Abstract

Background: The COVID-19 pandemic could increase violence against children at home. However, collecting empirical data on violence is challenging due to ethical, safety, and data quality concerns. Objective: This study estimated the anticipated effect of COVID-19 on violent discipline at home using multivariable predictive regression models. Participants: Children aged 1-14 years and household members included in the Multiple Indicator Cluster Surveys (MICS) conducted in Nigeria, Mongolia, and Suriname before the COVID-19 pandemic were included. Methods: A conceptual model of how the COVID-19 pandemic could affect risk factors for violent discipline was developed. Country specific multivariable linear models were used to estimate the association between selected variables from MICS and a violent discipline score which captured the average combination of violent disciplinary methods used in the home. A review of the literature informed the development of quantitative assumptions about how COVID-19 would impact the selected variables under a "high restrictions" pandemic scenario, approximating conditions expected during a period of intense response measures, and a "lower restrictions" scenario with easing of COVID-19 restrictions but with sustained economic impacts. These assumptions were used to estimate changes in violent discipline scores. Results: Under a "high restrictions" scenario there would be a 35% to 46% increase in violent discipline scores in Nigeria, Mongolia and Suriname, and under a "lower restrictions" scenario there would be between a 4% to 6% increase in violent discipline scores in these countries. Conclusion: Policy makers need to plan for increases in violent discipline during successive waves of lockdowns.

Keywords: Physical violence, corporal punishment, violent discipline, violence against children, COVID-19, pandemic, MICS.

Violent discipline by parents and other caregivers at home is one of the most common forms of violence against children (Devries et al., 2018; UNICEF, 2014). Approximately half the world's children below the age of 15 are subjected to physical punishment (UNICEF, 2014), and roughly three in four children between the ages of 2 and 4 years are exposed to psychological aggression and physical punishment on a regular basis (UNICEF, 2017). Violent discipline is defined as any physical punishment and/or psychological aggression, including spanking or physically forcing children to do things; use of guilt, humiliation, the withdrawal of love, or emotional manipulation to control children (UNICEF, 2010). Use of violent discipline varies by country, and may be both a normative behaviour and originate from feelings of stress, frustration and lack of self-control (UNICEF, 2010). Violent discipline in all its forms, and regardless of the reasons that motivate its use, is a fundamental violation of children's rights (United Nations, 1989).

At the time of writing in October 2020, population-level data on children's experiences of violence during the COVID-19 pandemic are either absent or very limited. Recent research efforts have focused on evaluating the effects of the pandemic on reporting of cases of violence relying on administrative data (Baron, Goldstein, & Wallace, 2020; Cabrera-Hernández & Padilla-Romo, 2020). Collection of data from children on their experiences of violence during the current pandemic is not recommended under most circumstances, due to ethical, safety and methodological concerns (Berman, 2020). Policymakers and service providers are lacking robust evidence on how COVID-19 response measures and the socioeconomic impacts of the current crisis may affect levels of violence against children. Prior analyses of Multiple Indicator Cluster Surveys (MICS) – one of the few nationally representative and internationally comparable sources of data on violence against children - suggested that across 86 countries an average of 74% of children aged 1–14

years experienced some form of physical punishment and/or psychological aggression in the past month, ranging from 36% in Cuba to 94% in Ghana (UNICEF, 2019).

This study is motivated by concerns that the COVID-19 pandemic has potentially increased children's risk of experiencing violence. The pandemic has led to the disruption of formal and informal child protection systems responsible for identification of and response to cases of violence (Bhatia et al., 2020; The Alliance for Child Protection in Humanitarian Action, May 2020; WHO, 2020) and exacerbated many of the known risk factors for violence against children within the household. Poverty, socioeconomic inequalities, economic insecurity and unemployment compromise caregivers' mental health and their ability to provide for children, increasing risk of child maltreatment (Berger, 2005; Meinck, Cluver, & Boyes, 2015; Raissian & Bullinger, 2017; Sedlak et al., 2010). Intimate partner violence, tensions in the family, poor mental health, and alcohol use are also associated with increased risk of child abuse and violent discipline (Cluver et al., 2020; Stith et al., 2009; Whipple & Webster-Stratton, 1991). Furthermore, caregivers' psychological status and subjective wellbeing may influence their relationships with children and therefore their disciplinary methods (Brown, Doom, Lechuga-Peña, Watamura, & Koppels, 2020).

This paper has three aims: to present the results of multivariable analyses of risk factors for violent discipline using MICS data for Nigeria, Mongolia and Suriname; to propose a framework of how the COVID-19 pandemic could affect risk factors for violent discipline; to estimate, through a modelling approach (Chawanpaiboon et al., 2019; Moller, Petzold, Chou, & Say, 2017), how the severity of violent discipline could change under two hypothetical pandemic scenarios, and to discuss the benefits and challenges of this approach.

Methods

We followed four steps. One, we developed a conceptual framework that outlines selected household- and child-level risk factors for violent discipline, and illustrates what

aspects of the pandemic might directly or indirectly affect such factors, and therefore children's experiences of violence in the home. We distinguished between factors that would likely be affected by the COVID-19 pandemic and factors that would remain unaltered but are important predictors of violent discipline. We refined our framework by mapping these risk factors against the variables available in the MICS for three case-study countries that offered comparable data – Nigeria (2016), Mongolia (2018), and Suriname (2018). Two, we developed a multivariable model to estimate the association between risk factors from our conceptual framework and severity of violent child discipline under non-pandemic conditions. Three, we formulated assumptions to quantify the effect of the COVID-19 pandemic on these risk factors under a "higher restrictions" and "lower restrictions" pandemic scenario. Four, using the regression equation from step two, we estimated predicted changes in severity of violent child discipline under the two pandemic scenarios.

Conceptual Framework: How Could the COVID-19 Pandemic Affect Violent Discipline?

We drew on an ecological framework (Maternowska & Fry, 2018) which defines violence as the result of a multitude of interactions at the individual, interpersonal, family, and community level, to identify pathways to violent discipline in the context of the COVID-19. The framework in Figure 1 illustrates the possible pathways to violent discipline stemming from three common COVID-19 response measures – business closures, social distancing and restrictions to movement, and school closures – as well as from the general fear and insecurity triggered by the spreading of COVID-19 and by changes in the global social and economic context. This was informed by literature on the known risk factors for violent child discipline, including emerging evidence on pathways to violence under pandemic conditions (Bakrania et al., 2020; Peterman et al., 2020). Availability of data in the MICS was also taken into consideration in the development of the framework. We defined violent discipline as the

outcome. The risk factors that were likely to be affected by the COVID-19 pandemic appear in blue whereas other factors associated with violent discipline in the literature, but which we assumed would not be affected by COVID-19, appear in grey.

