An assessment of the Philippines government's response to the COVID-19 pandemic based on policy response indices

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ABSTRACT

COVID-19 has resulted in governments worldwide implementing policies for pandemic suppression or containment. The Oxford COVID-19 Government Response Tracker (OxCGRT) global database of pandemic policy responses provide open access data to allow for national assessments of pandemic response policies. Using OxCGRT data for the Philippines, we assessed the temporal trends of pandemic response indices and indicators. Using principal components and principal coordinate analyses, OLS and logistic regression on the ordinal policy response variables, composite policy response indices, and epidemiological estimates of pandemic spread, we assess which policy response is most significant in pandemic management. Stringency and Restrictions to Internal Movement are most significant and this reflects on the primary policing and securitizing strategy used by the Philippines government in the pandemic response. This has limited effective outcomes based on its relationships with health, economic and vaccination policy categories. We contextualize these findings with the outcomes of the government's vaccination policy.

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INTRODUCTION

On 31 December 2019, the World Health Organization (WHO) country office in China notified the WHO Asia Pacific office in Manila, the Philippines about a new viral pneumonia of unknown origin. On 10 January 2020, the WHO determined that this pneumonia was of a novel coronavirus (nCov). On the same day, the WHO issued a set of comprehensive guidelines for

KEYWORDS

COVID-19 policy, pandemic stringency, containment, epidemiology, securitization, OxCGRT

managing the disease and policy recommendations to member states. On 12 February 2020, guidance on surveillance and monitoring was sent by the WHO to member states. With these guidelines, global monitoring and surveillance began.

In the Philippines, the first diagnosed case was a traveler from Wuhan, China on 28 January 2020. On 7 March 2020, health authorities recorded the first local case of a COVID-19-diagnosed patient without a travel history. On 12 March 2020, the first documented local transmission was diagnosed. On 14 March 2020, quarantine restrictions were imposed on the National Capital Region (NCR) and the whole country. On 24 March, the Bayanihan to Heal as One Act 1 (BAHO) was enacted, giving the Executive Department emergency powers to mobilize all government resources for pandemic management.

With the first BAHO law, it is possible to assess the effectiveness of government policy decisions on COVID-19 pandemic management. BAHO is the legislation on which the Philippine COVID-19 policy was based and implemented at each level of governance (Vallejo and Ong 2020). These policy decisions were reported to the WHO and subsequently are standardized in the Oxford Covid-19 Government Response Tracker (OxCGRT) Variation in Government Advice dataset (Hale et al 2022).

OxCGRT collects systematic and standardized information on policy measures that governments have taken to address COVID-19. One hundred eighty countries (180) and their COVID-19 policies have been tracked daily beginning 1 January 2020. These are coded into 23 indicators, such as school closures, travel restrictions, and vaccination policy. As government policy responses and interventions are varied, OxCGRT has recorded these responses on a standardized scale that reflects the extent of government action. The resulting scores are aggregated as policy indices, and are broadly organized into five areas (Table 1a):

1. Containment and closure policies;
2. Economic policies;
3. Health system policies;
4. Vaccination policies;
5. Miscellaneous policies.

Table 1: OxCGRT indicators and metrics. Table 1a describes the metrics. Table 1b describes the composite indices, the ordinal variable levels, and the number of k as the number of component indicators in an index. x indicates that an indicator contributes to that index (Modified from Hale et al 2021).

A.

OxCGRt Indicators			
ID	Name	Type	Target
Containment and closure			
C1	School closing	Ordinal	Geographic
C2	Workplace closure	Ordinal	Geographic
C3	Cancel public events	Ordinal	Geographic
C4	Restrictions on gatherings	Ordinal	Geographic
C5	Close public transport	Ordinal	Geographic
C6	Stay-at-home requirements	Ordinal	Geographic
C7	Restrictions on internal movements	Ordinal	Geographic
C8	Restrictions on international travel	Ordinal	None
Economic response			
E1	Income support	Ordinal	Sectoral
E2	Debt/contract relief for households	Ordinal	None
E3	Fiscal measures	Continuous	None
E4	Giving international support	Continuous	None
Health systems			
H1	Public information campaigns	Ordinal	Geographic
H2	Testing policy	Ordinal	None
H3	Contact tracing	Ordinal	None
H4	Emergency investments	Continuous	None
H5	Vaccine investments	Continuous	None
H6	Facial coverings	Ordinal	None
H7	Vaccination policies	Ordinal	Funding
Miscellaneous			
M1	Other responses	Text	None

These indices reflect the scope and extent of government policy response and can help decision-makers and citizens to consistently understand government responses. Further, they aid in effective pandemic response strategies (Hale et al 2022).

Because government responses are inherently variable from jurisdiction to jurisdiction with its nuance contingent on social and political realities, OxCGRT indices are designed to include composite measures of a combination of different indicators which are reflected as a general composite metric. This general index abstracts from the political and social nuances on which the policy response is applied. While this approach preserves mathematical objectivity using ordination methods such as principal component analysis (PCA) and principal factor analysis (PFA), tt has both strengths and limitations. The composite measures are aggregated into four policy indices (Table 1b):

- Government Response Index (GRI)
- Stringency Index (SI)
- Containment and Health Index (CHI)
- Economic Support Index (ESI) (Table 2)

Table 1: OxCGRT indicators and metrics. Table 1a describes the metrics. **Table 1b describes the composite indices, the ordinal variable levels, and the number of k as the number of component indicators in an index. x indicates that an indicator contributes to that index (Modified from Hale et al 2021).**

B.

