Abstract

School disruptions during public health emergencies (PHEs) have a detrimental effect on students, families and societies, and exacerbate pre-existing education inequalities. Built on OECD's six education equity policy options and PROGRESS-Plus framework, this systematic review produced a narrative account of consequences of and barriers to access to primary and secondary educational policies and interventions implemented during PHEs through an equity lens. By examining 52 included studies, the review found that disadvantaged learners lacked reliable access to essential learning materials and resources. Families from disadvantaged socio-economic background and those with learning difficulties required extra support services during remote learning. Schools faced unique challenges in delivering inclusive teaching during PHEs. Recommendations were provided for practitioners to uphold education equity during school disruptions.

Keywords: education policy, equity, public health emergency, school disruption, systematic review

1. Introduction

In the midst of a global health pandemic, education systems around the world are struggling to provide continuity of teaching and uphold quality and inclusiveness while putting in place safeguards to minimise risks of infection. As the outbreak of coronavirus disease 2019 (COVID-19) escalated to become a global health pandemic, governments in more than 180 countries temporarily closed schools in an effort to control the spread of the disease. Globally, 94 percent of learners were affected, representing 1.58 billion children and youth from pre-primary to higher education (United Nations [UN], 2020c).

School disruption of this scale has a short and long-term detrimental effect on individuals, communities, and societies. Prolonged school closures are likely to have severe consequences and long-term effects on children and young people's livelihoods, learning and economic opportunities, and psychological health. The crisis is also exacerbating pre-existing education inequalities with an increased risk of learning loss and dropping out for the most disadvantaged groups, such as those living in remote and poor areas, girls and people with disabilities or special learning needs (Global Partnership for Education, 2020; UN, 2020b). Furthermore, the adverse impact of education disruption has gone beyond the education sector. School closures hinder students' access to nutritious food, affect parents' ability to work, and increase risks of violence against women and girls (Krentz et al., 2020; UN, 2020a; World Food Programme, n.d.).

To cope with the prolonged school closure, education systems around the world have implemented a wide range of educational policies and interventions, from distance learning to teacher training support, from school feeding initiatives to mental health counselling. Despite the quick and innovative response, disadvantaged groups who tend to have poor digital skills, less parental support and limited access to hardware and internet are less likely to benefit from these interventions (UN, 2020c). For example, children in the poorest households

receive significantly less help with their homework (Mishra et al., 2020). Such disparity has led to a series of unanswered questions in the context of public health emergencies (PHEs): What action has been taken to ensure the educational provision for disadvantaged groups? How have education polices and interventions affected participants with different characteristics? Which responses are effective in providing inclusive education for all?

Various studies investigated the consequences of school disruptions and reported a disproportionately negative impact on disadvantaged students, parents, teachers and schools (Boldt et al., 2021; Cachón-Zagalaz et al., 2020; Cauchemez et al., 2014; Coe et al., 2020; Kneale et al., 2020; Viner et al., 2020). There is, however, limited evidence on educational policies and interventions that may have tackled or aggravated these disparities. Understanding the challenges and consequences of educational policies and interventions on learners, families and various stakeholders' experiences implemented during school disruption is crucial to inform decisions and improve the current education system towards inclusiveness and resilience. To address this gap, this study aimed to conduct a global evidence review on how educational policies and interventions affect and address inequalities in primary and secondary education in the context of PHEs.

2. Methods

The present review adhered to the Preferred Reporting Items for Systematic Reviews and Meta Analyses-Equity 2012 extension guidance (Welch et al., 2012). Before conducting the review, a protocol was developed and registered in PROSPERO (No.CRD42020196650).

2.1. Eligibility criteria

This review focused on studies reporting evidence of equity in primary and secondary educational policies and interventions in response to Public Health Emergencies of International Concern defined by World Health Organisation (WHO) since 2007. Any studies focusing on education policies and intervention programmes including, but not limited to, homeschooling, distance learning, school meals, school management, parental support, mental health counselling and teacher support were included in the review. We included studies published in English from 2000 (see Appendix A for eligibility criteria).

2.2. Searching, screening and data extraction

A systematic search was conducted to locate relevant studies in major bibliographic databases, including MEDLINE, EMBASE, PsyInfo, British Education Index, Education Resources Information Centre, Web of Science, Child Development and Adolescent studies, CINHAL Plus, Econlit, Education Abstracts, Education Administration Abstracts and Education Source. Search strings were developed for three key concepts: educational polices and intentions, primary and secondary education and PHEs (see Appendix B), which were adapted for each database.

Search results were imported to EPPI-Reviewer 4 software (Thomas, Brunton & Graziosi, 2010). Two reviewers screened a subset of citations by applying the eligibility criteria. Any differences were resolved through discussions. Each citation was initially screened on the basis of titles and abstracts. A full report was obtained when there was insufficient information to assess relevance. Those citations that met the eligibility criteria

were screened again based on the full text papers. A specifically designed coding tool was then used to extract data from each included study on geographical location, PHE context, school setting, type of education interventions and policies, target population, equity focus, outcome, and study design.

2.3. Synthesis of evidence

We adopted a synthesis approach to organise and analyse the findings from the primary studies using a framework for identifying and mitigating the equity harm of COVID-19 policy interventions (Glover et al., 2020). This approach brings together research evidence informed by a priori framework of themes and concepts (Barnett-Page & Thomas, 2009; Gough et al., 2012). In this review, we built on two frameworks to understand to what extent educational policies and interventions responding to PHEs may face challenges and affect equity in young people's learning, health and well-being. Organisation for Economic Co-operation and Development (2020) described six policy options to ensure equity and inclusion in education during school closures, namely, access to learning resources, access to good learning conditions, information in different languages, meeting emotional needs, access to extra services and support for teachers and teaching staff. These policy options were used as the initial domains to categorise the data from the included studies. Additional domains were added as new evidence emerged. Findings under each domain were then examined by various equity dimensions of PROGRESS-Plus framework, namely, place of residence, race/ethnicity/culture/language, occupation, gender/sex, religion, education, socioeconomic status (SES), social capital, personal characteristics associated with discrimination, features of relationships and time-dependent relationships (Oliver et al., 2008). This review produced a narrative account of a) the scope and characteristics of existing literature; b) consequences of and barriers to access to educational policies and

