

Understanding Elementary Statistics on COVID-19: What do they measure? & How to use them?

Roger R. Betancourt, Professor of Economics, Emeritus, UMD* (December 11, 2020, update)

The Statistics and What They Measure

- 1) IR= Infection rate = total or cumulative # of Covid-19 cases per million persons in the population

IR measures how many persons have contracted the virus relative to its total population at a point in time.

Usefulness, comparing any two countries (or areas) at similar times after identification of the first few cases. For instance, 30 days after the first case. It measures the rate of spread of the virus at a given distance in time from its arrival.

- 2) DR= Death Rate = cumulative number of COVID-19 deaths per million persons in the population.

DR measures how many people have died from the virus relative to a country's total population at a point in time.

Usefulness, comparing most damaging unsuccessful outcome between countries at any point in time.

- 3) TR = cumulative # of COVID -19 tests performed per million persons in the population

TR measures the number of COVID-19 tests performed at any point in time relative to the number of persons in the population.

Usefulness, not much by itself. Essential in conjunction with the infection rate to generate.

- 4) POR = Positivity Rate = IR/TR = total # of COVID-19 cases relative to the number of tests given.

POR measure how fast COVID-19 is spreading in a country at a point in time, especially accurate when multiple tests to same person excluded from TR. It is still useful as an estimate even if multiple tests to same person not excluded, because we know it biases positivity rate downwards.

- 5) HSPR = Health System's Performance Rate= DR/IR

HSPR measures the number of deaths for any given infection rate in an area at a point in time.

Usefulness, despite lags between deaths and infection, it gives an estimate of how a health system is performing in preventing the most unsuccessful outcome for a given infection rate in an area at a point in time that could be useful if other things were indeed equal. A minimum requirement for its usefulness is availability of positivity rate in the comparison, because the performance of health systems can vary dramatically between normal times and crisis times, i.e., depending on level of virus transmission going on at any point in time. It is also useful if age distribution of areas compared are similar, i.e., with respect to the most vulnerable residents, for example pop. or males over 65. Finally, it is not a measure of quality of the health system by itself because performance depends on the behavior of the population which the health system doesn't control, e.g., social distancing. I am grateful to Tanjim Hossain for a clever illustration of this point.

How to Use Them.

I first calculated these statistics for a variety of countries using the same publically available data set (Worldometer) on August 5 2020; I updated them on September 4 2020. This provided the basis for an illustrative example with five countries: The U.S., the UK, Australia, Canada and New Zealand. That is, the UK and four of its former colonies or Anglophone countries. It generates two useful cross-country comparisons and one overtime comparison August/September for each.

The first useful cross-country comparison is U.S. versus UK because the US and the UK began their official public reaction to the pandemic at the same time. Namely, when on March 26 the Ferguson simulation study predicted 500 K deaths for the UK and 2.200 K for the U.S if nothing was done, i.e., a death rate of 0.7% of the population in each country. That got Boris Johnson and Donald Trump out of their do nothing attitudes. Johnson figured out what to do with the testing; Trump did not. One consequence shows up by August and September in the substantial differences between the positivity rates between the two countries (IR/TR), i.e., .018 and .019 for the UK against .080 and .075 for the U.S. A second consequence was the striking difference in the health system's performance rates (DR/IR). The US system outperformed the UK one (.033 versus .151) in August by a ratio of about 1 to 5 despite the greater strain on its medical system. While they both improved over time (.030 versus .122), the UK improved more and its ratio improved to about 1 to 4. Finally, there was a reported change in the death rate for the UK that suggested a decrease, which seems unreasonable since every one of the other 17 countries considered experienced a monthly increase between August and September as expected when the population figure does not change. Nonetheless, it will be useful to report the death rate evolution going forward since it is an important, if not the most important single outcome of the pandemic.