Government Response index	Containment Health index	Stringency index	Economic Support index	Legacy stringency index	Maximum value (Nj)	Flag (Fj)	Code
k	13	11	9	2	7		
C1	x	x	x		x	3 (0, 1, 2, 3)	Yes = 1
C2	x	x	x		x	3 (0, 1, 2, 3)	Yes = 1
C3	x	x	x		x	2 (0, 1, 2)	Yes = 1
C4	x	x	x			4 (0, 1, 2, 3, 4)	Yes = 1
C5	x	x	x		x	2 (0, 1, 2)	Yes = 1
C6	x	x	x			3 (0, 1, 2, 3)	Yes = 1
C7	x	x	x		x	2 (0, 1, 2)	Yes = 1
C8	x	x	x		x	4 (0, 1, 2, 3, 4)	No = 0
E1	x			x		2 (0, 1, 2)	Yes = 1
E2	x			x		2 (0, 1, 2)	No = 0
E3							
E4							
H1	x	x	x		x	2 (0, 1, 2)	Yes = 1
H2	x	x				3 (0, 1, 2, 3)	No = 0
H3	x	x				2 (0, 1, 2)	No = 0
H4							
H5							
H6	x	x				4 (0, 1, 2, 3, 4)	Yes = 1
H7	x	x				5 (0, 1, 2, 3, 4, 5)	Yes = 1
M1							

Table 2: PCO loadings of OxCGRT policy ordinal indices on the first principal coordinate axis. Indices in bold were hypothesized to be significant.

Ordinal indices	Coord 1
C1 School closing	0.035282
C2 Workplace closing	0.022201
C3 Cancel public events	0.036767
C4 Restrictions on gatherings	0.065777
C5 Close public transport	0.035419
C6 Stay-at-home requirements	0.034434
C7 Restrictions of internal movements	0.065777
C8 Restrictions on international travel	0.036767
EI Income support	0.55472
H1 Public information campaigns	0.036767
H2 Testing policy	0.036767
H3 Contact tracing	0.036767
H6 Facial coverings (masks)	-0.08579
H7 Vaccination policy	-0.40666
H8 Protection of senior citizens	0.034434
V1 Vaccination prioritization	-0.37879
V2 Vaccination availability	-0.40699
V3 Vaccination financing	-0.40699

How OxCGRT codes ordinal indicators compute the composite indices and standardize them are described in the OxCGRT working paper (Hale et al. 2022) The standardized indices allow for systematic comparisons of policies across countries even if the indices are based on perception of context and expert evaluations. The range of indicators reduce the possibility that one indicator is over or misinterpreted. The main limitation of composite indices is that they leave out detailed information on how policies are implemented at each level of governance with its political, economic, and social dynamics and contexts.

The Philippine government response data comes from publicly available documentation, such as Government and Department of Health (DOH) media releases, WHO Asia Pacific advisories, newspaper articles, DOH data drops, and independent science advisories (such as OCTA Research bulletins). The data were collected and identified via internet searches by a team of over one hundred Oxford University students and staff. OxCGRT records the original sources and in its is verified prior to coding. OxCGRT data are in the public domain under a creative commons license.

Table 2: PCA loadings

Component Loadings

	PC1	PC2	Uniqueness
Government Response Index	0.973		0.052
Containment Health Index	0.929		0.029
Stringency Index	0.924		0.127
Economic Support Index		-0.823	0.322
Cases per Million		0.796	0.360

Note: Applied rotation method is varimax.

Together with other relevant datasets, OxCGRT has been used by governmental science advisors, health, and environmental scientists in calculating the level of healthcare resources with levels of transmission, the impact of non-pharmaceutical interventions, and in the environmental assessment of the anthropause (Liu et al 2020). Political scientists have used it to estimate the effectiveness of COVID-19 policy in various regime types (Frey et al 2020). Economists have used it to estimate the effect of work-from-home policies on sectoral changes and on effects on food prices (Akter, 2020).

Previous publications on government response and government science advice political dynamics of COVID-19 in the Philippines are narratives that contextualize the effectiveness and contradictions of the government policy response (Vallejo and Ong, 2022). This study empirically evaluates our hypotheses of the effectivity of the policies using a large data matrix of responses as collated by OxCGRT.

MATERIALS AND METHODS

Exploratory data analysis (EDA) and visualization

We used the OxCGRT subset of data for the Philippines. The time series data used is from 30 Jan 2020 to 26 Feb 2022 representing 21 OxCGRT indicators, 4 composite indices, and 5 epidemiological indices in a data matrix consisting of 747 x 30 cells consisting of 22,410 data points. We designated the standardized ratio of cases per million as the response variable in statistical analyses. We used the Our World in Data-COVID-19 data set for the Philippines for the total number of cases, deaths, and new cases (John Hopkins University 2020). A principal components analysis (PCA) was used to explore which among the continuous composite indices contribute to the variance of cases per million. For the ordinal and categorical OxCGRT indicators, we used a principal coordinates analysis (PCO) to explore hypothetical relationships between the ordinal and categorical OxCGRT indices. We used JASP (Love et al 2019) for EDA.

