

Visible Insights of the Invisible Pandemic: A Scientometric, Altmetric and Topic Trend Analysis

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Introduction

Applying various tools and techniques of scientometrics, and altmetrics and analysing google trends, the study attempts to draw meaning from the huge volume of research papers and online activity surrounding COVID-19 pandemic. Specifically the study has attempted to address the following research questions:

- What are the key papers that captures the most relevant research, areas and topics on COVID-19?
- What is the knowledge base that influences current research on this pandemic?
- What are the key aspects of this pandemic that is influencing the society at large?

Method

- The data for this study was drawn from Dimensions database (www.dimensions.ai), an integrated linked database that provides data of funding agencies (grant), research publications, patents, clinical trials and key policy documents. It also provides dynamic interface to the online mentions of publications, clinical trials and policy documents
- The articles on this virus were extracted using the search string "Covid-19" Or "SARS-CoV-2" Or "SARS-CoV2" Or "2019-nCoV" on April 12, 2020 from this database.
- The search string applied on the publications database of Dimensions resulted in 9146 papers, containing 7332 articles and 1814 pre-prints. This data set of 9146 papers were further used for analysis.
- Detail approach for undertaking altmetric analysis, co-citation analysis and google trend analysis are discussed in the full paper (*can be downloaded from the source given*)

Highlights of the Study

- The exponential growth of research papers with almost 300 percent increase in research papers in fifteen days provide an indication of the high intensity of research activity. E-print/preprint repositories primarily bioRxiv, MedRxiv, arXiv are emerging as the most preferred modes of communication with large number of papers getting deposited in them each day for fast communication among scientists.
- Papers in highly reputed journals (*journals characterised by high impact factor and its establishment in the field*) are having very high online visibility. Quantitative and content analysis of the influential papers show that they have addressed issues that have strong correlation with policies/action plans such as period of quarantine, treatment type, use of face masks, population more vulnerable to disease etc. The citations of research papers in policy documents provide another indication of their direct influence on policy actions.
- High level of collaboration among authors, institutes, and countries is one of the characteristic one observes from COVID-19 research papers. China and USA drive COVID-19 research globally and are also actively engaging with other countries in research.
- Co-citation citation linkages show that the highly co-cited research papers are very contemporary papers. This indicates that the core knowledge base surrounding the disease draws mainly from recent works indicating the novelty and uncertainty of this disease.

- Google trends highlight that ‘social distancing’, quarantine, face mask, lockdown and covid-19 are topics that trend very highly worldwide. However, country variations are seen with ‘social distancing’ for example not trending much in Brazil. Some relationship can be seen with country policy that drives the trends.

