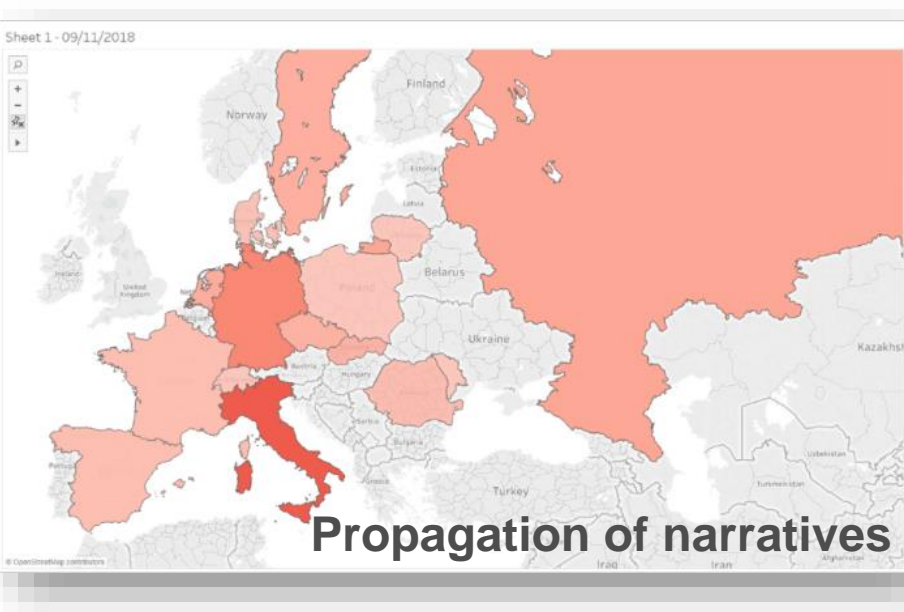


• Source: PEW Research Center, 2018



Enhancing early warning and monitoring mis/disinformation

- **Machine learning** for building classifiers (WHO, JRC and AWS)
- Monitoring **Twitter** channels & hashtags
- Better **Geolocation** (e.g. Korean, Nepali language)



COVID-19 media surveillance

18 February 2021; 22:30 weekly brief

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) remains a mayor news topic, with 75 thousand articles per day (in 70 languages, as detected by [EMM/MEDISYS](#)).



Figure 1 Media reports on Covid-19 (source: EMM/MEDISYS)



Headlines

- US: About [57.7 million Covid-19 vaccine doses administered](#) in the US; [Pfizer-BioNTech started vaccine trial for pregnant women](#); [Life expectancy in the US dropped a full year](#) in the first half of 2020 according to the US CDC
- UK: [Scientists have identified another new variant B.1.525 of coronavirus in the UK with some potentially troubling mutations](#); Calls for [compensation scheme for UK frontline workers with long Covid](#)
- Brazil [hits 10 million Covid cases with new strain taking hold](#)
- Spain: [incidence rate falling at different speeds in each region](#) may be connected to the more contagious UK variant
- Portugal: The numbers of infections are improving but Portugal is still



Figure 2 Geolocations mentioned in coronavirus media reports showing clusters of media reports (source: EMM/MEDISYS)



Twitter

The following news were found among the most mentioned/retweeted items:

- "Two variants have merged into heavily mutated coronavirus. The UK and California variants of coronavirus appear to have combined into a heavily mutated hybrid, sparking concern that we may be entering a new phase of the covid-19 pandemic" ([newscientist](#))
- "The coronavirus is here to stay — here's what that means. A Nature survey shows many scientists expect the virus that causes COVID-19 to

Thank you

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Slide xx: **element concerned**, source: **e.g. Fotolia.com**; Slide xx: **element concerned**, source: **e.g. iStock.com**