Descriptive and visual and regression modeling

We used the correlation module in JASP in modeling the Pearson Correlations of OxCGRT variables. We visually represented the correlations as a heatmap. For the temporal trends in the composite indices and epidemiological parameters, we plotted their trends using Microsoft Excel. For the composite indices, we regressed them on cases per million. Cases per million is a discrete variable as previously defined.

Logistic regression

From PCO analysis, we identified five out of the 21 OxCGRT indices that are significantly correlated with our hypothesized regressand of cases per million. These are H4-Vaccination Policy, H6-Facial coverings, C3- cancel public events, C6-Stay-at-home requirements, and C7-Restriction on internal movement. While we did OLS regression over continuous variables, we performed logistic regression over ordinal variables such as the four OxCGRT variables identified. The logistic regression was coded as 0, 1, where the daily cases-per-million outcome was coded as 0 if <100 and 1 if >100. The covariates used were the 2 composite indices that were significant as OLS regressors of cases per million, Stringency Index, and Containment Health Index. The logistic regression model used was forward selection using JASP.

RESULTS

Exploratory data analysis and visualization

The temporal trends of cases per million and R0 reflect the three infection surges, whose daily estimate is greater than 100 cases per million (Figs 1,2,3). These surges were in April 2021, Aug 2021, and January 2022. The R0 signal was greatest during the January 2022 surge when 350 cases per million were estimated on January 15.

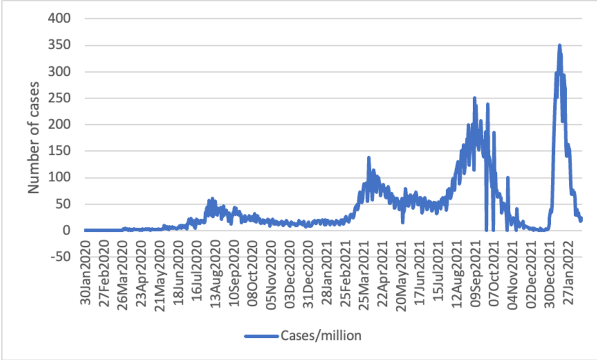

Figure 1: Temporal trends in COVID-19 cases/million from 30 Jan 2020 to 26 Feb 2022

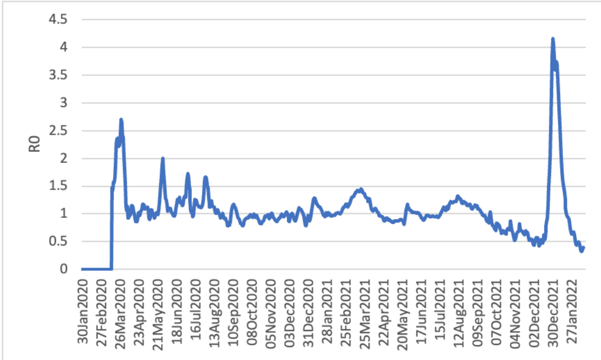

Figure 2: Temporal trends in R0 from 30 Jan 2020 to 27 Feb 2022

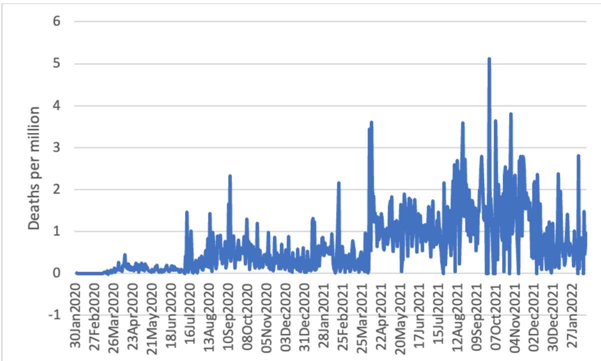

Figure 3: Temporal trends in COVID-19 deaths/million from 30 Jan 2020 to 26 Feb 2022

The highest death rate was recorded on 29 September 2021, with an estimate of 5.11 deaths per million. This was during the August to September 2021 surge. The second highest death rate was recorded on 9 April 2021 with 3.44 deaths per million. This was during the March-April 2021 surge. During the January 2022 surge, the highest death rate was recorded on 6 February 2022, with an estimated 2.81 deaths per million.

The PCO analysis suggests that the ordinal indicators that contribute to most variation are H7, V1, V2, and V3, all of which reflect vaccination. Since these indicators are negatively loaded on the first principal coordinate axis, they were hypothesized to be significantly and negatively correlated with cases per million. Stringency and Containment were highest starting in March 2020, when the government declared a national health emergency and instituted a national lockdown (Fig 4). Economic response reached its highest estimate from August 2020 to December 2020. From then, it declined to 0 from April 2021. From Feb 2021 to Nov 2021, the indices averaged between 60 and 80 but when the government declared a relaxation of quarantine restrictions on the advice of economic managers for the 2021 Christmas holidays, this was noted as a decline in stringency and containment. However, the threat of the Omicron variant surge resulted in a greater tightening of regulations in December 2021.