The current pandemic undoubtedly produced large changes in the global economy with consequences for both income and wealth levels as well as employment at the household level (ILO, 2020a; Lawson, Piel, & Simon, 2020; The World Bank, June 2020). Similarly its potential effects on mental health have been widely acknowledged (United Nations, 2020). Economic insecurity coupled with stay-at-home orders and widespread fear of contagion contributed to increases in levels of stress and anxiety among caregivers (Jia et al., 2020; Salari et al., 2020; Serafini et al., 2020), and may have heightened the risk of conflicts at home and of substance misuse (Biddle, Edwards, Gray, & Sollis, 2020; Clay & Parker, 2020; Sharma & Borah, 2020). Modifications to lifestyles, habits and caring responsibilities induced by COVID-19 containment measures have also affected individuals' psychological status and subjective wellbeing (ILO, 2020b; Kola, 2020) with consequences for the risk of harsh parenting (Chung, Lanier, & Wong, 2020) . Family structures and household composition may have also been altered due to COVID-19-related changes in migration flows, employment patterns and economic opportunities (Fisher et al., 2020; The World Bank, 2020). School and business closures, and movement restrictions have radically altered how and where adults and children spend their time, which may affect children's exposure to violence at home (Bullinger, Raissian, Feely, & Schneider, 2020; Peterman & O'Donnell, 2020). In our framework children's time is split between schooling (proxied as attendance) and engagement in labor such as household chores and economic activities.

Given the lack of evidence from previous and the current pandemic we assumed no effects of COVID-19 on household characteristics such as demographics, education, values and beliefs around violence. For simplicity, we also assumed no changes in risk factors for

violence due to COVID-19 associated mortality or hospitalization and therefore did not include these variables in our framework (estimated mortality rate from COVID-19 as at 23 September 2020 was 17.36 per 100,000 in Suriname and 0.56 per 100,000 in Nigeria; no COVID-19 deaths were recorded in Mongolia).

Other known risk factors for violent discipline, such as caregivers' own experiences of violence, availability of social and support networks, and children's own mental health were not included in the framework because there was no corresponding variable in the MICS datasets. Similarly, due to the unavailability of data in the MICS, the framework intentionally excludes the potential mitigating effects of economic, financial, and social assistance programs implemented in response to the pandemic.

Analytical Approach to Modelling the Association Between Risk Factors and Violent Discipline Under Non-Pandemic Conditions

Data sources. We used MICS data from Nigeria (2016), Mongolia (2018) and Suriname (2018) to estimate mean values or proportions and associations between household- and child-level risk factors and violent discipline under non-pandemic conditions. These countries were selected because their respective MICS datasets included all the variables of interest, they were geographically diverse, and differed in the number of COVID-19 cases (The New York Times, 2020) and stringency of the response measures implemented (Hale et al., 2020). Although we selected countries with similar variables, our analyses should not be interpreted as cross-country comparisons but are aimed at showing how this modelling approach can be applied to different datasets.

MICS are cross-sectional, nationally representative household surveys which use a multi-stage sampling approach. A dedicated module asks about the use of disciplinary methods by household members. In the case of Nigeria, this module was administered to the household head and asked about discipline methods used with one randomly selected child

aged 1-14 years in each household. In Mongolia and Suriname, the child discipline module was administered to the mother, or if the mother was not alive or not living in the same household, to the primary caregiver of every child aged 1-4 years and/or of one randomly selected child aged 5-14 years. In addition, men and women aged 15-25 years in Nigeria and 15-49 years in Mongolia and Suriname were also interviewed and asked about their alcohol use, well-being, and employment (Nigeria only). Data for this study come from the child, household, men's and women's questionnaires in each country.

Outcome. The primary outcome was caregiver reported use of violent discipline, measured using an adapted version of the Parent-Child Conflict Tactics Scale (PC-CTS). This includes 8 questions on psychological and physical violent disciplinary practices. Caregivers provided information about disciplinary methods used with the child by any member of the household in the past month, it is therefore impossible to know which household members used the reported violent methods. Furthermore, no information was collected on the frequency of these practices in the past month.

We used the eight violent discipline items to construct a violent discipline score as a continuous variable. We assigned each of the eight items a score ranging from 5 to 30 points based on the severity of discipline as defined by the Conflict Tactics Scale (Table 1). Acts of violent discipline which constituted psychological aggression (name calling and shouting/yelling) were assigned a score of 5 points. Acts of discipline defined as minor assault (shaking if the child was above 2 years of age, spanking, hitting on the bottom, hitting on the arm of legs) were assigned a score of 10 points. Severe assault (shaking if child is under 2 years of age, hitting on the face, head or ears) was assigned a score of 20 points. Finally, very severe assault (beating with an implement) was assigned a score of 30 points. We calculated a total score for each child which ranged from 0 to 110, where 0 corresponded to no use of violent discipline in the past month and 110 to situations where all eight types of

psychological and physical violence were used. Although the score used in our analyses can be interpreted as a proxy for the severity of violent discipline, a complete assessment of severity would need to include a measure of frequency, which is not available in the MICS.

Variable selection. We defined exposures as the risk factors that we hypothesized would be affected by COVID-19. We drew on data from the men and women's MICS datasets to construct several aggregate and average household-level measures. These included: (1) a measure of youth employment defined as the proportion of household members aged 15-24 years who have a job over the total number of household members between 15-24 years; (2) a measure of subjective wellbeing defined as overall mean happiness; (3) a measure for average household alcohol consumption defined as the number days in which alcohol was consumed in the past month by men and women in the household. The subjective wellbeing (happiness) variable relied on data from household members aged 15-24 years in the Nigeria dataset, but included all women and men aged 15-49 years in households in Mongolia and Suriname. The youth employment variable was the only variable that was not available in all three case-study countries and only available in the Nigeria MICS. At the household level we also included household wealth quintiles (data on household income was not available in the MICS) and two variables that described the household structure: an indicator for the total number of household members and a variable for whether the household head was a woman. At the child level we used three variables to proxy for children's time use: we included a measure of school attendance defined as the proportion of children who attended school at any point in the past year, and two measures to capture children's work defined as the number of hours engaged in household chores in the past week and the number of hours engaged in economic activity in the past week.

We also included in the model several covariates. These were defined as risk factors for violent discipline that were unlikely to be affected by the pandemic, such as: the child's

sex and age, whether parents were living in the household, education, ethnicity and religion of the household head. We also included measures of attitudes towards violence: attitudes about physical punishment were defined as the percentage of respondents who believe the child needs to be physically punished to be brought up properly. Attitudes towards domestic violence were defined as the average number of "yes" responses to five items which asked respondents whether wife beating was justified (if she: goes out without telling husband, neglects the children, argues with husband, refuses sex with husband, burns the food). Finally, we included urban/rural residence and geographic region.