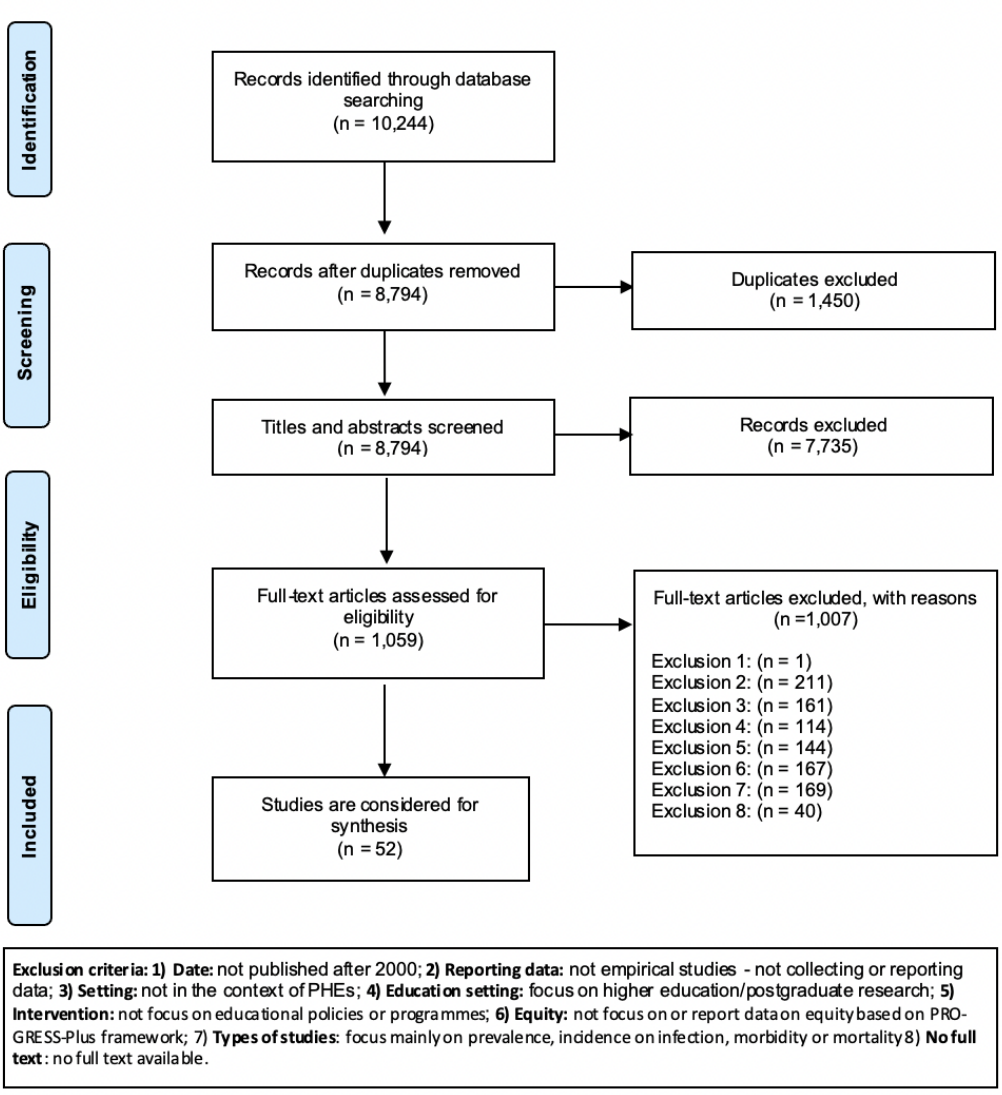
interventions implemented during PHEs with a focus on equity; and c) recommendations for future practice.

3. Results

Of the 8,794 peer-reviewed journal articles identified, 1,059 publications were included for full text screening based on titles and abstracts. Fifty-two publications meeting the eligibility criteria were eventually included for evidence synthesis. The complete process of selection is detailed in Figure 1.

Figure 1

PRISMA Flow Diagram of the Study Selection Process



3.1. Study scope and characteristics

Table 1 describes included studies in terms of settings, public health context, study design, interventions, equity dimensions, and policy domain. Geographically, studies

included covered a total of 31 countries, including 17 high-income countries (Australia, Belgium, Croatia, Cyprus, Denmark, Germany, Ireland, Israel, Italy, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, United Kingdom [UK] and United States of America [USA]), 12 middle-income countries, including seven upper-middle-income countries (Brazil, China, Ecuador, Georgia, Jordan, Mexico and South Africa) and five lower-middle-income countries (Belize, Cameroon, Indonesia, Philippines and Zimbabwe), and two low-income countries (Ethiopia and Sierra Leone) based on World Bank's classification in 2021. The majority of studies were conducted in the context of COVID-19. In terms of the study design, this review included 22 quantitative studies, 24 qualitative studies and six mixed-methods studies.

A total of 13 types of educational policies and interventions were discussed, among which distance learning was reported in 27 studies, home learning/schooling in 18 studies and food programme in four studies. Other educational policies and interventions included radio, call-in session, teacher training, parent engagement, online resources, school community' s response, micro strategy management, education policy, TV programme and inquiry-based stress reduction intervention. The majority of the interventions (n=47) targeted at students or young people. The impact of educational policies and interventions in responding to PHEs on students from low-income families or those with disadvantaged socioeconomic background were most commonly reported in the included studies. We identified and described six policy domains responding to the needs of students, families and schools during PHEs, including access to learning resources such as technology and education materials, access to good learning environment such as parent support and engagement, students' emotional needs, access to extra services such as school meals, provision to support for teachers and teaching staff, and education and school policies. We found the impact of educational policies and interventions implemented during PHEs in 33

studies on educational outcomes (including students' time spent on learning, performance, attainment and attendance) or/and teaching outcomes (including teaching quality, assessment and classroom management).

Table 1

A description of the included studies (n=52)

Studies	Country	PHE	Study design (Data type)	Interventions	Equity dimensions	Domains/impact of education policies and practices
1. Al Salman et al, 2021	Jordan Upper-middle income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary and secondary education	Place of residence Gender/sex Education	Educational outcomes
2. Andrew et al., 2020	UK High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** primary and secondary education	SES Personal characteristics (age)	Access to learning resources Educational outcomes
3. Asanov et al., 2021	Ecuador Upper-middle income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** secondary education	Race/ethnicity/culture/language Gender/sex SES Personal characteristics (age)	Access to learning resources Educational outcomes
4. & Fajri, 2021	Indonesia Lower-middle income	COVID-19	Mixed methods (survey & interview data)	**Type:** distance learning **Target population:** students or young people **School setting:** secondary education	SES	Access to learning resources Access to good learning conditions
5. Bansak & Starr, 2020	USA High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling; distance learning **Target population:** students or young people **School setting:** primary and secondary education	Education SES	Access to learning resources Access to good learning conditions Educational outcomes
6. Barnett et al., 2018	Sierra Leone Low income	Ebola	Mixed methods (survey & interview data)	**Type:** radio broadcast; call-in session; teacher training; parent engagement **Target population:** students or young people **School setting:** primary education	Gender	Emotion needs Educational outcomes
7. Béché, 2020	Cameroon Lower-middle income	COVID-19	Qualitative (document, interview data & observation)	**Type:** distance learning **Target population:** students or young people **School setting:** primary and secondary education	Place of residence	Access to learning resources
8. Becker et al., 2020		COVID-19	Quantitative (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** secondary education	SES Personal characteristics (special needs)	Access to learning resources Access to good learning conditions Access to extra services