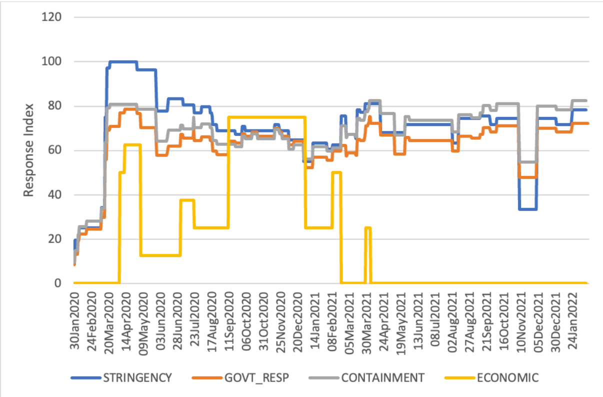

Figure 4: Temporal trends in OxCGRT composite response indices for the Philippines

PCA of the composite components suggests that Stringency, Government Response, and Containment indices are highly loaded on the first principal component with factor loadings of 0.973, 0.924, and 0.929 respectively. Economic support has a negative loading on the second principal component.

Visual and OLS regression modeling

The Pearson's R heatmap (Fig 5) shows the correlation of OxCGRT indices that make up the four composite indices. Correlations in dark blue suggests strong positive correlation and those in dark brown suggests strong negative correlations. The flagged indices are significantly correlated.

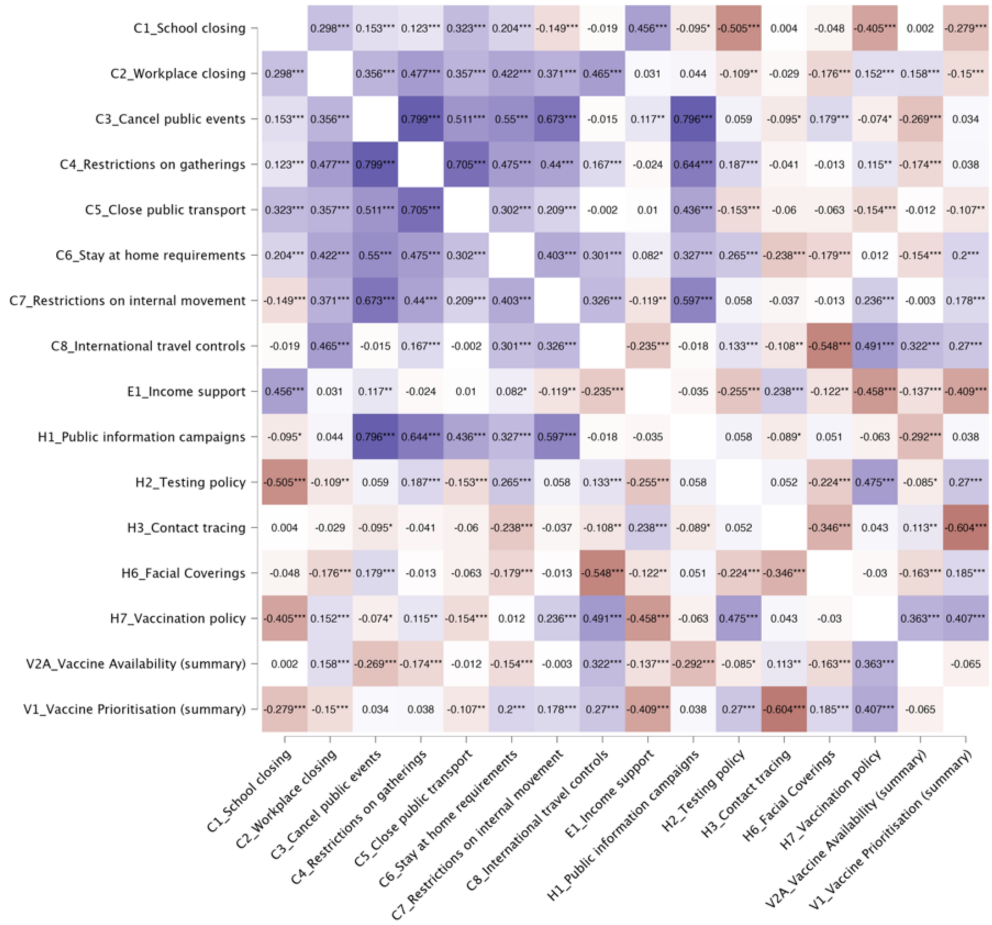

Figure 5: Pearson correlation heatmap of Philippines government COVID-19 policy responses indices within and between OxCGRT composite indices.

Generally, containment policy (C) indices are strongly correlated with each other while the healthcare (H) and Vaccination policies (V) are less so. Some of the healthcare policies are negatively correlated with containment. This shows a disjunction of policy applications in pandemic management where the national priority was on containment consistent with the "flattening the curve" strategy.

Regression of the composite indices over cases per million resulted in Stringency and, Containment as significant predictors.