Statistical analysis. First, we used the MICS data to calculate a violent discipline score. Next, we estimated unadjusted bivariate models between exposures, covariates and violent discipline, using linear regression (results not shown). Only observations with data on the violent discipline outcome and covariates were included in bivariate models. These analyses informed the selection of the final list of exposures to be included in our final multivariable model. Finally, we estimated unadjusted and adjusted multivariable linear models with violent discipline as the outcome, that included all theoretically relevant exposures and the covariates above. Only children with data on the outcome and all the covariates were included in our analytical sample and therefore in the fully adjusted models. To measure the association between the identified exposures and the violent discipline outcome we estimated the following OLS regression:

$$Y_{ijv} = \beta_0 + \beta_1 X^C{}_{ijv} + \beta_1 X^H{}_{jv} + \beta_3 D^C{}_{ijv} + \beta_4 D^H{}_{jv} + \lambda_v + \epsilon_{ijv} + \mu_v$$

where Y_{ijv} is the violent discipline outcome for child i in household j in region v. $X^C{}_{ijv}$ is an indicator of child i's covariates and $X^H{}_{jv}$ is an indicator of household j's covariates. $D^C{}_{ijv}$ includes the child-level exposures and $D^H{}_{jv}$ includes the household level exposures. λ_v are region fixed effects and ϵ_{ijv} and μ_v are the error terms.

We used a linear model because we specified the outcome as a continuous variable and because of its simplicity compared to multiplicative binary models. However, in order to validate our results, we replicated the analyses using probit regression models which specified the violent discipline outcome as a binary variable taking the value of one if the child had experienced any form of violent discipline in the past month (results not shown). This binary outcome specification is consistent with how MICS report violence discipline prevalence, and follows a widely used approach in the literature (Cuartas et al., 2019; UNICEF, 2010).

All analyses were weighted to account for the multi-stage sampling design and were conducted using Stata 16, separately for each country.

How Does the COVID-19 Pandemic Affect Risk Factors for Violent Discipline?

We formulated assumptions about magnitude and direction of the effect the COVID-19 pandemic on household and child exposures from our conceptual framework under two scenarios. The "high restrictions" scenario describes the potential situation in the immediate aftermath of the pandemic and represents a situation that countries may have experienced during a phase of intense containment measures. The "lower restrictions" scenario refers to a situation when containment measures may have started to ease but the effects of the economic crisis triggered by the pandemic may have started to intensify. To inform these assumptions, we conducted a literature review and also relied on expert opinion.

Literature review. We searched for evidence on the relationship between pandemics, humanitarian and economic crises, natural disasters and any of the exposure variables identified in our conceptual framework. We searched Pubmed, Google Scholar, and EconLit with keywords such as "pandemic", "epidemic", "crisis", "disaster", "covid19", "quarantine", and keywords for each intermediate variable. We also searched websites of academic institutions, NGOs and other organisations involved in the current COVID-19 and past

epidemic responses, to identify recent unpublished evidence and working papers. We also reviewed literature cited in UNICEF's rapid review of evidence on the effect of pandemics on child protection (UNICEF, 2020a).

Selection of estimates. We selected the most relevant study describing associations between the COVID-19 pandemic and each exposure variable included in our conceptual framework by applying selection criteria in the following order: relevance to crisis settings (considering studies from pandemics most relevant, followed by other crises), study design (cohort studies, followed by cross-sectional studies), and representativeness (nationally representative, geographically representative, or other), relevant geographical setting (studies from the case-study country, followed by regional and global analyses). Where no quantitative evidence was available, we considered qualitative evidence. We prioritized evidence and projections published by international organizations and by national statistical services where possible. When there was more than one relevant study providing an estimate, we discussed amongst the study team and decided on an estimate by consensus. Effect estimates were extracted and stored into a Google form database that generated Table 2. Further detail on sources of data and explanatory notes for each assumption are provided in Supplementary Table S1.

In the "high restrictions" scenario we assumed that full school closures and movement restrictions would affect children dramatically, with consequences on school attendance and time use. We also assumed important drops in employment (for Nigeria) and happiness, but no changes in wealth distribution or alcohol use. We hypothesized that wealth – relative to income – would be more resistant to shocks and therefore would only be affected over a longer term. We also assumed small changes in household structure linked to internal movements, return migration and conditions of smart working, resulting in crowding. In the "lower restrictions" scenario we assumed re-opening of schools and relied on regional

forecasts on risk of drop-out to formulate our assumptions. We assumed continued effects on employment but a partial recovery of subjective wellbeing as individuals adjust to the COVID-19 context. We also assumed that there would be an increase in both poverty (with consequences on the wealth distribution) and alcohol consumption. We also assumed sustained changes to household structures. These assumptions reflect the availability and quality of the evidence at the time of writing. As new data on the effect of COVID-19 on risk factors for violent discipline become available, these assumptions could be updated.

Modelling approach for the pandemic scenarios. For each case-study country we applied our "high restrictions" and "lower restrictions" assumptions to the mean (or proportion) of each exposure variable calculated for the sample of children included in the multivariable regression model. For each exposure variable we then multiplied the new mean (or proportion) by the corresponding beta coefficient obtained from the multivariable regression model and computed the predicted violence discipline score under each COVID-19 scenario.

Results

Sample Characteristics

The final analytical sample included 1,843 children aged 1-14 years in Nigeria, 1,354 in Mongolia, and 679 in Suriname (Table 3). Prior to COVID-19, the prevalence of any experience of violent discipline in the past month in the full MICS sample of children aged 1-14 was 84.9% in Nigeria, 49.1% in Mongolia, and 87.3% in Suriname. These estimates confirm findings from previous analyses of MICS (Ministry of Social Affairs and Public Housing, 2019; National Bureau of Statistics & UNICEF, 2017; National Statistical Office, 2019). The average violent discipline score among children aged 1-14 years was 32.63 in Nigeria, 7.90 in Mongolia, and 19.75 in Suriname and Figure 2 shows the distribution of the violent discipline score in each country. Supplementary Table S2 includes further detail on

the violent discipline scores. The mean violent discipline score in Nigeria suggests that the

average child experienced either a mix of psychological and physical violence (mild or

severe), or multiple forms of physical violence (mild or severe), or one form of very severe

physical violence in the past month. The score for Mongolia suggests that on average

children experienced primarily one to two forms of psychological violence or one form of

physical violence. In Suriname, on average children were exposed to either multiple forms of

psychological violence and one form of physical violence, or multiple forms of physical

violence, or one severe form of physical violence in the past month.

The mean age of children in the analytical sample was 9 years in each country and the

majority of children in each country had attended school in the past year. In Nigeria and

Mongolia children spent between 6 and 7 hours doing household chores in the past week

compared to 1.5 hours in Suriname. In Nigeria children spent an average of 3.4 hours

engaging in economic activities compared to 0.9 hours in Mongolia and 0.4 hours in

Suriname. Sixty-five percent of household heads agreed that a child needs to be physically

punished to be brought up properly in Nigeria compared to less than 25% of mothers/primary

caregivers in Mongolia and Suriname. Overall, there were no large differences between the

analytical sample and the full sample for each MICS country (Supplementary Table S3).

Base Multivariable Violent Discipline Model

Table 4 shows null and fully adjusted models for each country. In Nigeria, attitudes

supportive of physical punishment were a statistically significant predictor of increased

violent discipline. Higher levels of happiness among young people in the household were

associated with a lower violent discipline score. In Mongolia, children's sex (female) and

older age appeared to be negatively associated with violent discipline, whereas attitudes

supportive of physical punishment were positively associated with violent discipline. Higher

levels of average household happiness were weakly associated with a lower violent discipline

score in Mongolia (p=0.093). In Suriname, attitudes in support of physical punishment were a significant risk factor for increased violent discipline score. Reports of violent discipline from any household member were also positively associated with the presence of the mother in the household. Finally, child's sex (female) and older age, together with higher levels of average household happiness were statistically significant protective factors in Suriname.