The second useful cross-country comparison is the USA versus Canada, Australia and New Zealand because they differ with respect to area, population and its ethnic composition, geography, and pandemic policies and their consequences. For instance, just as in the case of the UK, Canada's positivity rate is greater than 1% and transmission is still expanding whereas it is considerably less than 0.1 % in Australia and New Zealand. One consequence is that just as in the case of the UK the strain on the medical system is greater for the US than for Canada but the U.S health system's performance is better than Canada's. Yet, Canada did significantly lower testing per capita (40% less than either the U.S or the UK in both periods). On the other hand, Canada has substantially better outcomes than these two countries in terms of death rates although far worse than Australia and New Zealand. In the same vein, it is noteworthy that the positivity rate remains the same over the month in Australia while it declines by a third in New Zealand. One consequence of this difference shows up in the HSPR, which increases by less than 10% in New Zealand but by over 100% in Australia. Similarly, death rates in New Zealand increase by 20% but by over close to 200% in Australia. Again, New Zealand's testing rate is well below each of the countries in this group. Hence, contract tracing, social distancing, mask wearing and lockdown practices or being an island must be doing the job of controlling the pandemic.

Summing up, lowering the positivity rate well below unity and keeping it there, regardless of your specific strategy, is the optimal policy for controlling the pandemic and optimizing the performance of the health system.

I added 13 other countries to the five above and calculated these elementary pandemic statistics to check these basic conclusions by looking for some pattern that contradicted what these two initial cross-country comparisons over a month suggested. First, I selected five European countries with a wide range

of experiences in dealing with the virus: Spain, Italy, France, Germany and Denmark. Second, I selected a variety of five other countries that differ from the ones above culturally and in terms of experience with viruses such as SARS (Japan, South Korea) or in terms of government systems (China, Cuba) or ethnically (Jamaica). Finally, I added three countries from the Western hemisphere that differ widely within the region and from the previous ones (Brazil, Chile and El Salvador). The reader can add any other countries of interest, calculate these elementary statistics for them and observe how they vary over time and with respect to whatever countries in these tables they want to use as reference for whatever reason.

Tables with the data for the 18 countries are included after the last page of text in this short educational memo for the reader's convenience in designing his/her/their own comparisons.

An illustration of the usefulness of these elementary statistics and their comparisons is that they can highlight basic human welfare issues that complex analyses easily overlook. For instance, a recent NBER working paper (A. Atkinson, K. Kopecky and T. Zha, "Four stylized facts about COVID-19", NBER Working Paper 27719, August 2020) argues that transmission rates become quickly insensitive to government mandated non-pharmaceutical intervention (NPI's) policies. In essence, after an initial period of cumulative deaths, arbitrarily defined as 25 deaths, if you wait for 100 days the growth rate of deaths stabilizes quickly below zero and the transmission rate around unity. A simple comparison between Australia and New Zealand shows the perils of this argument for drawing conclusions about policy implications of NPI's. The death rate (in terms of deaths per million citizens) for Australia is over five times that of New Zealand by September 4. It increases to over six times by September 18. Nonetheless, the positivity rate is substantially below unity in both cases, and in both periods for both countries, but twice as high for Australia relative to New Zealand. That is a substantial number of dead human beings due to the different NPI's in New Zealand relative to Australia well beyond 100 days after the start of the pandemic in both places. Moreover, the Australian testing strategy (an NPI) is different from New Zealand's, e.g., they are testing at about 1.6 times (not shown) the rate New Zealand is testing. Yet they are having substantially less success in terms of POR, HSPR and DR. Similarly, the UK's testing rate (not shown) is almost 1.8 times that of Canada on September 18, their positivity rates are both above 1 and relatively close to each other (1.9% for the UK; 2.2% for Canada). Yet, their death rates are far apart. The UK has 2.53 persons per million dying for everyone Canadian per million that dies due to Covid-19.

What do we learn from having three 2- week periods of data as of October 2, 2020, about the previous 2 comparisons? From the US/UK comparison, we see that evaluating the welfare impact of the pandemic takes time due to the lags in these statistics picking up the effects they measure. The welfare effects in the US are definitely much worse than in the UK due to their different NPI policies but it does not show up convincingly in the death rates per capita until the third 2- week period when the US death rate overtakes the UK (642 vs. 621). From the US (UK)/Canada, Australia New Zealand comparison with three periods, we obtain a reinforcement of the important welfare characteristics of the pandemic salient from the previous comparisons of two- week periods over time described in the previous paragraph. Finally, we introduce information available in the same source for two US states of interest to the author for idiosyncratic reasons. At this point, they just illustrate the obvious: Namely, diversity of experiences across US states in terms of positivity rates, welfare losses, and health system's performance rates and, of course, their implicit and explicit underlying determinants, e. g., a republican governor toeing the party line and one not doing so and in the composition of vulnerable populations, respectively. The tables include this information starting September 18 2020.