Studies	Country	PHE	Study design (Data type)	Interventions	Equity dimensions	Domains/impact of education policies and practices
						Educational outcomes
9. Belay, 2020	Ethiopia Low income	COVID-19	Qualitative (document)	**Type:** distance learning **Target population:** students or young people; teachers **School setting:** primary and secondary education	Place of residence SES	Access to learning resources
10. Bonotto et al., 2020	Brazil Upper-middle income	COVID-19	Qualitative (online posts)	**Type:** online resources **Target population:** students or young people **School setting:** N/A	Personal characteristics (special needs)	Access to learning resources
11. Braunack-Mayer et al., 2013	Australia High income	H1N1	Qualitative (interview data)	**Type:** school community's response **Target population:** students or young people; parents; teachers; school leaders **School setting:** primary and secondary education	Race/ethnicity/culture/language	Education and school policies
12. Bubb & Jones, 2020	Norway High income	COVID-19	Mixed methods (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** primary and secondary education	Personal characteristics (age)	Access to good learning conditions Educational outcomes Teaching outcomes
13. Cahapay, 2020	Philippines Lower-middle income	COVID-19	Qualitative (interview data)	**Type:** home learning/schooling **Target population:** parents **School setting:** N/A	Personal characteristics (special needs)	Access to good learning conditions Teaching outcomes
14. Canning & Robinson, 2021	UK High income	COVID-19	Qualitative (interview data)	**Type:** home learning/schooling **Target population:** students or young people; parents **School setting:** N/A	Personal characteristics (special needs)	Access to learning resources Access to good learning conditions Emotion needs Educational outcomes
15. Catalano et al., 2021	USA High income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary and secondary education	Place of residence Race/ethnicity/culture/language SES Personal characteristics (special needs)	Educational outcomes Teaching outcomes
16. Corrêa et al., 2020	Brazil Upper-middle income	COVID-19	Quantitative (existing data)	**Type:** school feeding programme **Target population:** students or young people; parents **School setting:** primary and secondary education	SES	Extra services
17. Couper-Kenney & Riddell, 2021	UK (Scotland) High income	COVID-19	Qualitative (interview data)	**Type:** home learning/schooling; distance learning **Target population:** students or young people **School setting:** N/A	Personal characteristics (special needs and disabilities)	Access to learning resources Access to good learning conditions Emotion needs

Studies	Country	PHE	Study design (Data type)	Interventions	Equity dimensions	Domains/impact of education policies and practices
						Educational outcomes
18. Dietrich et al., 2021	Germany High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** secondary education	SES	Educational outcomes
19. Dike et al., 2021	Indonesia Lower-middle income	COVID-19	Qualitative (interview data & observation)	**Type:** distance learning; micro strategy management **Target population:** students or young people **School setting:** primary education	SES	Access to learning resources Educational outcomes
20. Dube, 2020	South Africa Upper-middle income	COVID-19	Qualitative (participatory action)	**Type:** distance learning **Target population:** students or young people **School setting:** secondary education	Place of residence	Access to learning resources Support for teachers and teaching staff
21. Gornik et al., 2020	Slovenia High income	COVID-19	Qualitative (interview data & observation)	**Type:** distance learning **Target population:** students or young people; teachers **School setting:** primary and secondary education	SES	Access to learning resources
22. Greenway & Eaton-Thomas, 2020	UK High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** primary and secondary education	SES Personal characteristics (special needs and disabilities)	Access to learning resources Access to good learning conditions Emotion needs Educational outcomes
23. Gross & Opalka, 2020	USA High income	COVID-19	Quantitative (existing data)	**Type:** distance learning **Target population:** students or young people **School setting:** N/A	Place of residence SES	Teaching outcomes
24. Hash, 2021	USA High income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary and secondary education	Personal characteristics (age) School characteristics	Access to learning resources Educational outcomes
25. Karasel Ayda et al., 2020	Cyprus High income	COVID-19	Qualitative (interview data)	**Type:** distance learning **Target population:** students or young people; teachers **School setting:** primary education	Personal characteristics (special needs)	Access to learning resources Educational outcomes
26. Kim & Padilla, 2020	USA High income	COVID-19	Qualitative (survey & interview data)	**Type:** distance learning **Target population:** students or young people **School setting:** N/A	Race/ethnicity/culture/language SES	Access to learning resources Access to good learning conditions Educational outcomes
27. Kingsbury, 2021	USA High income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary and secondary education	Race/ethnicity/culture/language SES School characteristics	Teaching outcomes

Studies	Country	PHE	Study design (Data type)	Interventions	Equity dimensions	Domains/impact of education policies and practices
28. Kirshner, 2020	Belize Lower-middle income	COVID-19	Qualitative (interview & focus group discussion data)	**Type:** distance learning; radio broadcast **Target population:** students or young people **School setting:** N/A	Place of residence SES	Access to learning resources Support for teachers and teaching staff
29. Korzycka et al., 2021	Poland High income	COVID-19	Mixed methods (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** secondary education	Place of residence Gender/sex SES Personal characteristics (age)	Access to learning resources Educational outcomes
30. Li et al, 2020	USA High income	COVID-19	Qualitative review (document)	**Type:** education policy **Target population:** students or young people **School setting:** primary and secondary education	Race/ethnicity/culture/language Gender/sex SES Personal characteristics (age)	Education and school policies
31. Ma et al., 2021	China Upper-middle income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary and secondary education	Place of residence Education SES Personal characteristics (age) School characteristics	Educational outcomes
32. Mælan et al., 2021	Norway High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling; distance learning **Target population:** students or young people **School setting:** secondary education	Personal characteristics (levels of achievement)	Emotion needs Educational outcomes
33. Mailizar et al., 2020	Indonesia Lower-middle income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** students or young people **School setting:** secondary education	Education SES	Support for teachers and teaching staff Teaching outcomes
34. Majoko & Dudu, 2020	Zimbabwe Lower-middle income	COVID-19	Qualitative (interview data, document & observation)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** N/A	Personal characteristics (special needs)	Access to learning resources Access to good learning conditions
35. McLoughlin et al., 2020	USA High income	COVID-19	Mixed methods (document)	**Type:** school meals **Target population:** students or young people **School setting:** primary and secondary education	SES	Access to extra services
36. Ng et al., 2021	Europe High income	COVID-19	Quantitative (survey data)	**Type:** school community's response **Target population:** teachers **School setting:** N/A	Personal characteristics (special needs)	Teaching outcomes
37. Nusser, 2021	Germany High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** secondary education	Personal characteristics (special needs)	Access to good learning conditions Educational outcomes