Logistic regression

Logistic regression suggests that the covariates Containment Health Index, Stringency Index, and Restriction of internal movement are significant using the Wald Test on the outcome of increased cases per million. Stringency and restriction of internal movement regression coefficients are negative. This means that with the increase in cases per million, these indices are negatively correlated. Containment as an aggregate index does not have a negative coefficient thus indicating its limited effectiveness. The low odds ratio of stringency and restriction of internal movement indices suggests an effective response policy response to the increasing cases.

Table 3: OLS regression of OxCGRT composite indices on COVID-19 cases per million from 1 Jan 2020 to 28 Jul 2021

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	39.360	1.891		20.813	< .001
H_1	(Intercept)	-75.640	12.689		-5.961	< .001
	Stringency Index*	-2.859	0.198	-0.783	-14.420	< .001
	Government Response Index	-0.505	0.511	-0.082	-0.988	0.324
	Containment Health Index*	5.017	0.392	0.961	12.791	< .001

*significant

Table 4: Logistic regression table of OxCGRT policy ordinal variables and covariate composite indices. Model 5 in forward selection logistic regression selects for Containment Health, Stringency, and C7 Restriction on internal movement.

Coefficients

						Wald Test			95% Confidence interval	
Model	Parameter	Estimate	Standard Error	Odds Ratio	z	Wald Statistic	df	p	Lower bound	Upper bound
5	(Intercept)	-47.156	1187.557	3.314e-21	-0.040	0.002	1	0.968	-2374.726	2280.414
	H7_Vaccination policy (1)	-0.326	5874.231	0.722	-5.552e-5	3.083e-9	1	1.000	-11513.607	11512.955
	H7_Vaccination policy (2)	19.925	1187.538	4.502e+8	0.017	2.815e-4	1	0.987	-2307.606	2347.456
	H7_Vaccination policy (3)	10.497	1187.538	36207.629	0.009	7.813e-5	1	0.993	-2317.034	2338.028
	H7_Vaccination policy (4)	17.663	1187.538	4.688e+7	0.015	2.212e-4	1	0.988	-2309.868	2345.194
	H7_Vaccination policy (5)	12.200	1187.538	198878.656	0.010	1.055e-4	1	0.992	-2315.331	2339.732
	Containment Health Index*	0.994	0.251	2.702	3.953	15.623	1	< .001	0.501	1.487
	Stringency Index*	-0.659	0.185	0.517	-3.556	12.644	1	< .001	-1.022	-0.296
	C7_Restrictions on internal movement (1)**	6.883	3.726	975.266	1.847	3.412	1	0.065	-0.421	14.186
	C7_Restrictions on internal movement (2)	3.462	2.850	31.866	1.215	1.475	1	0.224	-2.124	9.047

Note. Outcomes level '1' coded as class 1. *significant, **marginally significant

While facial coverings and vaccination policies were initially hypothesized to be significant, these were not reflected in this analysis. Likely, the applications of these policies in the subnational units of the Philippines were varied with local government units who apply these with varying effectiveness contingent on logistical constraints and political realities. In contrast, the restriction of internal movements has a more national character with air and maritime transportation regulated by national agencies, while local land transport is regulated by the local governments which implement the quarantine restrictions of BAHO.

DISCUSSION

COVID-19 has a myriad of symptoms which include cardiopulmonary, gastrointestinal, and neurologic manifestations however its mode of transmission is largely respiratory. Restrictions in internal mobility, wearing of face masks, closure of public transport, and restrictions to mass gatherings reduce risks of transmission. While vaccination does not guarantee protection against breakthrough infection, it reduces the risks of severe to critical COVID-19 (CDC-COVID-19, 2021). A paper published in the British Medical Journal; Reason (2000) described the "Swiss Cheese Model" in errors in systems management. Reason states that engineering and administrative controls have roles in protecting potential victims against hazards. Each cheese slice is a barrier against accidents and the holes in the defenses represent "active failures and latent conditions" where the former are unsafe acts such as procedural violations and the later inevitable issues within a system such as those that arise from decisions made by management, engineering, or design.

The general health policy response model adopted for the pandemic highlights the combined personal and shared responsibilities into a multi-layer response used in communicating policy controls analogous to Reason's (2000) "Swiss Cheese Model". The various government policies worldwide describe the use of masks, stay-at-home, cough etiquette, personal hygiene, and physical distancing as personal responsibilities while vaccination, workplace ventilation, lockdowns, contact tracing, and quarantine as shared responsibilities. However, the combination of these measures according to (Escandón et al 2021) is dependent on several factors: COVID-19 awareness, available resources, infrastructure, and political will.

Together with COVID-19's clinical presentations, epidemiological estimates, statistics on hospital admissions, and compliance behavioral data, it is possible to use government response indices such as OxCGRT indicators and composite measures to explore the trends of government response to the COVID-19 pandemic (Hale et al 2022). OxCGRT ordinal indicators can discriminate policies, such as what limits gatherings (e.g., large, and small crowds). However, since these indicators are ordinal, it groups heterogeneous policy responses into pre-established categories. These indicators need to be interpreted within their policy environment contexts.