Pandemic Scenarios

Tables 5a, 5b and 5c describe associations between the exposures included in our framework and violent discipline under our base scenario, "high restrictions" and "lower restrictions" pandemic scenarios. Although we predicted similar percentage increases in violent discipline across countries, the size of these increases should be interpreted in reference to the base estimate of violent discipline in each country.

In Nigeria, we estimated that the violent discipline score would change from 32.63 prior to COVID-19 to 43.97 in the "high restrictions" scenario, representing a 34.75% increase. In the "lower restrictions" scenario we predicted a violent discipline score for Nigeria of 34.09, which corresponds to a 4.48% increase from the non-pandemic score. In the context of Nigeria, where the initial violent discipline score was higher, these estimated increases under pandemic conditions mean that on average children could be exposed to repeated forms of physical violence or to forms of very severe beating.

In Mongolia, we estimated that the violent discipline score would increase from 7.90 to 11.27, in the "high restrictions" scenario representing a 42.64% increase. In the "lower restrictions" scenario we estimated a violent discipline score of 8.34 which corresponds to a 5.61% increase compared to the base level. Mongolia is one of the countries with the lowest prevalence of violent discipline globally (UNICEF, 2019). Our findings show that although children may become increasingly exposed to violent discipline during periods of high

COVID-19 restrictions the severity and types of violence under COVID-19 restrictions remain relatively lower than in other contexts.

In Suriname, we estimated an increase in the average violent discipline score from 19.75 to 28.81 in the "high restrictions" scenario, representing a 45.86% increase. In the "lower restrictions" scenario we predicted a violent discipline score of 20.63 which corresponds to a 4.47% increase from our base model. In periods of high restrictions, children could be exposed to either a mix of psychological and physical violence, or multiple forms of physical violence, or one form of very severe physical violence in the past month.

The sensitivity analyses conducted with the outcome constructed as a binary variable (results not shown) confirmed the same patterns estimated with the linear modelling approach.

Although the violent discipline score prior to COVID-19 varies by country, these findings suggest that, on average, children may be exposed to more violent discipline as a consequence of COVID-19 measures.

Discussion

Summary of Main Findings

Our findings indicate that the COVID-19 pandemic is likely to affect children's experiences of violent discipline at home. There were large differences in the violent discipline score prior to COVID-19 in each country, which is essential in informing the interpretation of the results from the multivariable models. Under a "high restrictions" COVID-19 scenario we estimate a 35-46% increase in violent discipline scores from their respective base levels in each country. Modelling the longer-term "lower restrictions" scenario, that assumes some easing of restrictions combined with sustained economic effects, suggests a 4-6% increase in violent discipline scores. Our analyses also indicate that

reductions in levels of happiness among household members could be a key driver of increases in violent discipline.

These results should not be interpreted as changes in the proportion or the number of children who have experienced violent discipline as a result of COVID-19 nor are intended to provide cross-country comparisons. Taken together, they point to increases in severity of household violence during successive waves of lockdowns. Results suggest that violence prevention should be central to COVID-19 response measures.

Strengths and Limitations

The approach we used has both strengths and limitations. We used microdata from MICS surveys, which are nationally representative, internationally comparable and available for over 100 countries. The vast majority of these surveys have relevant data on a range of indicators which are affected by COVID-19 and which are associated with violent discipline. Data on violent discipline were collected using the PC-CTS in all settings, which measures whether specific behavioral acts were used against children in households. We acknowledge that whether survey participants define these acts as 'violence' is likely to differ across countries, which has important implications for how results are interpreted. However, our results show that, regardless of differences in interpretation of what constitutes violence, the COVID-19 pandemic is likely to make the average combination of behavioral disciplinary acts that children experience at home more severe.

We found that we were able to operationalize most of the major pathways by which COVID-19 pandemic may have affected violent discipline. This means that we were able to fit a statistical model with robust individual level data to describe the associations between household, child level exposures, relevant covariates, and our violent discipline outcome. We formulated assumptions on how COVID-19 may affect household and child level indicators but relied on survey data to model our base scenario. The multivariable regression modelling

approach we have taken is replicable in other settings and accessible to a range of professionals with adequate training in statistics, and does not require specialist knowledge of mathematical modelling. This analytical approach can be adapted to other datasets and settings, and as new data become available these models could also be updated to reflect emerging evidence.

The limitations of this approach relate mainly to common limitations of modelling. Our approach assumes independence in how COVID-19 affected each individual household and child level exposure, which may have led to overestimation of some of the effects. Although MICS surveys produce a wealth of robust data, we combined data from the men's, women's household, and child datasets and therefore derived our regression equation from an analytic sub-sample of households with 1-14 year-old children which also had data on resident 15-24-year old in Nigeria and 15-49 year old in Suriname and Mongolia.

MICS surveys do not collect income data for household members, and information on employment was only available in the Nigeria survey, among 15-24 year old, and was measured with only one question. This means that the economic effects of COVID-19 on households are likely to be underestimated. Children's time use is not directly captured in the MICS, so we estimated this using proxy variables, which could have biased our estimates upwards or downwards. For simplicity, we assumed that children's time was split between schooling and labor within or outside the household only. School attendance may not adequately capture the longer-term effects of school closures - for example, emerging qualitative data from lockdown suggests that poor young people in Uganda are extremely concerned that they will not be able to return to school and will instead need to spend more time earning income to support their families (Parkes J. et al., 2020). In some countries, COVID-19 has had large impacts on emotional distress. In the MICS data, we made use of an indicator for 'overall happiness' (only measured among 15-24 year old in Nigeria), to capture

some variation in wellbeing and mental health, but this measure is not a validated measure for mental health. If different variables to proxy other mental health impacts had been available, our estimates may have changed up or down. Given that MICS surveys only collect data on violent discipline, our analyses are unable to provide insights into the effects of the pandemic on other forms of violence against children.

We were also limited by the data available to inform the assumptions about how COVID-19 affects household and child exposures in our model. For some variables we could rely on official projections and recent estimates from Nigeria, Mongolia and Suriname, however for other variables we had to use less reliable sources of data extrapolating from literature from past health and economic crises and/or from COVID-19-related evidence generated in very different contexts. This means that the final estimates produced for each country under different scenarios reflect only the assumptions outlined in Table 1. Estimates do not fully reflect the nuances of all restrictions in each country and do not account for mitigation measures. Finally, our modelling approach does not allow us to estimate confidence intervals or other measures of variance or precision of our estimates. We are therefore unable to determine the statistical significance of the predicted changes in violent discipline scores.

In light of these limitations, our study primarily aimed to illustrate a methodological approach to estimate predicted effects of the pandemic on violent discipline in the absence of current population-level data, and in light of current challenges of collecting data on children's experiences of violence (UNICEF, 2020b).