Studies	Country	PHE	Study design (Data type)	Interventions	Equity dimensions	Domains/impact of education policies and practices
38. Pajarianto et al., 2020	Indonesia Lower-middle income	COVID-19	Quantitative (survey data)	**Type** home learning/schooling **Target population:** students or young people **School setting:** secondary education	Religion	Emotion needs
39. Parnham et al., 2020	UK High income	COVID-19	Quantitative (survey data)	**Type:** food voucher **Target population:** students or young people **School setting:** primary and secondary education	Place of residence SES Personal characteristics (age)	Access to extra services
40. Peterson et al., 2020	USA High income	COVID-19	Qualitative (document)	**Type:** distance learning; school meals **Target population:** school leaders **School setting:** primary and secondary education	SES Personal characteristics (special needs)	Access to extra service
41. Popyk, 2021	Poland High income	COVID-19	Qualitative (interview data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary education	Personal characteristics (migrants)	Access to good learning conditions Emotion needs Educational outcomes
42. Pozas et al., 2021	Germany High income Mexico Upper-middle income	COVID-19	Qualitative (interview data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** primary education	SES Personal characteristics (special needs)	Teaching outcomes
43. Reimer et al., 2021	Denmark High income	COVID-19	Quantitative (administrative & new digital data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** secondary education	Gender/sex SES	Educational outcomes
44. Sánchez-Cruz et al, 2021	Mexico Upper-middle income	COVID-19	Qualitative review (document)	**Type:** home learning/schooling; radio broadcasts **Target population:** school leaders **School setting:** N/A	Place of residence Race/ethnicity/culture/language	Access to learning resources
45. Scully, Lehane & Scully, 2020	Ireland High income	COVID-19	Quantitative (survey data)	**Type:** distance learning **Target population:** school leaders **School setting:** secondary education	School characteristics	Teaching outcomes
46. Svalina & Ivic, 2020	Croatia High income	COVID-19	Qualitative (interview data)	**Type:** distance learning **Target population:** students or young people **School setting:** secondary education	Personal characteristics (disability)	Teaching outcomes
47. Tabatadze & Chachkhiani, 2021	Georgia Upper-middle income	COVID-19	Qualitative (document)	**Type:** distance learning; online resources; TV programme **Target population:** students or young people; parents; teachers; school leaders **School setting:** primary and secondary education	Race/ethnicity/culture/language SES	Access to learning resources Access to good learning conditions Support for teachers and teaching staff Education and school policies

Studies	Country	PHE	Study design (Data type)	Interventions	Equity dimensions	Domains/impact of education policies and practices
						Educational outcomes Teaching outcomes
48. Thorell et al., 2021	UK; Germany; Italy; Sweden; Spain; Belgium; Netherlands High income	COVID-19	Quantitative (survey data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** primary and secondary education	Personal characteristics (special needs; age)	Emotion needs
49. Toquero, 2020	Philippines Lower-middle income	COVID-19	Qualitative (document & interview data)	**Type:** education policy **Target population:** students or young people **School setting:** N/A	Personal characteristics (disabilities)	Access to learning resources
50. Wang, 2020	China Upper-middle income	COVID-19	Qualitative (interview data)	**Type:** home learning/schooling **Target population:** students or young people **School setting:** primary education	Place of residence Gender/sex SES	Access to learning resources Access to good learning conditions Emotion needs Educational outcomes
51. Wang et al., 2021	China Upper-middle income	COVID-19	Qualitative (interview data)	**Type:** distance learning **Target population:** students or young people **School setting:** primary education	Occupation	Teaching outcomes
52. Zadok-Gurman et al., 2021	Israel High income	COVID-19	Mixed methods (controlled trial data)	**Type:** Inquiry-Based Stress Reduction Intervention **Target population:** students or young people **School setting:** N/A	Gender/sex Personal characteristics (age)	Support for teachers and teaching staff

3.2. Uneven access to learning resources

Twenty-four studies discussed education policies and interventions during PHEs regarding inequalities in accessing to learning resources, learning devices and technologies as well as educational materials. All of the studies that focused on distance learning and homeschooling, reported that disadvantaged students had challenges in accessing to learning resources, including those who were from remote areas (Béché, 2020; Belay, 2020; Couper-Kenney & Riddell, 2021; Dube, 2020; Hash, 2021; Korzycka et al., 2021; Sánchez-Cruz et al, 2021), from ethnic minorities backgrounds (Asanov et al., 2021; Kim & Padilla, 2020; Sánchez-Cruz et al, 2021; Tabatadze & Chachkhiani, 2021), from low-income households (Asanov et al., 2021; Azhari & Fajri, 2021; Bansak & Starr, 2020; Becker et al., 2020; Belay,

2020; Kim & Padilla, 2020; Kirshner, 2020; Peterson et al., 2020; Pozas et al., 2021; Tabatadze & Chachkhiani, 2021) and/or those studying in high poverty schools (Hash, 2021). Students from low-income families often experienced inadequate, unstable and unaffordable access to electricity, internet and digital devices, which interrupted or even hindered them from online learning. The situation was worsened when their siblings at the same household engaged in online learning at the same time (Gornik et al., 2020; Kim & Padilla, 2020; Tabatadze & Chachkhiani, 2021).

Four studies reported mitigation measures to reduce this inequality. Peterson et al. (2020) through document analysis found that schools in rural America provided support to families without internet access by identifying free local internet services. They also prioritised the provision of digital devices for special education and English learner students. Educators in Belize used radio and TV broadcasts to reach marginalised students in remote areas without internet connectivity (Kirshner, 2020). In Indonesia, some schools used text messages and telephone to inform students and their parents to come to school to complete assignments (Dike et al., 2020). For students whose parents were away or incapable of using digital technology to support their children's learning, some schools organised special mentoring sessions for them to get equal and fair learning services. Other teachers conducted distance teaching in WhatsApp instead of online learning platforms, so that students could keep up with the learning without costing their parents too many internet fees (Azhari & Fajri, 2021).

Beyond limited access to internet and devices, students who spoke minority languages, had special needs, or from disadvantaged socioeconomic background often had insufficient and inappropriate educational resources. A qualitative study found that the lack of educational materials in relevant or local languages could increase disparity in accessing to resources by language minority groups (Sánchez-Cruz et al., 2021). For example, one

qualitative study in Georgia found that non-Georgian speakers could not take advantage of the educational materials posted at the government website, as all resources were published in the local language (Tabatadze & Chachkhiani, 2021). In Gornik et al. (2020), several schools in Slovenia provided computers or tablets for migrant learners, but only allocated limited time to teach migrant children how to use online platforms that were not in their mother tongue. For students with special needs and disabilities, there were insufficient educational applications or materials that were designed to meet their specific learning needs (Greenway & Eaton-Thomas, 2020; Karasel Ayda et al., 2020; Toquero, 2020). As a result, parents were often responsible for supporting their children's access to learning resources. In Couper-Kenney and Riddell (2021), half of the parent participants of interviews needed to create, identify, filter or translate educational materials for their children with special needs and disabilities. Parent interviewees in Majoko and Dudu (2020) drew interventions for their children with autism from the internet because of the inaccessibility of therapy services during lockdown. In addition, Andrew et al. (2020) using quantitative real-time survey data found that poorer children had less access to active school support for home learning because their schools were more likely to support them through passive means, such as assignment of learning packs, instead of active means such as online classes and video conferencing.