The results here are suggestive of government responses worldwide, with high stringency and containment within the first 60 days of the pandemic (Liu et al 2021). This supports two general policies on the COVID-19 pandemic adopted by 180 member countries of the WHO. These are pandemic suppression and pandemic containment. A few countries, notably New Zealand, China, and Australia initially adopted pandemic suppression or a Zero COVID policy. These countries implemented strict border controls, massive testing and contact tracing, and vaccination. The majority of WHO member states adopted a pandemic containment policy or a "Flattening the Curve" where the outcome was to reduce infections to a level that would not burden the public health and hospital system. This strategy offered graded systems of lockdowns, international borders, and internal travel restrictions as well as a prioritized vaccination program. Most WHO member states adopted the containment strategy beginning in April 2020, when a gradual shift to economic opening was decided upon. The containment strategy was based on a wider effort at testing and epidemiological monitoring that allowed for "trigger lockdowns". The Philippines followed this strategy and because of its political and governance culture, adopted a policing approach (Vallejo and Ong 2020).

The policing or securitization (Arcala Hall, 2023) approach is evidenced in the positive correlation of OxCGRT indicators that require quarantine law enforcement. However, the correlations of health indicators with containment indicators have low positive and even negative correlations. Among these is contact tracing, which is one of the least effectively implemented policies in pandemic management in the Philippines according to Duterte administration contact tracing czar and Baguio City mayor Benjamin Magalong (Talabong, 20211 March 30). The difficulties in contact tracing are logistical and technological. There was a lack of contact tracers especially when cases started rising and the technological and digital methods of contact tracing were hampered by poor internet connectivity and the diversity of apps distributed by local government units and medical services organizations from the public, civil society, and private sectors.

PCO suggests that vaccination policies will have an effect on pandemic outcomes, and this was tested using forward selection logistic regression. However, these are not significant although with small odds ratios. This means that vaccination policies have a corresponding decrease in case numbers. Vaccination Policy (code 1) has a negative regression coefficient. This represents the priority vaccination of one vulnerable sector of the population which is the health workers. The other vaccination policy codes, 2 (for two vulnerable sectors), 3 (all vulnerable sectors), 4 (additional sectors), and 5 (universal access) do not have negative regression coefficients. They are not as determining of reduced case outcomes as prioritization of one vulnerable sector followed by other sectors. In the Philippines, health workers were prioritized for vaccination beginning in February 2021.

The other non-pharmaceutical policy options such as face coverings are not significant predictors for cases per million. These reflect the variability of pandemic management behaviors at all levels of governance. It is likely at smaller geographic scales; these are more significant. Mask-wearing is an important factor in transmission control. There is growing evidence that COVID-19 is transmitted by aerosol in hospital wards thus supporting the use of masks as a precaution against transmission. However, the effectiveness of face coverings differs according to the material and manner worn by the individual. Wang et al (2021) concluded that N95 masks filter bacteria and viruses more efficiently than surgical masks. However, the surgical mask is more comfortable to wear with less respiratory effort. Cloth masks on the other hand are worn by many in the community setting due to its reusability and ease of breathing. However, cloth masks are not generally subject to standards and may have varying mesh patterns and gaps between fibers. Furthermore, it must be properly washed and decontaminated prior to reuse which may further decrease its filtering capacity (Wang et al 2021; MacIntyre and Chugtai, 2020; Silva et al 2020).

A 2021 study in the Philippines on the correlations of local government responses reveals a divergence of response outcomes which the researchers consider as "good outliers" (Talabis et al 2021). These outliers are a function of economic development metrics as well as geographical distance from the national capital. It reflects on the uneven distribution of health infrastructure and service which impacts the delivery of pandemic health response services. The successes and failures of local government response are also within the context of the securitization approach of the Duterte administration which favored some local government executives but not all as a result of the national centralization of policies and the devolved powers given to local government executives by the Local Government Code (Calimbahin and Agoho, 2023). In the case of Cebu City, the national government directly intervened in the quarantine and testing policies which revealed the weaknesses of national government agencies working within and with local government structures in responding to crisis, and in the case of Cebu province, guarding the autonomy provided by the local government code (Gera, 2023). The success or failure of the pandemic response is based on the local government's loyalty and political alliance with Malacanang while balancing the local politicians' exercise of autonomy. Cebu City is a special case as is a leading economic center in the Visayas and the Philippines.

Among the OxCGRT indicators that have a national significant effect on cases per million is C7 Restriction on internal movement (code 1) which is a recommendation on restrictions in traveling between cities. This was implemented by all local government units with varying requirements on which population sector, age groups, and vaccination status can cross internal borders. This indicator has a positive regression coefficient and a high odds ratio which means border crossing implies a higher risk of causing increases in cases. C7 Restrictions on internal movement (code 2) or implemented restrictions have a lower odds ratio, which suggests some effect on reducing cases. Many local government units required rtPCR or rapid antigen tests for travel and border clearances. However, the stringency of applications must be assessed by continuous measures of policy compliance behaviors.

The composite continuous indices that captures policy compliance behaviors and implementation. Thus, in the Philippines, the Stringency Index, which is high during the time series observed, is the most significant covariate of all OxCGRT ordinal indicators. The other three composite indices, Government response, Containment and Economic Support are not as significant in determining pandemic outcomes. Stringency is the arithmetical mean of Containment indicators (k=9). Government response is the arithmetical mean of Containment, Health, and Economic Support indicators (k=16) while Containment is the mean of Health and Containment indicators (k=14). Since the Philippines government has adopted a policing and securitized approach to pandemic containment, it is not surprising that Stringency will be most significant nationally. Stringency thus captures much of the policy setting and implementation in the COVID-19 pandemic in the Philippines. Economic support is the weakest of the composite indices.