Key Table and Figures

Table 1: Ten most popular research papers on COVID-19

Paper	Research Area	Altmetrics Score	Popularity Breakup
Andersen, G.K, Rambaut, A., Lipkin, W.I., Holmes, E.C., & Garry, R.F. (2020). Proximal Origins of SARS-CoV-2. <i>Nature Medicine</i> , https://doi.org/10.1038/s41591-020-0820-9	Medical and Health Sciences	27718	<ul style="list-style-type: none"> • Twitter- 74942 tweets from 67349 users • News- 541 news stories from 353 outlets • Blog- 58 Posts from 47 blogs • Facebook- 49 public wall posts from 47 users
van Doremalen, N., Bushmaker, T., Morris, D.H., Holbrook, M.G., Amandine Gamble, A., et al. (2020). Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. <i>New England Journal of Medicine</i> , doi: 10.1056/NEJMc2004973	Medical and Health Sciences	21877	<ul style="list-style-type: none"> • Twitter- 23842 tweets from 20633 users • News- 1573 news stories from 722 outlets • Blog- 111 posts from 77 blogs • Facebook- 33 public wall posts from 29 users • 6 Policy Documents reference this paper
Li, R., Pei, S., Chen, B., Song, Y., Zhang, T., Yang, W., & Shaman, J. (2020). Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2). <i>Science</i> , doi: 10.1126/science.abb3221	<ul style="list-style-type: none"> • Medical and Health Sciences • Medical Microbiology 	15634	<ul style="list-style-type: none"> • Twitter- 22965 tweets from 19798 users • News- 485 news stories from 293 outlets • Blog- 61 posts from 49 blogs • Facebook- 15 public wall posts from 14 users • 2 Policy documents reference this paper
Leung, N. H. L., Chu, D. K. W., Shiu, E. Y. C., Chan, K.-H., Mcdevitt, J. J., Hau, B. J. P. et al. (2020). Respiratory virus shedding in exhaled breath and efficacy of face masks. <i>Nature Medicine</i> . doi: 10.1038/s41591-020-0843-2	<ul style="list-style-type: none"> • Medical and Health Sciences • Medical Microbiology 	15370	<ul style="list-style-type: none"> • Twitter- 34608 tweets from 29664 users • News- 207 news stories from 149 outlets • Blog- 35 posts from 32 blogs • Facebook- 5 public wall posts from 5 users
Shen, C., Wang, Z., Zhao, F., Yang, Y., Li, J., Yuan, J. (2020). Treatment of 5 Critically Ill Patients With COVID-19 With Convalescent Plasma. <i>Jama</i> . doi: 10.1001/jama.2020.4783	<ul style="list-style-type: none"> • Medical and Health Sciences • Clinical Sciences 	14379	<ul style="list-style-type: none"> • Twitter- 43514 tweets from 39886 users • News- 179 news stories from 150 outlets • Blog- 17 posts from 15 blogs • Facebook- 5 public wall posts from 5 users
Caly, L., Druce, J. D., Catton, M. G., Jans, D. A., & Wagstaff, K. M. (2020). The FDA-approved Drug Ivermectin inhibits the replication of SARS-CoV-2 in vitro. <i>Antiviral Research</i> , 104787. doi: 10.1016/j.antiviral.2020.104787	<ul style="list-style-type: none"> • Medical and Health Sciences • Medical Microbiology 	11630	<ul style="list-style-type: none"> • Twitter- 17977 tweets from 15077 users • News- 257 news stories from 221 outlets • Blog- 12 posts from 12 blogs • Facebook- 7 public wall posts from 7 users

Paper	Research Area	Altmetrics Score	Popularity Breakup
Wu, Z., & McGoogan, J.M. (2020). Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China. <i>JAMA</i> , doi:10.1001/jama.2020.2648	Medical and Health Sciences	11283	<ul style="list-style-type: none"> • Twitter- 17896 tweets from 15509 users • News- 991 news stories from 426 outlets • Blog- 88 posts from 54 blogs • Facebook- 49 public wall posts from 45 users • 6 Policy Documents reference this paper
Lauer, S.A., Grantz, K.H., Bi, Q., Jones, F.K., Zheng, Q., Meredith, H.R., et al. (2020). The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. <i>Annals of Internal Medicine</i> , doi: https://doi.org/10.7326/M20-0504	<ul style="list-style-type: none"> • Medical and Health Sciences • Public Health and Health Services 	8090	<ul style="list-style-type: none"> • Twitter- 4823 tweets from 4484 users • News- 1026 news stories from 561 outlets • Blog- 47 posts from 39 blogs • Facebook- 11 public wall posts from 10 users • 1 Policy Document referenced this paper
Cao, B., Wang, Y., Wen, D., Liu, W., Wang, J., Fan, G., et al. (2020). A Trial of Lopinavir–Ritonavir in Adults Hospitalized with Severe Covid-19. <i>New England Journal of Medicine</i> , doi: 10.1056/NEJMoa2001282	<ul style="list-style-type: none"> • Medical and Health Sciences • Clinical Sciences 	7746	<ul style="list-style-type: none"> • Twitter- 9036 tweets from 7931 users • News- 299 news stories from 198 outlets • Blog- 40 posts from 37 blogs • Facebook- 24 public wall posts from 23 users • 1 Policy Document referenced this paper
Fang, L., Karakiulakis, G., & Roth, M. (2020). Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? <i>The Lancet Respiratory Medicine</i> , DOI: https://doi.org/10.1016/S2213-2600(20)30116-8	<ul style="list-style-type: none"> • Medical and Health Sciences • Clinical Sciences • Public Health and Health Services 	6902	<ul style="list-style-type: none"> • Twitter- 7108 tweets from 6154 users • News- 307 news stories from 220 outlets • Blog- 30 posts from 28 blogs • Facebook- 18 public wall posts from 18 users