Evidence also revealed the importance of the provision to support learners' effective usage of resources by addressing their specific needs. One qualitative study reported that some rural children failed to utilise online communication tools due to inability to type (Wang, 2020). Korzycka et al. (2021) adopting a mixed-methods approach found that girls, more often than boys, encountered technical problems and lack of sufficient knowledge or skills to operate the computer for online learning. Two studies reported the provision that supported the learning of students with complex communication needs or disabilities. By qualitatively analysing online posts, Bonotto et al. (2020) described the initiative that used

the technology to identify and curate augmentative and alternative communication materials on Instagram that mediated communication in the limitation or absence of speech. In Peterson et al. (2020), schools dedicated technology coaches to onboard families without previous connection with communication apps and made sure that families with potential language barriers could use resources effectively.

3.3. Challenges in accessing good learning conditions

With a focus on social dimensions of students' learning, 14 studies discussed inequalities in accessing to good learning conditions during the PHEs such as students' physical learning environments and parental involvement in children's learning. Since lockdown policies and restrictions during the pandemics compelled most students to stay at home, their living spaces played an important role in their homeschooling learning environments. The findings from the included studies suggested that students who lived in rural areas and low-income households often lacked access to a quiet and private working space due to their minimal living spaces (Kim & Padilla, 2020; Tabatadze & Chachkhiani, 2021; Wang, 2020). In Wang (2020), rural girls usually studied in a communal space, where the whole family slept and conducted daily chores. Although their parents understood the importance of a conducive at-home education environment, they often failed to provide one due to intensified family confinement. In most cases, schools were not able to provide targeted and differentiated support to students in need (Tabatadze & Chachkhiani, 2021).

In addition, disparities existed in the availability and quality of parental support for their children's learning during homeschooling. Parents of younger children, those with disabilities, having low achievement levels, or having migrant status needed to invest more efforts to support their children's adaptation to the new normal, as those children, particularly, felt confused and restricted when transitioning from school to home learning (Becker et al., 2020; Cahapay, 2020; Canning & Robinson, 2021; Couper-Kenney & Riddell,

2021; Gornik et al., 2020; Nusser, 2021; Majoko & Dudu, 2020; Popyk, 2021; Tabatadze & Chachkhiani, 2021). Low-income parents were less present and experienced challenges in providing support for their children's learning (Azhari & Fajri, 2021; Kim & Padilla, 2020). Migrant parents found it difficult to support their children's schoolwork with their limited mainstream language knowledge and digital literacy skills (Gornik et al., 2020). However, the findings also suggested that when given access to similar resources, parents of disadvantaged children could contribute to sustaining their children's learning to a similar degree, regardless of their educational attainment, and schools could play a crucial role for supporting parents and students' learning (Greenway & Eaton-Thomas, 2020; Bansak & Starr, 2020).

Providing support and involvement in children's learning during online classrooms can affect parents' financial, physical and emotional wellbeing to a varying extent. While some parents found it enjoyable and inspiring to understand and spend more time with their children (Bubb & Jones, 2020; Greenway & Eaton-Thomas, 2020), most parents found it hard to juggle home-schooling, work and home-life, which caused them huge physical and emotional burden. In particular, parents of children with special needs, disabilities and low achievement levels felt exhausted and stressful for their educational responsibilities (Canning & Robinson, 2021; Couper-Kenney & Riddell, 2021; Greenway & Eaton-Thomas, 2020; Nusser, 2021; Wang, 2020). For example, comparing to parents of children without additional needs, parents with autistic children were under extra stress to constantly remind their children to sit still during an online session for children to meet their new classmates for next term, because they were worried that other parents would judge their child's behaviour (Canning & Robinson, 2021). They were also concerned that equity was not addressed by schools in supporting their children or recognising the extra work parents had to do to enable children to participate in online lessons. In addition, Becker et al. (2020) using quantitative

survey data indicated that families with incomes below the U.S. median were more likely than families with incomes above the U.S. median to incur a financial burden for homeschooling.

While few studies explored measures to improve the homeschooling experiences of children and their parents, some found that school support and parents' relationship with teachers and schools were decisive. Parents who felt well-supported by the school or maintained a good relationship with teachers reported significantly less challenges with respect to at-home learning for their child (Bubb & Jones, 2020; Nusser, 2021). Effective communication channels between parents and schools helped to solve many administrative and organisational problems related to emergency remote teaching (Tabatadze & Chachkhiani, 2021).

3.4. Limited extra support and services offered to disadvantaged students

Four studies discussed inequalities in accessing essential school services such as school meals during school closures during PHEs, which can lead to food insecurity and poor health outcomes of children from disadvantaged families (Parnham et al., 2020; Corrêa et al., 2020; McLoughlin et al., 2020; Peterson et al., 2020). Parnham et al. (2020) investigated access to Free School Meals in the UK using the UK Household Longitudinal Survey. The findings suggested that children from poor income households who were not in school during the lockdown may have difficulties in accessing the Free School Meals programme. The study also highlighted that children in early year education were less likely to have access to school meal services compared to older children. The school feeding programme in Brazil faced operational challenges during the pandemic in providing access to school meals programme for disadvantaged families (Corrêa et al., 2020). One mixed-methods study investigated the approaches to addressing inequalities in accessing school meals in urban schools in the USA (McLoughlin et al., 2020). Strategies included steps to increase healthy

meal options, the provision of information to improve access such as having a clear meal location, multiple languages, a reduction of deterrents such as discrimination, and a strong partnership with local communities such as local food bank facilities. The study also emphasised the importance of the policies that address barriers beyond school systems such as social protection policies to support low-income families.