CONCLUSIONS AND RECOMMENDATIONS

This analysis of the Philippines government's responses to COVID-19 shows the limitations of OxCGRT indicators as policy assessment metrics. The indicators lose granularity at large scales, such as nationally aggregated data. Unless flagged, indicators cannot reflect the variations in policy responses at different levels of governance. This is very much reflected in the likely importance of vaccination policies and their roll-out in the Philippines but because of low granularity, the significance of these policies is not much evident in the data. A similar case can be made for the other OxCGRT ordinal policy indicators.

The interpretation of the effectiveness of government response to pandemic emergencies does not solely lie on statistical analysis that characterizes normal science but on post-normal science approaches (Funtowicz and Ravetz, 1993; De Marchi and Ravetz, 1999) in which context of policy decisions in complex situations fraught with risks and uncertainties. These risks are contextually analyzed through extended participation and external peer review for positive policy outcomes. OxCGRT style ordinal metrics for rapid policy impact assessment capture more policy implementing behaviors for better assessment of policy outcomes and characterization. However, OxCGRT ordinal style metrics need to capture pandemic response inequities which have been noted in the global North and South divide in vaccine availability. The OxCGRT ordinal vaccine policy indicators capture some of these inequalities, but we did not use this in the analysis of the Philippines response due to the lack of regional granular data on vaccination. More vaccination data which is more granular with information on the timing and geography of vaccine roll-out may shed insight into the inequities of vaccination in the Philippines.

This study does not completely assess the policy impact of the Omicron variant on Philippines policy as the January and February 2022 datasets capture only the initial effects of Omicron. However, it appears that the government has followed similar responses by governments worldwide, most especially in the Asia Pacific, and that is to largely abandon testing and contact tracing due to the higher transmissibility of the new variant (Vallejo and Ong, 2022) instead these governments ramped up vaccination rates. In the face of Omicron, governments did not impose lockdowns so as not to further dampen economic recovery. The Philippines, however, had a national election campaign during this period, and the government had to ensure the elections were conducted on 9 May 2022 as mandated by the constitution.

This study provides empirical support to and confirms the observation that the Philippine government focused on containment policies based on policing, securitization, and law enforcement approaches during the COVID-19 pandemic with limited successful outcomes in reducing COVID-19 spread. To improve these outcomes, inequalities and inequities in health infrastructure and services deliveries, especially in vaccination, must be addressed, as well as improving coordination in crisis governance response between the national and local governments. Also, the emergence of highly transmissible variants requires recalibrated responses informed by epidemiological, clinical, and medical science research. (Hale et al 2021).

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SUPPLEMENTARY MATERIAL

OLS regression table of composite variables

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	611024.757	3	203674.919	118.873	< .001
	Residual	1.220e+6	712	1713.387		
	Total	1.831e+6	715			

Note: The intercept model is omitted, as no meaningful information can be shown.

Logistic regression coefficient table

Coefficients

						Wald Test			95% Confidence interval	
Model	Parameter	Estimate	Standard Error	Odds Ratio	z	Wald Statistic	df	p	Lower bound	Upper bound
1	(Intercept)	-2.238	0.127	0.107	-17.674	312.359	1	< .001	-2.486	-1.990
2	(Intercept)	-20.566	925.518	1.170e-9	-0.022	4.938e-4	1	0.982	-1834.548	1793.415
	H7_Vaccination policy (1)	0.000	3664.863	1.000	4.926e-15	2.427e-29	1	1.000	-7183.000	7183.000
	H7_Vaccination policy (2)	19.180	925.518	2.136e+8	0.021	4.295e-4	1	0.983	-1794.802	1833.162
	H7_Vaccination policy (3)	16.983	925.518	2.374e+7	0.018	3.367e-4	1	0.985	-1796.999	1830.964
	H7_Vaccination policy (4)	22.964	925.518	9.400e+9	0.025	6.156e-4	1	0.980	-1791.018	1836.946
	H7_Vaccination policy (5)	19.697	925.518	3.584e+8	0.021	4.529e-4	1	0.983	-1794.285	1833.679
3	(Intercept)	-26.450	899.257	3.257e-12	-0.029	8.652e-4	1	0.977	-1788.962	1736.062

