

A Case for Worldwide Mass Immunization with MMR to Limit Deaths from COVID-19

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Introduction

It is generally accepted that deaths related to Covid-19 are centred on adults about their 70's which might be reason for the association with co-morbidities like cardiovascular disease, obesity, diabetes mellitus, chronic kidney disease, chronic lung disease, smoking, cancer especially hematologic malignancies, lung cancer and presence of metastatic disease. The strength of the evidence for these associations is still being investigated. One plausible explanation for all these associations may be their increased risk for micro-thrombotic events in the microvascular circulation of vital organ systems as well as increased risk for thrombo-embolic disease in general. Male patients appear to have higher death rates in China, Italy, Denmark and the US. Black, Hispanic and South Asian patients have increased mortality in the US and this may be related to the disparities in healthcare indices in these populations as well as their higher representation in the "essential work-forces" and associated increased exposure to infection.

An initial concern about these Covid-19 related mortalities in New York and London suggested the effect of high-density populations. This theory has not been sustained in other high-density cities. Another possibility which linked the high mortality of Covid-19 deaths in Lombardo in Italy did not accord with low mortality rates in Florida where there are large populations of elderly individuals. A plausible explanation was that the factories in Lombardo were heavily staffed by Chinese workers who brought back the infection from China after the Chinese New Year celebrations.

An epidemiological conundrum was that Covid-19 viruses tended to spare children from serious outcomes. Onwude and Sokunbi (2021) have documented only six childhood mortalities in the worldwide medical literature [1].

We followed new scientific suggestions for the plausible expla-

nation of the minimal relationship between Covid-19 deaths and children and young individuals. Firstly, because we were aware of the relationship between Measles, Mumps and Rubella immunisations and Covid-19 deaths in children, we compared the areas of the world with recent mass immunisations and Covid-19 deaths to determine if there was an associative link between mass Measles, Mumps and Rubella (MMR) immunization strategies in countries with recent outbreaks of Measles who reported Covid-19 related deaths. We compared the results with mortality rates related to Covid-19 in countries who have either had Measles outbreaks or not who did not need to mass immunise. One refinement to MMR immunization was adopted by countries like Cambodia, where two doses of a Measles-containing vaccine regime was employed to provide high immunity against Measles and that this protection would last a lifetime.

Methods

We searched the internet literature for reports of countries with recent Measles, Mumps or Rubella outbreaks when mass or partial mass immunization was carried out. We also searched for countries with recent or just WHO concerns about outbreaks of Measles, Mumps or Rubella, recording whether it was followed with a mass or partial mass immunization program. We related these against reported Covid-19 deaths rates.

Results

In Table 1, we show some representative countries who have executed recent mass immunisations with MMR vaccinations for Measles outbreaks. Their reported mortality rates related to Covid-19 is also shown. Apart from Hong Kong where the mortality rates have increased from 5/10 million populations in 2019 to 11.4/million in 2020, the other countries show their mortality rates related to Covid-19 less than 10/million population.

Table 1: Recent Mass Immunisations with Measles, Mumps and Rubella*.

Country	Year*	Covid-19 Deaths	Population	Mortality rates to Covid-19	
Hong Kong ^{9,10}	1997	99	7.5 million	13.2/million	1997: Mass immunisation for infants to age 19 years. 2019: MMR vaccination for all adult healthcare workers, airport staff, foreign domestic helpers and any adults seeking them until 2020.
Madagascar ¹¹	2019	0	27.5 million	0	Vaccinated 7.2 million (27.4% of population) + all those already vaccinated]
Cambodia ¹²	2000/ 2012	0	16.25 million	0/million	Mass Vaccination of children in 2000 and second vaccination in 2012.
Vietnam ¹³	2005-9	35	96.54 million	4/10 million	High coverage of routine first vaccinations in infants, routine second vaccinations at school entry and supplementary campaigns in high-risk areas.
South Korea ¹⁴		321	51.6 million	6.2/million	Outbreak of Measles in 2001-2002. MMR immunisation of whole population
Libya ¹⁵	2005	272	6.7 million	40.6/million	National mass Measles vaccination of residents of age 9 months to 20 years; one vaccination.
Nigeria ¹⁶	2017	1011	200 million	5/million	Mass Vaccination of 4,766,214 children against Measles outbreak in conflict affected states in north-eastern Nigeria.

The reported Covid-19 mortality rates are between 0/million population in Cambodia (mass immunization 2017), 4.7/million population in Singapore (mass immunization in 1997), Madagascar 7.1/million (mass immunization in 2019), Vietnam 4/10 million population (mass immunization in 1997), and 0/million population in Cambodia (mass immunization 2017). In Nigeria, there was a partial mass immunization in conflict-affected states of the North Eastern Nigeria to protect more than 4 million children (4,766,214) against a Measles outbreak. Libya underwent a national mass immunization in 2005 of residents of age 9 months to

20 years but with one dose of immunization. Their Covid-19 mortality rates (40.6/million) are higher than in other countries who mass immunised.

In Table 2, we show that countries which had Measles outbreaks and did not institute mass MMR immunizations like the UK, USA and Italy have at least 10 times more Covid-19 related deaths compared to populations that had either mass immunizations or partial immunizations like Nigeria with a Covi-19 related mortality rate of 5/million (Table 1).