Note: Paper Pradhan, “P., Pandey, A. K., Mishra, A., Gupta, P., Tripathi, P. K., Menon, M. B. et al. (2020). Uncanny similarity of unique inserts in the 2019-nCoV spike protein to HIV-1 gp120 and Gag. doi: 10.1101/2020.01.30.927871” with 14263 altmetric score was also one of the popular paper. This paper is not given here because it has been withdrawn by the authors subsequently

Figure 2: Co-Citation Networks at various trim levels

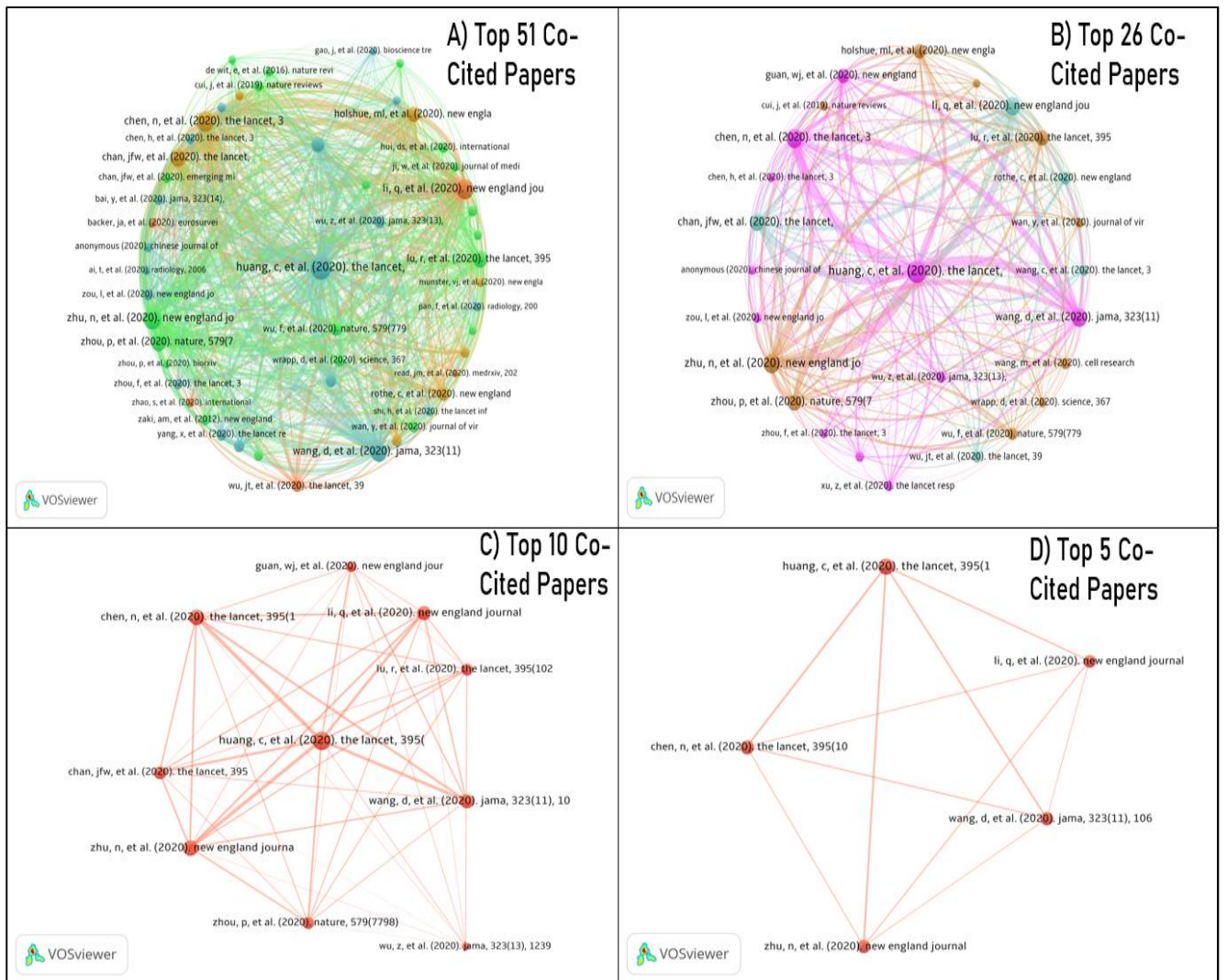
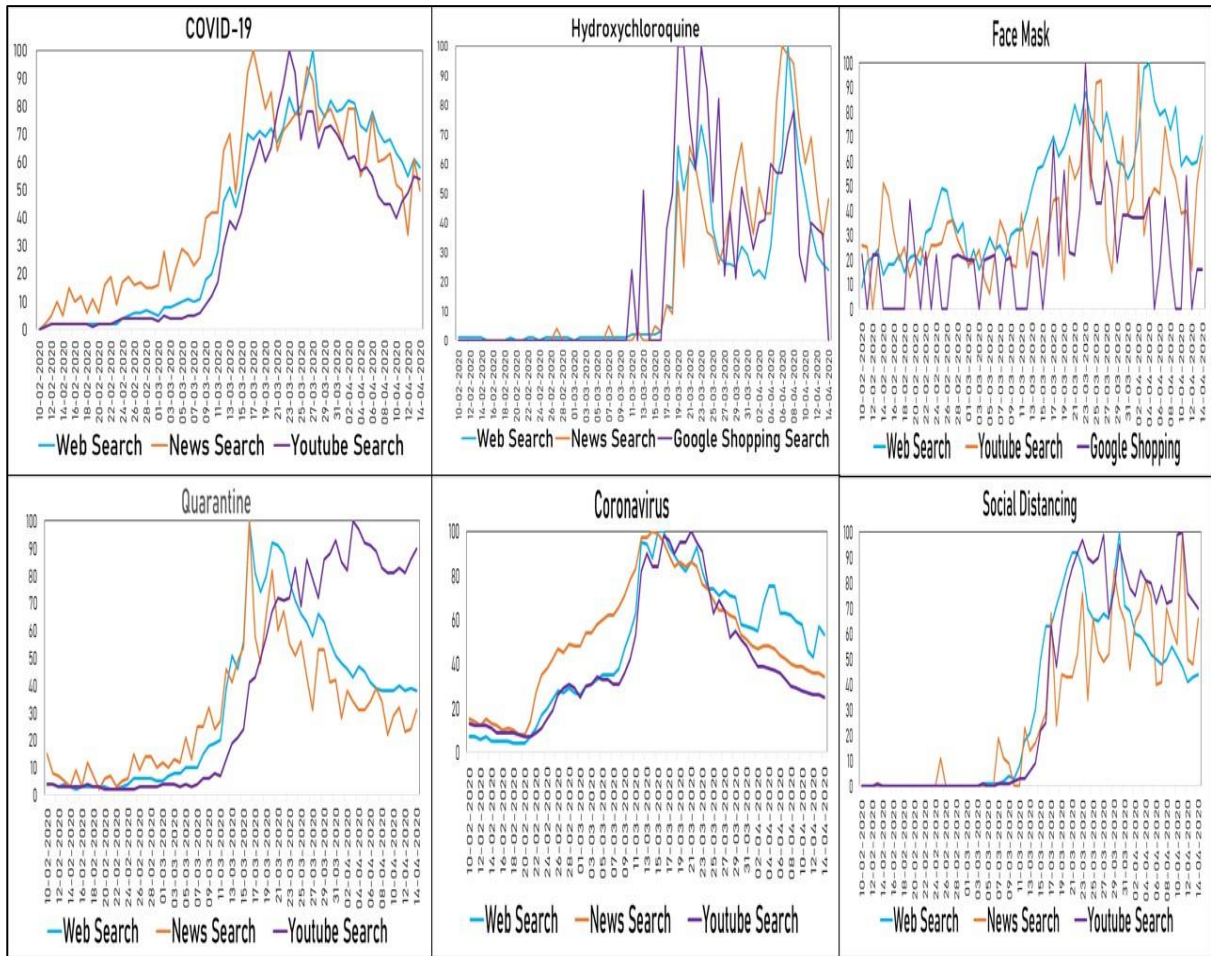


Figure 3: Globally trending topics related to COVID-19



Source: Google Trends