Comparison to Other Literature

There have been a range of efforts to estimate the effects of COVID-19 on various forms of violence; however a recent review of the evidence on COVID-19 and violence against women and children found only three studies that attempted to measure the effects of

the pandemic on children's experiences of violence (Peterman & O'Donnell, 2020). All three studies were conducted in middle to high-income settings and relied on administrative data to assess the effects of the pandemic on reporting of cases of abuse. Sidpra et al. (2020) used data from the Hospital for Children NHS Foundation Trust in London to estimate an increase of 1493% in cases of abusive head trauma in the period between March and April 2020 compared to the 3 previous years (Sidpra, Abomeli, Hameed, Baker, & Mankad, 2020). Using child maltreatment reports from Indiana's Child Protective Services between January and May 2020, Bullinger et al. (2020) found a decline in reported cases in April and May 2020 (Bullinger et al., 2020). Similarly, using child maltreatment case reports from the Mexico City Attorney General's Office, Cabrera-Hernández and Padilla-Romo (2020) used quasi-experimental methods to estimate the effects of school-closures on detection and reporting of cases and found a 21-30% reduction with larger effects among girls and in poorer municipalities (Cabrera-Hernández & Padilla-Romo, 2020). An analysis of data from a survey of 48 child helplines revealed that the number of contacts to helplines has drastically increased during the COVID-19 pandemic and that the number of contacts related to cases of violence has increased in some countries, whereas it decreased in others (Petrowski, Cappa, Pereira, Mason, & Daban, 2020).

Importantly, analyses of reports of violence may not be reflective of changes in prevalence given the existing barriers to reporting and help seeking, particularly in the context of COVID-19. Only one study used a similar modelling approach to estimate the effects of COVID-19 on sexual and reproductive health outcomes relying on survey data (Riley, Sully, Ahmed, & Biddlecom, 2020). To our knowledge our study is the first that relies on large nationally representative survey data from three low- and middle-income countries to estimate the possible effects of COVID-19 on children's experiences of violent discipline.

Implications

Given the high levels of violence against children even prior to the pandemic and the potential impact of COVID-19 measures on risk factors associated with such violence, efforts to prevent and respond to violence against children should, be integrated as essential components of pandemic response and recovery (Bhatia et al., 2020). Although some measures enacted to contain COVID-19, such as school closures, may have reduced children's exposure to specific forms of violence (e.g. school-based violence), children's risk of violence in other settings including their homes and online remains high (Babvey P. et al., 2020).

Increases in violent discipline in our models were driven mainly by large declines in happiness during periods of high COVID-19 restrictions. Wealth and changes to children's time use patterns were comparatively less important, although these findings should be interpreted with caution as there are limitations in how wealth/income and children's time use could be operationalized using MICS data. This important finding supports prioritization of mental health support for caregivers and families as a powerful way to mitigate the impact of the pandemic and reduce children's exposure to violence in the home. Recognizing that times of hardship can also provide a window of opportunity to foster stronger relationships in the family, offering parents and caregivers guidance to build positive relationships and to manage conflict and stress should be a central component of strategies to prevent violence against children during the pandemic and beyond (Cluver et al., 2020). Measures to address families' immediate needs, including paid sick leave for caregivers and child feeding programs, as well as longer-term social protection policies that reduce social inequities are equally fundamental to the pandemic response.

Finally, a concerted effort is needed to improve the availability of quality population-level and administrative data on violence against children (Cappa & Petrowski, 2020). Under most circumstances, it is not advisable to collect data on direct experiences of violence within

pandemic conditions for both ethical and methodological reasons. As restrictions lift, it will

be important to invest in rigorous data collection to understand the impact of COVID-19 on

the levels of violence, including testing model predictions, and to inform prevention and

response strategies.

Conclusion

Violence in all its forms represents an egregious violation of children's right to a safe

and healthy life. In the absence of robust population-level data on violence during COVID-

19, governments and other agencies need to rely on alternative sources of evidence to

formulate their prevention and response efforts. To help inform policy, we explored the

possibilities and limits of using a multivariable predictive regression modelling approach to

quantify changes in violent discipline under two different pandemic scenarios. We provide an

approach which is accessible and can be used to predict changes in levels of violence under

various pandemic scenarios, using robust national datasets and data on COVID-19's impacts.

This framework could be adapted for use with other datasets, in other countries, and

assumptions updated as new data on the impacts of COVID-19 become available.

Governments should plan for substantial increases in violent discipline under successive

waves of 'lockdown' restrictions.

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Tables

Table 1. Conflict Tactics Scale Items

Item	Weighting	Type of violence (as per the Conflict Tactics Scale)
1 Shook him/her	10 (if >=2 years) 20 (if <2 years)	Minor assault (but severe if child is less than 2 years)
2 Shouted, yelled at or screamed at him/her	5	Psychological aggression
3 Spanked, hit or slapped him/her on the bottom with bare hand	10	Minor assault
4 Hit him/her on the bottom or elsewhere on the body with something like a belt, hairbrush, stick or other hard object	10	Minor assault
5 Called him/her dumb, lazy or another name like that	5	Psychological aggression
6 Hit or slapped him/her on the face, head or ears	20	Severe assault
7 Hit or slapped him/her on the hand, arm or legs	10	Minor assault
8 Beat him/her up with an implement (hit over and over as hard as one could)	30	Very severe assault

Table 2. Assumptions Formulation

Definition of variable in MICS	**High Restrictions Assumptions**	**Lower Restrictions Assumptions**
NIGERIA		
School attendance		
Attended school during current school year	89% decrease in attendance	1.03% drop in enrolment
Child labor		
Hours of economic activity (child)	increase of 41% h/w labor	increase of 21% h/w labor
Hours of household chores (child)	increase of 13% h/w household chores	increase of 6.5% h/w household chores
Employment status		
Proportion of young people who have a job	17.32% increase in unemployment	45.02% increase in unemployment
Mental health (subjective wellbeing)		

Average overall happiness among household members aged 15-25 years	50.98% decrease in happiness	7.84% decrease in happiness
Household wealth		
Wealth quintiles	unchanged	8.81% increase in the number of poor
Alcohol use		
Days alcohol was used in the past month (men)	unchanged	0.5 more days of drinking in past month
Days alcohol was used in the past month (women)	unchanged	unchanged
Household structure		
Number of household members	0.1 person increase	0.1 person increase
Female headed household	unchanged	unchanged
MONGOLIA		
School attendance		
Attended school during current school year	89% decrease in attendance	0.71% drop in enrolment
Child labor		
Hours of economic activity (child)	increase of 41% h/w labor	increase of 21% h/w labor
Hours of household chores (child)	increase of 13% h/w household chores	increase of 6.5% h/w household chores
Employment status		
Proportion of young people who have a job	N/A	N/A
Mental health (subjective wellbeing)		
Average overall happiness among household members	50.98% decrease in happiness	7.84% decrease in happiness
Household wealth		
Wealth quintiles	unchanged	26.23% increase in the number of poor
Alcohol use		
Days alcohol was used in the past month (men)	unchanged	0.5 more drinks in past month
Days alcohol was used in the past month (women)	unchanged	unchanged
Household size and composition		
Number of household members	0.1 person increase	0.1 person increase
Female headed household	unchanged	unchanged
SURINAME		
School attendance		
Attended school during current school year	89% decrease in attendance	1.20% drop in enrolment
Child labor		
Hours of economic activity (child)	increase of 41% h/w labor	increase of 21% h/w labor
Hours of household chores (child)	increase of 13% h/w household chores	increase of 6.5% h/w household chores
Employment status		
Proportion of young people who have a job	N/A	N/A
Mental health (subjective wellbeing)		