Table 2: No Recent Mass Immunisations with Measles, Mumps and Rubella (www.wordometer.com)

Country	Deaths from Covid-19	Population	Mortality rates to Covid-19	
UK	41,498	66 million	628/million population	Lost its WHO Measles free status following rising cases of Measles infection
USA	183,000	372 million	491/million population	More than 73% of the cases are linked to outbreaks in New York
Italy ¹³⁻	35,473	61 million	581/million population	Measles outbreak 2017
Spain	29,011	47 Million	592/million population	Measles outbreak 2019
Germany	9,360	83 million	116/million population	It has been shown that educated and high-earning parents from Baden-Wurtemberg and Bavaria, in particular, are the ones who fail to vaccinate their children.
France	30,602	65 million	470/million population	Most cases are in children who are too young for MMR vaccine. MMR vaccination rates in France are among the worst in Europe. Vaccine confidence in France is lowest in the world. Creches and schools in six regions affected.

Sweden	5,821	10 million	582/million population	In an outbreak of measles in Gothenburg, Sweden, breakthrough infections (i.e. infections in individuals with a history of vaccination) were common.
Brazil	120,000	212 million	566/million population	Measles outbreak 2018
India	63,498	1380 million	46/million population	Children under the age of one get infected by the virus the most in India as they have the highest incidence rate of 76.4 per million population. Moreover, this is the same age bracket that has received highest number of zero doses of measles vaccination between July 2018 and June 2019. The second highest rate of incidence occurs in children in the age group of 1-4 years. This age bracket had received second highest number of zero doses of vaccination. The trend is almost similar for children between 5-9 years who have the third highest incidence. WHO recommends two doses of measles vaccine to create immunity against the disease.

Conclusion

These observations of reported data show that countries that have had recent episodes of Measles outbreaks and either mass immunized or partially immunized their population with MMR have seen benefits in lower Covid-19 related deaths, in most cases less than one-tenth the mortality rates from Covid-19 deaths compared to the best countries that did not mass immunize, like Germany. Not all the countries that have not mass immunized had outbreaks to Measles but there were WHO concerns about Measles outbreaks in the UK, USA, Italy and Spain.

The best comparative example is Italy which had a large-scale Measles outbreak in 2017 affecting over 4,000 individuals, caused by a much lower than typical MMR rate in that country. The lack of sufficient MMR is a possible explanation why there has been a higher death rate in Italy from COVID-19 when compared to most other similarly affected countries. The Measles immunization rate in Italy in 2005 was just 85%, one of the lowest in Europe [2-4].

There has been an accumulation of different evidence types for our proposal for mass MMR immunization. Firstly, there is a scientific link between MMR and Covid-19. Kodzius et al proposed that MMR vaccination may be able to protect children from Covid-19 because of their discovery of a sequence similarity of the 30 amino acid residues between glycoproteins of SARS-COV-2, Measles and Rubella viruses [5]. They followed this hypothesis along the lines that the antibodies produced in children due to the MMR vaccine could recognize some protein parts (epitopes) on the SARS-CoV-2 spike proteins". They theorised that these antibodies, particularly in the epithelial layer of respiratory airways, block binding and entry of the virus into the cells".

Kodzius et al were inspired by the immunological principle based on the antibody cross-reaction recognizing antigens in two different microbes. They wanted to look for homology sequence in SARS-CoV-2 and the viruses that commonly are prevented by vaccination during childhood. It was discovered that 30 amino

acid residues share similarities between the Spike (S) glycoprotein of the SARS-CoV-2 virus and the fusion glycoprotein of Measles virus as well as with the envelope glycoprotein of the Rubella virus. These initial findings have been supported by other epidemiological studies, including proposals for a plausible explanation in cross-immunity protection [6, 7].

There is other corroborating epidemiological evidence. Belgium has one of the highest rates of Covid-19 deaths worldwide. This has now been linked to the absence of Measles, Mumps, and Rubella (MMR) immunization in Belgium in the 1980 and 1990 [8]. Similar to countries like Nigeria with massive attacks of Measles and widespread adoption of the MMR vaccine since 1971 and which now show very low level relative rates of Covid-19 mortality rates (5/million population), the other group of countries with the lowest rates of Covid-19 deaths are those that have been involved with mass immunizations with MMR because of recent epidemics of Measles, example in Samoa 0/million population, Singapore 4.7/million population, Madagascar 6.8/million population and Hong Kong 11.4/million population as of early 2020.

This theory of the potential protection of MMR can be criticised because of new cases in places like Hong Kong. This can hang on the possibility that full protection of MMR is based on two vaccinations or new cases from visitors who did not take part in the mass immunisation program.

An anomalous result of Covid-19 deaths in mass immunised populations occurred in Libya. A plausible explanation is that one dose of MMR immunization, instead of two doses was employed. It is generally accepted that two doses of MMR are best protective.

The evidence is strong that childhood deaths worldwide from Covid-19 is extremely rare, with only 6 reported cases in the medical literature. The evidence points to a strong determination that MMR vaccination in children and world mass MMR vaccination could have had a protective effect on Covid-19 deaths.

World Health maintains that evidence continues to add up demonstrating that the commonly available MMR vaccine could be the key to stopping the COVID-19 pandemic quickly, allowing much of the world to get back to business as usual within months [8]. There is no doubt that the MMR vaccine is safe and that mass immunization with the MMR vaccine is feasible even as progress continues on developing a specific SARS-Cov-2 vaccine.

There is a potential benefit that in countries which cannot afford Covid-19 immunization, then there is a choice for MMR as a viable alternative, especially if the practice worldwide is to give repeated top-ups [9-17].

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