What new knowledge do we acquire from the additional data and periods available as of October 16?

First, the patterns discussed earlier continue to hold, which strengthens our confidence in them. Second, the main positive conclusion noted earlier holds even more strongly in the additional data: **lowering the positivity rate at all stages of the pandemic process has a substantial impact on lowering the death rate**. This is true at positivity rates substantially above unity (US/UK, Brazil/Chile, and Florida /Maryland) as well as substantially below unity (Australia/ New Zealand). Third, the main negative conclusion implicit in the earlier data becomes explicit: **the health system's performance rate exhibits a variety of behaviors over time regardless of the positivity rate**. That is, slow and substantial improvements at positivity rates above unity (US/UK, Canada/4 European countries); deterioration and oscillation at rates below unity (Australia, New Zealand); substantial improvement at positivity rates below unity (Denmark); slow improvement at a positivity rate below unity (China, Cuba); slow deterioration at rates above unity (Chile, Florida).

What do we learn from our three main statistics from the two- week period reported on October 30?

First, the UK has a substantially increasing positivity rate, in contrast to the US, although the US rate still remains twice above the UK rate. This pattern for the UK is consistent with a similar pattern of substantial increases in the positivity rates for all five continental European countries and press reports of a second wave starting in Europe. Second, the pattern of death rates per capita remains the same across all 20 spatial units on the table. For example, there are no changes in rankings within any of the four spatial unit groups in the table. Third, the previous patterns of a variety of behaviors of health system's performance rate holds up across the table and a new behavioral pattern emerges very clearly with respect to Jamaica. Namely, the health system's performance rate shows a persistent pattern of substantial deterioration since September 4. This is consistent with Jamaica's steadily increasing positivity rate since September 4 and a substantial increase in its death rate per capita during the previous two- week period of 26%. Jamaica's death rate per capita increase is well above the next highest increase during this period, i. e., of 12% for France. The latter country also experienced a sustained increase in its positivity rate since September 4. Indeed, this increase was substantial enough to overtake Spain as the continental European country with the highest positivity rate in the table during the two –week period ending October 30. These results confirm the usefulness of the positivity rate as a leading indicator of the state of the pandemic and the death rate per capita as a lagging indicator.

Finally, unless the U.S. cuts down its positivity rate substantially, it is likely to face a second wave as bad as the European one or worse starting in the next two to four weeks. It will do so from a base with a much higher per capita death rate than all European countries in the table except Spain.

What do we learn from the November 11 update? There is a reversal in the decreasing positivity rate in the US, a strengthening of that reversal from the previous two- week period in the UK, and a move from stability to an increasing rate in Canada with no change for Australia and New Zealand. Not surprisingly, death rates per million remain the same in the latter countries while increasing substantially in the former countries. Similarly, HSPR (the health system's performance rate) remains the same in Australia and New Zealand but continues to decrease in the other three countries since death rates are increasing more slowly than infection rates. Most interestingly, however, two consecutive increases in the two week positivity rate lead death rates per capita in the UK to increase by about 11% in the UK while they increase by about 6 and 7 % in the US and Canada, respectively. This acceleration in death rates per capita in the UK suggests that the second wave in Europe is also in full force in the UK. Support for this suggestion comes from changes in the lagging indicator of the state of the pandemic, namely death

rates per capita. In four European countries these rates are growing by more than 10% (all but Denmark), positivity rates are also increasing and HSPR(DR/IR) are decreasing since infection rates are growing faster than death rates. In Denmark, however, death rates are increasing faster than infection rates (albeit from the lowest level among all European countries in the Table) and HSPR is increasing. Not surprisingly, as of November 6, all five of these European countries have introduced lockdown measures to deal with the second wave as can be seen in the link below

<https://www.bbc.com/news/explainers-53640249>).