3.5. Challenges for teachers and teaching staff

Five studies explored barriers to and facilitators of implementing provision aiming to support teachers and teaching staff during PHEs (Dube, 2020; Kirshner, 2020; Malilizar et al., 2020; Tabatadze &Chachkhiani, 2021; Zadok-Gurman et al., 2021). Two studies discussed challenges faced by teachers from rural areas for adapting to distance learning during COVID-19 pandemic (Dube, 2020; Kirshner, 2020). Dube (2020) conducted a participatory action research and reported that most rural teachers in South Africa lacked computer skills to support learners and pointed out the importance of teacher training both before and after the pandemic to support teachers to deliver online teaching. One qualitative study focused on the national school radio which played a critical role in Belize after its independence in 1981 (Kirshner, 2020). During the COVID-19 pandemic and school closures, the school radio broadcasting provided inclusive education including students from rural areas. However, teachers who volunteered to record the lessons often felt the pressure to deliver the programme, and to have such an impact on their communities. Training provided by the Belize Ministry of Education on technical skills and knowledge was seen as critical to delivering successful radio broadcasting. The quantitative study in Indonesia echoed the importance of teacher training on technical skills to effectively operate online teaching tools and platforms (Mailizar et al., 2020). The findings revealed secondary mathematics teachers, both males and females in Indonesia, lacked confidence and had negative experiences in delivering e-learning. One study focusing on remote teaching at non-Georgian language

schools in Georgia found that teachers who had limited knowledge of Georgian and English reported difficulties to deliver effective and high-quality remote teaching using teaching materials and online technologies where instructions were in English or Georgian (Tabatadze & Chachkhiani, 2021). Teacher collaboration and teamwork were seen as the key elements to address technical difficulties during the transition of teaching practice during the pandemic. In addition, one mixed-methods study, highlighting the importance of teachers' mental health, reported on one psychological intervention (Inquiry-Based Stress Reduction) aiming to reduce stress and improve wellbeing of teachers in Israel during the pandemic (Zadok-Gurman et al., 2021). The intervention was found to be effective with no difference between gender and age of teachers who received the intervention.

3.6. Educational policies and interventions on equity within school systems

The domain of school systems concentrated on school-level responses during PHEs. Four studies discussed equity issues at the policy decision process at the school system level. Li et al. (2020) through document analysis investigated whether the guidance on reopening schools in the USA addressed equity concerns. The study found that most of the policies regarding the reopening of schools considered equity and welfare of students with disabilities and special needs, and those at greater risk of severe illness from COVID-19. Other key equity issues considered in the guideline were mental health, food security and nutrition, access to the internet and technology, health and safety of teaching staff, and English language students. Less-discussed equity issues in the guideline were on students or staff who lived with at-risk populations for having severe COVID-19 complications. Peterson et al. (2020) described the efforts of one rural school district in the USA to plan for equitable distancing learning. The strategies included an assessment of students and staff access to internet, a review of past learning and the relationship between teachers and learners to ensure equal participation during emergency distant learning. The study in Australia aiming

to understand the school community's responses to school closures during the H1N1 influenza pandemic reported the importance of equity when making decisions during the pandemic. For example, to address the barriers to access to reliable information, school and education department staff worked to produce accessible information about the pandemic and school policies for families including using multiple languages (Braunack-Mayer et al., 2013). The study of the non-Georgian language schools in Georgia discussed school systems to address barriers to the successful implementation of remote teaching during the pandemic including the introduction of useful tools to improve teacher collaboration and parental engagement. For example, to increase parental engagement during remote teaching, schools could improve communication channels through parents' mobile phones as many students used their parents' devices for online lessons (Tabatadze & Chachkhiani, 2021).

3.7. Impact of educational polices and interventions on emotion needs

Ten studies explored the impact of educational policies and interventions on students' psychological and socio-emotional wellbeing. Eight studies found that teaching provision such as distance learning and homeschooling during school disruption can contribute to the increase in students' emotional difficulties including girls who were from rural areas and those with special needs, disabilities, mental health conditions and low achievement (Barnett et al., 2018; Canning et al., 2021; Couper-Kenney & Riddell, 2021; Gornik et al., 2020; Greenway & Eaton-Thomas, 2020; Mælan et al., 2021; Thorell et al., 2021; Wang et al., 2020). One study focusing on 'left-behind' girls in rural China provided the example of the impact of educational policies such as online learning introduced during Covid-19 on children's anxiety, particularly on girls (Wang et al., 2020). Three studies conducted in the UK (Canning et al., 2021; Couper-Kenney & Riddell, 2021; Greenway & Eaton-Thomas, 2020) emphasised the impact of remote learning and the pressure from the government agencies on the psychological consequences of children with educational needs and

disabilities. The international comparison study quantitatively investigated parents' experience of homeschooling found that families with children with mental health conditions reported more negative experiences of homeschooling comparing to families without children with mental health conditions (Thorell et al., 2021). One quantitative study in Norway reported that low achieving students may experience lower efforts and self-efficacy during homeschooling, which may lead to inequalities of learning outcomes when schools reopen (Mælan et al., 2021). In addition, Pajarianto et al. (2020) using quantitative survey data found that students with high religiosity in Indonesia could better control their academic stress during homeschooling. One qualitative study exploring views of migrant children in Poland found both negative and positive impact of online learning on migrant children's psychological wellbeing (Popyk et al., 2021).

However, the findings from the included studies suggested that schools provided inadequate support for students' mental wellbeing. Two studies, one quantitative (Greenway & Eaton-Thomas, 2020) and the other qualitative (Canning et al., 2021), explored parents and families' experiences of homeschooling of children with educational needs and disabilities during the COVID-19 lockdown. Both studies found families' dissatisfaction with the support they received from authorities and schools in addressing psychological needs of the children. Based on observation and interview data, Gornik et al. (2020) reported teachers' concerns of inadequate support for the psychological and emotional needs of migrant children in Slovenia during a rapid transition to distance learning. They expressed the issues on the equal opportunities relating to the discontinuation of Slovenian language learning that could lead to inequalities in learning outcomes and long-term economic outcomes.

There is evidence of good provision for providing support to students, families and teachers during PHEs. One study suggested policies that support personalised learning with support from key workers to address social and emotional needs of children with educational

needs and disabilities (Canning et al., 2021). Barnett et al. (2018) offered an exception where the child-friendly radio project and the UN Girls Education Initiative implemented in Sierra Leone in response to the Ebola outbreak were adapted to address the psychological needs of children. The programme provided access to education for children and supported parents and caregivers to promote a better understanding of early child development and the range of harmful events facing the girls. Using a mixed-methods approach, the study suggested that the gender-responsive programme in terms of content and targeting improved not only academic outcomes such as reading skills but also confidence and life skills for girls.

3.8. Impact of educational policies and interventions responding to PHEs on students' learning

Twenty-four studies included in the review outlined a range of impact of educational policies and interventions implemented during school disruption on students' learning and well-being including students' time spent on learning, performance and attainment, and learning difficulty. In terms of time spent on learning, Asanov et al. (2021) using detailed quantitative time-use data showed that most students in Ecuador established similar daily routines around education, although gender differences emerged in time spent working and on household tasks. While one quantitative study using longitudinal data pointed out that students with special educational needs spent much more time on learning comparing to their peers without special needs (Nusser, 2021), 11 studies found that students spent less time on homeschooling if they were from more disadvantaged groups, such as students with low SES and achievement levels. Eight qualitative studies suggested that any impact of inequalities in time spent on learning between poorer and richer children tended to be worsened by inequalities not only in learning resources available at home, but also in those provided by schools (Andrew et al., 2020; Asanov et al., 2021; Becker et al., 2020; Catalano et al., 2021; Dietrich et al., 2021; Greenway & Eaton-Thomas, 2020; Ma et al., 2021; Reimer et al., 2021),

which is in accordance with the previous discussion on access to learning resources (see Section 3.2). Hash (2021) took a quantitative approach and analysed student participation in school band by low-poverty and high-poverty schools in the USA, where students at the latter reported a lower percentage of participation. Students with low achievement levels also tended to have a lower learning effort during homeschooling than others (Mælan et al., 2021; Nusser, 2021). Several studies suggested that parents and children spent significantly more time on learning activities when their schools provided varying educational inputs, especially live contact time with teachers (Al Salman et al, 2021; Bansak & Starr, 2020; Ma et al., 2021).