Coefficients

Model	Parameter	Estimate	Standard Error	Odds Ratio	z	Wald Test			95% Confidence interval	
						Wald Statistic	df	p	Lower bound	Upper bound
	H7_Vaccination policy (1)	-0.111	3641.612	0.895	-3.050e-5	9.303e-10	1	1.000	-7137.540	7137.318
	H7_Vaccination policy (2)	19.120	899.255	2.012e+8	0.021	4.521e-4	1	0.983	-1743.387	1781.627
	H7_Vaccination policy (3)	16.432	899.255	1.369e+7	0.018	3.339e-4	1	0.985	-1746.075	1778.939
	H7_Vaccination policy (4)	22.156	899.255	4.191e+9	0.025	6.070e-4	1	0.980	-1740.351	1784.663
	H7_Vaccination policy (5)	18.998	899.255	1.782e+8	0.021	4.463e-4	1	0.983	-1743.508	1781.505
	Containment Health Index	0.085	0.031	1.089	2.775	7.700	1	0.006	0.025	0.145
4	(Intercept)	-40.078	818.519	3.929e-18	-0.049	0.002	1	0.961	-1644.347	1564.190
	H7_Vaccination policy (1)	-2.939	3618.657	0.053	-8.121e-4	6.595e-7	1	0.999	-7095.376	7089.499
	H7_Vaccination policy (2)	16.242	818.506	1.132e+7	0.020	3.937e-4	1	0.984	-1588.001	1620.484
	H7_Vaccination policy (3)	9.209	818.508	9985.024	0.011	1.266e-4	1	0.991	-1595.038	1613.456
	H7_Vaccination policy (4)	15.034	818.508	3.381e+6	0.018	3.374e-4	1	0.985	-1589.212	1619.279
	H7_Vaccination policy (5)	10.313	818.509	30111.891	0.013	1.587e-4	1	0.990	-1593.935	1614.560
	Containment Health Index	0.770	0.197	2.159	3.908	15.275	1	< .001	0.384	1.156
	Stringency Index	-0.440	0.124	0.644	-3.551	12.608	1	< .001	-0.683	-0.197
5	(Intercept)	-47.156	1187.557	3.314e-21	-0.040	0.002	1	0.968	-2374.726	2280.414
	H7_Vaccination policy (1)	-0.326	5874.231	0.722	-5.552e-5	3.083e-9	1	1.000	-11513.607	11512.955
	H7_Vaccination policy (2)	19.925	1187.538	4.502e+8	0.017	2.815e-4	1	0.987	-2307.606	2347.456
	H7_Vaccination policy (3)	10.497	1187.538	36207.629	0.009	7.813e-5	1	0.993	-2317.034	2338.028
	H7_Vaccination policy (4)	17.663	1187.538	4.688e+7	0.015	2.212e-4	1	0.988	-2309.868	2345.194
	H7_Vaccination policy (5)	12.200	1187.538	198878.656	0.010	1.055e-4	1	0.992	-2315.331	2339.732
	Containment Health Index	0.994	0.251	2.702	3.953	15.623	1	< .001	0.501	1.487
	Stringency Index	-0.659	0.185	0.517	-3.556	12.644	1	< .001	-1.022	-0.296
	C7_Restrictions on internal movement (1)	6.883	3.726	975.266	1.847	3.412	1	0.065	-0.421	14.186
	C7_Restrictions on internal movement (2)	3.462	2.850	31.866	1.215	1.475	1	0.224	-2.124	9.047

Note: Outcomes level '1' coded as class 1.

Descriptive statistics of the composite indices

	Containment	Stringency	Govt response	Economic response
Mean	68.6968675	70.308166	62.6098	19.6954485
Standard Error	0.48718026	0.612382892	0.43225937	1.01778667
Median	71.43	71.76	65.47	0
Mode	73.63	71.76	64.43	0
Standard Deviation	13.3152703	16.73722098	11.8379103	27.8174335
Sample Variance	177.296424	280.1345662	140.136121	773.809604
Kurtosis	4.38926325	2.143787755	5.79839909	-0.2882358
Skewness	-1.9509417	-1.13931793	-2.3082247	1.13754734
Range	73.04	88.89	70.32	75
Minimum	9.52	11.11	8.33	0
Maximum	82.56	100	78.65	75
Sum	51316.56	52520.2	46957.35	14712.5
Count	747	747	750	747
Largest(1)	82.56	100	78.65	75
Smallest(1)	9.52	11.11	8.33	0
Confidence Level(95.0%)	0.95640747	1.202198893	0.84858404	1.99806693

PCO loadings of OxCGRT variables

	Coord 1	Coord 2	Coord 3
C1 School closing	0.035282	-0.11182	-0.015148
C2 Workplace closing	0.022201	-0.11355	-0.024206
C3 Cancel public events	0.036767	-0.11525	-0.019288
C4 Restrictions on gatherings	0.065777	-0.11839	-0.019216
C5 Close public transport	0.035419	-0.10142	0.055498
C6 Stay-at-home requirements	0.034434	-0.10974	-0.01277
C7 Restrictions of internal movements	0.065777	-0.11839	-0.019216
C8 Restrictions on international travel	0.036767	-0.11525	-0.019288
EI Income support	0.55472	0.12404	-0.19443
H1 Public information campaigns	0.036767	-0.11525	-0.019288
H2 Testing policy	0.036767	-0.11525	-0.019288
H3 Contact tracing	0.036767	-0.11525	-0.019288
H6 Facial coverings (masks)	-0.08579	-0.052197	0.10434
H7 Vaccination policy	-0.40666	0.1281	0.012779
H8 Protection of senior citizens	0.034434	-0.10974	-0.01277
V1 Vaccination prioritization	-0.37879	0.10125	0.013551
V2 Vaccination availability	-0.40699	0.1314	0.01313
V3 Vaccination financing	-0.40699	0.1314	0.01313