Ironically, the UK will surpass the US in death rates per capita again in the next two-week period unless the US decreases its positivity rate by pursuing seriously and consistently elementary virus control measures, e.g., social distancing, mask wearing and contact tracing. If the pandemic in the US evolves in a fashion similar to the UK, all it takes is two consecutive two-week increases in the positivity rate even at a level around 3%. The US is currently at above 6% and it already had a substantial increase in its positivity rate in this two-week period. **We are likely to see in the US a second wave as bad as Europe by the end of November. Why? The rate of change in the two-week death rate per capita in the US on November 13 is 6.1 %, which about equals the rate of change in the two-week death rate per capita in the UK as of October 30. Our current- lame-duck President and his blind followers among Republican governors are doing little or nothing about preventing exponential growth in transmission. Moreover, they are also preventing President-elect Biden from beginning to address the issue officially during the transition.**

Finally, the next group of spatial units reveals that Jamaica lowered its positivity rate slightly, which led to a decrease in the two-week change in its death rate from 26% to 12%! Finally, in the last group of spatial units, all units lowered or maintained their positivity rates although at a high level. Their death rates per capita increased less than 5% with the exception of El Salvador (6%) but death rates were increasing faster than (or as fast as) infection rates (HSPR) in all five and positivity rates were well above 1 % in all of them.

November 17.revisions.

- 1) Actual:** The last column in the earlier tables reported population over 65 for countries and males over 65 for the two states under the over- all heading % male over 65 for all. The last column in the September 4-October 16 table here is unchanged so the error is noticeable when contrasted to the last column in the October 30 –December 11 table, which fits an education memo.
- 2) Future:** After some reflection on the data and comments about the various two- week updates, I am beginning to have doubts on the usefulness of the HSPR statistic as an elementary statistic. It varies with too many different factors to interpret any set of changes confidently other than mechanical ones. Hence, I am considering its replacement in the not too distant future.

What do we learn from the November 27 updates?

Mechanically, the positivity rates increase for a second two-week period for the US, the UK and Canada whereas they remained the same for Australia and New Zealand. **The UK death rate per capita surpasses the US, which is the first reversal in rankings among the five Anglophone countries.** Notice that this happens despite the much higher level of the positivity rate in the US than in the UK. Of course, the US positivity rate had been decreasing from September 4 to October 30, when it turned upwards,

whereas the UK positivity rate had been relatively stable at a rate below 2% between September 4 and October 16 when it jumped above 2% and began to accelerate to its current level of 3.7%. Canada had a declining or stable positivity rate above 2% from September 4 to October 16 when it began to increase and arrived at its current level of 3.2%. **In any case, this suggests spatial size matters when it comes to keeping death rates lower, at least when positivity rates are substantially above 1 %.** Finally, the HSPR measures exhibit a declining trend in four out of five Anglophone countries. Australia, where it remains the same since October 30, is the exception.

Lockdown measures introduced in the UK and Europe by November 6 have not been equally successful. Only Spain, which declared a state of emergency in late October, was able to lower its positivity rate although it remains at the uncomfortably high level of 7.5%! In the other four countries and the UK, it was still increasing from the previous two-week period by November 27. The positivity rate is a leading indicator of the state of the pandemic. The death rate is a lagging indicator and its rate of change in three of the five European countries and the UK were still above 10%. **Spain was able to decrease the change in the death rate below 10% (from 13.5% to 9.7%) in the previous two-week period; Denmark experienced a substantial increase in the rate of change of its death rate (from 5.7% to 7.8%) during the last two-week period although it is still below 10%.** Not surprisingly, in both Canada and the US this rate of change in the death rate increased to 9.9% and 8.5%, respectively, from the previous two-week period. Interestingly, in both countries lockdown measures are decentralized although the central government had a more favorable view of trying to control the pandemic through NPI's in Canada than in the US. Furthermore, in the US the Trump administration, which can be viewed as anti-lockdowns whenever possible, did not allow the official transition to the incoming Biden one, which can be characterized as pro-lockdowns whenever necessary, until this last week.