In addition, disparities existed in students' educational attainment and performance by various equity dimensions. Students with low SES tended to decline their academic performance, including reading behaviour, during online learning (Kim & Padilla, 2020; Catalano et al., 2021). Two studies exploring the educational inequality of rural students using situational analysis unveiled the multiple inequalities of rural students that put them in a disadvantaged position compared to urban students. Wang (2020) looked at how the pandemic affected rural girls in China in relation to school and family life and suggested that it has 'exposed and magnified gender inequalities, particularly those related to the maltreatment exerted by their guardians and/or brothers, that have left them even further behind' (p.17). Gornik et al. (2020) found that school closure had severe consequences for migrant students, as many of the existing measures that facilitate their equal opportunities, for example, additional language learning and migrant learning support, discontinued when the schools were closed. Several studies presented mixed evidence on the impact of homeschooling on the performance of students with special needs and disabilities (Bubb & Jones, 2020; Couper-Kenney & Riddell, 2021; Greenway & Eaton-Thomas, 2020; Karasel Ayda et al., 2020; Nusser, 2021). While some believed that students' performance was

harmed due to the lack of school routine and structure, some believed that homeschooling connected students with education and improved students' performance due to less stress and distraction. Tabatadze and Chachkhiani (2021) found that remote teaching affected student achievement differently across three levels of education in Georgia. One study in Sierra Leone reported that friendly radio program during the Ebola outbreak increased vulnerable students' self-efficacy, language abilities and academic performance (Barnett et al., 2018).

Lastly, several studies reported that students experienced various degrees of difficulty with remote learning (Al Salman et al., 2021; Canning & Robinson, 2021; Korzycka et al., 2021; Ma et al., 2021; Popyk, 2021). In Poland, Korzycka et al. (2021) found that the oldest adolescents and those living in rural areas had the heaviest burden of distance learning. Migrant children encountered more learning challenges, as they had to "translate materials to their native language, learn it and do the tasks with the help of parents or siblings, and translate it back to Polish" (Popyk, 2021, p. 538). Taking a quantitative approach, Al Salman et al. (2021) found a statistically significant relationship between students' ICT skills and their level of challenges. In Canning and Robinson (2021), qualitative interview data suggested that students with special needs and disabilities in England struggled to participate in online learning, as they had a hard time to adjust to the new routines, such as talking to classmates and meeting new teachers from the screen.

3.9. Impact of educational policies and interventions responding to PHEs on teaching

Thirteen studies discussed the impact of the educational policies and interventions on teaching during school disruption. The quality of online teaching provision varied by school location and type and students' characteristics. Gross and Opalka (2020) discussed how urban and suburban school districts in the USA during the COVID-19 pandemic were significantly more likely than rural and small-town districts to communicate an expectation that teachers

would provide instruction, take attendance, and monitor their students' progress on a regular basis based on quantitative data. Schools in urban and affluent areas in Ireland were also more likely than those in rural areas to provide a predominantly or fully live, real-time instructions during the pandemic based on survey data (Scully, Lehane & Scully, 2020). Both studies addressed the issue of teachers' digital competence as an area in need of development and noted that 'the pandemic may have provided an impetus for this' (Kingsbury, 2021; Scully, Lehane & Scully, 2020, p.1). One quantitative study in the USA suggested that virtual schools that already operated online before the COVID-19 pandemic provided a higher quality education than brick and mortar schools that switched to online operation after the pandemic in terms of active learning, communication, pedagogical efficacy, and classroom management (Kingsbury, 2021). Tabatadze and Chachkhiani (2021) reported that despite the overall low readiness level in non-Georgian schools for online teaching, teachers managed to improve their competencies and conduct online lessons effectively. For students with special needs and disabilities, Gornik et al. (2020) and Pozas et al. (2021) indicated the lack of differentiated instruction to satisfy their diverse learning needs. By contrast, Catalano et al. (2021) using quantitative survey data and Svalina and Ivic (2020) using interview data indicated that their teacher participants accommodated the needs for those students such as giving them more time to complete assignments and providing separate sessions for them. Overall, these studies highlighted the importance of context and need-based professional development for the best improvement of teacher's skills and competencies. In terms of teachers' feedback, while most young pupils in Bubb and Jones (2020) found digital communication an effective way to receive useful feedback from teachers, Mælan et al. (2021) reported that more high-achieving students than low-achieving students experienced worse feedback during homeschooling than in regular schools in Norway.

Teachers' practice also varied by school location and teacher and student characteristics. In regard to student assessment, rural schools in Ireland were more likely than urban schools to continue with the traditional examination format instead of using alternative assessments (Scully, Lehane & Scully, 2020). In Wang et al. (2021), core subject (such as Literature and Mathematics) teachers in China took on heavier workloads than their colleagues of non-core subjects (such as PE), most likely resulting in the former's visual fatigue and impairment, based on interview data. Lower grade-level teachers mostly chose to record lessons, while those of higher grade-level chose to live broadcast at times. In terms of teaching students with special needs, four qualitative studies considered a team-based approach to remote learning as being more effective for students, teachers, and guardians (Cahapay, 2020; Gornik et al., 2020; Pozas et al., 2021; Svalina & Ivic, 2020). Bubb and Jones (2020) took a mixed-methods approach and discussed a grassroots approach to innovating more effective means for incorporating personal characteristics into remote curriculum. Based on survey data, teachers in several European countries used three to four different modes of communication for students with special educational needs, highlighting the need for preparing teachers to use the right combination of multiple technologies in the future (Ng et al., 2021).

4. Conclusions and recommendations

Our review highlighted the needs for 'building back better' equitable and inclusive education to achieve the Sustainable Development Goals and sustainable futures. Post-pandemic long-term recovery education strategies must prioritise the most marginalised, including children with disabilities, migrants and those living in remote areas. School leaders and policy makers should focus on how to respond to the disruption and make sure 'no child' is left behind. Disadvantaged learners lacked reliable access to essential learning materials and resources. The findings also underline the role of the 'transgenerational transmission of social inequalities' in educational policies and interventions during PHEs. Families from disadvantaged socioeconomic background had difficulties in creating safe spaces and supportive learning environments for their children. Families of younger children and those with difficulties required extra support services from school and government agencies to address specific needs during online classroom and homeschooling. With constrained resources and support for professional development, teachers and school leaders, especially those from disadvantaged background, faced the unique challenges in engaging students and delivering inclusive teaching during PHEs. Our review also indicated the commonality of the challenges above across developed and developing settings, where disadvantaged population suffer most from the educational inequities in the context of PHEs.