Average overall happiness among household members	50.98% decrease in happiness	7.84% decrease in happiness
Household wealth		
Wealth quintiles	unchanged	24.47% increase in the number of poor
Alcohol use		
Days alcohol was used in the past month (men)	unchanged	0.5 more drinks in past month
Days alcohol was used in the past month (women)	unchanged	unchanged
Household size and composition		
Number of household members	0.1 person increase	0.1 person increase
Female headed household	unchanged	unchanged

Notes:
- Evidence on school attendance under both scenarios was drawn from UNESCO and UNICEF while we relied evidence from the Ebola epidemic to make assumptions on children's time engagement in household chores and income generating activities.
- Employment (available only in the Nigeria data) was adjusted based on evidence specific to the COVID-19 pandemic.
- Data on subjective wellbeing and alcohol consumption came from a mix of literature from other crisis settings and from the COVID-19 pandemic in other countries.
- Changes in wealth were based on poverty forecasts specific to each case-study country.
- Increases in household size were informed by discussions among authors based on emerging qualitative evidence from ongoing studies.

Table 3. Sample Descriptives

Sample characteristics	Nigeria (n= 1,843)			Mongolia (n=1,354)			Suriname (n=679)		
		% or mean	N		% or mean	N		% or mean	N
Violent discipline score									
		32.6	1,843		7.9	1,354		19.8	679
Attended school during current school year									
No		5.3%	95		3.5%	48		3.2%	30
Yes		94.7%	1,748		96.5%	1,306		96.8%	649
Hours of economic activity in the past week (child)		3.4	1,843		0.9	1,354		0.4	679
Hours of household chores in the past week (child)		7.0	1,843		5.7	1,354		1.5	679
Proportion of young people who have a job (out of all young people in the household)		0.3	1,843		N/A	N/A		N/A	N/A
Average overall happiness among household members		4.5	1,843		4.2	1,354		4.1	679
Days alcohol was used in the past month (men)		1.4	1,843		1.3	1,354		2.7	679
Days alcohol was used in the past month (women)		0.4	1,843		0.5	1,843		0.9	679
Wealth Quintiles [ref=Poorest]									
Poorest		17.4%	267		23.2%	380		20.2%	124
Second		21.1%	348		21.1%	324		26.5%	172
Middle		23.2%	421		15.6%	234		17.8%	136
Fourth		20.3%	398		18.9%	256		20.3%	143
Richest		18.0%	409		21.3%	160		15.2%	104
Number of household members		11.3	1,843		5.0	1,354		6.5	679
Female headed household									
No		97.2%	1,745		95.1%	1,283		62.2%	464
Yes		2.9%	98		4.9%	71		37.8%	215
Child's sex									
Male		50.1%	937		49.1%	673		49.7%	328
Female		50.0%	906		50.9%	681		50.3%	351
Child's age (years)		9.6	1,843		8.9	1,354		9.3	679
Mother in the household									
No		8.3%	208		2.7%	41		10.5%	50
Yes		91.7%	1,635		97.3%	1,313		89.5%	629
Father in the household									
No		6.6%	220		6.4%	97		26.2%	156
Yes		93.4%	1,623		93.6%	1,257		73.8%	523
Education of household head									
None or non-formal education		40.8%	601		8.8%	126		8.2%	43
Primary		20.2%	416		14.6%	230		27.5%	190
Secondary		23.3%	479		53.0%	735		59.0%	406
Higher		15.7%	347		23.5%	263		5.3%	40
Ethnic group of household head									
	Hausa	57.6%	775	Khalkh	77.8%	1,028	Indigenous/Amerindian	29.5%	139
	Igbo	6.2%	218	Kazakh	6.9%	153	Maroon	6.9%	41

	Yoruba	7.2%	222	Other	15.3%	173	Creole	11.3%	89
	Other ethnic group	29.0%	628				Hindustani	24.7%	188
							Javanese	15.3%	129
							Mixed ethnicity	10.5%	80
							Other	1.7%	13
Religion of household head									
	Christian	27.5%	822	Buddhist	48.3%	642	Christianity	53.6%	343
	Islam	71.6%	996	No religion	41.6%	534	Hinduism	19.5%	148
	Other	1.0%	25	Muslim or other	10.0%	178	Islam	15.4%	123
							Traditional or other religion	4.9%	27
							No religion	6.6%	38
Child needs to be physically punished to be brought up properly									
No		34.9%	604		76.5%	1,078		77.5%	542
Yes		65.1%	1,239		23.5%	276		22.5%	137
Average domestic violence norms score (out of 5)		0.4	1,843		0.04	1,843		0.03	679
Urban/rural residence									
Urban		35.8%	581		62.1%	681		69.0%	403
Rural		64.2%	1,262		37.9%	673		31.0%	276
Geopolitical Zones									
	North central	17.2%	410	Western	15.6%	390	Paramaribo	31.7%	197
	North east	24.1%	257	Khangai	18.4%	261	Wanica	32.0%	150
	North west	40.7%	569	Central	17.1%	230	Nickerie	5.4%	72
	South east	4.1%	171	Eastern	7.8%	185	Coronie	1.0%	11
	South south	6.4%	213	Ulaanbaatar	41.2%	288	Saramacca	3.2%	54
	South west	7.6%	223				Commewijne	5.8%	65
							Marowijne	5.0%	45
							Para	7.3%	46
							Brokopondo	5.0%	19
							Sipaliwini	3.8%	20

Table 4. Multilevel Linear Models: Association Between Risk Factors And Violent Discipline Score