The changes in the next set of spatial units in the table for this two-week period are non-existent or weaker than the ones above. Finally, the same is true for the last set of spatial units except for Brazil. There the cumulative testing rate fell in an unexplainable fashion in the last two-week period, leading to a substantial increase in an already high positivity rate. This peculiar result stems from a reporting mistake in the original source or the need to throw out a substantial number of tests found defective in an earlier period. In neither case do we have anything to add to the possible explanation. **With respect to the two US states, it is noteworthy that Maryland differs from the average of the US in the opposite direction than Florida in all three dimensions recorded in the table.**

What do we learn from the December 11 updates?

Incidentally, let me first confirm my decision to discontinue the health system's performance measure after this update. Starting with the December 25 update, I will provide the percentage rate of change in the last two weeks per capita death rate as a substitute. The latter provides a dynamic measure of acceleration or deceleration of the pandemic that over time captures the impact of holidays, pandemic fatigue, new treatments and vaccines.¹

¹ An interesting insight on the use of HSPR emerges from a recent editorial in the Washington Post (December 7), titled "China's Coverup". It reports an internal estimate of cumulative infections for February 10 2020 as 5,918 cases relative to an official public estimate of 2,478 and an internal estimate of cumulative deaths for March 7 2020 as 3,456 deaths relative to an official public estimate of 2,986. This information yields an underestimate of infections by 139% and of deaths by 16%. This large difference in underestimation between the numerator and the

Just as before, the data for the positivity rates in the Anglophone countries reveals dramatic differences between the two countries that controlled the virus early (Australia and New Zealand) and the three that did not (USA, UK, and Canada). More specifically, there is almost no transmission in the former two with stable positivity levels substantially below 1% and increasing transmission in the latter three at increasing levels substantially above 1%. Incidentally, the two successful countries maintained most if not all of their NPI control policies until very recently. Even now, they have not relaxed many if not most of the ones pertaining to international travel. The increases in transmission are more alarming in the USA and Canada than in the UK because of the persistence of the increasing trend over four consecutive two-week periods in the former two. In the UK, there is at least a noticeable decrease in the magnitude of the increase in the last two-week period.

Not surprisingly, death rates per capita continue to increase in all three high positivity rate countries and remain stable (at 0.0%) in the two low positivity countries. In the former countries, these increases are all above 10% (10.6%, UK; 10.9%, Canada; and 11.1 %, USA). Interestingly, the percentage changes in the US and Canada reflect increases over the previous two-week period whereas in the UK it represents a decrease. The health system's performance measure (HSPR) decreases for all high transmission countries, which implies mechanically that the cumulative infection rates are increasing faster than the cumulative death rates in all three of these countries over the four consecutive two-week periods. The pattern is similar for New Zealand despite its very low and stable transmission rate. Australia, however, has a constant positivity rate, death rate per capita and HSPR over the four two-week periods (at least at this level of aggregation, which includes rounding off proportions at the fourth decimal).

European countries' experience is useful by revealing a broader variety of patterns among high transmission countries (i.e., those with positivity rates above unity). Italy experiences a trend of increasing positivity rates of substantial magnitude over the four-two week periods that ends up at a rate of 7.5% while Spain's oscillates over the same period ending on a decreasing trend that ends up at 7.2%. This comparison generates a reversal in the levels of deaths per capita among the European countries in which Italy replaces Spain as the leading country in this category among the European countries as well as among all countries in the table.² France resembles Spain in terms of the pattern of positivity rates but, in contrast to Spain, the rate of change of the death rate per capita during the last two-week period was 20.8% rather than 6.6% and, thus, much closer to Italy's 18.4%. Germany and Denmark experience systematic increases in their positivity rates throughout the four two-week period and the percentage change of the per capita death rates in the last two-week period were well above 10% for both (34.6% and 12.9% respectively). These numbers are consistent with recent urgency in press accounts of the need for greater control measures in the last three European countries. This call for urgency relies on typical short-run measures available such as hospitalization increases, 7-day moving averages of infection rates, and ICU capacity. It is encouraging that a measure relying on a

denominator may explain China's relatively high value on the HSPR measure in our Tables, especially when compared to other countries with similarly low values of the transmission or positivity rate such as Australia and New Zealand.