We identified several important research gaps. With the majority of the studies conducted in high income countries, there is an urgent need for research on developing countries where educational inequalities are more prevalent. Included studies predominantly focused on the challenges and the impact of distance learning and homeschooling in the context of COVID-19 during the unprecedented public health interventions. Only few examined support for educational staff's wellbeing, school support services such as school meals, mental health and psychosocial support in schools or policies on school management

and school system levels, including financial support to building back better inclusive education. The review also indicates that inequalities in primary and secondary education during PHEs were mostly examined through the lens of SES and personal characteristics. Indeed, a few studies explored other key equity domains such as religion, education level and occupation. To take occupation for an example, future research could focus on the outcomes of children whose parents were health professionals or key workers or those working in high-risk occupation or have economic impact from PHEs (e.g., hospitality, supply chain, travel etc.).

Based on the review findings we propose a practical recommendation for providing equitable and inclusive education during PHEs. This class of equality-based reasoning, strategising, and implementing suggests a malleable and long-term solution to better understanding the preparations needed to ensure equitable, accessible, and sustainable education system.

Recommendations for providing equitable access to learning resources, learning conditions, and extra support services

- Conduct a needs analysis to identify the availability and gap of different groups' needs to address barriers to access to learning resources, learning conditions, and extra services
- Understand different students' home living and study spaces, and provide differentiated support for creating a conducive education environment when possible
- Provide targeted support to students who were rural or remote area based, ethnic minorities, with low SES and special needs
- Provide homeschooling training and support for parents, especially those with limited homeschooling capabilities and with children with special needs and disabilities

- Diversify remote learning channels to cater to students' various needs and circumstances (such as combining online learning with radio and TV broadcast and in-person mentoring)
- Train students and parents to use learning resources effectively and efficiently and provide troubleshoot services
- Develop appropriate educational materials for students with special needs and disabilities and in multiple languages
- Build effective communication channels between parents and teachers and schools for information sharing and feedbacks
- Understand how the school involves health, social care and local authorities to provide support for families
- Coordinate preparation for primary students moving between phases of education and preparing for next stages

Recommendations for future educational policies and interventions

- Provide additional resources to alleviate complications arising from language barriers and manual translation responsibilities falling on primary students
- Provide support and services for students, teachers, parents' physical, mental and emotional wellbeing
- Develop context and need-based professional development for the best improvement of teacher's skills and competencies to increase teaching quality
- Review and assess children's progress towards outcomes
- Accumulate comprehensive data to recognise impact and necessary actions to promote and develop the progression of equality
- Utilise research evidence to inform decision-making, particularly involving social and educational equality, access to resources, and quality assurance

- Cultivate a collaborative proposition to determine and acknowledge barriers to education, including the wider community and families of all demographics
- Encourage a team-based approach to classroom management

This review aims to explore the impact of educational policies and interventions during PHEs through an equity lens. Although the reviewers conducted a comprehensive search, the search was limited to major bibliographic databases studies and to studies written in English. The review revealed a wide range of educational policies and interventions in different contexts by various equity dimensions. However, due to the mixed nature of the included studies in terms of study design and quality, the review was not able to conduct a meta-analysis on these studies. Instead, the review provided a narrative account of synthesised key findings of included studies. The review provides a framework to consider equitable and appropriate educational policies and interventions for inclusive education during the current pandemic and beyond.

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Appendix A

Eligibility criteria

Inclusion criteria	Exclusion criteria
• Studies were published in English after/in 2000. • Empirical studies collected and reported research data. • Studies were conducted in the context of recent coronavirus outbreaks, namely, Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), or public health emergencies of international concerns defined by WHO since 2007, namely, the 2009 H1N1 influenza pandemic, Ebola (West African outbreak 2013-2015, outbreak in Democratic Republic of Congo 2018-2020), poliomyelitis (2014 to present), Zika (2016) and COVID-19 (2020 to present). • Studies focused on primary and secondary education systems. • Studies focused on education policies and interventions, including, but not limited to, homeschooling, distance learning, school meals, school management, parental support, mental health counselling and teacher support • Studies discussing inequalities or the impact of interventions on inequalities based on the PROGRESS-Plus framework. • Any type of study designs was included except prevalence and incidence studies of disease burden. • Studies were conducted in any geographical location.	• Published before 2000 • Not empirical studies, including, but not limited to, comments, editorials, blogs, opinion pieces • Not conducted in the context of PHEs • Focused on higher education or postgraduate research instead of primary and secondary education • Not focused on education policies and interventions. Those studies focused on pharmaceutical interventions and medical treatment were excluded. • Not reported or discussed equity domains in the PROGRESS-Plus framework • Prevalence or incidence studies of infection, mortality, morbidity rates

Appendix B

Search terms of key concepts

KW1: relevant interventions

‘computer assisted instruction’ or EdTech or ‘ICT’ or ‘Information Communication Technology’ or ‘online learning’ or ‘safe space*’ or ‘online classroom*’ or ‘remote teaching’ or ‘remote classroom*’ or ‘radio education*’ or ‘television education*’ or ‘home school*’ or ‘online education*’ or ‘virtual learning’ or ‘virtual education*’ or ‘virtual classroom*’ or ‘distance learning’ or ‘distance classroom*’ or ‘distance education*’ or ‘cash transfer’ or ‘social protection’ or ‘school meal*’ or ‘school voucher*’ or ‘teacher training’ or ‘teacher support*” or ‘parental support’ or ‘community support*’ or ‘community engagement’ or ‘school-based’ or ‘school leader*’ or ‘education polic*’ or ‘education system’ or ‘school monitoring’ or ‘school accountability’ or 'inclusive education*' or 'equitable education*' or 'inequalit*’

KW2: primary and secondary education

'primary school student*' or 'secondary school students or learner*' or school* or 'primary education or primary school*' or 'secondary education' or 'secondary school*' or 'early year education' or nursery or 'elementary education' or 'elementary school*' or 'elementary school students' or 'high school*' or 'high school students*' or 'middle school*'

KW3: PHEs

'coronavirus' OR 'covid19' OR 'covid-19' OR '2019nCOV' OR 'SARS COV2' OR "Severe acute respiratory syndrome" OR 'SARS-CoV' OR 'MERS-CoV' OR 'Middle East Respiratory syndrome coronavirus' OR 'MERS' OR Zika OR pandemics OR 'influenza pandemics' OR polio OR cholera OR 'public health emergencies' OR outbreaks