	Nigeria				Mongolia				Suriname			
	Coef.	P	95% Confidence Interval		Coef.	P	95% Confidence Interval		Coef.	P	95% Confidence Interval	
	Null model (n= 21,583)				**Null model (n= 11,131)**				**Null model (n= 6,620)**			
Constant	29.78	0.000	28.97	30.60	7.49	0.000	7.09	7.89	19.62	0.000	18.71	20.54
	Analytic sample, null model (n=1,843)				**Analytic sample, null model (n= 1,354)**				**Analytic sample, null model (n=679)**			
Constant	32.63	0.00	30.18	35.08	7.90	0.00	6.72	9.08	19.75	0.00	17.83	21.67
	Fully adjusted model (n=1,843)				**Fully adjusted model (n= 1,354)**				**Fully adjusted model (n=679)**			
Constant	37.00	0.001	15.98	58.02	11.84	0.044	0.30	23.38	35.74	0.000	18.13	53.36
Attended school during current school year (2013-2014) [Ref=No]	-0.51	0.916	-9.92	8.91	1.36	0.617	-3.99	6.71	-2.39	0.544	-10.14	5.36
Hours of economic activity in the past week (child)	0.08	0.550	-0.19	0.35	0.23	0.044	0.01	0.44	0.21	0.424	-0.30	0.72
Hours of household chores in the past week (child)	0.07	0.398	-0.10	0.24	-0.01	0.855	-0.08	0.07	-0.38	0.096	-0.82	0.07
Proportion of young people who have a job (out of all young people in the household)	2.40	0.327	-2.40	7.20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Average overall happiness among household members aged 15-25 years	-4.69	0.006	-8.04	-1.34	-2.10	0.093	-4.54	0.35	-3.32	0.018	-6.06	-0.57
Wealth Quintiles [ref=Poorest]												
Second	-1.23	0.675	-7.00	4.54	2.38	0.159	-0.93	5.69	0.00	1.000	-5.04	5.05
Middle	0.01	0.996	-5.96	5.99	-0.28	0.843	-3.06	2.50	2.93	0.350	-3.23	9.10
Fourth	0.58	0.848	-5.37	6.53	0.02	0.988	-3.31	3.36	1.48	0.588	-3.88	6.84
Richest	-2.16	0.588	-10.01	5.68	0.03	0.989	-4.27	4.33	-0.66	0.877	-8.99	7.67
Days alcohol was used in the past month (men)	-0.03	0.790	-0.29	0.22	-0.26	0.255	-0.72	0.19	-0.01	0.966	-0.32	0.30
Days alcohol was used in the past month (women)	0.04	0.894	-0.49	0.56	0.12	0.696	-0.49	0.74	-0.10	0.658	-0.52	0.33
Number of household members	0.01	0.955	-0.47	0.50	-0.01	0.976	-0.67	0.65	0.29	0.366	-0.34	0.92
Female headed household [ref=No]	14.20	0.088	-2.09	30.49	0.30	0.871	-3.38	3.99	-1.58	0.351	-4.92	1.75
Child's sex [ref=Male]												
Female	-1.38	0.418	-4.72	1.96	-2.97	0.001	-4.79	-1.16	-4.02	0.010	-7.09	-0.95
Child's age	-0.35	0.291	-1.00	0.30	-0.41	0.011	-0.72	-0.09	-0.46	0.098	-1.01	0.09
Mother in the household [ref=No]	3.29	0.299	-2.92	9.50	3.74	0.199	-1.97	9.44	5.20	0.019	0.86	9.53

Father in the household [ref=No]		6.20	0.205	-3.39	15.79		1.76	0.480	-3.13	6.65		3.03	0.118	-0.77	6.84
Education of household head [ref=none or non-formal education]															
Primary		-4.00	0.096	-8.72	0.71		-2.00	0.380	-6.48	2.48		-1.50	0.688	-8.82	5.83
Secondary		0.17	0.949	-5.20	5.55		-1.10	0.618	-5.41	3.22		0.22	0.954	-7.42	7.87
Higher		-2.60	0.421	-8.95	3.74		-0.08	0.971	-4.70	4.53		-4.42	0.389	-14.50	5.66
Ethnic group of household head	[ref=Hausa]					[ref=Khalkh]					[ref=Indigenous/Amerindian]				
	Igbo	1.44	0.756	-7.67	10.55	Kazakh	-2.13	0.274	-5.95	1.69	Maroon	-6.53	0.031	-12.44	-0.61
	Yoruba	9.02	0.147	-3.17	21.21	Other	1.75	0.307	-1.61	5.11	Creole	-3.06	0.335	-9.31	3.18
	Other ethnic group	1.42	0.605	-3.96	6.80						Hindustani	-7.84	0.048	-15.62	-0.06
											Javanese	-8.37	0.036	-16.20	-0.54
											Mixed ethnicity	-10.80	0.000	-16.20	-5.41
											Other	-12.08	0.049	-24.11	-0.05
Religion of household head	[ref=Christian]					[ref=Buddhist]					[ref=Christian]				
	Islam	1.32	0.636	-4.14	6.77	No religion	-2.22	0.049	-4.42	-0.01	Hinduism	3.196	0.354	-3.584	9.976
	Other	-4.66	0.361	-14.66	5.35	Muslim and other	3.81	0.046	0.07	7.55	Islam	5.61	0.103	-1.14	12.35
											Traditional or other religion	-1.81	0.637	-9.35	5.72
											No religion	-1.71	0.640	-8.89	5.48
Child needs to be physically punished to be brought up properly [ref=No]		20.85	0.000	17.19	24.51		5.15	0.000	2.28	8.01		11.102	0	6.9076	15.295
Average domestic violence norms score		4.15	0.077	-0.44	8.74		-0.90	0.807	-8.11	6.32		15.84	0.213	-9.15	40.83
Urban/rural residence [ref=urban]															
Rural		-0.41	0.869	-5.23	4.42		0.50	0.666	-1.79	2.80		-1.17	0.707	-7.26	4.93
Regions/Geopolitical Zones	[ref=North central]					[ref=Western]					[ref= Paramaribo]				
	North east	-10.53	0.001	-16.96	-4.09	Khangai	2.48	0.107	-0.54	5.51	Wanica	1.52	0.515	-3.07	6.10
	North west	-2.32	0.490	-8.90	4.26	Central	2.61	0.124	-0.72	5.94	Nickerie	-5.96	0.021	-11.03	-0.90
	South east	-0.62	0.902	-10.55	9.31	Eastern	2.96	0.093	-0.49	6.42	Coronie	-3.54	0.397	-11.74	4.66
	South south	-3.95	0.220	-10.27	2.37	Ulaanbaatar	4.48	0.022	0.66	8.30	Saramacca	0.70	0.872	-7.84	9.24
	South west	-12.65	0.013	-22.58	-2.72						Commewijne	-3.88	0.276	-10.87	3.11
											Marowijne	1.96	0.640	-6.28	10.20
											Para	0.03	0.994	-7.54	7.60
											Brokopondo	-4.79	0.378	-15.48	5.89
											Sipaliwini	9.42	0.163	-3.84	22.67

Table 5a. Modelling The Effects of COVID-19 on Violent Discipline Score In Nigeria