² Interestingly, Italy is substantially smaller than Spain in terms of physical area and the same applies to the UK relative to the US where we also saw a similar reversal of fortune. This feature raises the question of the extent to which size in terms of physical area matters in generating pandemic effects. Whether this is due to higher population density or to the virus mutations with different contagion properties across space might become an interesting research question after the pandemic is over.

change in the lagging indicator suggests the same conclusion. The HSPR rates in these countries also reveal a variety of patterns with similar mechanical implications as before.

The next group of spatial units generates a similar variety of experiences in which the most noteworthy feature is the increase in the Japanese death rate per capita in the last two-week period. It is 25% over the previous period, which indicates a potentially serious problem. For, the cumulative death rate per capita is a lagging indicator of the evolution of the pandemic at any point in time. This feature illustrates that relatively small changes in the two-week positivity rate (about 5%) at levels that remain below the widely used 5% cut-off for short-run measures can mask substantial negative future impacts on the main welfare indicator of the pandemic. That the Japanese authorities recognize the increasing spread of the virus as serious is emphasized by the Japanese press as can be seen in the link below.

[\(https://www.japantimes.co.jp/news/2020/11/26/national/japan-virus-emergency-possible/\)](https://www.japantimes.co.jp/news/2020/11/26/national/japan-virus-emergency-possible/)

Finally, the last set of spatial units generates two potentially useful insights. First, Chile has exhibited a consistent trend of decreases in its two-week cumulative positivity rate from the extremely high level of 16.6% on September 4 of 2020 to the current level of 10% on December 11 of 2020. For instance, Chile has been relaxing strict lockdown measures in Santiago since September 29. Yet, as of December 10, 2020, the Santiago metropolitan region remains on Step 2 level of quarantine

[\(https://www.garda.com/crisis24/news-alerts/412916/chile-officials-modify-and-extend-coronavirus-related-restrictions-as-of-dec-9-update-54\)](https://www.garda.com/crisis24/news-alerts/412916/chile-officials-modify-and-extend-coronavirus-related-restrictions-as-of-dec-9-update-54). The latter requires, for example, 24-hour quarantine but only on Saturdays, Sundays as well as holidays and allows restaurants to operate but only offering outside seating. The percentage change in the cumulative death rate has remained stable at 3.5% over the last two two-week long periods. How the incoming summer season will affect the spread of the virus will materialize in the next couple of months. Second, the positivity rates for both states increase in this last two-week period but the increase is larger in magnitude absolutely and relatively for Maryland than for Florida. Not surprisingly, the corresponding change in the cumulative percentage death rate per capita for this last two-week period is 10.2% for Maryland and 7.3% for Florida. In response, several local jurisdictions in Maryland have increased restrictions. For example, Montgomery County health and county officials have proposed new restrictions, e.g., to ban indoor dining. In Florida, the state government is under suspicion of underreporting infections, according to a former health official. Time and the percentage change in cumulative death rates over two-week periods will eventually tell if this accusation is warranted!

*Exchanges with Juan Belt, Beatriz Hardy, Julio Betancourt, Allan Drazen, Tanjim Hossain, Luis R. Luis, Christopher Clague, Paul Meyer, José Ramón de la Torre and Alicia Juarrero have substantially increased my confidence in the robustness and educational usefulness of the initial comparison exercises explicitly illustrated here. I am grateful for these comments. Any issues that have arisen or may arise with the data and analysis above are the sole responsibility of the author.

Country*/State	September 04- October 16, 2020												
	POR=IR/TR				DR				HSPR= DR/IR				% Male>65^
	9/04	9/18	10/02	10/16	9/04	9/18	10/02	10/16	9/04	9/18	10/02	10/16	
USA	.075	.072	.069	.067	577	610	642	672	.030	.029	.028	.027	15
UK	.019	.019	.019	.023	611	614	621	637	.122	.109	.092	.064	17
Canada	.070	.022	.022	.023	242	243	246	256	.070	.065	.058	.051	16
Australia	.004	.004	.004	.003	029	033	035	035	.028	.031	.033	.033	15
N. Zealand	.002	.002	.002	.002	005	005	005	005	.013	.014	.014	.013	15
Spain	.053	.061	.061	.064	625	650	684	718	.060	.046	.041	.035	17
Italy	.031	.021	.028	.029	587	590	594	602	.130	.121	.113	.095	21
France	.040	.042	.052	.064	470	476	490	507	.102	.075	.055	.041	18
Germany	.020	.019	.017	.019	112	113	114	117	.038	.035	.032	.028	19
Denmark	.007	.007	.007	.008	108	110	112	117	.036	.029	.023	.020	19
Japan	.045	.043	.040	.038	010	012	012	013	.018	.020	.018	.018	25
S. Korea	.010	.010	.010	.010	006	007	008	009	.015	.016	.017	.018	13
China**	.001	.001	.001	.001	003	003	003	003	.051	.051	.051	.050	10
Cuba	.010	.010	.009	.008	009	010	011	011	.024	.023	.022	.021	14
Jamaica	.048	.062	.083	.093	010	017	037	054	.010	.012	.017	.020	9
Brazil	.281	.305	.271	.289	586	634	680	716	.031	.030	.030	.029	8
Chile	.166	.149	.138	.128	597	637	669	701	.027	.027	.028	.028	10
E. Salvador	.080	.076	.073	.071	115	124	131	140	.029	.029	.029	.029	8
Maryland	9/26→.049	.048	.045	→	648	653	666	→	.032	.031	.030	.030	5^
Florida	9/26→.133	.133	.131!	→	648	673	733	→	.020	.020	.021	.021	10^

*All country/state data taken from Worldometer; ^ World Bank data for 2019; author's estimates

**The actual POR rates are .00053 for all dates; rounded up to .001 for ease of presentation. ! figure corrected on 10/29/2020 (from .171)

Country*/State	October 30 – December 11												
	POR=IR/TR				DR				HSPR = DR/IR				%pop.> 65^
	10/30	11/13	11/27	12/11	10/30	11/13	11/27	12/11	10/30	11/13	11/27	12/11	
USA	.060	.067	.071	.075	706	749	813	903	.025	.023	.020	.019	15
UK	.029	.034	.037	.038	676	749	838	927	.048	.039	.036	.035	17
Canada	.023	.028	.032	.036	266	284	312	346	.044	.038	.033	.030	16
Australia	.003	.003	.003	.003	035	035	035	035	.032	.032	.032	.032	15
N. Zealand	.002	.002	.002	.002	005	005	005	005	.013	.013	.012	.007	15
Spain	.074	.077	.075	.072	762	865	949	1,012	.029	.027	.027	.027	17
Italy	.040	.059	.071	.075	631	721	875	1,036	.062	.041	.035	.035	21
France	.082	.102	.108	.083	551	658	780	871	.028	.023	.023	.024	18
Germany	.023	.030	.036	.042	124	146	188	253	.023	.016	.016	.017	19
Denmark	.009	.010	.011	.012	123	130	140	158	.009	.013	.011	.009	19
Japan	.037	.038	.041	.043	014	015	016	020	.018	.017	.015	.015	25
S. Korea	.010	.010	.011	.012	009	009	010	011	.018	.017	.016	.014	13
China**	.001	.001	.001	.001	003	003	003	003	.050	.050	.050	.050	10
Cuba	.008	.008	.008	.008	011	012	012	012	.018	.018	.017	.015	14
Jamaica	.095	.094	.094	.093	068	076	084	091	.023	.023	.024	.024	09
Brazil	.251	.215	.283#	.264	746	771	804	843	.029	.028	.028	.026	08
Chile	.120	.112	.105	.100	736	767	794	822	.028	.028	.028	.032	10
El Salvador	.071	.071	.071	.071	149	158	170	182	.029	.028	.029	.029	08
Maryland	.043	.043	.044	.047	683	705	752	829	.029	.027	.024	.022	16^
Florida	.080	.080	.080	.081	776	809	850	912	.021	.020	.018	.018	21^

*All country/state data taken from Worldometer; ^Word Bank estimates, 2019; Census estimates, 2020.

**The actual POR rates are .00053 for all dates; rounded up to .001 for ease of presentation; #, the testing rate for Brazil in this two- week period decreases, which is peculiar and unexplained.