Exposures	Base model			Scenario 1: High COVID-19 restrictions			Scenario 2: Lower COVID-19 restrictions		
	(A) Proportion or mean	**(B)** Multivariate regression coefficient	**(C)** Violent discipline score for "average child" [A*B]	Assumption	**(E)** Proportion or mean	**(F)** Violent discipline score for "average child" [B*E]	Assumption	**(G)** Proportion or mean	**(H)** Violent discipline score for "average child" [B*G]
Model constant									
Constant		37.00	37.00	N/A	N/A	37.00	N/A	N/A	37.00
Intermediate variables									
Attended school during current school year (child)	0.95	-0.51	-0.48	**89% decrease**	0.10	-0.05	**1.03% decrease**	0.94	-0.47
Hours of economic activity in the past week (child)	3.41	0.08	0.28	**41% increase**	4.81	0.39	**21% increase**	4.13	0.34
Hours of household chores in the past week (child)	7.05	0.07	0.52	**13% increase**	7.96	0.58	**6.5% increase**	7.51	0.55
Proportion of young people who have a job	0.33	2.40	0.78	**17.32% decrease**	0.27	0.65	**45.02% decrease**	0.18	0.43
Average happiness among household members aged 15-25 years	4.54	-4.69	-21.31	**50.98% decrease**	2.23	-10.45	**7.84% decrease**	4.19	-19.64
Wealth Quintiles									
Poorest	0.17		0.00		0.17	0.00		0.26	0.00
Second	0.21	-1.23	-0.26		0.21	-0.26	**8.81% increase in poor**	0.19	-0.23
Middle	0.23	0.01	0.00	**No change**	0.23	0.00		0.21	0.00
Fourth	0.20	0.58	0.12		0.20	0.12		0.18	0.10
Richest	0.18	-2.16	-0.39		0.18	-0.39		0.16	-0.34
Days alcohol was used in the past month (men)	1.43	-0.03	-0.05	**No change**	1.43	-0.05	**0.5 days increase**	1.93	-0.07
Days alcohol was used in the past month (women)	0.36	0.04	0.01	**No change**	0.36	0.01	**No change**	0.36	0.01
Number of household members	11.30	0.01	0.16	**0.1 person increase**	11.40	0.16	**0.1 person increase**	11.40	0.16
Female headed household	0.03	14.20	0.40	**No change**	0.03	0.40	**No change**	0.03	0.40
Other covariates									
Sum of all covariates			15.85			15.85			15.85
Violent discipline score			32.63			43.97			34.09
Change in violent discipline score					**34.75%**			**4.48%**	

Table 5b. Modelling The Effects of COVID-19 on Violent Discipline Score In Mongolia

Exposures	Base model			Scenario 1: High COVID-19 restrictions			Scenario 2: Lower COVID-19 restrictions		
	(A) Proportion or mean	**(B)** Multivariate regression coefficient	**(C)** Violent discipline score for "average child" [A*B]	Assumption	**(E)** Proportion or mean	**(F)** Violent discipline score for "average child" [B*E]	Assumption	**(G)** Proportion or mean	**(H)** Violent discipline score for "average child" [B*G]
Model constant									
Constant		11.84	11.84	N/A	N/A	11.84	N/A	N/A	11.84
Intermediate variables									
Attended school during current school year (child)	0.97	1.36	1.32	**89% decrease**	0.11	0.14	**0.71% decrease**	0.96	1.31
Hours of economic activity in the past week (child)	0.92	0.23	0.21	**41% increase**	1.30	0.29	**21% increase**	1.11	0.25
Hours of household chores in the past week (child)	5.66	-0.01	-0.04	**13% increase**	6.39	-0.04	**6.5% increase**	6.02	-0.04
Proportion of young people who have a job	N/A	N/A	N/A	**N/A**	N/A	N/A	**N/A**	N/A	N/A
Average happiness among household members	4.18	-2.10	-8.75	**50.98% decrease**	2.05	-4.29	**7.84% decrease**	3.85	-8.06
Wealth Quintiles									
Poorest	0.23				0.23	0.00		0.49	0.00
Second	0.21	2.38	0.50		0.21	0.50		0.14	0.34
Middle	0.16	-0.28	-0.04	**No change**	0.16	-0.04	**26.23% increase in poor**	0.09	-0.03
Fourth	0.19	0.02	0.00		0.19	0.00		0.12	0.00
Richest	0.21	0.03	0.01		0.21	0.01		0.15	0.00
Days alcohol was used in the past month (men)	1.31	-0.26	-0.35	**No change**	1.31	-0.35	**0.5 additional days**	1.81	-0.48
Days alcohol was used in the past month (women)	0.49	0.12	0.06	**No change**	0.49	0.06	**No change**	0.49	0.06
Number of household members	5.04	-0.01	-0.05	**0.1 person increase**	5.14	-0.05	**0.1 person increase**	5.14	-0.05
Female headed household	0.05	0.30	0.01	**No change**	0.05	0.01	**No change**	0.05	0.01
Other covariates									
Sum of all covariates			3.18			3.18			3.18
Violent discipline score			7.90			11.27			8.34
Change in violent discipline score					**42.64%**			**5.61%**	

Table 5c. Modelling The Effects of COVID-19 on Violent Discipline Score In Suriname

Exposures	Base model			Scenario 1: High COVID-19 restrictions			Scenario 2: Lower COVID-19 restrictions		
	(A) Proportion or mean	(B) Multivariate regression coefficient	(C) Violent discipline score for "average child" [A*B]	Assumption	(E) Proportion or mean	(F) Violent discipline score for "average child" [B*E]	Assumption	(G) Proportion or mean	(H) Violent discipline score for "average child" [B*G]
Model constant									
Constant		35.74	35.74	N/A	N/A	35.74	N/A	N/A	35.74
Intermediate variables									
Attended school during current school year (child)	0.97	-2.39	-2.31	**89% decrease**	0.11	-0.25	**1.20% decrease**	0.96	-2.29
Hours of economic activity in the past week (child)	0.42	0.21	0.09	**41% increase**	0.59	0.12	**21% increase**	0.51	0.11
Hours of household chores in the past week (child)	1.52	-0.38	-0.57	**13% increase**	1.72	-0.65	**6.5% increase**	1.62	-0.61
Proportion of young people who have a job	N/A	N/A	N/A	**N/A**	N/A	N/A	**N/A**	N/A	N/A
Average overall happiness among household members	4.15	-3.32	-13.75	**50.98% decrease**	2.03	-6.74	**7.84% decrease**	3.82	-12.67
Wealth Quintiles									
Poorest	0.20		0.00		0.20	0.00		0.45	0.00
Second	0.26	0.00	0.00		0.26	0.00		0.20	0.00
Middle	0.18	2.93	0.52	**No change**	0.18	0.52	**24.47% decrease**	0.12	0.34
Fourth	0.20	1.48	0.30		0.20	0.30		0.14	0.21
Richest	0.15	-0.66	-0.10		0.15	-0.10		0.09	-0.06
Days alcohol was used in the past month (men)	2.73	-0.01	-0.02	**No change**	2.73	-0.02	**0.5 additional days**	3.23	-0.02
Days alcohol was used in the past month (women)	0.94	-0.10	-0.09	**No change**	0.94	-0.09	**No change**	0.94	-0.09
Number of household members	6.50	0.29	1.89	**0.1 person increase**	6.60	1.92	**0.1 person increase**	6.60	1.92
Female headed household	0.38	-1.58	-0.60	**No change**	0.38	-0.60	**No change**	0.38	-0.60
Other covariates									
Sum of all covariates			-1.35			-1.35			-1.35
Violent discipline score			19.75			28.81			20.63
Change in violent discipline score					**45.86%**			**4.47%**	